Zhizhuan Business Research Institute

How Digital Intelligence Drives Business Growth

Management for Professionals

The Springer series "Management for Professionals" comprises high-level business and management books for executives, MBA students, and practice-oriented business researchers. The topics cover all themes relevant to businesses and the business ecosystem. The authors are experienced business professionals and renowned professors who combine scientific backgrounds, best practices, and entrepreneurial vision to provide powerful insights into achieving business excellence.

The Series is SCOPUS-indexed.

Zhizhuan Business Research Institute
Editor

How Digital Intelligence Drives Business Growth

中国工信出版集团　　電子工業出版社·
PUBLISHING HOUSE OF ELECTRONICS INDUSTRY
http://www.phei.com.cn

Springer

Editor
Zhizhuan Business Research Institute
Alibaba Cloud Research Institute
Alibaba Group
Beijing, China

Translated by
Wu Na
Department of Translation
Tianjin University of Science
and Technology
Tianjin, China

Yi Long
Department of Translation
Tianjin University of Science
and Technology
Tianjin, China

Foreword by Zhang Jianfeng

The year 2020 is an extraordinary year in which we have witnessed great changes in people's life and work styles, due to cloud entering our daily life. Cloud class, cloud office, cloud shopping, everything can happen with cloud today. Cloud is becoming a carrier of the era, and also a symbol of digital development. In a complex business era full of uncertainties, the digital economy has arrived in full force, with digitalization presenting itself as the greatest certainty in the future. In the era of digital economy, all business will be data-driven, with consumption, industry and governance embracing a comprehensive digital upgrade. Digitization has reshaped the logic of business operation by making corporate organizational operations collaborative, business process agile, management decisions intelligent, and industrial ecology integrated.

Alibaba is a provider, a practitioner, an active promoter and most importantly, an innovator of business operating systems. It is using the experience, products and systems it has accumulated over the years to empower public governance, enterprise onlineization, enterprise IT and big data capabilities through the Alibaba Cloud platform. The annual "Double 11" is a microcosm of Alibaba's ecology, with the GMV of the 2020 Tmall "Double 11" global shopping festival reaching 498.2 billion yuan, a 26% increase compared with the 2019 "Double 11". Behind the high growth is the strong domestic demand in China, the participation of the whole society, and more importantly, the comprehensive digital upgrade and empowerment. During the 2020 "Double 11" period, 474 brands each had transaction volume of over 100 million yuan; 105 industrial belts each had a turnover over 100 million yuan; 2.1 million small offline stores participated, with AI calls exceeding 15 trillion times, which processed 16.5 billion images and over 35 million hours of video, and translated 3.7 trillion words; 2.321 billion logistics orders occurred, with a peak of 583,000 orders created per second. These numbers reflect China's digital innovation dividend.

The digitization and intelligence of the industrial Internet is also rising rapidly while the consumer Internet has witnessed the strong digital impact. All the equipment, processes and procedures of production are digitized through new technologies such as cloud computing, big data, IoT, and 5G, helping factories reduce energy consumption, improve processes, save resources and enhance efficiency and quality via digintelligent simulation and emulation. Also, in terms of

enterprise governance, the digitization of organizations is also in full swing. Currently there are more than 400 million users and 17 million enterprise organizations on DingTalk, and enterprise application ecology based on the unity of cloud and DingTalk is blossoming, since the DingTalk industry chain has gathered more than 200,000 developers, developing hundreds of thousands of enterprise applications for a myriad of organizations. In the future, enterprises may not need to have the expertise in programming to gain capabilities in cloud, data, intelligence, mobility, and IoT. In this way, cloud can used as a public resource accessible to more enterprises and more people, just like water, electricity and coal.

In front of the gigantic historic opportunity of digitalization, Alibaba believes that it is in the best position, because Alibaba has been practicing its mission from day one, to create a world where there is no barrier in doing business. The standard method to achieve such a goal is through digitization; we have been striving for the past 20 years to fulfill our mission with digital technology and by integrating it profoundly in business.

Based on Alibaba Group's 20 years of practical experience in the retail industry and Alibaba Cloud's latest achievements in digital transformation exploration, the book *Digintelligence Drives New Growth* has made systematic summary and theorization. Meanwhile, it explains in detail the profound driving effect of external environment changes on digital transformation, illustrates the overall capabilities of Alibaba Business Operating System (ABOS)[1] as well as the methodology of digintelligent transformation, and finally confirms the feasibility of this methodology through the successful practice cases of benchmarking enterprises. The process of reading this book is an experience of visualizing the abstract ideas. It is a manual that combines theory and practice in the mist of digital transformation, and thus worth our time studying and pondering.

March 2021   Zhang Jianfeng (alias Xingdian)
                                                    President of Alibaba Cloud
                                                    Intelligence
                                                    Head of Alibaba DAMO Academy
                                                    Hangzhou, China

---

[1] In this book, the Alibaba Business Operating System can be expressed in its abbreviation ABOS.

Foreword by An Xiaopeng

The Anchors of Digintelligent Transformation in an Age of Uncertainty

Today, the greatest certainty for entrepreneurs is that they are faced with the uncertainty of an era of great changes. Never before in history has any technology had such a profound and widespread impact on humanity in such a short period of time as digital technology, thus opening up a great journey for humanity to migrate to the "digital continent" which is composed of chips, algorithms, data, software, networks, knowledge, sensors, databases, cloud platform, etc. In the next decade, one of the most important themes of the global digital economy is the reconstruction, switching, and migration of digital infrastructure, as well as the re-engineering of business ecology based on the new digital infrastructure.

In this great and risky journey, the book *Digintelligence Drives New Growth* plays the role of the "man" who stands at the top of the mast and looks into the distance, hoping to be the first to discover the "New World" and lead everyone to reach the digital continent. This book shows us the innovations in today's digintelligent business, and the inner logic and trends behind the changes regarding the evolution of demand, technology, organization, and strategy.

This book has conducted a journey of exploring into all the directions and new paths for this business transformation, and more importantly, for this new business era of "turbulence" and uncertainty, it finds the constant anchor points not influenced by the times. We need to keep asking, "What is the constant?"

Anchored by the Original Aspiration

Today, all entrepreneurs are thinking about one question, what is the starting point in the logic of this digintelligent transformation? The answer is adapting to the huge change in demand. After the migration of consumers to the new digital world, in terms of clothing, food, housing, and transportation consumption, the various links of discovery, research, purchase, payment, order fulfillment, and after-sales service of goods and services have achieved the integration of the physical and digital worlds. Consumers' decision-making chain and fulfillment methods have

been fully in digitization, which is not only concerned with functional appeals, but also with experiential ones such as content, service, engagement, social experience, sharing, and interaction. In the next decade, the major challenge for enterprises is how to respond to the rise of consumers' rights in expression, discourse, choice, and participation, and how to meet consumers' massive, fragmented, real-time, and multi-scene demand.

No matter how the times change, the original aspiration of enterprises is to better serve and satisfy customers, which makes it the anchor. With such an anchor, enterprises in the era of digital intelligence need to think about how to gain real-time insight into customer needs and meet those needs in real time.

Daniel Kahneman and Richard Thaler, Nobel laureates in economics in 2002 and 2017, respectively, made important contributions as pioneers of behavioral economics by recognizing that people's decisions are sometimes irrational. People's choices have a certainty effect: between a certain gain and a "gamble", most people will choose a certain gain; there is a reflexive effect: between a certain loss and a "gamble", most people will choose a "gamble". To put it another way, the question we need to think about is what is the biggest risk associated with refusal to transformation or transforming slowly? If we abandon a high-risk digital project, are we risk-free? The truth is no. When we are missing a digital strategy, the risks are definite and can be summarized in five areas: out-of-focus market, out-of-touch marketing, out-of-balance management, out-of-work system, and out-of-momentum growth.

Out-of-focus market: In the digital economy, who are our customers? Where are the customers? What do they like? How is the customer experience? How can customers send us feedback? If we don't understand those customer needs, we don't know what to produce, how much to produce, how much to purchase, or how to arrange production schedules. We can only make decisions by guessing, in an almost gambling manner.

Out-of-touch marketing: Without digitization, we don't know how to tell the story of our products and services to our customers. Very often, we don't know who to tell, where to tell, what to tell, how to tell, or how well we tell.

Out-of-balance management: In management, we may face a front-back imbalance: the front end engaged in "battles" cannot get strong support from the back end; a left-right imbalance: there is no efficient collaboration either between various departments inside the enterprise, or between the company and suppliers or sellers; a top-bottom imbalance: the determination of the chairman and general manager for digital transformation cannot be responded by the middle-level managers and employees; and an imbalance between corporate culture and the requirements of digital transformation of the enterprise.

Out-of-work system: The original information system is increasingly difficult to adapt to the rapid changes in demand, and the enterprise's supply chain, flexible production, finance, inventory, and new product development cannot keep up with the business development.

Out-of-momentum growth: With the lack of digital strategy implementation comes the inevitable growth stall of the company.

For companies, whether or not they initiate digital transformation, no matter how hard or fast they promote digital change, they all have to face risk and uncertainty. It is not that there is no risk if you don't join in or take risks; on the contrary, the risks of not participating or taking risks may be greater. Very often, the risk of not transforming is certain, and the benefit of transforming is uncertain; very often, the motivation for digital transformation is not the benefit that can be expected, but the unbearable cost and risk of not transforming; very often, the engine of transformation is not from the push of CIO, CPO, or CEO of the company, but from the fact that CIO, CPO, or CEO of the competing companies are pushing. So today, for most enterprises, digital transformation is not carried out because they like it, but because they have to do it.

Anchored by Practice

For a long time, the digitalization of developed countries in Europe and America has been at the forefront of the world. The perception of many people is that the present of American enterprises is the future of Chinese enterprises. Also, it is a popular understanding of digitalization that it is a system composed of concepts such as ERP, CRM, CAX, MES, etc. In fact, putting these concepts together, one still sketches an "old continent", an old map. China, as the world's largest consumer Internet country and manufacturing country, now driven by new technologies such as cloud computing, artificial intelligence, and IoT, is entering a "new continent". Along with the full expression of consumer demand, the expansion of resource optimization from the enterprise to the whole industry chain, and the revolution of development and operation in software and application systems, we are ushering in the digital transformation of the universal scenarios, the whole life cycle, and the total elements. It is the new development system based on demand, scenario, and roles, and a shift from resource optimization inside the enterprise to resource optimization focusing on consumer demand. Today, when we define the "new world", it is increasingly difficult to have an accurate description if we adopt the original concept system.

The inspiration the book *Digintelligence Drives New Growth* brings us with those vivid cases of Chinese practices is that today, the anchor point for digintelligent transformation of enterprises is the latest practice in China, instead of American companies which can be outdated if taken as the anchor point and frame of reference. When Dr. Xiao Lihua's team co-creates new solutions with enterprises such as Mengniu, Chiaus, Junlebao, Abbott, Yashily, Deyi Dairy, Adopt A. Cow, Joyang, Jala, Perfect Diary, Beukey Cosmetics, Bosideng, Mendale Home Textiles, Cabbeen, Guangxi Xuanma Food, New Hope, Xibei Youmiancun, Snow Beer, Ecolovo Food, Daoxiangcun, Youyou Food, Jiusan Oils & Grains Industries Group, TATA, Wonly, Harbin Pharmaceutical Group, etc., and transforms those solutions into best practice, one can see the uniqueness of China's digintelligent transformation.

China is on the path of exploring the unique transformation of digital intelligence. Perfect Diary, a four-year-old cosmetics brand, has gone public in the US with a market value of $12.2 billion. In red ocean industries such as food, apparel, home appliances, and cosmetics, a number of unicorns are accelerating their rise through the infrastructure of the platforms. The year 2020 saw the birth of a new brand every 9 days on average on the Tmall platform, with over 100 million RMB in sales. In the past three years, Tmall has seen 100,000 new brands in total. Alibaba's Rhino Smart Manufacturing Platform represents the cloud-native trend in the industry, making it the first company in the world to put the core elements of manufacturing enterprises in the cloud, achieving for the first time global optimization of resources from demand, design, R&D, production, supply chain, etc.

Alibaba helps enterprises establish end-to-end operation systems precisely matching supply and demand, achieve data-driven consumer operation, product R&D and testing, omnichannel management, and construction of factory for fast-reorders; it helps traditional industries such as apparel to carry out commodity planning, design proofing, trial sales, and production and delivery, with cycles shorter than traditional methods by six times, two times, 2.7 times, and three times, respectively. From 2018 to 2019, Tmall helped key industries such as home appliances, 3C electronics, and cosmetics shorten their new product development cycle by 1/3 on average compared with the previous year; based on accurate sales prediction, it helped leading footwear and apparel companies cut their average production and shipping time from 45 days to 20 days.

In the context of the dual circulation development pattern in China, the anchor of practice means that the traditional "Copy to China" may be transformed into "Copy from China". The future of digintelligent transformation can be identified only when new ideas, new technologies, and new solutions are deeply rooted in China's latest business practices, in the crowded shopping malls, in the workshops roaring with machines, and in the pastures smelling of the earth; only when the problems with cost, quality, experience, and efficiency in the business world are tackled from the root. More importantly, the book *Digintelligence Drives New Growth* has summarized a set of digintelligent solutions based on Chinese practice: Pentalogy × Five Layers × Eleven Elements.

Anchored by the Future

Without a perspective on the future, we can't have a prospect in the future. The digintelligent transformers should be down to earth while looking up to the vast starlit sky.

The inspiration brought to us by *Digintelligence Drives New Growth* is that we have entered an era of great systemic migration of technology architecture, and we need to always watch and grasp the changing trends of technology, business, demand, and competitive landscape, to have destination-oriented mentality, and to

reflect on the present actions from the perspective of destination. The transformation of digintelligence is following the trend and taking the lead in the future trends.

The next decade is the installation period of digital infrastructure. In the face of complex business scenarios, the traditional IT architecture and solutions built in the past 20 to 30 years are increasingly difficult to adapt to the complexity of business systems, and more often faced with difficulties in efficiently making accurate, scientific, real-time, and low-cost responses to the fragmented and real-time demands.

The cluster of intelligent technologies represented by IoT, cloud computing, edge computing, AI, mobility, digital twin, etc., will provide a technical base with high economic efficiency, high availability, and high reliability for future development, with its continuous convergence, superposition, and iterative upgrades. Along with OT and IT convergence, cloud architecture upgrade, and micro-service implementation, the traditional rigid development model and stereotypical shackles are being broken; new solutions are being built for the complex business world; and new digital business infrastructure is on the rise.

Today, the digital infrastructure system constructed by IoT + 5G + cloud computing + AI + digital twin is more complicated. In the system of data + computing power + algorithm, the function of infrastructure depends to a greater extent on the integration of multiple technologies, with a higher frequency of technology iteration, stronger interdependence, and faster overall functional evolution. The new digital infrastructure will continuously migrate the originally computing-and-storage-based resources to the cloud platform, breaking up the previous isolated and scattered business systems to reconstruct them on the system based on cloud computing and mid-ends, including data mid-end, business mid-end, IoT mid-end, with various SaaS-based applications that can form role-oriented, scenario-oriented, and demand-responsive solutions. The value generated by the New Infrastructure has been fully demonstrated during the Pandemic.

From the perspective of infrastructure, digital technology is tearing down an old world and building a new one, a world of digital twins. The ultimate map of digital society is to build a digital twin of the real world in cyberspace, which has a ubiquitous connection to physical space, virtual-real mapping, real-time linkage, accurate feedback, and systematic autonomy. That will be a process to span 20 or 30 years.

The digital twin world is to reconstruct the orbit of atoms in the ocean of bits, and the interaction between the physical world and the digital world will evolve from being static to dynamic, and then to real-time exchange, which will drive the digital twin in cyberspace to infinitely resemble the real physical space, and determine the optimal allocation of resources based on "physical entity + digital twin" as the basic form of digital economy. This will drive the digital twin of cyberspace to approach the real physical space infinitely. The significance of the digital twin world is that it could build the operational framework and system of the physical world in the world of bits, and to build a new system of large-scale

collaboration in human society. In this sense, digital infrastructure is literally the "foundation" for the "skyscraper" construction of the digital twin world.

A new round of global competition for digital transformation has begun, with historic opportunities and ferocious competition around digital products, solutions, and business models meeting the new needs of companies.

Anchored by Innovation

What is the scarcest resource in the digital age? The answer is creativity and people with innovative ideas. The inspiration from *Digintelligence Drives New Growth* is that the digintelligent transformation starts with technology, but has a destination in the organization. Without organizational change, there is no future for digital intelligence. No matter how the organization is reconstructed, one essence remains unchanged–how to stimulate the enthusiasm, initiative, and innovation of each and every person.

Facing uncertainty and digital transformation, all organizations have to think about one question: how to switch from an industrial-era organization to an organization oriented to the digital era.

In July 1995, Chicago suffered a heat wave that killed more than 700 people, and in 2002, an American sociologist wrote a book *Heat Wave: A Sociological Autopsy of Disaster in Chicago* (by Eric Klinenberg), in which the author posed the question: Can traditional organizations that run on strong regulations and are accustomed to dealing with deterministic events respond effectively to an unexpected event? Very often, in the face of an ever-changing market, there may be nothing wrong with a company operating according to its original way of working and thinking, but mistakes will be inevitable in such an environment of high uncertainty. The inertia of organizational behavior based on certainty is the culprit of the failure to respond to unexpected events. We can learn from the key in Internet competitive strategies–"high frequency beats low frequency". One of the differences between normal operations and emergency responses in organizations is that the normalized low-frequency decision-making mechanism cannot adapt to the high-frequency decision-making needs in emergent events.

From the industrial era to the digital era, the evolution of the organization has many manifestations: the decision-making unit shifting from being linearly controlled and monocentric, to network collaborative and polycentric; the organizational characteristics changing from being mechanized to ecological; the task sources upgraded from being arranged by superiors to self-defined; and the decision-making laws changing from being system-oriented to culture-oriented, the decision-making process from process-oriented and procedure-first to efficiency-oriented and efficiency-first, and the decision-making consciousness from sticking to empiricism to being alert to experientialism.

Building a high-frequency, multi-centered, and short-linked decision-making mechanism is the route an organization must take to realize the switch from the industrial era to the digital economy. Facing the digital economy, all organizations

need to start a transformation of organizational culture from its genes. Only after completing genetic engineering at the organizational level can enterprises enter the digital economy era, which accelerates organizational differentiation. In the face of uncertainty, the traditional rigid organization exposes the imbalance of organizational capabilities and requires the construction of an open, flat, and flexible system that is in line with the needs.

To implement such "genetic engineering" at the organizational level, the organizational boundary, from manager to leader, needs to change from being closed to being open, because the core of the organization is to encourage the emergence of autonomy, to rebuild the organizational life cycle, and to move from series style to parallel style and then to a network, finally building an ecological organization. The organizational structure must feature a large mid-end and small front-end, which can fully empower and support the front-end operation units and make real-time, accurate, and low-cost responses to changes in demand.

In terms of digital transformation, enterprises need to realize three changes in mentality. The first is learning to cope with uncertainty. In the face of demand uncertainty, enterprises need to respond with the strategy of data + algorithm, and need to abandon redundant and static thinking to embrace accurate and dynamic thinking. The second is to build a new type of capacity with incremental revolution, and to transform software, equipment, process optimization, and management innovation into new capabilities of the enterprise eventually; that is the starting point and also the ending point of digitalization. The third is to transform from a product manufacturer to a customer operator, who establishes a "strong relationship" with customers through products and services, offering online responses around the clock, and understanding, forecasting, and meeting customer needs in a timely manner.

Today, the transformation of digintelligence has just started. The publication of *Digintelligence Drives New Growth* is not to attract more readers, but about calling for fellow travelers on this migration journey to the digital continent.

An Xiaopeng
Deputy Head of AliResearch
Executive Committee Member of China
Beijing, China

Preface

The greatest danger in times of turbulence is not the turbulence;
it is to act with yesterday's logic.

—Peter F. Drucker

Let me start with a short story. Three people took an elevator. One of them kept running on the spot; another one banged his head against the walls all the way up; and the last one never stopped doing push-ups.

When the elevator reached the top, the three persons were invited to share their success stories of how they got up so high.

The first person said he was here because he ran all the way; the second person said he came up because he bumped his head; and the last person said the push-ups were the reason he made it.

They all sounded very reasonable:

"Success is just the result of your own efforts."

Yet the real reason for their rapid success was that the "elevator" of the times carried them up.

Some people say that Warren Buffett was able to make great investments because he was born into the rising period of the fifth Kondratieff Wave; if not, he would not necessarily have had such a high achievement.

There are myriad explanations for the soaring growth of various industries in China. It is just reasonable to first take a look at the "elevator" of the times.

The Era of High Growth

In terms of demand, China has formed the world's largest and most promising market with a huge population of 1.4 billion (including more than 400 million middle-income people), and as China's per capita income continues to increase, the size of the domestic market will further expand.

In terms of supply, China is the world's largest manufacturing country. At present, China has become the only country in the world that has all the industrial categories in the United Nations Industrial Classification, with the most complete and largest industrial system and perfect supporting capacity in the world. Among more than 500 kinds of major industrial products in the world, China has more than 220 kinds with the largest output in the world. China's industrial value added increased from 12 billion yuan in 1952 to 31.7 trillion yuan in 2019, an increase of about 971 times at constant prices, with an average annual growth rate of 11%. According to data released by the World Bank, China's manufacturing value added surpassed that of the U.S. in 2010 to become the top manufacturing country. In 2018, China's manufacturing value added accounted for more than 28% of the world, making it a crucial engine driving global industrial growth. At the same time, China has 130 million market players and more than 170 million talents with higher education or various professional skills, and its R&D capacity is constantly improving.

If we ignore supply and demand, such two most fundamental factors of the times, and neglect the scale effect and network effect from the perspective of economics, all the summaries of the success factors of Chinese enterprises are not comprehensive and profound enough. Those who succeed often like to attribute their achievements to the subjectivity in themselves, but forget about the factors of the general environment and the era; and after failure, they often look for the causes from other people or blame the environment, which is quite understandable but not quite consistent with the facts. Of course, there are many other success factors for the rapid growth of various industries in China, such as:

Logistics infrastructure: As a popular saying goes, "Roads lead to prosperity." If there hadn't been the large-scale infrastructure construction of railroads, highways, ports, and airports for so many years, it could have been impossible to see such rapid growth in all sectors, including e-commerce.

Communication network infrastructure: we have to mention the construction of 1G, 2G, and especially 3G and 4G networks. By the end of 2019, China has extensively built up optical network cities, with the total scale of 4G base stations reaching 5.44 million, the access rate of optical fiber and 4G in administrative villages both exceeding 98%, over 1.2 billion the number of 4G users. China is a global leader in the network scale, with the number of 5G base stations accounting for 70% of the world. The rapid development of Internet, mobile Internet, and other communication network infrastructure has greatly helped cultivate new consumption habits of users. Only with the communication network infrastructure, the whole end-to-end whole industry chain could be efficiently coordinated, up and down, inside and outside, and the information flow could be smooth.

In terms of the flow of funds, the government's openness, tolerance, guidance, and support also play a very key role in realizing the onlinezation, mobility, and intelligence of payment infrastructure.

It is essential to probe into matters with the right height, depth, breadth, and perspectives. We can have a clearer vision of things if we think out of the box and

find the core and the root. We should stretch the timeline and look at the "elevator" of the times.

We should all hold gratitude for living in such a rare and great era of peace and development.

The Elements of Business Success in the Future

For sure, we need to think why there are successful cases and failures in the same era; even in the best times, many enterprises might fail; in the worst times, many enterprises might still succeed. At the same time, the probability of success and the number of great enterprises that emerged in different times vary to widely different degrees. With a longer perspective, success can be seen as often accidental, along with a certain element of luck, but failure is inevitable, occurring sooner or later. The sufficient and necessary conditions for success must be the profound combination of external and internal factors. The external factors are mainly the background of the times and the general industry environment internationally and domestically, while the internal factors include elements such as the leadership of the founder, strategic positioning and selection, brand positioning, product planning, design and development, procurement, manufacturing, logistics and supply chain, channel layout and integration, marketing planning, online and offline terminal retail, service system of pre-sales, during-sales and after-sales, financing, accounting, team organization and culture, and IT system. The success of each enterprise is the result of multiple factors, but the weighting of core elements varies at different stages.

The thing that we need to pay special heed to is the fact that the elements of success are constantly changing from one era to the next.

Different times feature distinctive core driving factors of production. The past times were more about land and labor, with capital being added later, and then technology, management, and knowledge. Now and the future should be powered by data and algorithms, the proportions of which will expand; the world of future is more data-driven, arithmetic-driven, and algorithm-driven. Brand new consumption, supply, and economy will usher in new power and new engine. The "elevator" of the times has been constantly evolving.

Labor force   Capital   Land   Knowledge   Technology   Management   Data

Over the past 40 years, industries and enterprises in different regions of China have been experiencing or have completed the first, the second, and the third industrial revolutions, with some leading industries or enterprises having even entered the stage of the fourth revolution. China can be said to have gone through the path that the developed Western countries treaded for over 200 years in a compressed

and parallel development fashion. Unlike its previous high-speed development, the present and the future of China require higher quality growth.

Digitalization and onlinezation is only the first step; intelligence and smartization will be the future. The combination of the compressed yet paralleled "digital" and "intelligence" development has made "digintelligence". Most companies still have to go a long way in making up for their digitalization and onlinezation lessons, such as communication online, organization online, business online, collaboration online, ecology online, etc. Such lessons are needed when consumers are already online, which means digitization and onlinezation are needed in terms of offline stores, commodities, services, as well as various daily operations of employees involved in all links of the industry chain. Only a handful of leading enterprises have already come to the intelligence stage, building intelligent and smart end-to-end systems, capabilities and systems, smartizing forecasting, stocking, replenishment, goods transferring, pricing, site selection, recommendations, services, matching, voice and image recognition, driving, etc. Traceability is extensive in the entire process and a mode of operation driven by data, computing capacity, and algorithms has been established.

Of course, there is still huge room for intelligence improvement in all industries, with the curtain just pulled back, far from the end of digital intelligence. We believe that in the future, all enterprises will be digintelligent enterprises. Since the essence of enterprise management is decision-making, it is crucial to make the enterprise's decision-making more intelligent, efficient, accurate, and flexible.

The era of digital economy will feature a world with a digital twin, which directs the physical world to match and operate more efficiently and precisely.

What is the essence of business or commerce? It is the exchange of value, and the matching of purchase and sale, of supply and demand. Under the traditional business models, the problem businesses often face is that the difficulties for consumers to buy what they want coexist with the large inventory backlog of the merchants who, based on "guessing", produce and stock massively. So, the high frequency of "out of stock" paralleling with high inventory levels has remained a sore point for a multitude of companies. By contrast, in the era of digintelligence economy, the value exchange, the matching of purchase and sale, and of supply and demand will be made easier, more efficient, and more intelligent.

Keywords in the Transformation of Digintelligence

I am often asked to distill and summarize the most core keywords related to the digintelligent transformation and upgrading. My reply would include:

- Consumer-centric
- Universal order fulfillment online and offline
- End-to-end whole industry chain, covering the whole process, all scenarios, all touchpoints, and the full lifecycle
- Network collaboration × data intelligence
- Data driven + algorithm driven + computing capacity driven

- Demand pulls supply (C2B), supply creates demand (B2C), C2B2C^n
- C2B2G

The focus on consumers contrasts with the previous centering on company administration.

The universal order fulfillment online and offline contrasts with the fragmentation, conflicts, and internal friction of the different online and offline channels.

End-to-end whole industry chain, covering the whole process, all scenarios, all touchpoints, and the full lifecycle indicates that despite the significance of marketing and sales, such a front end is not enough, and the ultimate competition must be around the whole supply chain system driven by big data.

As for network collaboration $\times$ data intelligence, I would recommend *Smart Business I* and *II* by Professor Zeng Ming to interested readers, for both books have been written with profundity and great explanations.

Data-driven $+$ algorithm-driven $+$ computing capacity-driven contrasts with experience-driven.

Now I would like to focus on explaining C2B2C^n and C2B2G.

The traditional business is based on B2C, namely companies selling commodities they have designed and produced to consumers. However, the future is more about C2B, meaning demand pulls supply, which has increasingly formed a consensus; supply also creates demand (B2C), because good design, development, and production on the supply side could create and stimulate the growing demand for a better life. The reality is that consumers are already digitalized and get online, with a digitalization level much higher than that of enterprises. The consumer Internet and the industrial Internet, however, are not in a relationship of fragmentation and antagonism, but rather in a mutually reinforcing process, with the former urging the comprehensive upgrade of the latter, which in turn will promote the elevation of the consumer Internet.
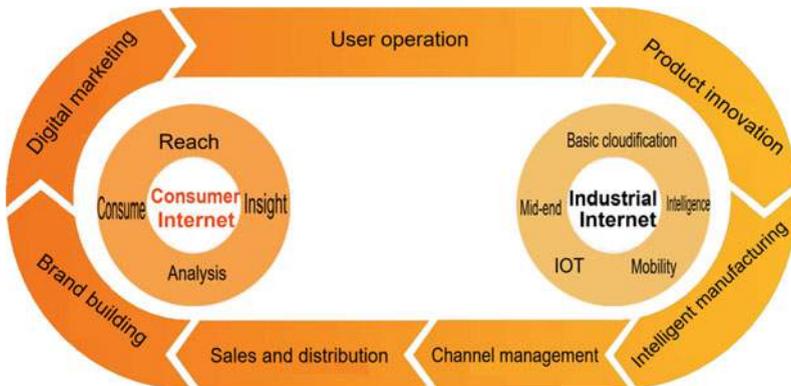
C2B2C to the power of n (C2B2C^n) means that everything is conducted with the consumer (C) as the center, so that businesses (B) are urged to do well in user operations, new product innovation, design, R&D, intelligent manufacturing, channel management, sales and distribution, brand building, digital marketing and distribution as well as other services. Then the businesses could precisely promote their services to more consumers (2C) across the network in all channels. The power of n is realized through the continuous iteration facilitated by the combination of "data + computing capacity + algorithm", which keeps optimizing the entire end-to-end industry chain covering the whole process, all scenarios, all touchpoints, the entire Internet, omni channels, and the full lifecycle. In this sense, the consumer Internet needs to function well in consumer insight, consumer analysis, and consumer accessibility and promote consumption while the infrastructure on the side of the industrial Internet needs to usher in cloudification, IoTization, mid-end functionalities, mobile informatization, and intelligence.

The future is definitely a world where everything is connected and all fields are upgraded with digital intelligence. Work, daily shopping, entertainment, accommodation, etc., on the consumer Internet, and design, supply, manufacturing, process, and industries on the industrial Internet all need to be iterated digitally and intelligently.
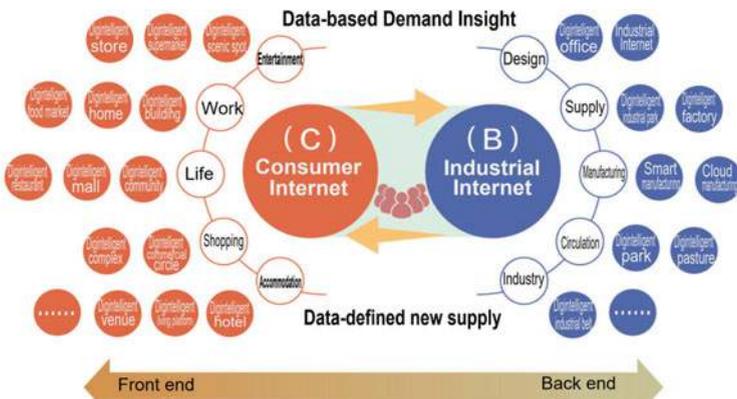
The four major links of economic activity are production, distribution, exchange, and consumption. In achieving consumption, the most important link in business is retailing, which realizes the final transaction–the value exchange between B and C. Any discussion about retailing would not happen without the mentioning of "people, goods, and fields". Despite the familiar appearance of "people, goods, and fields", the dimensions of the present retailing are deeply reconstructed by the economy of digintelligence.
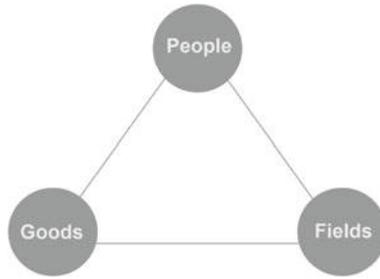
"People, goods, and fields" remain unchanged, just the same as the matching of buying and selling, of supply and demand. Behind the Internet traffic is the flow of people, behind which is the demand, driven by desires and human nature.
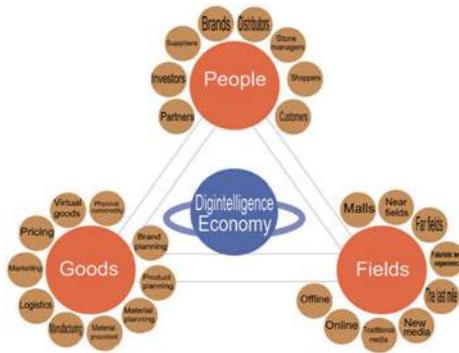
Changed are the ideas, the ways, and the methods. The economy of dig-intelligence is reconstructing "people, goods, and fields"! Universal and multi-dimensional efforts are made to increase the near field/far field/off-store trans-actions, expand in terms of time and space, and promote human efficiency as well as time efficiency. In this way, the sales per square meters of the store can be enhanced, with consumer satisfaction and business operations efficiency and effects elevated.

The three important things in traditional retail are location, location, and…lo-cation. Why? Any ordinary brand will find it hard to perform badly on Nanjing Road in Shanghai, but even the strongest brand could not achieve great sales if it opens a store on Mount Everest or on the moon? Location is closely associated with the flow of people, behind which is the demand, driven by desires and human nature. It is a constant truth.

"People" are changed. Previously, the concept only referred to consumers, which is not accurate now. Who serves the consumers? Shoppers and other front-line staff, as well as the store manager, distributors, general agents, brands, suppliers, logistics providers, etc., all the personnel on the chain have to understand the needs of consumers so as to truly serve consumers. It is always stressed that "the organization must be online". If the organization fails to run smoothly, with poor communication, how could it be possible to provide consumers with goods and services they truly desire, when there is only a shopper understanding the needs of consumers, with other personnel in the entire industry chain lacking such knowledge?
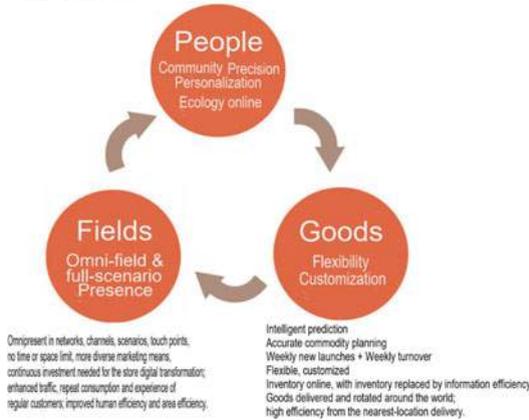
"Goods" are changed. In the past, the goods in the store were limited by the stock space and could not meet the specific needs of customers. Many companies have faced the problem that they don't have enough inventories of the goods consumers want, and that those leftover goods consumers do not want have piled up in warehouses. Could it be possible that we innovate to make the goods exist both virtually and in reality, and have timely replenishments? In this way, merchants can sell whatever consumers want, and replenish stocks of whatever sells well.

"Fields" are changed. Physical transactions are only part of the fields, and multiple new approaches and forms such as live stream, 3D, VR/AR, and quick delivery to home have constantly emerged. In the past, more often than not, the locations can only be selected by experience, but now precise site selection can be achieved based on big data.

The reconstruction of "people, goods and fields" for an omnichannel integration of the whole network with consumers as the core, aims to redefine the "people, goods and fields" and make them online, realizing the highly efficient and accurate connection, beyond time and space restrictions. In the context that "people, goods and fields" are completely deconstructed and reconstructed, it is believed that the splendid future is just beginning, and the whole market bears huge opportunities.

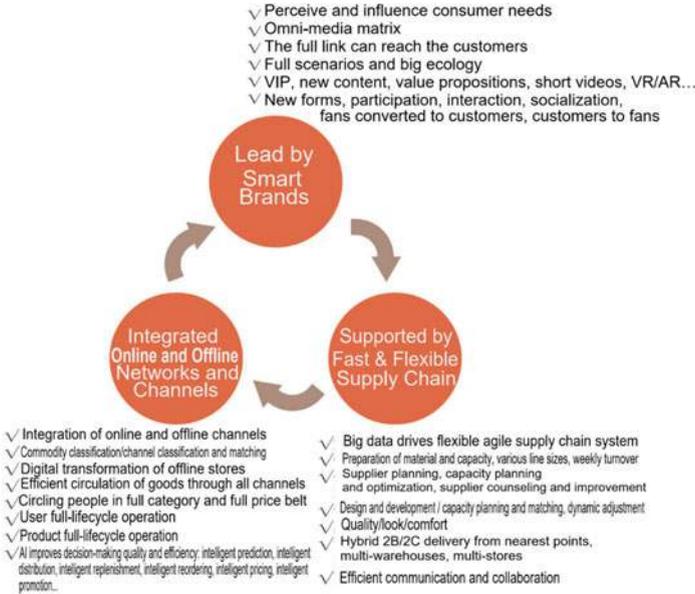Retailing is just an essential link in all economic activities. With the consumer Internet urging the upgrade of the industrial Internet, I prefer to call the future business a New Business, with consumer as the core, driven by big data, led by intelligent brands, supported by the fast and flexible supply chain, integrating online and offline networks and channels, and achieving end-to-end full-link efficient and accurate matching.

Consumers: identifiable, accessible, discernible and serviceable (consumers and shoppers)
·Bring new members to the brand and stores and provide efficient service
·Value to consumers: purchase of goodies everywhere (consumption upgrade), improved experience
(futuristic technology, content, marketing), accurate matching, discounts, convenience, experience
Organization online, communication online, business online, collaboration online, ecology
online, creating and meeting consumer demand, accumulating digital consumers and
organizational assets.

People
Community Precision
Personalization
Ecology online

Fields
Omni-field &
full-scenario
Presence

Goods
Flexibility
Customization

Omnipresent in networks, channels, scenarios, touch points,
no time or space limit, more diverse marketing means,
continuous investment needed for the store digital transformation;
enhanced traffic, repeat consumption and experience of
regular customers; improved human efficiency and area efficiency.

Intelligent prediction
Accurate commodity planning
Weekly new launches + Weekly turnover
Flexible, customized
Inventory online, with inventory replaced by information efficiency,
Goods delivered and rotated around the world;
high efficiency from the nearest-location delivery.

In the New Business era, consumers' experience will continue to leap, while businesses, based on big data, can design, develop, and produce goods that are marketable and truly needed by consumers, instead of working overtime every day just to create an inventory of goods consumers don't need, leading to huge wastes and mismatch of resources in the society.

C2B2G (Consumer to Business to Government) also has great importance. Since consumers (C) are the center now, the convenient, personalized, intelligent, and accurate services and experience required by consumers are forcing businesses (B) to improve operational efficiency and effectiveness while governments (G) are in pursuit of offering more open, fair, transparent, efficient, and standardized services. A typical example is the government of Zhejiang Province, which has a high degree of digitalization. Before it proposed such ideas of "more computing makes less visits" and "one-stop solution", citizens had to run back and forth between various departments to get things done, sometimes just to validate basic personal information, such as "proving your father is your father", due to the barriers widely existing in the information system. Such a situation no longer occurs with the government's digintelligent transformation. The government of Zhejiang Province has developed more than 1,000 mini programs based on DingTalk, with a lot of data being called millions of times. Now people will never have to fill out forms with information repeatedly to finish procedures. Digintelligence has greatly improved the government's office efficiency, making the procedures more simple, transparent, fair, and standardized, and also enhancing the experience and the sense of gain of the people.

√ Perceive and influence consumer needs
√ Omni-media matrix
√ The full link can reach the customers
√ Full scenarios and big ecology
√ VIP, new content, value propositions, short videos, VR/AR…
√ New forms, participation, interaction, socialization,
   fans converted to customers, customers to fans

Lead by Smart Brands

Integrated Online and Offline Networks and Channels

Supported by Fast & Flexible Supply Chain

√ Integration of online and offline channels
√ Commodity classification/channel classification and matching
√ Digital transformation of offline stores
√ Efficient circulation of goods through all channels
√ Circling people in full category and full price belt
√ User full-lifecycle operation
√ Product full-lifecycle operation
√ AI improves decision-making quality and efficiency: intelligent prediction, intelligent distribution, intelligent replenishment, intelligent reordering, intelligent pricing, intelligent promotion…

√ Big data drives flexible agile supply chain system
√ Preparation of material and capacity, various line sizes, weekly turnover
√ Supplier planning, capacity planning and optimization, supplier counseling and improvement
√ Design and development / capacity planning and matching, dynamic adjustment
√ Quality/look/comfort
√ Hybrid 2B/2C delivery from nearest points, multi-warehouses, multi-stores
√ Efficient communication and collaboration

Consumers have become fully digitalized and online extensively, with their sense of rights awakening, raising increasingly higher requirements for state-owned enterprises, private enterprises, foreign enterprises, and governments. It is the trend of the times which we must respond to.

It is digintelligence that drives new growth.

One must keep rolling with the times and following the trends to create his own advantages.

The ultimate goals can only be achieved through the integration of knowledge and practice; the ultimate goals are the result of grasping the trends, perceiving the right ways, optimizing the techniques, uniting the crowd, and fulfill the commitment.

The Pathway to the Transformation of Digintelligence

More and more companies have reached the consensus that digintelligent transformation is the trend, but their question is how to carry it out in business.

Here is our theory: Pentalogy× Five Layers× Eleven Elements.

Pentalogy: Cloudification of infrastructure, digitization of touch points, onlineization of business, digitization of operations, and intelligence of decision-making.

• Infrastructure cloudification

Why should infrastructure be cloud-based? Let me analyze this with an example. An enterprise needs 100 servers for daily operation, but when it comes to a big promotion like "Double 11", the data volume is likely to be tens or hundreds of times higher than usual (let's assume that 10 times or 1000 servers are needed). If the enterprise purchases only 100 servers, such a great opportunity to serve consumers as "Double 11" will be lost for nothing, and the market share will be gained by its competitors; if this enterprise purchases 1,000 servers, the utilization rate of such capacity during the other 364 days will be very low, with unreasonable cost effectiveness, creating a huge waste of resources. What could it do? It should seek resources from the cloud, which is just like tap water, which one can use as much as he wants, and pays as much as he needs. Flexibility and cost are only some of the reasons why enterprises should go to the cloud; security, talents, and many other reasons should also be considered.

Enterprises need to use the new digintelligent infrastructure to transform and upgrade the whole chain. With the infrastructure cloudification, enterprises can spend more energy on their core business, such as brand building, products R&D, fast and flexible supply chain, and meeting the needs of consumers in online and offline networks and channels, without wasting too much time and energy on non-core business. It is a substantial boost to work efficiency.

• Digitalization of touch points: information on procurement, production, logistics, all-network and omnichannel retail terminals, and "people, goods, and fields" should be collected in time.
• Onlineization of business: all consumers are already online, so the stores under the company, products, services, organization, management, and ecology should also get online.
• Digitization of operations: all business should be displayed in data, and all data can be used in operations.
• Intelligence of decision making: the core of the future organization is the quality, efficiency, and execution of decisions.

The details of the pentalogy will be revealed in chapters later.

Five Layers: The traditional cloud was mostly just IaaS (Infrastructure as a Service), and then added later with PaaS (Platform as a Service) and SaaS (Software as a Service). On such a basis, we have added two more layers, DaaS (Data as a Service) and BaaS (Business as a Service). DaaS essentially belongs to the PaaS layer, but is different from the past PaaS. It is now a new service based on data and data-related processing capabilities; BaaS belongs to the SaaS layer, but is also different from the past service that was more oriented to internal the communication process; it is now a service that matches B (business) and C (consumers) more efficiently and accurately across multiple scenarios. The traditional sector was more of IT, but we think the future should be more about DT and DI (Data

Technology and Data Intelligence). We provide a common applet framework for various high-frequency applications such as Taobao, Alipay, Amap, and DingTalk.

The business is where the consumer is. The standard future business will feature cross-terminal multi-scenarios plus underlying integrated data mid-ends. The front and back-end mini programs allow the merchants to better communicate with consumers. Also, we put more emphasis on real-time data as well as future-based data. For example, if a user has not yet had lunch at noon, the information about the surrounding restaurants should be pushed by applications to the user. The data application in this situation is meaningful. Otherwise, it is ineffective, especially if the information arrives after lunchtime.

Eleven Elements: the elements of brand, commodity, manufacturing, channel, marketing, retail, service, logistics supply chain, finance and accounting, organization, and technology have covered the flow in business (the first seven elements), the flow of goods, the flow of capital, the flow of people and technology, as well as the information flow that runs through and connects all the links and elements. Essentially those make up the total factors, but since industries have specific focuses on elements, they can be named differently.

The Pentalogy and the Eleven Elements can be combined, as in the following chart, and each enterprise can make specific arrangements according to its own development stage, capacity and resources, and priorities. Generally speaking, most enterprises choose marketing, retail, etc., to realize sales increment first, and then integrate their advantages throughout the entire networks and channels by utilizing the current resources in the forms of stores, shoppers, and online and offline goods; some leading enterprises have already get upstream, using big data to drive brand optimization, commodity planning, design, and development, flexible manufacturing, logistics supply chain optimization, supply chain finance, and realizing full-link traceability, anti-counterfeiting, anti-fleeing-goods based on blockchain technology, etc.; a handful of head enterprises of industries have already, based on their judgments on the future, co-created with the platforms to upgrade the organization's vision, mission, and values, while constantly iterating and optimizing the strategy, business, organization, technology, and operations, in their exploration and practice of vertical industry ecological platform.

In a nutshell, full-link digintelligent transformation is an efficient and accurate matching covering all the links, the entire process, the total factors, all the touch points, the entire network, the omnichannel, and the full life cycle, driven by the big data with consumers as the core.

The best time to plant a tree is 10 years ago. The second-best time is now

Dambisa Moyo
Lusaka, Zambia

A step ahead gives a pioneer the edge; only those keeping up with the times can enjoy the dividends.

March 2021

Xiao Lihua
Vice President of Alibaba Group
Director of Alibaba Cloud Research
Institute
Alberta, Canada

Praise for *How Digital Intelligence Drives Business Growth*

"The only constant in today's world is change. In the fast-changing era of digintelligence, how could enterprises build and maintain a leading edge? With a methodology pentalogy and an exploration into the eleven elements, the book elaborates on the opportunities and challenges for Chinese companies ushered in by digintelligence. It is, therefore, a good guide for both companies that have already undertaken the transformation of digital intelligence and those that are about to do so."

—Prof. Li Jizhen, *Ph.D. Supervisor, Deputy Dean of School of Economics and Management, Tsinghua University*

"In the era of digital economy, the full-link digintelligence transformation has turned an urgent need, which requires comprehensive upgrading in strategies, businesses, organization, capabilities, systems and operations, with the organizational iteration being the most challenging one. Dr. Xiao Lihua, with his profound theoretical capability and rich practical experience, has summarized the pentalogy, five-layer structure and eleven elements in such a significant transformation, which are valuable resources for enterprises in various industries, and worth learning for business owners, executives, students of MBA/EMBA and readers who look forward to engagement in this great endeavor of the era."

—Yang Baiyin, *Chair Professor, Ph.D. Supervisor, School of Economics and Management, Tsinghua University*

"At this extremely crucial juncture when the fundamental drivers of China's economy are rapidly shifting, the question of how enterprises, as micro subjects, can gain growth from digitization and intelligence is one that all decision makers need to answer. This book gives important theoretical and practical guidance, and the practice in the Part Four provides very meaningful reference for practitioners."

—Zhang Ying, *Professor of Marketing Strategy and Behavioral Sciences, Ph.D. Supervisor, Associate Dean of Guanghua School of Management, Peking University*

"I was impressed by Dr. Xiao Lihua's pursuit of the unity of knowledge and action during his doctoral studies at the Chinese Academy of Sciences. He is the kind of dream pursuer who has sparkles in his eyes, fully committed to persevering to the end to turn his dreams into reality. I am very glad to see the publication of this book, believing that the steps, methodology and cases in the book will help innumerable enterprises with their full-link digintelligence transformation."

—Zhao Hong, *Professor and Ph.D. Supervisor, Dean of Sino-Danish College, University of Chinese Academy of Sciences*

"The era of digintelligent business has arrived. The successful cases in this book about leading companies such as RT-Mart, Haidilao and Feihe clearly manifest this point. Moreover, as the biggest highlight, a proven path to the full-link digital intelligence has been elaborated in the book, which can help companies quickly fit into the new business era and achieve sustainable growth."

—Xin Rong, *Professor of Management and Associate Dean of CEIBS, Chief Planner of Business Review*

"Cloud computing, big data, Internet of Things, mobile Internet, artificial intelligence and blockchain are what we should know and practice in this era. Centered on how to apply those factors to the full-link digintelligence transformation, this book covers theories, realization paths and practice cases, with excellent comprehensiveness, full depth and strong feasibility. The book is worth recommendation for its integration of theory and practice, and the unity of knowledge and practice."

—Tian Xinmin, *Associate Dean of Antai School of Economics and Management, Associate Dean of Industry Research Institute, Professor and PhD Supervisor, Shanghai Jiao Tong University*

"The leap from Internetization, digitalization to intelligence is the most profound change that the whole society has experienced in a short span of just over 20 years. From Alibaba's cutting-edge practice, Dr. Xiao Lihua summarized a system of "Pentalogy× Five Layers× Eleven Elements", which provides a clear path for enterprises who are bewildered at the full-link digital intelligence transformation, guiding them from value demand to value realization."

—Wu Xiaobo, *Professor of School of Management, Director of the Department of Social Sciences, Zhejiang University*

"Digintelligent transformation is an inevitable trend of enterprise development, and Alibaba is the global leader in this field. This book features theory, practical methods and classic cases, making it a must-read for entrepreneurs facing corporate transformation and upgrading nowadays. It is hereby highly recommended."

—Prof. Lin Xi, *Dean of Blockchain Development Research Institute of Harbin Institute of Technology (Shenzhen), Deputy Director of National Simulation Control Engineering Research Center, Director of International Financial Technology Laboratory of Bay Area, Chief Scientist of Shenzhen Supply Chain Finance Public Service Platform*

"Dr. Xiao Lihua has outstanding sensitivity to scientific research and academic expertise. He has demonstrated his unique talent in the field of information technology during his undergraduate studies, and participated in the research of a number of national award-winning projects as a key member. Later, he worked as a senior manager in multiple positions of enterprises of varied sizes in different sectors, keeping abreast of the new progress in management science research to meet enterprises' urgent needs of solving problems, which has enhanced his theoretical capabilities and enriched his practical experience. Nowadays, digintelligent transformation has become an inevitable trend of enterprise development, and Alibaba is a global leader in this area. Dr. Xiao Lihua has written this book based on his solid theoretical capability and the extensive experience he has accumulated by leading his team to guide many enterprises in the full-link digintelligent transformation and upgrading on Alibaba's platforms. This book elaborates on the shift from population-and-consumption-dividend drives to technology-and-intelligence drives, and the advancing impact of digital intelligence on the future development of enterprises. It distinctively features theoretical height and operation principles, as well as classic cases and practical methods, presenting itself as a must-read for entrepreneurs transforming their enterprises. It is a book worth study for senior managers of various industries, MBA/EMBA students and relevant personnel who are interested in digintelligent transformation and upgrading."

—Song Fugen, *Second-level Professor, Ph.D. Supervisor, School of Management, Donghua University*

"In the context of China as a whole seeking to change the mode of economic development and upgrade the industrial structure, many enterprises are looking forward to corner overtaking at this juncture to realize leapfrogging development, hoping to lift management efficiency sharply with Internet technology, information technology and intelligent means. In this process, Alibaba and other Internet companies in consumption realm are undoubtedly at the forefront, embarking on the journey of digintelligence way ahead of countless enterprises which are still struggling over digitization.

Dr. Xiao Lihua, with his solid theoretical capability and rich practical experience, systematically deconstructed and analyzed Alibaba's application path and management practice of digintelligent technology in the past 20 years. Meanwhile, he cited multiple real cases of digintelligent transformation of enterprises, which provide a good answer to the question how enterprises can build and maintain the leading edge in the rapidly changing market environment.

As Dr. Xiao remarked, we are sitting in the "elevator of the times" of China's forty years of peaceful development, witnessing all sectors growing at an extraordinary speed, with the development in many fields going far beyond the laws and concepts of traditional management theory. However, it is such rapid change that provides rich soil for our management theory research and allows management

theory to be constantly iterated and updated. Featured with both practical experience and theoretical exploration, this book presents itself a very meaningful work for both the business and management communities."

—Wei Wu, *Professor of School of Economics and Management, Ph.D. Supervisor, Deputy Director of Department of Business Administration, Wuhan University*

"The publication of *Digintelligence Drives New Growth* is very timely and much needed. In the face of the complex and fast-changing business environment, this book can be deemed as a representative guide to digintelligent transformation, with not only theories but also pioneering cases, showing the direction to enterprises amid transformation."

—Gao Junjun, *Professor and Ph.D. Supervisor, SHU-UTS SILC Business School, Shanghai University, Founder & CEO of Euromonitor Shanghai*

"Discussions on new technologies such as cloud computing, big data, Internet of Things, mobile Internet, artificial intelligence, blockchain, etc. are very hot topics in this era; yet how to profoundly integrate these new technologies into our business and drive innovation is what our enterprises need to ponder over and find an answer to. Dr. Xiao Lihua's book *Digintelligence Drives New Growth* elaborates on it from theories to realization paths, with great comprehensiveness and depth, and is worth studying for our enterprises."

—Pei Liang, *President of China Chain Store & Franchise Association (CCFA)*

"The only constant in today's world is change. In the fast-changing era of digital intelligence, how to build and maintain the leading edge of enterprises? This book adopts a pentalogy approach and analyzes each of the eleven business elements, digging deeply into the opportunities and value of digintelligence. For both companies that have already carried out digital intelligence transformation and those that are about to do so, gaining a clear understanding of the key stages and important factors described in the book will advance the endeavor at faster pace!"

—Chen Dapeng, *President of China National Garment Association*

"Since 2020, the sudden pandemic has stricken the global industries including catering, real estate, cultural tourism, hotel, making the full-link digintelligent transformation and upgrading an urgent need! After listening to Dr. Xiao Lihua's speeches for many times, I have been inspired a lot, and his book *Digintelligence Drives New Growth* is a "timely rain" for high-quality transformative development in our industry."

—Han Ming, *President of China Hotel Association (CHA)*

"For the future development of enterprises, there is an inevitable trend of digintelligent transformation, of which Alibaba is the practitioner and leader. The book *Digintelligence Drives New Growth* features theoretical height, practical methods

and real-world cases, making itself a valuable resource and reference book for our enterprises."

—Zeng Xian, *Executive Vice President of Outlet Industry Development Committee, President of Outlet (China) Co. Ltd.*

"Being the inevitable trend of corporate growth, digintelligent transformation, pioneered by Alibaba, coincides with what I promoted, "Smart Outlets". This book is an essential reference I would particularly recommend to today's entrepreneurs, due to its theoretical height, practical methods, and classic cases."

—Chen Yabo, *President of China Outlets Association*

"Dr. Xiao Lihua has worked at Xtep for nearly 10 years, during which he witnessed and participated in the start-up and maturity of its operation system, supply chain system and e-commerce department, promoted a series of changes in strategy, business and organization, thus playing a very important role in the continuous and rapid growth of the company. After Dr. Xiao's entry into Alibaba, he seized the golden period of rapid development of the Internet and gained sufficient nutrients for his full-link digintelligence theory from the industry dividends and the Internet platforms. With his team, he has summarized the pentalogy, five layers and eleven elements of the full-link digintelligent transformation and upgrading, as well as the Alibaba Business Operating System (ABOS), and used this approach to help enterprises in various industries in their digital transformation, contributing to the development in the digital business era in China."

—Ding Shuibo, *Chairman and CEO of Xtep International Holdings Limited*

"The greatest danger in times of turbulence is not the turbulence itself, but the way to think and act with yesterday's logic. In an era where digintelligence is king, the "second curve" of corporate growth has inevitably been the drive of digital intelligence. The strategic cooperation between Yuexiu Real Estate and Alibaba was the reason why I got to know Dr. Xiao Lihua, whose guidance has greatly promoted the development of Yuexiu REIT's "Yuexiu Fangbao" App, "Yue+" platform, the mid-end data model, and the RFM model of consumer analysis in retail malls. In particular, the theory of Pentalogy × Five Layers × Eleven Elements of digintelligent transformation proposed in the book has been well proven in our "Yue+" platform and its underlying business logic based on "people, goods and fields". Moreover, the theory has effectively integrated the ten operation systems, data collection and analysis, and accurate investment, operation and promotion of Yuexiu retail business. The book is undoubtedly the profound combination of forward-looking concepts and business practice."

—Lin Deliang, *Chairman, Executive Director and Chief Executive Officer of Yuexiu Real Estate Investment Trust*

"The publication of the book "Digital Intelligence Drives New Growth" is very timely. Facing the complex business environment that are constantly changing, this book is literally a guide and a treasure trove for digintelligent transformation, with

not only theories but also pioneering cases, showing the direction to the enterprises on the way of transformation, and also offering great help to our fashion industry."

—Xu Yu, *Founder, Chairman of the Board & CEO of Trendy Group*

"For enterprises, digintelligence transformation is not only a new opportunity but also a new challenge. Through in-depth communication with Alibaba, enterprises can better understand this transformation, reduce risks and enhance core growth drivers. With Alibaba's digital technology and operation capabilities, enterprises can gain better data accumulation and application capabilities. I believe this book can help more enterprises understand digital intelligence and achieve new growth."

—Chen Zebin, *President of Liby Group*

"In the era of digital economy, enterprises are no longer facing the traditional competitive environment. They need to change in terms of their responses, according to the principle of survival of the fittest. In particular for the New Retail industry which consists of enterprises not digintelligent natively, the change is even more urgent, because the industry is closest to consumers. Since Alibaba first introduced the concept of New Retail in 2016, it has had rich practice in this area. The pentalogy and the eleven elements proposed in this book provide the orientation and weapons for enterprises to make one-stop, full-link digintelligent transformation."

—Zhang Yuchen, *CEO of Zhou Hei Ya International Holdings*

"This is an era of transformative marketing where business models are innovated and iterated again and again. We have seen that a company that has achieved the position of industry leader can suddenly be kicked out by a cross-industry company; there is no more classic example than Apple beating Nokia. Disruptive innovation is the result of a combination of technologies such as big data, artificial intelligence, cloud computing, and cloud storage, and there are many studies with different perspectives in this area. Dr. Xiao Lihua provides a unique practice-based perspective. He has done many projects in different fields in college, and then worked for many years in multiple positions in traditional companies of different sizes, gaining both a strong theoretical capability and rich real-world experience. He has led his team to help many enterprises in various industries to transform and upgrade their full-link digital intelligence through Alibaba's platforms, and has accumulated a lot of experience. Now, he has further summarized the practice into the pentalogy, five layers and eleven elements in the full-link digintelligent transformation and upgrading, presenting great value for various industries. Only by following the trend of the times and keeping pace, while reforming and seeking changes, could our enterprises respond well to competition and survive, or even redefine and actively innovate the industry."

—Yin Bo, *Vice President of Yinger Fashion Group*

"The publication of the book *Digintelligence Drives New Growth* is very timely. Facing the complex and changing business environment, this book is a guide for digintelligent transformation and shows the direction to the enterprises on the way."

—Wei Fuxian, *Chairman of the Board of Guangxi Xuanma Food Co., Ltd.*

"When the Alibaba Business Operating System (ABOS) was proposed, Red Dragonfly was the first participant, practitioner and beneficiary of the full-link digintelligent transformation and upgrading. I benefited a lot from the communication with Dr. Xiao Lihua and his team, who are very professional and dedicated. *Digintelligence Drives New Growth* is a perfect bedtime reading for all corporate presidents, an essential treasure for this significant transformation!"

—Qian Jinbo, *Founder of Red Dragonfly, Chairman of Red Dragonfly Group*

"In the book *Digintelligence Drives New Growth*, Dr. Xiao Lihua and his team have elaborated on the digintelligent transformation in depth with simple terms through a system of the pentalogy, five layers and eleven elements, offering plentiful classic cases. Such a system has helped Camelot become one of the New Retail practitioners and beneficiaries of digintelligent transformation. I believe this book will bring more readers a new awareness of the New Business in the digintelligent era."

—Wan Jingang, *Chairman of Guangdong Camel Apparel Co., Ltd.*

Contents

Digintelligence Reconstructs the Eleven Elements of Business

Contributors

Xiao Lihua Beijing, China

Fuming Chen Shanghai, China

Dongying Hong Taiwan, China

Ye Tian Shanghai, China

Beihong Wu Shanghai, China

Wenya Yang Zhuhai, China

Digintelligence Opens Up a New Business Era

In 2020, dramatic changes happened in the world. A multitude of challenges fills the business environment. In such a context of gigantic uncertainties, one thing is certain—the trend of digintelligence has not changed. In the past, digintelligence was just like icing on the cake for businesses, but today it has stood out as the key to corporate survival. The process of digintelligence had been estimated to be finished within a span of 30 to 50 years, but now it has been greatly accelerated to a journey possibly as short as 10 to 20 years. Among all the uncertainties in front of us, digintelligence is the biggest opportunity we are most certain of right now.

—Jack Ma

For most companies, a transformation of digintelligence is the new driver of business growth. Before 2020, companies were discussing what that was and whether they should jump in right away; since 2020, more companies have been concerned about how to carry out such a transformation, the specific pathway, and the experience.

Any change in business comes from the combined effect of the following four driving forces:

1. Changes in consumers as the subject of business services. For example, due to the different needs and behavioral characteristics of consumers at different times, the emerging consumer groups will replace the previous ones and drive changes in the entire market.

2. Changes in business models and approaches. For example, online users allow brands to have user data insight capabilities, which triggers business model upgrades and casts a profound impact on a series of business practices such as marketing methods, and product development models.

3. Technological changes that support business operations. For example, the development of big data technology, Internet of Things technology, and blockchain technology has made data processing and data mining more convenient, thus creating possibilities for reconfiguring business elements and optimizing resources.

4. Infrastructure changes in the business operation environment, for example, changes in energy sources like coal, oil, and electricity, shifts in communication media such as press, television, and the Internet, and alteration in digital computing power from local area networks to the cloud.

It is under the role of those four driving forces that the digintelligent transformation of enterprises occurs and develops. New consumers, new technologies, new approaches, and new business infrastructure have formed a new business ecosystem, adaptation to which definitely requires enterprises to embrace the great transformation.

The Driving Force from Environment

Wenya Yang

CHANGE IS THE ONLY CONSTANT. This is one of the values upheld in Alibaba, and also a manifestation of the natural laws of the time and space that we live in. Each change derives from factors underneath, and every social transformation and business iteration originate from profound causes. The digital intelligence transformation has now emerged as a focus of Chinese business managers. While the factors behind such a transformation may vary, the most direct influences have remained the changes in the environment, including society, market and business operation where they belong. This chapter is, thus, dedicated to the discussion of various environmental factors in this transformation.

1   The Evolving Social Environment

In agricultural civilization, the main infrastructure was land, the factors of production being human labor plus hand tools, and the system of social division of labor being family-based. The industrial civilization witnessed the advancement of infrastructure to railroads, highways, airplanes, and ports, with the factors of production upgrading to machines, and capital as an emerging factor. Yet a wide leap into the era of digital intelligence has featured the augmented infrastructure of cloud computing, the Internet of Things and intelligent terminals, with smart machines taking over, and data rising as an essential factor.

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

In Alibaba's "Five New" Strategy, namely the "new retail, new manufacturing, new finance, new technology and new energy", the "new energy" is defined as data. In contrast to the industrial age when petroleum was the energy promoting development, data, in the digital intelligence era, presents itself as the energy to boost new economic growth. From agricultural civilization to industrial civilization, and now to digital intelligence civilization, each era keeps upgrading with new factors of production, while inheriting the old ones from the predecessors. That is how our times evolve.

2   A Changing Market for New Growth

Along with the evolving social environment, the market see differences, and vast changes in people's lifestyle come along.

Unlike twenty years ago when Chinese people always went to a bustling commercial street, a shopping mall or a supermarket to make purchases, now we can fulfill all shopping needs offline or online. The boundary between offline and online purchases is also blurring, since a customer today can shop online from Hangzhou's Intime Department Store and enjoy a 2-h home delivery within a 10-km radius of the mall. The dimension of shopping has been expanded to include virtual stores.

The major merits of offline business are the high degree of localization, purchase immediacy, real experience, and a service guarantee. In contrast, e-commerce boasts a huge flow of visitors, a rich variety of goods, price transparency, and unlimited access. The biggest advantages of offline commerce are high degree of localization, instant purchase, authentic experience, and guaranteed service; the most appealing features of e-commerce are huge traffic, rich variety of goods, transparent price, and instant purchase anytime and anywhere. With the upgrading of consumption and various high-tech technologies making consumers' experience more enjoyable, faster and better, a single shopping style can no longer meet all consumers' needs; it is high time to integrate online and offline channels and innovate the retail industry.

AliResearch defines new retail as a data-oriented, consumer experience-centered, pan-retail business, with three distinctive features. First, it is consumer-centric. It starts from the consumer's feeling and improves the customer experience.

Second, it is about data technology. Moving offline business to Taobao should be still considered as traditional e-commerce; expanding Taobao and Tmall online stores and then opening physical stores offline is still not new retail because no data analysis is applied. So, is it possible to collect online and offline data reasonably and effectively, and analyze these data to make various decisions including product selection and commodity placement? The key point is data technology, if we want to realize a transition from selling what is available to being driven by consumer demand.

Third, it is pan-retailing. Pan-retail is a broader definition of retail than before, meaning that the concept of previous retail does not fit now. For example, Freshippo can be a seafood market, a restaurant, a supermarket, an online shopping and logistics center, but it is also a fan-management portal and a community center with strong consumer interactions. Unlike shopping centers of the past, Freshippo has received more than 50% of its orders online. So new retail is still a type of retail, but cannot be defined only by shopping malls. Hotels, cabs, restaurants, tourist attractions and any other places with flows of people will be ideal locations for this new form of pan-retail commerce.

On January 11, 2019, at the ONE Business Conference, Zhang Yong, Alibaba Group CEO, officially launched the Alibaba Business Operating System, which aims to help companies complete the digitalization of 11 business elements, including brand, commodity, manufacturing, channel, marketing, retail, service, logistics, finance, organization, and technology, and make all these elements available online. It aims to help enterprises upgrade their business and open up new growth curves.

At the early stage of e-commerce development, as long as products not available online were posted to the Internet, the business could attract numerous visits from customers, so adding more new products and opening more stores used to be a very effective way to get traffic. Nowadays, from aggregation of products to the categorizing of customers, from selling goods to managing clients, shopping malls, as the offline base of new retail, need to study the flow lines of consumers and digitalize the data; online stores, as the online base of new retail, used to channel traffic directly to single product pages and create hit products, but now it's all about attracting consumers to live steaming rooms through advertising and finding ways to retain fans and sustain growth. Next step is centered on visits, no matter online or offline. Where there are people, there will be traffic, even when people are lining for dinner. How to attract these people, convert them into visits and views, and then serve them well at a later stage will become the focus of all industries to explore opportunities. In other words, all business with "people, goods and fields" will gradually be computed in traffic, be networked and digitalized. The new retail means a reconstruction of "people, goods and fields" based on big data.

3   Technology Drives Business Upgrades

Along with the development of society, business is also constantly iterating and upgrading. In the era without the Internet, business and trade occurred basically face-to-face, in simple and direct transactions. Yet the advent of the Internet has changed everything. On April 20, 1994, China was fully connected to the international Internet through an exclusive 64Kbit/s line, which marked the starting point of the Internet era in China. On this day, China officially became the 70th member of the Internet family. More than two decades later, China has seen the profound impact of the Internet, and it is also deeply influencing the global Internet landscape. China's network application capabilities have attracted worldwide attention.

4G base stations could be taken as an example; of more than 5 million 4G base stations in the world, China accounts for more than 3.5 million; and in the era of 5G, China's related technologies are even farther ahead.

5G allows everything to be accessible online, and being networked, online, and digitalized are the prerequisites for intelligence. In this sense, the advent of 5G is accelerating the transformation of China's enterprises into digital intelligence. Chinese enterprises, such as Freshippo, Intime Department Store, EasyHome, Feihe, Haidilao, Bestore, Xtep, Forest Cabin, and Red Dragonfly, are embracing digital intelligence transformation at a super-fast pace and have already made great progress.

Artificial intelligence, an emerging technology in recent years, can easily beat the top human Go players; unmanned driving technology has been piloted in various cities; 3D printing has become an important tool for industrial design; and virtual reality technologies such as VR and AR are bringing a new experience… The digital intelligence of enterprises, the comprehensive application of big data, and the replacement of workers by intelligent robots will be important directions for the next business changes, and among them, digital intelligence transformation will become a must for the future development of enterprises.

Facts have proved that every technological innovation will bring about social progress and upgrade of business elements, and the commercial application of technology for enterprise development will make various high technologies no longer just stay in the laboratory. Technology and business will become more closely integrated like the double helix structure of DNA, impacting and stimulating each other, together promoting the development of society.

4 Creating a "New World" in the Age of Digital Intelligence

The physical world we live in is like a network that connects people's work, life, and entertainment. This network is composed of nodes, such as subway stations, railway stations, airports, etc. Nodes, including office buildings, shopping malls and residential buildings, make up our cities; cities form a province, and provinces compose a country or a region, and all the countries or regions make the world, a physical and tangible world. Imagine, in the digital world, there is actually a network that is rapidly forming. We present the nodes of the real world digitally, forming a digital world suspended above the physical world, which are like twins corroborating each other.

A ranch's seasonal temperature, rainfalls, vegetation growth, groundwater quality, soil microbial biomass, the information of each cow, including their age, walking routes, health situation, milk production, milk quality and other data form a digital world mapping of the ranch. The data such as a factory's order volume, production line scheduling, unit capacity, raw material coordination, and the efficiency of each worker constitute the digital world mapping of the factory. The data, such as traffic flow every time unit in a shopping mall, the counter numbers,

spatial locations and traffic density of each brand, the area effectiveness, the demographic and behavioral attributes of customers of each merchant, form the digital world mapping of the shopping mall.

Today, through digital technology, we seem to be living on a virtual network. We are connected to the matching point of the physical world through various digital touch points—no matter it is travel, shopping, or doing business. The scenes of purchasing, transporting, and receiving goods that once left traces in our real life are all shown in the digital world as a path of movement. The network in the physical space of the city is deriving a virtual network through digital and intelligent technology, corresponding so precisely with each other.

The digital twin functions as it can comprehensively establish a quasi-real-time connection between the physical world and the digital world, which interconnect, integrate, and interoperate with each other. From the perspective of the specific implementation, firstly, digital twin integrates and models various data of physical objects, creating a faithful mapping; secondly, the digital twin exists in the full life cycle of physical objects, co-evolves with them, and continuously acquires relevant knowledge to form data accumulation and algorithm models; and finally, the digital twin not only describes the physical objects, but also can optimize the physical objects based on the model, and eventually realize the transformation of the physical world. In this way, the digital world can react to the physical world, improving the quality of human life and production at ultra-low cost. The City Brain of Hangzhou is already a prototype of a digital twin, as shown in Fig. 1.
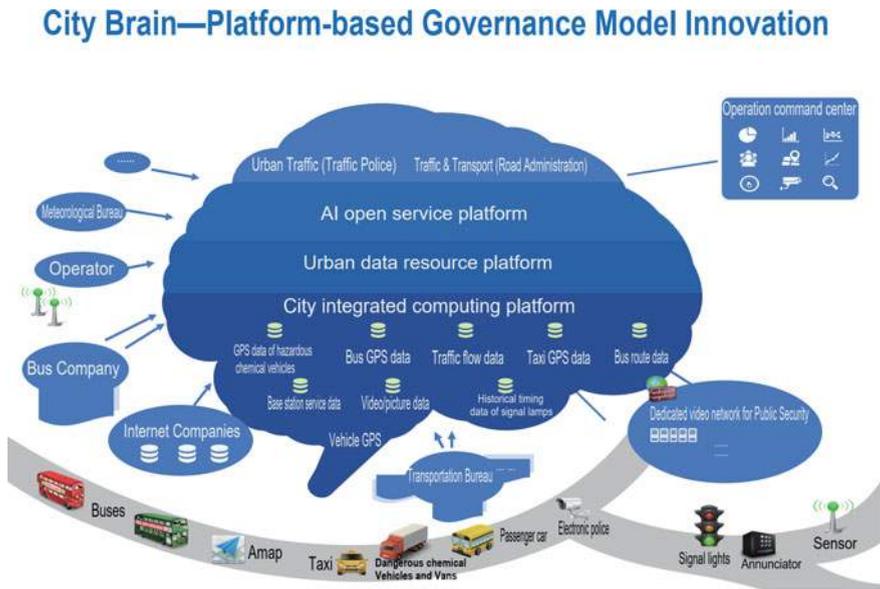
Fig. 1 Hangzhou's city brain

5   Summary

This chapter starts from the development and changes that people are familiar with, and mainly approaches the development and changes from the aspects of society, market and business.

(1) Human development has leaped from agricultural civilization to industrial civilization and now entered the era of digital and intelligent civilization. Data is the new energy, and digital intelligence will comprehensively promote the social progress and development.
(2) Changes in the market have driven the emergence of new consumer demands. A single consumption scenario has failed to satisfy consumers, requiring the integration of online and offline networks in all channels, which sets higher requirements for new retail.
(3) Business is constantly iterated, with the arrival of the Internet bringing brand new growth. In particular, the advent of 5G will enable us to enter the era of the Internet of Things, and business will embrace full digital intelligence transformation, ushering in a comprehensive upgrade of epoch-making significance.
(4) Looking forward to the future, the physical world will be mapped into a digital world through new intelligent technology, and the digital world will in turn promote the innovation and optimization of the physical world, thus improve people's quality of life. A new era of digital twinning is coming.

The Driving Force of Consumption Change

Wenya Yang

Consumers are the most basic elements of business, and changes in consumers are also one of the important factors driving business changes. In recent years, the shift of business operation from goods to people is particularly obvious. In the past, merchants focused on describing product information such as the quality, function, and material of a product, but now they are beginning to present product information such as the temperament of the consumers that this product conforms to, or which character traits it reflects. The change from "things clustered together" to "people divided as groups" is a true portrayal of business operation centering on consumers in this era. Changes in consumer demand, consumer behavior and habits are also driving business upgrades. How to quickly define accurate portraits of these consumers, understand their individualized and unique needs, and reach them in real time has become a breakthrough for new growth of enterprises. Therefore, digitizing consumers and consumer information has become an inevitable trend.

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

9

1   Consumption Revolution Drives Digital Intelligence Transformation

In the digital intelligence economy, the consumption structure is undergoing tremendous changes. The overall consumption has turned from "quantitative growth" to "qualitative growth". The disposable income of residents continues to increase, and the rapidly expanding middle-income group has become the main consumer force. Driven by the purchasing power of the "new generation" and female groups, consumers have higher requirements for products and services, manifested by their pursuit of quality, brand, emotional value of goods, etc., showing the characteristics of personalized, diversified, high-end and experiential consumption. From 2015 to 2019, residents' medical and health care, cultural and entertainment consumption rose rapidly, up by 63 and 46% respectively. In 2020, affected by the COVID-19 pandemic and demographic structure changes, consumers continued to pay attention to the field of healthcare. These are the new changes in consumer demand. McKinsey predicts that by 2030, the proportion of Chinese households' expenditure on food will continue to decline, while the expenditure on "optional items" and "secondary necessities" will increase significantly, with the expenditure on cultural, educational and entertainment activities accounting for over one-fifth.

In the past, consumers shopped because they lacked a certain necessity; when they found they needed a washing machine at home, they went to offline shopping malls selling home appliances. However, in today's era of excess commodities, consumers often do not buy because they have to. A girl may make a purchase just because she sees an article, a video or a live streaming, and is attracted by a product that matches her temperament. In the past, consumers used to visit offline shopping malls on weekends. Now, however, the popularity of mobile Internet has made online shopping more convenient, thus urging businesses to be online 24 h a day. The evolution of consumer demand and consumption patterns require merchants to identify, gain insight of and reach consumers more quickly, so as to provide quality services that are more in line with consumers' personalized and high-quality pursuits.

The "Digital Store" built by Li Ning and Alibaba Cloud in Shanghai World Expo Park in June 2019 for young people can be taken here as an example. Before entering the store, consumers can interact with the store through terminals such as vending machines, rental power banks, Focus Media, and Over the Top Services (OTT) in the business district near the Li Ning digital store; they can receive store coupon information, or participate in the motion-sensing games in front of interactive windows. These help to gain a more accurate insight into consumers' interests and preferences while bringing consumers convenience and sparking their interest, as shown in Fig. 1, consumers are interacting with stores.

After entering the store, consumers will receive targeted product recommendations from the shopping guide, who will also instruct customers to use the electronic shelf which enables consumers to enjoy delivery-to-home service when the store is out of stock. When checking out, customers can also pay with a simple

Fig. 1 Consumer scanning and store interaction

and quick face swipe, a very popular way among young people. Li Ning provides consumers with more personal and caring services with the building of such digital stores.

2 Consumer-Centric Full Integration Strategy

In the era of digital intelligence, consumers are fully online, and mobile phones are eliminating the boundaries between all sectors, allowing originally different business worlds to vie for users' time from the same starting point. The reason is very simple. A consumer only has 24 h a day. If time is devoted to viewing a certain product, little will be left for another commodity. Based on this fact, any business that captures the minds of consumers is likely to be a competitor. The competition here is not limited to the competition of products, but is more about the competition of consumer traffic. All things that can attract consumers' attention are traffic entrances.

From the moment one is tempted to buy things, to the after-sales service after the transaction, there are many online or offline channels for him or her to choose from in each link, known as the "consumption behavior paths", as shown in Fig. 2. There are touch points on all the paths to promote transactions by means of interaction. Everything is a medium. If a business wants to seize the opportunity of transaction, it is necessary for it to lay out consumption paths at all touch points. When consumers switch increasing frequently between these different touch points, the integration of online and offline will also become an inevitable trend for enterprises.

As mentioned earlier, consumers are fully online. In order to seize new growth opportunities, enterprises need to realize the "four ables" for users, namely able to
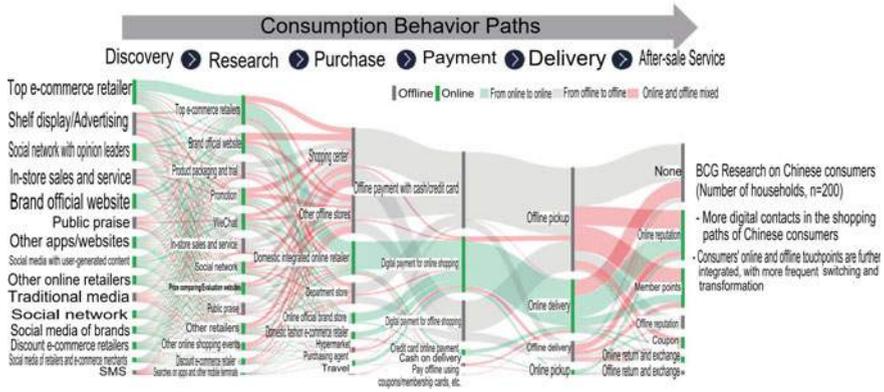
Fig. 2 Consumer behavior path

identify, able to understand, able to reach, and able to service. That means every-
thing at stake including offline stores, online stores, commodities, supply chains,
organization, services, needs to be reconstructed and connected more efficiently
and precisely, and enterprises are urged to change their thinking to break the situ-
ation of being isolated, so as to transcend the limitations of time and space. Being
digitalized and online is only the first step. In the future, network collaboration
plus data intelligence is the ultimate foundation for businesses.

In the future, there will only be digital intelligent businesses or non-digital
intelligent businesses! How enterprises can achieve new growth through the digital
intelligence transformation of the entire links will be discussed in the next section,
which gives the key factors behind the answer.

3 The New Growth Path of Digital Intelligence—New Clients, New Products, and New Organization

Driven by consumption changes, new clients, new products, and new organization
have become the three key words for business growth, which together form a new
path to drive future digital intelligent growth of enterprises.

3.1 New Clients

Consumers are omnipresent today, everywhere and every moment. Maps, social
life, offline stores, information outlets, videos, live streaming, wherever there is
traffic, there are consumers. How could we predict when and where consumers
will be? Elements such as the age, region, living environment, brand preference,
and product recognition of consumers targeted by brands are constantly changing.
The key is the timely insight of and influence on new consumers. Therefore, it is

particularly important to establish a close connection with consumers, and "All-around Customer Acquisition" has created a new space for enterprise growth.

Alibaba's commercial operating system aggregates this group's ecological capabilities accumulated over the past two decades, as shown in Fig. 3, which is summarized as "One Cloud, Multiple Ports, Five Mid-ends and Various Industry Applications". It consists of applications including Tmall Flagship Store 2.0, Light Store, Taobao Live, Same City Shopping, Alipay, plus Data Mid-end, Business Mid-end, AIoT Mid-end (Digital touchpoints), Financial Mid-end, and Organization Mid-end (DingTalk) plus Alibaba Cloud, which serves as a foundation for multi-terminal and cross-scenario operations for enterprises, covering as many touch points serving consumers as possible for enterprises. Brands can reach consumers through Taobao, Tmall, Alipay, Ele.me, Taoxianda, Freshippo and other ports, establish a membership system integrating online and offline business, and meet the diversified needs of consumers anytime, anywhere. Enterprises can follow our paradigm and operate accordingly. Later chapters of this book will be dedicated to a detailed description of this operating system.

Through digital marketing and crowd labelling technology (DMP, Data Management Platform), the previous customer acquisition via advertising featured with inaccuracy, low efficiency and difficult evaluation has been changed; on the digital media delivery platform (DSP, Demand-side Platform), brand owners has control over their commercials in any media on the entire network, making media effects transparent, realizing real-time adjustment and optimization, and flexible delivery levels. Through AI crowd amplification technology, brand owners are more empowered to reach more new consumer groups which could be converted to new customer sources.

For many merchants that take traditional offline business as their main touch point, a new batch of online consumers can be naturally attracted when they switch
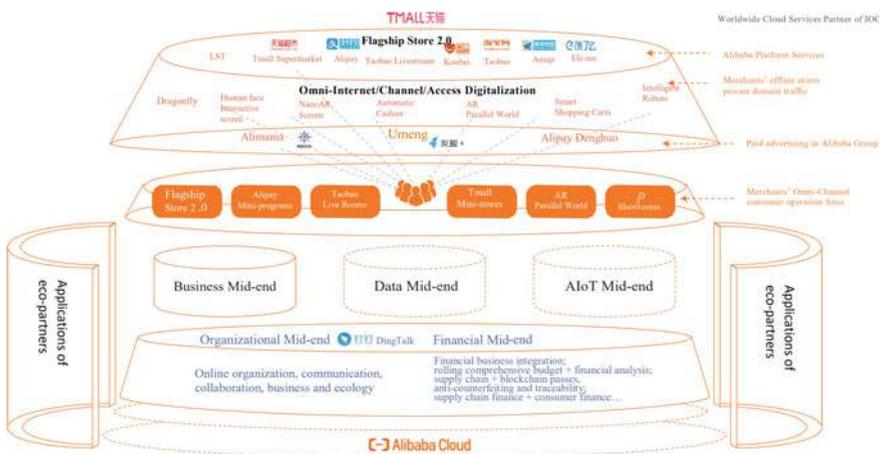
Fig. 3 Alibaba's business operating system

to embrace the online and offline integrated businesses in the whole domain. With the conversion to some extent, these merchants can own an enormous number of "new clients". As the consumer decision chain continues to evolve, so does consumer-focused marketing. In the end, only the numbers of consumers actually served and the digital consumers accumulated are the effective answers in terms of "new clients".

3.2   New Products

New product innovation is one of the core competitiveness of an enterprise. It is relatively easy for a company to launch a new product, a "hit product", but it is difficult to have the ability to innovate faster and with a higher success rate. This requires companies to plan new products based on consumer demand rather than production capacity, and target their new products precisely at interested consumers based on global consumer insights.

"Hits are not pure luck." In 2018, 2,000 brands with sales of over 10 million yuan were born on Taobao. As of September 2019, a total of 90 million new products were released on Tmall, and customized new products in the C2M industrial belt increased by 7 times year-on-year. How did so many "new products" with outstanding performance come about? Here are the moves.

The first move: groping the way by throwing stones (brand positioning and product planning). Through Alibaba's panoramic data insight tools (such as business advisor service, Databricks data insight service, etc.), an enterprise can have accurate product and brand positioning, enhance brand value, and guide consumer demand. Our big data analysis can continuously improve prediction accuracy, based on receiving real-time streaming data and the batch data on external cloud storage, in combination with fast iteration of algorithms. After the prediction results are generated, the results are timely fed back to the decision makers of the enterprise, which are used as the basis for brand and commodity positioning decisions and for generating new commodity plans accordingly. At this stage, multi-dimensional analysis will be carried out based on historical sales data, inventory, industry big data, etc. The main goal is to mine market opportunities and blank spots, so as to inspire the corporate brand teams to generate inspirations of new products (combined with market data, crowd research, etc.), clarify brand positioning, and carry out system product planning.

The second move: shooting the arrow at the target (product development). According to the product planning, combined with the analysis of "hit products" and fashion trends in previous years, the ideas, concepts and new product models are tested and confirmed. On this basis, product development and integration are carried out, and pre-launch strategic assistance (accurate crowd positioning, price optimization, communication optimization, etc.) is completed in the process.

The third move: the push–pull method (the creation of a "hit product"). When a new product enters the project stage and is ready to be launched on the market, it could gain brand decision support from various aspects in the new product

incubation stage and the launch strategy stage, with the help of Alibaba's business operating system. Enterprises can use the GROW model to analyze product competitiveness and formulate product tiering strategies; the customized new product launch tracking tool can help brands quickly track the performance of new products, sort out market changes and adjust market strategies. At this stage, the enterprise can conduct feedback analysis of product trial sales on our platforms such as Tmall and Taobao, from sample distribution, public testing, to inspecting details of the figures, evaluations, and feedbacks. With our support to product adjustment and continuous optimization, the enterprise can eventually create a "hit product".

The fourth move: flexible supply (balance of production and sales). After the product plan is determined, the company requires flexible supply capabilities on the production side to keep production and sales in a balanced state. Alibaba's Tao Factory and Rhino Smart Manufacturing Factory are both flexible supply chain production platforms created by Alibaba for enterprises. These platforms have the ability to support fast and flexible supply chains, which empower the B-side, and then serve the C-side through the B-side. The core of such a flexible supply capability lies in "production on demand" and "production based on sales", that is, the realization of C2M's customized production mode. Take Alibaba's Rhino Smart Manufacturing Factory (Clothing Smart Manufacturing) as an example: the design side (product solution) is connected with the manufacturing side; the market side (user order data) is connected to the production and supply side. Order information and production data can be quickly fed back to the production end, and with highly flexible production lines and facilities, high-speed customized production can be achieved.

All the moves above, crowd research, market insights, and the creation of "hit products", are based on demand; that means a shift from traditional B2C to C2B, followed by expansion to more C, based on rapid market feedback and verification of the product (a model of $C2B2C^n$).

By positioning, designing, producing and promoting new products in this way, more trendy new products can be developed and produced, while speed, cost and other advantages do not come at the expense of quality and accuracy, thus achieving multi-party value creation and win–win situation. The development of new products driven by digital intelligence not only empowers brands to gain insight into market opportunities and launch new products with quick iterations in small but quick steps, but also provides more possibilities to meet the potential needs of consumers for current consumption upgrades.

Alibaba has opened Freshippo stores offline, and in cooperation with RT-Mart, an offline retailer, it has opened Hexiaoma, a quasi-Freshippo store inside the mart. These will highly complement RT-Mart's already mature hypermarket experience and provide fresher and more refined global goods. Freshippo's product plans derive from online and offline global consumer insights.

In the past, the Freshippo stores did not dare to sell Australian lobsters or Boston lobsters, for fear that such expensive items could not be sold in time, but now they dare to sell them. That's because the data will inform store owners how

many lobsters and king crabs should be purchased, and as the operation becomes more accurate, real-time feedback and corrections enable Freshippo to satisfy the ideal life of consumers within three kilometers to its greatest extent.

One thing to explain is that the data here is not the customer list stored in the IT system. That is "dead data", and the real data is "growing data", which is the data that show increasingly comprehensive insight of customers, as exemplified by the data in Freshippo. Through the data, it is possible to predict the preference of customers for purchasing various types of seafood. Today, it is facing our traditional retail problems and using digital intelligence to solve them. As shown in Fig. 4, a Freshippo salesperson is selling products.

In addition to self-exploration, Alibaba's business operating system includes capabilities such as global consumer insight, global membership, multi-terminal cross-scenario operations, data mid-end and digitalizing organization, as well as the concept and methodology of digital intelligence, the competences more intended to help businesses in various industries to grow sustainably.

Take Liby's new product development as an example. The brand owner has benefited from big data-driven consumer insights on the Alibaba platform, and its new product development cycle was shortened from 2 years to 3–6 months, with more than 85% of its new products ranked among the top in the industry within half a year.

Fig. 4 Freshippo's salesman is selling lobsters

3.3   New Organization

Like in the case of Liby, the digital and intelligent transformation of many enterprises can help gain benefits from new customers and new products, and it is the new organization that ensures the sustainability of such benefits. Take the shoe and apparel brand Red Dragonfly as an example. It is making a transformation, shifting from management to empowerment, from empiricism to forging the data-based decision-making competence.

Due to the Covid-19 Pandemic, Red Dragonfly launched the "Dragonfly Battle" project since February 1, 2020, training all employees to sell online, and organizing more than 200 WeChat groups for out-of-store sales. Data shows that during the pandemic period, Red Dragonfly took advantage of the Mid-end Project built in cooperation with Alibaba Cloud, and efficiently migrated its offline business online through Mobile Taobao plus DingTalk, realizing 30% average daily growth rate of off-store sales.

In the past, Red Dragonfly developed products in 1,500–2,000 styles per quarter, many of which consumers actually did not favor. To this end, its senior management embraced changes, and more accurately understood consumers' needs and preferences through our online data and consumer insights service. The number of products designed in the recent quarter went down to 500, with a surprising increase of sales volume.

In the era of digital intelligence, Red Dragonfly centers their designing around consumers and users, and replaces the traditional top-down leadership model with a leadership model driven by operations and business, new technologies and new tools offered by the IT department, and supports from senior management. The truth is revealed that success can only come when a consensus and a highly efficient coordination are achieved among the business end, the technical department and the strategic executive team.

As of 2020, more than 10 million enterprises have achieved digital transformation through DingTalk; about 2 million merchants have established new organization in intelligent customer service; 4,000 merchants have the organization in online consumer insight services; 500 Tmall merchants have established their "departments of Internet new products". The organizational upgrade brought by Alibaba's business operating system to enterprises has shown its magic. Take Baodao Optical as an example. From "618" to "Double 11" shopping festivals in 2019, more than 5,000 shopping guides in more than 1,200 stores of Baodao Optical across the country, as well as more than 2,000 staff working in the headquarters and its dealers, totaling more than 7,000 people, all opened their shopping guide sharing and distribution functions on DingTalk. With the help of the platform's "shopping guide's commission" function, Baodao Optical paid extra commission to these online shopping guides who facilitated the success of transactions, which greatly stimulated the enthusiasm of the shopping guides in promoting sales.

Management capabilities of the digital intelligent enterprise need the guarantee of new organization. This requires managers to change their thinking and push the organization itself towards digital intelligence. Under the flat, open and flexible

organizational form, front-line business data and feedback can be reflowed, analyzed and summarized in real time, and the core capabilities of the company can be efficiently allocated to every front-line employee. On the one hand, the process can serve people and motivate the team to inspire initiative; on the other hand, it can also greatly reduce the cost of collaboration.

On October 29, 2020, at the Alibaba Cloud New Business and Digital Intelligence Summit themed as "New Technology, New Scenarios, and New Business", Alibaba Group executives remarked that the essence of business could be summarized by buying and selling, or supply and demand. Alibaba Cloud has defined the "fields" of new business so as to make buying and selling more efficiently matched, while new customers, new products, and new organization will demonstrate the new business in the era of digital intelligence in a variety of new scenarios. A brand-new era has arrived when all fields are upgraded to digital intelligence.

4   Summary

The era of digital intelligence is a new era centered on consumers (with big data supporting accurate and ultimate experience), led by smart brands, supported by a fast and flexible supply chain, featuring efficient operation with omni-channel online and offline integration.

The transformation is only the means to reach the goal of growth. The main points of this chapter are as follows:

(1) Great changes have taken place in consumer demand and consumption patterns. How to reach consumers in a timely manner, or even predict potential demand, requires companies to digitize consumers.
(2) Consumers have developed the habit of comprehensive online consumption, which has brought explosive growth of online sales. Consumers' strong voice and their personalized and fragmented needs are pushing enterprises to change their concepts, styles, and methods, to realize online organization, online business, and online ecology, and finally form a globally integrated response strategy focusing on consumers as the core.
(3) Business development driven by digital intelligence is dependent on new technologies, and the three key elements of new customers, new products, and new organization have constituted the major driving forces ensuring new growth.

New Infrastructure in the Era of Digintelligence

Dongying Hong

This chapter illustrates the macro trends of the New Infrastructure in the era of digital intelligence reflected by the vicissitudes of infrastructure construction, and further analyzes how companies handle the gigantic opportunities and challenges brought about by the variables intrinsic to the New Infrastructure.

1   Overview of the New Infrastructure

If the infrastructure represented by "railways, highways and airports" has driven China's socio-economic prosperity in the past decades, what should be the New Infrastructure that will support its continuous social progress in the next 10 years?

In March 2020, a CCTV feature report initially defined the New Infrastructure and summarized the seven major areas involved, including Ultra-High Voltage, charging piles for new energy vehicles, 5G base station construction, big data centers, artificial intelligence, industrial Internet, intercity high-speed railways and intercity rail transportation, as shown in Fig. 1.

On April 20, 2020, the National Development and Reform Commission (hereinafter referred to as NDRC) of China defined the "New Infrastructure" as an infrastructure system led by new development concepts, driven by technological innovation, and based on information networks, aiming to provide services including digital transformation, intelligent upgrades, and integrated innovation so as to meet the needs of high-quality development.

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

Fig. 1 Seven major areas involved in new infrastructure
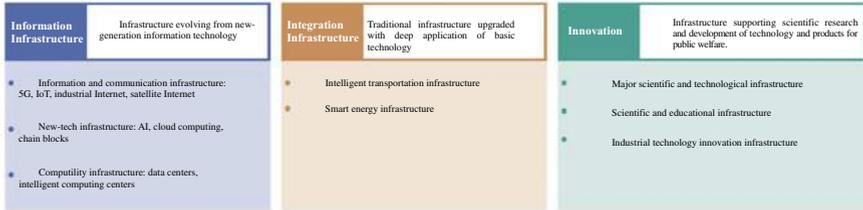
Fig. 2 Three development aspects of new infrastructure

At the same time, the NDRC of China designated the three dimensions in developing the New Infrastructure, namely information infrastructure, integration infrastructure and innovation infrastructure, as shown in Fig. 2.

The New Infrastructure has a dynamic system of dimensions, which will be constantly updated and enriched with the development of industries and technologies.

In the tide of New Infrastructure, an increasing number of local governments have announced the list of their New Infrastructure construction projects, actively promoting the implementation. For example, on August 11, 2020, Hunan Province released its list of 100 "Digital New Infrastructure" landmark projects of the year, with a total investment of 56.378 billion yuan on these key projects as traction in accelerating digital industrialization and industrial digitization and boosting the digital economy.

In addition to local governments, technology giants have expressed confidence in the development of the digital economy, vigorously contributing to the New Infrastructure and participating in the layout. Alibaba Group can be taken as a case in point. On April 20, 2020, Alibaba Cloud announced to invest another 200 billion yuan in its New Infrastructure Business Layout in the next three years, partly for global data center construction, partly for major and core technology R&D and future-oriented data center construction, represented by cloud operating systems and servers, chips, networks, etc., as shown in Fig. 3.

To sum up, unlike the traditional infrastructure of the industrial age, represented by "railways, highways and airports", the New Infrastructure is based on emerging technologies, especially the information technology. As the basic facilities of the information age, or the age of digital intelligence, it is also the foundation of and the guarantee for the digital intelligence transformation.

Fig. 3 Schematic diagram of alibaba cloud-related businesses

The New Infrastructure and the traditional infrastructure are the same in the sense that they are conducive to stimulating economic growth, releasing long-term economic growth potentials, and creating convenience for people's lives. Their differences lie in the different backdrops of era.

There are three main definitions of the New Infrastructure, differentiated by their senses:

(1) In the "narrow sense", the New Infrastructure refers to brand new infrastructure related to the digital economy, including 5G networks, data centers, artificial intelligence, industrial Internet, and IoT.
(2) In the "new sense", the New Infrastructure refers to the construction of sci-tech infrastructure, demonstrating the brand new concepts of innovation-driven development and green growth, covering the above-mentioned seven major areas of the new infrastructure.
(3) In the "broad sense", the New Infrastructure spans not only the foundation of the digital economy such as clouds, pipelines, edges, and terminals, but also the digital transformation and upgrading of traditional infrastructure represented by "railways, highways and airports".

2 What's New in the New Infrastructure?

The New Infrastructure is a construction applying "new" technologies to "new" scenarios, with the participation of "new" entities, and a purpose of fostering "new" industries. The new era grants new dimensions to it, reflected in new technologies, new applications, new industries and new subjects.

- New technologies: The New Infrastructure is based on new technology, and the core technology of the next-generation information infrastructure grows out of the profound integration of 5G with the IoT, artificial intelligence, big data, cloud computing, industrial Internet and other fields.
- New applications: The New infrastructure is not to overthrow traditional infrastructure, but to empower it and explore into new application scenarios.

- New industries: The New Infrastructure promotes the advanced smart technology-related industries to develop, while initiating the overall upgrading of the industrial chains as the basic facility of the smart economy.
- New Entities: The New Infrastructure encourages the participation of private enterprises, further liberalizing investment market access and improving resource utilization efficiency.

In addition, the New Infrastructure has showcased the following three co-existing characteristics:

(1) "Data empowerment", which emphasizes data as the basis for intelligent decision-making; data, as an important part of the New Infrastructure, offers the basis for users to make intelligent decisions. The key to digital transformation is data assetization, while the key to realizing data value is unification of cloud and edge data, automated and intelligent storage, unified management and real-time analysis of massive data. Here are some examples of traditional infrastructure empowered by data:
    - Epidemic big data empowers traffic control, tracks the flow of people, and guides epidemic prevention and control.
    - The combination of medical imaging AI and medical equipment enables rapid diagnosis.
    - E-commerce data and logistics data are combined to match the supply and demand of materials precisely.
(2) "Coordination and integration", which means that all components of the New Infrastructure, instead of being isolated and operating separately, are interconnected as a network of multiple basic facilities.
(3) "Application flexibility", which means that the New Infrastructure can quickly allocate resources and adjust functions according to changing conditions. Take emergency applications as an example: under the unusual circumstances of an epidemic outbreak, cloud computing can quickly allocate data resources such as communication network and computing resources so as to launch emergency applications. After the lift of emergency, those resources can be soon released.

3   Trends in Industrial Ecology

This section will explain two key entries to illustrate the trends of the industrial ecology in the tide of the New Infrastructure.

(1) Digitalization of Society. The year of 2020 was extraordinary. The appropriate key word to define the year is the digitization of society, if we look back on the major changes in our way of life, from the epidemic outbreak to the resumption of work and production, to the full digitization in new scenarios

and new businesses. In that year, the COVID-19 pandemic accelerated such social digitization. Teachers who used to be more reserved to technology began to learn how to live broadcast, take screenshots, and wake up the children sleeping on the other side of the screen. That is the reality we are seeing today. Cloud classes, cloud office, and even cloud medical treatment all feature digital integrated scenarios, meaning there is always a scenario integrated with digital technology for people, be it in education, work or medical treatment, or even travel.

(2) Upgrade of All Scenarios, triggered by the integration into the New Infrastructure. In 2020, Chinese people enjoyed a unique digital dividend in the world. Digital platforms such as DingTalk, Didi, Ele.me, and Freshippo ensured conveniences for work and life. Our gratitude should go to the advanced construction of digital infrastructure throughout China. This can be contrasted with the SARS epidemic in 2003, when China's digital infrastructure was offering services based on text messages and web pages, quite different scenarios in people's work and life from now.

So what do we look at in the future? We will see the integration of physical infrastructure and intelligent technology base, and an array of new scenarios evolving out of such integration. Here are three major representative integrated infrastructures. They are:

(1) Urban infrastructure (represented by the City Brain).
(2) Energy infrastructure (represented by the Smart Grid).
(3) Transportation infrastructure.

We have noticed that starting from 2020, autonomous driving, smart energy, etc. have all entered a new construction cycle. In the next ten years, digital and intelligent technology will be further integrated and superimposed into the three infrastructures above, which is bound to foster a huge industry. In other words, the new business era has come, featuring the "Upgrade of All Scenarios".

4   Digital Infrastructure in Alibaba

In the fields of new digital infrastructure such as 5G, artificial intelligence, industrial Internet, and databases, Alibaba Cloud has ranked among the top three in the global cloud computing market, with its technical indicators having reached a world-class level.

At the 2020 Alibaba Cloud Summit, Zhang Jianfeng, president of Alibaba Cloud Intelligence, announced for the first time the "Three Major Directions" of Alibaba Cloud's regrowth to target at building infrastructure of the digital economy at full speed, mainly including the following three endeavors: "building a deep foundation", "forging a solid mid-end" and "strengthening the ecosystem".

(1) "Building a deep foundation": extending downward from Ali Apsara Cloud Operating System to define hardware, which involves large-scale introduction of top sci-tech talents, in particular key technical talents in core technology fields such as servers, networks, chips, databases, and artificial intelligence. The logic behind is not simple substitution, but building an entire basic system in accordance with the characteristics of the cloud. Just like years ago, when Alibaba launched the initiative of "Taking off IOE" (getting rid of IBM servers, Oracle databases and EMC storage devices), it was not to adopt another minicomputer to replace the old one, but to overtake the horse-hauled carriage of the old era with Ali Cloud, a new combustion-driven car.

(2) "Forging a solid mid-end": profoundly integrating DingTalk and Alibaba Cloud to form a unity. With the new cloud architecture combining with the operating system, platform services could be offered to enterprises, enabling them to develop and manage all organization and business applications at fast pace. Such a unity will be elaborated in chapter "Infrastructure Cloudification".

(3) "Strengthening the ecosystem": establishing a prosperous application ecosystem based on cloud and new operating systems. At present, Alibaba Cloud has reached the world's top level in terms of software, but real prosperity should be manifested in diversity. As the future business system becomes more flat and integrated, Alibaba will be oriented to an application service ecosystem for wide-ranging industries in diverse sectors, and opening up infinite possibilities in working with ecological partners to build digital economic infrastructure. At present, Alibaba Cloud has launched solutions for seven major industries, covering digital government, operators, future community, future education, smart transportation, new finance and industrial manufacturing.

In addition to Alibaba Cloud's endeavors in New Infrastructure, Alibaba has also stepped up its efforts in the field of AIoT (the integration of AI and IoT), to provide partners with full capabilities ranging from the cloud to terminals, from technology empowerment to commercial realization. Currently, Alibaba has deployed four IoT core nodes and 14 accelerated computing nodes around the world, supporting 12 languages and covering more than 200 countries and regions. Therefore, an equipment manufacturer only needs one set of SDK to conduct overseas sales, substantially cutting back the costs. Specifically, Alibaba's AIoT strategy is aimed at providing partners with technologies centered on AI + IoT, so as to create hundreds of 10-million-scale intelligent hit products equipped with various functions in connection, voice interaction, semantic analysis, visual recognition, chip modules, etc.

For example, Alibaba customized a set of enterprise-version Tmall Genie for the property developer CIFI Holdings. Among all its functions, this product can connect all front-end and back-end devices, which means that all automated devices can be fully integrated through Tmall Genie. Additionally, it is able to connect the inside and outside of the venue or the room; when one wants to go out, he can call out "Get the elevator for me!" to the Tmall Genie, and the elevator can

be ready within ten seconds or when he is ready to go. Such services certainly require collaborative efforts with partners to enhance the user experience.

Here are two more cases to show how the construction of digital infrastructure empowers other industries.

1. **Alibaba provides new digital infrastructure for Chinese factories**

In terms of industrial belt empowerment, Taobao C2M Division and 1688 are the main forces. The former has launched the "Super Factories Plan" and "Ten Billion Production Area Plan", aiming at helping 1,000 industrial belt factories achieve a total output value of over 100 million yuan within three years.

Among them, the C2M model is to link factories directly to the consumer market, turning the individual needs of hundreds of millions of buyers into a perpetual motion machine for the thousands of production lines in the industrial belts.

1688, on the other hand, focuses on the New Wholesale concept, allowing factories in China's core industrial belts to efficiently connect to the final end of China's commercial capillary channels, through digital distribution supply chains.

Zhejiang province is the benchmark of "made in China", while its Jinhua city is known as the "Golden Card" of "made in Zhejiang". Various business units of Alibaba work together to provide digital infrastructure and services in the fields of new product development, marketing, supply chain and finance for the Jinhua industrial belt, transforming the traditional factories into "super factories" and ushering in full digitalization of this belt.

The New Wholesale model of 1688 has now covered 70% of the national manufacturing industry belts, and is the main digitizing channel for those belt factories. Among them, more than 30 million SMEs, through the digital supply chain behind 1688 New Wholesale, have quickly completed accurate matching with the demand side.

2. **Alibaba's new digital infrastructure for comprehensive healthcare**

In addition to Alibaba Health, Alibaba's comprehensive health ecosystem includes all other platforms that are related to medical and health services, such as Alibaba Cloud, Damo Academy, DingTalk, Alipay, and UC.

The Alibaba comprehensive health ecosystem consists of platforms, technologies, content, products and applications, the layout of which is displayed in the Overview of Alibaba's Comprehensive Health Digital Infrastructure released by Alibaba Research Institute, as shown in Fig. 4.

The landscape above shows a system of various application services in the field of medical and health care, which derive from the basic platforms of Internet payment and credit system, data mid-end, medical cloud and other industry applications, all based on Alibaba cloud computing.

Specifically, this big picture of the digital health infrastructure includes first the "base" of digital technology infrastructure, composed of cloud computing, big data, artificial intelligence, Internet of Things, etc. Built on the "base" are

Fig. 4 Alibaba's Layout in New Medical and Health Infrastructure

the fundamental platforms of industry applications, deeply rooted in the digital infrastructure and playing their roles in the current practices of medical and health industry, including Alibaba's Internet payment and credit system, regional health cloud, digital medical community, various code engines and medical data platforms, etc., from which a range of featured products and services could possibly emerge.

Built upon the two levels above is the digital health service system of Alibaba Health. This system not only includes patients-oriented products and services such as Internet medical treatment, medical e-commerce, online medical science popularization platforms, electronic medical insurance cards and electronic

health files, but also includes industry-oriented traceability system, medical artificial intelligence, hospital online management system, etc. Particularly, it includes the epidemic emergency management system built in support of the governments during the Covid-19 Pandemic.

Upon the outbreak of the coronavirus pandemic, Alibaba Group launched a series of impressive "combination blows". From science campaigns on epidemic prevention to 24-h epidemic reporting, from the Hubei free clinic platform to free medical consultation services for overseas Chinese, from developing health codes in support of epidemic prevention and control to providing online nucleic acid testing appointment services, all of these have demonstrated the roles and capabilities of new digital infrastructure. Those moves also benefit from the solid foundation in digitalization accumulated in Alibaba's technical services.

Facts show that Digital Health is bound to become an essential part of the next-generation infrastructure construction of our medical system. In this process, platform companies do not only participate in the construction, but also lead the innovation. The new digital infrastructure as a breakthrough, will promote the upward transformation of all industries, which is a long-term, comprehensive and consensus-based process.

The digital economy, an emerging form of economic development, can be defined in the framework consisting of "Four Features", explained as follows:

(1) Digital industrialization: focusing on the information and communication industry, which provides technologies, products, services and solutions for the digital economy.
(2) Industrial digitalization: referring to the production efficiency enhancement brought by the application of digital technology in traditional industries, and thus providing a broad space for the development of the digital economy.
(3) Digital governance: referring to the application of digital technology in governance and public services, which constitutes an important part in promoting the modernization of the national governance system and capacity.
(4) Data value: including but not limited to data collection, data labeling, data flow, etc., which stand as key element in the growth of digital economy.

As mentioned earlier, the New Infrastructure has been designed to have a scope covering the three aspects of "information infrastructure", "integration infrastructure" and "innovation infrastructure".

Among such three dimensions, information infrastructure includes the basic facilities evolving out of a new generation of information technology, such as 5G, IoT, industrial Internet, etc.; integration infrastructure encompasses intelligent transportation infrastructure, and smart energy infrastructure, etc.; innovation infrastructure mainly refers to the infrastructure with public welfare attributes, offering support to scientific research and development of technology and products. The first two dimensions of the New Infrastructure are in close accordance with the "Four Features" mentioned above, for they could consolidate the foundation of the digital economy in an all-round way and empower its development. Specifically,

the information infrastructure, with a focus on the innovation and power-lifting of the core technology of the next-generation communication network, presents an effective boost in building the foundation of digital economy.

Integration infrastructure, mainly dedicated to accelerating the process of integrating the next-generation core information technologies into various sectors of our society, empowers social production with digital capabilities.

5   Summary

This chapter illustrates the trends of the New Infrastructure in the era of digital intelligence from the perspective of the changed eras, and further demonstrates the great opportunities and challenges that companies will encounter in facing the variables of the New Infrastructure. Here are the essential points:

(1) Overview of the development of New Infrastructure: The traditional infrastructure, namely the "railways, highways and airports", belong to the industrial age, while the New Infrastructure, based on emerging technologies, especially the information technology, suits the needs of the information age or the digital age and exists as the foundation and guarantee of digital transformation.

(2) The New Infrastructure is aimed at applying "new" technologies to "new" scenarios, with the participation of "new" entities, and a purpose of fostering "new" industries.

(3) The new trend of the industrial ecology in the tide of New Infrastructure: "digitization of society" and "upgrade of all scenarios, triggered by the integration of the New Infrastructure". The two dimensions of the New Infrastructure, information infrastructure and integrated infrastructure, could offer effective support to demonstrating the "Four Features" of the digital economy, and in an all-round way consolidate its foundation and empower its development.

Digintelligence Growth Based on Commercial Operating Systems

Ye Tian

There is a high degree of similarity between the development of an enterprise and the evolution of organisms. Every time the environment changed, an array of new species emerged. The technological changes in the business environment and altered consumers also push the evolution of new corporate "species", whose survival depends on whether they could keep up with and adapt to the changes in the market environment. It's not that Kodak's photosensitive film technology was outdated, nor did Nokia lower the quality of its mobile phones. These brands once swept their opponents in the industry, but eventually lost to the times. The new business environment created by digital intelligence technology requires enterprises to transform and upgrade, and the growth pressure encountered by enterprises in their development can be solved with new technical means. The following sections are dedicated to a discussion on what the relevance of digital intelligence technology is to enterprises, and what problems enterprises are facing can be solved with the technology.

1   Digintelligence Solves Corporate Problems

The various problems encountered in the development of enterprises today seem complex on the surface, but underneath they could be concluded as one issue that that levels of digital intelligence in those corporations do not match the needs of enterprise management. The following common problems listed are cases in point

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

to illustrate how those corporate agonies can be solved through digital intelligence technology.

(1) Inventory backlog. For retail enterprises, especially the footwear and apparel industry, inventory management has always been a daunting challenge, and it is also the key to the success or failure of a brand. The essence of the inventory problem is the misalignment of planning and sales. Through digital intelligence, commodity sales forecasting can be achieved, and inventory can be dynamically and intelligently adjusted. With the forecast ability based on data, it is possible to set production and prepare warehouses based on sales, and deliver quick orders in small batches, achieving flexible inventory management, and solving the problem of inventory backlog caused by inaccurate planning at the root.

(2) Low success rate of new products. Traditional product development relied on the experience of developers and their ability to interpret market intelligence. As a result, the new product development cycle was long and the cost was high, with disappointingly low rate of success. Often, a "hit product" could support a brand for many years, but the enterprise died as the product went out of production. Now when digintelligence is ushered in, the new product development relies on the big data industry forecast, while digital simulations could be utilized to test product elements in the development process, and data indicators are monitored throughout the process since the launch of the new product. So, products could be rapidly iterated, greatly improving the success rate.

(3) Frequent occurrence of channel conflicts. Problems such as smuggling, counterfeiting, and channel conflicts are stubborn problems in the retail industry. The digital intelligence technology marks the unique identification code of the commodity, which can trace the source of the commodity throughout the whole process. RFID (Radio Frequency Identification) can help track the location of goods in real time, analyze the logistics path, and then control the channel.

(4) Difficulty in evaluating advertising effects. Brand marketing and promotion requires huge amount of advertising, with high cost paid only to achieve unpredictable effects. Nowadays, with so many forms of new media, such as anchors, talents, self-media, etc., information flow delivery relies on data for evaluation and management before, during and after the placement. Digital intelligence can save a lot of costs in marketing trials and errors for enterprises.

(5) Lack of basis in planning. Enterprises formulated annual sales targets generally based on several rough data dimensions such as the previous year's performance and industry growth rates. Such plans are not systematic or accurate. When it was necessary to disassemble the plan into implementation plans in marketing, production, channel, etc., resistance was bound to occur, worsened with a shortage of data support. When digintelligence is ushered in, the sales increment could be estimated based on the growth of consumer

assets, and the target could be divided through algorithms based on data of marketing, production, channels, etc., and an accurate and feasible operation plan is thus formed.

(6) Difficulty in profit control. There are constants and variables in the cost of an enterprise. Profits could be directly impacted by marketing costs, pricing and concessions on the sales side, and also be influenced by factors such as changes in the cost of raw materials on the supply side of the commodity and price fluctuations in low and peak production seasons. The front-end and back-end information is often not synchronized, leaving the sales end usually not knowing about the varying costs of the products and making the marketing investment based on original costs. With the transformation of digintelligence available, enterprises can break through data barriers between departments since the commodity center could facilitate their understanding of cost data in real time and making intelligent loss warnings when formulating marketing plans. This further helps companies control costs and ensure profits.

(7) Unstable production intervals. Production in self-owned factories and rigid supply chains were often trapped in the extremes of outrageously busy and completely idle. Now the transformation of digintelligence could coordinate multiple factories horizontally, while collaborating the upstream and downstream of the supply chain vertically, so even the gigantic orders from top anchors of livestreaming sales requiring short-term delivery can be produced in time.

(8) Difficulty in expanding new channels. Due to the disproportion between input and output, most enterprises gave up developing small and micro channels, sunken channels, or overseas channels, etc., but now they can use the S2B2C platforms to distribute goods to these emerging channels with one click, and use digital and intelligent means to conduct management.

(9) Unreasonable performance appraisal. As an issue that employees are most concerned about, performance appraisal can often only assess the result-oriented data: sales, profits, growth rates, etc. However, attributing factors in those performances have been difficult to detect and motivate. It has not been uncommon to see the inflated sales brought about by over-marketing and employees appropriating the work results of colleagues just to achieve their own assessment goals. But after the business moves online, every work behavior of employees could be digitally recorded, so that the assessment can be traced and evidence-based. At the same time, through the AI algorithm, a comparative study of successful samples can be carried out to find out the key common behaviors that deliver the results, and then employers could deepen the incentives for these behaviors, realizing a shift from result assessment to process assessment.

(10) Poor coordination among departments. There have been many "walls" among corporate departments, resulting in mutual blaming and lack of understanding between those departments, creating difficulties in communication and collaboration. A great deal of energy of the CEO could be spent coordinating

departmental relationships. However, as the mid-end system is established with digital intelligence transformation, general capabilities of the enterprise are "packaged" into business centers, and the front-end system can call out the various capabilities of the mid-end system at any time. In this way, the previous "walls" between departments could be smashed, with communication and collaboration accomplished through online tools. For example, when the North China Marketing Center plans a marketing activity, it can directly call the various data, marketing plans, supplier resources, etc. of the corresponding activities that have been done by the South China Marketing Center through the mid-end system, and directly grasp the key experience such as product configuration, preparation process, and implementation points.

In summary, some common problems of enterprises and how these problems could be solved with transformation of digintelligence have been elaborated above. Those are just the tip of the iceberg of the business problems that digital intelligence can solve. Knowing such variety in the benefits, you may wonder: is there a complete blueprint that can help companies plan the entire path in the transformation of digital intelligence?

2   ABOS Empowers the Transformation of Digintelligence

Alibaba, as the pioneer in the transformation of digintelligence, has evolved a complete business operating system for the digitalized era based on over ten years of practice. Enterprises can directly utilize this system and complete their own transformation. ABOS (Alibaba Business Operating System) is structurally represented as: One Cloud, Multiple Ports, Five Mid-ends and Various Industry Applications, as shown in Fig. 3.

One Cloud refers to Alibaba Cloud, which is the foundation of the transformation. Only by moving data to the cloud can data silos be broken.

Multiple Ports include various applications associated with Alibaba: in e-commerce, 1688, Alibaba International Station, Alibaba LST, Taobao, Tmall, Tmall Supermarket, Tmall Global, Rural Taobao, etc.; in finance and payment, Ant Financial and Alipay; in local applications category, Ele.me, Amap, Koubei, Fliggy, Damai, etc. as well as Youku in pan-entertainment, Cainiao in logistics, and Intime, Freshippo, etc. in offline retail. All those ports can empower enterprises in building channels, implementing logistics and expand marketing campaigns in a digintelligent manner. The customized port on the enterprise side can be integrated into mini-programs of Taobao and Alipay, or an independent App can be constructed through Alibaba Cloud technology.

Five Mid-ends refer to the data mid-end, business mid-end, AIoT mid-end, financial mid-end and organizational mid-end. The data mid-end functions to analyze and process data, to obtain data assets that can be analyzed and reused to empower businesses, and to optimize business processes and enterprise resource allocation through big data algorithms. The business mid-end includes business

centers such as commodity center, marketing center, member center, order center and corresponding middleware, as well as professional database services. The AIoT mid-end provides solutions featuring the Internet of Everything, including intelligent manufacturing, PAI (Platform for Artificial Intelligence), IoT technology platform, etc. It is a technology mid-end for enterprises to build smart factories, logistics and commerce. The financial mid-end connects the business system and the financial system, and then obtains the capabilities of financial configuration management, financial accounting, settlement, receipt and payment management, and bill management. The organizational mid-end is the DingTalk mobile intelligent collaborative platform, which can help enterprises to achieve online organization, communication, collaboration, business and ecology.

Various Industry Applications cover all the digital and intelligent products developed by Alibaba and its ecological partners for various industries, which include functions of universal digital payment, consumer attraction, intelligent customer service, intelligent location selection, sales forecast, intelligent product selection, omni-channel membership, etc. The applications serving retail brands of fast-moving consumer goods, clothing, and home appliances include digitalized stores, retail consultants, on-shelf product identification, remote store inspections, and blockchain traceability. For retailers such as supermarkets and department stores, there are applications of indoor maps, store patrol robots, smart shopping guides, digital large screens, etc. In addition, applications serving industries likes catering, cultural tourism, banking, real estate, etc. are constantly being launched. Enterprises can directly empower their own business through these products, or they can cooperate with Alibaba to develop applications suiting their unique needs, such as smart ranches, smart warehouses, and virtual showrooms.

Enterprises can build their own digital transformation strategy through the Blueprint outlined by Alibaba Business Operating System. They can apply Alibaba Apsara platform in IaaS layer, build their own business mid-end and data mid-end in PaaS layer, introduce or develop application products in SaaS layer to solve enterprise's problems, and expand marketing, retail and logistics capabilities in BaaS layer with the help of Alibaba's platforms.

3   Summary

(1) The core contradiction of the enterprise has been reflected as the conflict between the degree of digitalization and the complexity of business development. Through transformation of digital intelligence, many enterprise problems will be solved.
(2) The transformation of digital intelligence is no longer a slogan. ABOS has now provided an overall blueprint and implementation plan for such a revolution.

Digintelligence Reconstructs the Eleven Elements of Business

With more than 20 years of development, Alibaba Group has grown a strong e-commerce ecosystem, instilled the world's leading big data technology in business, and evolved a new business operating system, which can facilitate businesses in building their capabilities in digitalized business. The 11 business elements in enterprise operation (including brand, commodity, manufacturing, channel, marketing, retail, service, logistics, finance, organization, and technology) will be transformed by Alibaba Business Operating System to become digital and intelligent and be online, thus building a bridge for the digital and intelligent transformation of enterprises.

Digital intelligence technology not only better opens up online sales channels, but also changes the basic enterprise operations. With consumers as the core, it drives various business elements and forms a reverse power chain; it pushes the technology through the entire path of brand marketing, supply chain management, commodity design, and channel management. All enterprises need to build a fully digital enterprise brain so as to embrace digital operation. Alibaba's business operating system will export a complete set of digital capabilities for enterprises, rather than providing individual tools. The sales platform, logistics, supply chain, and cloud computing within the Alibaba Group will, in an integrated manner, all contribute to the digital transformation of the retail industry, the business structure change, and business efficiency improvement, thus achieving new business growth.

This part provides a comprehensive explanation on how the 11 elements of Alibaba Business Operating System could be reconfigured and upgraded through digital intelligence technology.

Digintelligent Brands

Ye Tian

Brands are the cognitive bridge between consumers and commodities, and they are also important assets of enterprises. Brand positioning, operation, and dissemination are related to the success or failure of an enterprise. Traditional brand positioning has often been based on the founder's experience and intuition accumulated after long-term observation of the market, which explains why brands have demonstrated partiality, one-sidedness and inflexibility. Now, however, with big data resources and analysis capabilities introduced, brand positioning can be based on data, and market behavior can be verified with data, which greatly improves the accuracy of brand positioning.

Before the era of digital intelligence, the development of brands has depended on the expansion of channels and campaigns in the media. Businesses could not possibly directly connect with consumers, so they could not truly understand consumers' needs. That's why brand marketing behavior has often been carpet bombing with advertising. When companies replaced consumers' category perceptions with brands, they recruited agents to build channels. However, after the advent of the era of digital intelligence, brand campaigns enter the precise consumer-reach mode, which could be adjusted in real time according to the effect of marketing behaviors. Some cutting-edge brands have owned their own self-media, built consumer communities, and formed private domain traffic pools, so that the feedback cycle of brand behavior has shortened from the original time unit of years to time units of months, or even real-time feedback, significantly enhancing the brand's competitiveness. The comparison between the development

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

Table 1 Comparison between traditional brands and digital intelligent brands

Traditional brand Development	Digital intelligent brand Development
Experience-and-intuition-based strategic brand positioning	Data-based market positioning and entry point location
Disconnection between brand and consumers	Connection between brand and consumers
Difficulty in measuring brand assets or forming appeal	Real-time searchable brand assets and accessible consumers
Brand growth path relying on channel expansion	Brand growth path relying on consumer digital operations
Carpet bombing in campaigning	Surgical Strikes in campaigning

of traditional brands and the development of digital and intelligent brands is shown in Table 1.

1   Digital Market Analysis and Brand Positioning

Around 2015, China's real estate transactions surged, driving the boom in the furniture industry. Many furniture manufacturers, having seen the success of Internet brands such as Linsy and Uvanart, wanted to get rid of the simple foundry model and transform into furniture brands. Almost overnight, a large number of online stores emerged in the furniture industry in cities such as Dongguan and Foshan. They did not change the design style of foreign processing orders, but only adjusted them to suit the size of Chinese factories before quickly distributing them to Taobao and Tmall stores, trying to occupy the market with low prices by the cost advantage. After 3 years, the vast majority of furniture manufacturers suffered bitter failure. Why was that?

The growth of any brand has an important window period. As long as the window period is over, the probability of success is low. In 2015, the rapid development of the real estate industry indeed provided a development opportunity for the furniture industry, but that was only a short-term opportunity. However, it often takes a certain period to build the brand and to boost its competitiveness in terms of commodities, marketing and operations, namely building the brand's competitiveness barrier. Those require brands to choose a long track rather than a short track. For short-term opportunities, one can speculate, but only to operate on the business level, not to forge a brand. What is the long track of the furniture industry? A style based on a certain value orientation is the answer. After 2015, the rigid-demand consumption in the furniture industry has come from the "Gen Z" people born in the 1990s. Their favorite style is the Nordic style, and behind this style is their understanding and experience of life. As can be seen from the data in Fig. 1, ① Before 2014, the search indexes of Nordic style and American style were the same. ② From 2014 to 2017, the search index of keywords such as Nordic style and minimalist style in the furniture industry continued to increase, and the growth rate of words such as American style and Mediterranean style was far less

Fig. 1 Development milestones of home design

than that of Nordic style. ③ Since the second half of 2017, the search index of all these keywords has dropped on a large scale, because real estate transactions have slowed down and the dividend period of the furniture industry has passed, resulting in the temporary closing of the track.

As can be seen from Fig. 1, the best entry time is indeed around 2015, but in terms of style selection, Nordic-style furniture with a high outbreak factor should be the choice, instead of its levelling-out American-style counterpart. Merchants who entered the Nordic style furniture track in 2015 ushered in a full-scale outbreak in 2016 and 2017. In those two years, if a company quickly occupied market share, gained a competitive edge, and seized the traffic entrance and the minds of target consumers, there could be a high probability of building a brand. On the other hand, if the company, just like the swarming factories mentioned above, did not analyze the market or build core competitiveness, but directly brought products developed for foreign markets to the Chinese market for vicious price competition, then it not only would not achieve its brand dream, but also would face great risks, even losing the money earned previously from foreign trade.

It belongs to the fundamental skills of all entrepreneurs and marketers to assess the market digitally to decide brand positioning and entry point. Among those evaluating skills, there are four important digital dimensions explained as follows:

1. Market size

Whether the market size is large enough or whether it could support one or more brands can be assessed through market data from Business Advisor (a data tool developed by Alibaba). The content provided by the data tool could be used as a reference, as shown in Fig. Analysis Chart of 6 Major Fast Moving Consumer Goods Industries through GROW Model 2. For example, if a company sells snacks and wants to enter the blue ocean market, is it better to start with children's snacks or organic snacks? According to data from Business Advisor, the transaction index of children's snacks keywords is 20 times that of organic snacks. After the search
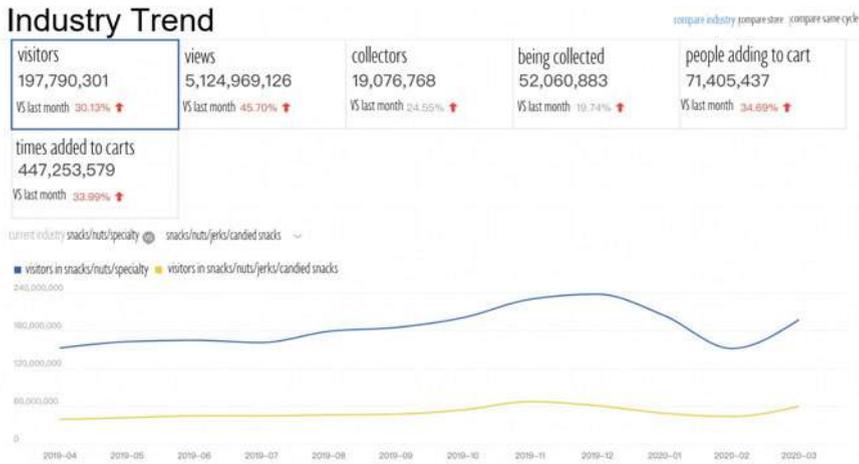
Fig. 2 Referring to what provided by data tools

index of organic snacks is converted into an absolute value, the total number of searchers in 30 days is less than 30,000. According to the 5% average conversion rate of the snack industry, assuming that 1,500 orders are sold per month, with the per customer transaction set as 50 yuan, the monthly transaction volume is less than 100,000 yuan. Therefore, the children's snack market is a better choice than the organic snack market (Fig. 2).

In addition to the existing market data, the scale of the new market can also be predicted by the size of the characteristic behavior groups, providing data basis for the brand to create new categories and develop new markets. For example, the maternity cosmetics market was quite small before 2010, and there were no influential cosmetic brands specifically targeting pregnant women. However, the crowd behavior data indicated that the number of people with dual identities of pregnant women and cosmetics consumers is not small, that is, some consumers still use cosmetics during pregnancy. In this case, providing safe cosmetics for pregnant women can meet their needs and open up new product categories. The rapid development of maternity cosmetics brands such as Mom and Kangaroo Mommy after 2010, based on Tmall, also proves that this market really exists.

The needs of each generation are unique, with "post-80s", "post-90s" and "post-95s" having different needs. Every category of goods thus has the opportunity to be reinvented in new demographics. Jiang Xiaobai for the "post-80s", Chicecream for the "post-90s", and Lelecha for the "post-95s" are all redefining the needs of new groups for those categories. Using data to observe changes in the behavioral attributes of new people provides data support for new brand innovation and old brand rejuvenation. In the work meal takeaway market, consumers who are concerned about quality will choose a one-person banquet, and weight-conscious consumers will favor light meals. We can predict the existence and scale of these groups through the consumption behavior of other industries.
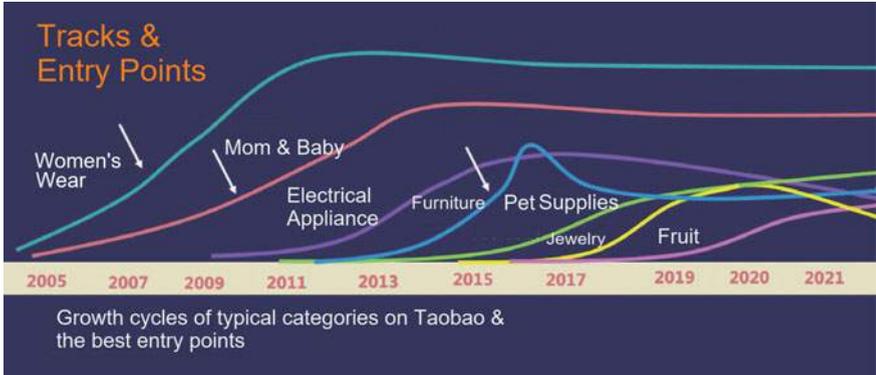
Fig. 3 Chart of development cycle of Taobao commodities category

2. Development trend

From trends reflected in the market size changes of Business Advisor, the category-related keyword search in Baidu Index, and keyword search on Taobao, as well as from Tmall Innovation Center industry development report, etc., we can judge the trends in industry development, category development, and keyword changes. As shown in Fig. 3, each industry has the best time to enter, and each product also has the optimal time to enter. The industry timing corresponds to the category development trend data, and the product timing echoes with the keyword change trend data. 70% of the brand success comes from being on the right track at the right time.

The growth rate of the market share of each category in the industry can be clearly seen from the red and blue ocean analysis of the market in Business Advisor. The x-axis is the proportion of the category's transaction value in the industry, and the y-axis represents the category's year-on-year increase in transaction value. The size of the circle represents the size of opportunity. As shown in Fig. 4, Western-style pastries stand out with a year-on-year growth of nearly 35% in transaction value. This data is from March 2020. It is a period when the epidemic had a greater impact on offline business, with those categories originally with advantages in offline supermarkets and convenience store channels now transferred to e-commerce. That is a market opportunity.

3. Market Competition Intensity

As for how many competitors exist in this market, or how many horses are running on the track, and whether the leading advantage has been formed, we can first filter the price range by searching keywords, then select the target opponents according to the sales volume, and then observe the traffic structure, operation methods of the opponents, and determine the winning rate of the entry against the strengths/
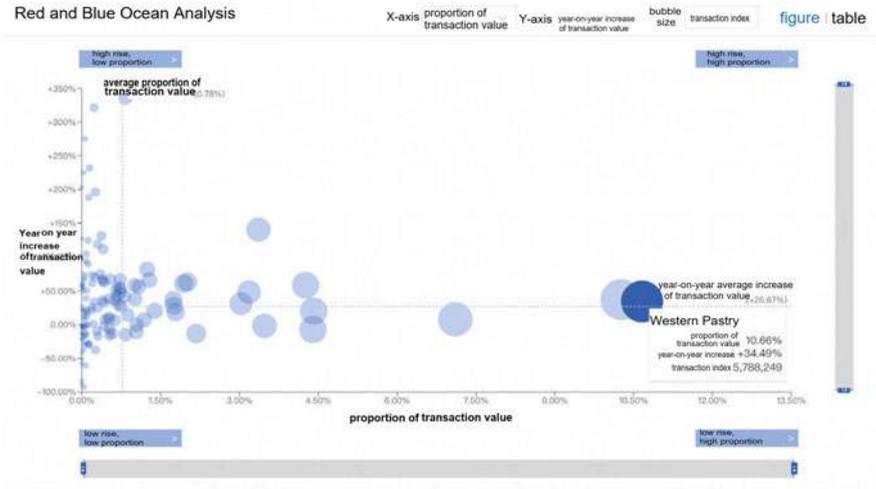
Fig. 4 Red ocean and blue ocean situations of western pastry market

weaknesses of your own brand. At the same time, in an industry where the number of transactions for keyword searches is less than the number of sales of the first and second brands, the market is likely to have formed a monopoly, because more consumers choose to search for brand keywords rather than category keywords and this situation can be regarded as a closing category track.

4. Channel growth opportunities

Every successful brand has to leverage the momentum of a larger platform. If one finds a large emerging channel with a burgeoning number of new people, this is an important opportunity for brand development. From 2008 to 2012, Tmall dividend was the best time for the development of the Taobao brands; the year 2015 was the opportunity for the development of the Weibo cyber celebrity brands; 2016 was the opportunity for the development of the WeChat Business brands; 2017 was the incubation period of the Little Red Book application; years from 2018 to 2020 were the chance for livestreaming brands to grow up. Brands are like fish, and platform channels are like ocean; the probability of success will be greatly increased by entering the ocean currents and following the trend. This is true online, as well as offline. The expansion of MINISO and Kulechaowan has been accompanied by the growth of shopping mall channels, just as LocknLock and Hurom Juicer grew along with the channel of TV shopping, and Hua Xizi and Wang Baobao rose with the growth of livestreaming channels. All have showcased the significance of selecting the right channel for development.

2   Digital Development Path of Brands

From 2015 to 2020, a large number of market disruptors appeared in the cosmetics, household chemicals, food, apparel and other industries. Wang Baobao has occupied the cold-brewed cereal market and became a cutting-edge brand of cereals, with a distant lead in sales in the e-commerce channel; the sales of Three Squirrels have grown from several hundred million yuan to several billion yuan; the sales of Adolf shampoos have surpassed those of traditional international big brands in the e-commerce channels; Perfect Diary and Hua Xizi have overtaken the traditional cosmetic brands and become the up-and-coming national color cosmetics. What has happened in just 5 years that those brands originally with unshakeable market positions had been challenged by new brands? The reason is simple.

Those new brands have found their way to digitalization.

What is the digital development path of brands which have boosted the rapid progress? It has three elements as follows.

1. Whole-chain and full-lifecycle digital management

Brand market positioning, consumer insight, marketing promotion, experience design, and interactive communication can be fully digitalized. Brands can conduct market behaviors through channels and media with digital touchpoints such as e-commerce, livestreaming, and content, and make in-depth data analysis and hierarchical operations on consumers, so as to achieve digital matching of products, content, and crowds. Using digital tools to manage the full-cycle relationship between consumers and brands could form a traffic conversion funnel from awareness to loyalty.

2. Hacker-Style Growth Model

Brands should seize the opportunity to quickly deploy products, highlight MVP (core selling points), and quickly understand consumers. Tests should be conducted with efficiency from crowd promotion circle selection conditions to copywriting communication, from the main images and videos to the anchor presentation methods, so as to realize a closed-loop operation. It is better to race horses than to waste time on selecting horses. All elements of brand marketing must be iteratively optimized using the horse racing model.

3. Resonance between private domain traffic and public domain traffic

After the data reaches the key indicators, the brand should boldly and accurately invest market expenses to continuously expand consumer awareness, and then establish a private domain traffic pool, using Weibo, WeChat Official Accounts or Taobao stores to accumulate fans and forming a free path to a quick and secondary touch. The public/private domain traffic cycle growth chart is shown in Fig. 5.
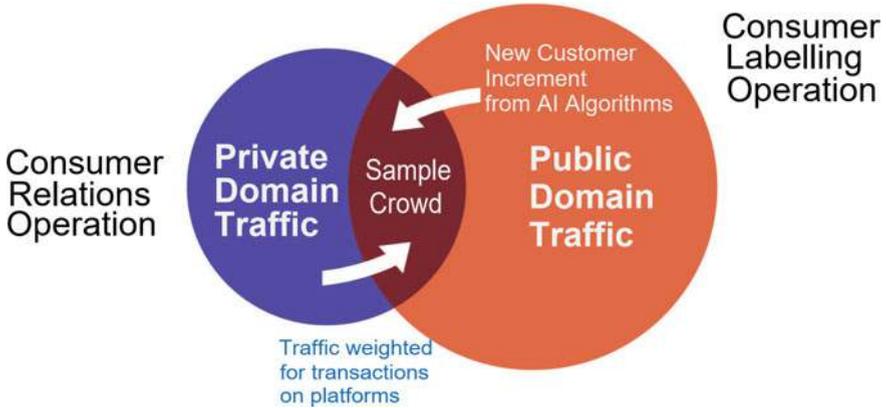
Fig. 5 Chart of growth of public/private domain traffic cycle

At the same time, the brand should set up a professional fan operation team to complete consumer relationship management online. By observing the change of the relationship deepening rate of a certain label group to a certain brand, artificial intelligence determines whether the group is interested in the brand, and then automatically increases the exposure of the brand in this group, bringing new consumers to the brand. Brands add consumers to the private traffic pool for maintenance and convert them into loyal consumers, which in turn can increase public domain traffic and expand the number of sample consumers based on algorithms, thereby acquiring more high-quality new consumers. Many brands have gone through a misunderstanding, which is to divert traffic to the private domain through the public domain, and then directly trade with consumers in the private domain. This seems to save some costs, but actually loses greater benefits, because according to the algorithms, brands get more free traffic and increase their ability to attract new people when trading on various public domain platforms. Therefore, the sensible approach is to divert traffic from the public domain, maintain it in the private domain, and then trade in the public domain to acquire more new consumers. The trickle flowing into the sea will not be exhausted.

There are three core operating models behind this style of operation, namely the AIPL model for full-cycle digital management of consumers, the FAST model for digital brand assets assessment, and the GROW model for digital growth path of brands.

3 The AIPL Model for Full-Cycle Digital Management of Consumer

With the change of the times and the diversification of sales channels, the role of consumers in the consumption process has changed, from the original passive role to the active role. So only managing the sales results of the channel can no longer meet the needs of competition, and brands need to be able to manage the behavioral process between consumers and the brand. We divide such a behavioral process into four stages, which correspond to four different groups of people: ①awareness (A), corresponding to brand-aware group, including those who are reached by brand advertisements and search with category words ②Interest (I), corresponding to brand-interested group, including those clicking on advertisements, browsing brand/store homepages, participating in brand interaction, browsing product detail pages, searching with brand words, receiving samples, subscribing, following, joining membership, and adding products to shopping cart or collections; ③Purchase (P), corresponding to brand purchasers, referring to those who have purchased branded products; ④Loyalty (L), corresponding to brand-loyal customers, including those who repurchase, comment, and share. The AIPL model is shown in Fig. 6.

In Alibaba's data bank, we can clearly see the A-I-P-L changes of consumers per unit time, as shown in Fig. 7.

1. Awareness (statistical time set as 15 days)

Awareness refers to consumers' relatively passive engagement with brands through exposure clicks and searches and clicks without brand inclination, the latter of which will be explained below.

Searches and clicks without brand inclination: consumers browsed the brand flagship store or brand products once; in other words, consumers have recognized the brand through Alibaba-based channels within 15 days. Under normal circumstances, if there is no further behavior within 15 days, this awareness group is judged as lost, so the statistical time is set to 15 days.
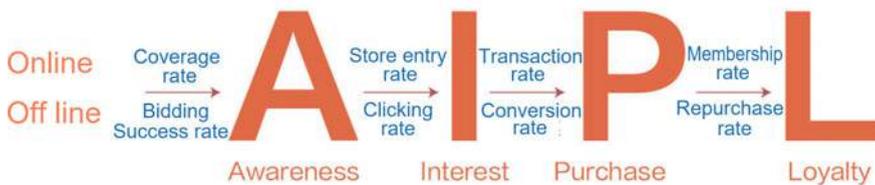
Fig. 6 Schematic diagram of AIPL model

Fig. 7 Changes of A-I-P-L of consumers in unit time

2. Interest (statistical time set as 15 days)

Interest is demonstrated by consumers' active contact with the brand, including becoming a member or fan, interacting, searching for and adding items to their shopping carts or collections with a brand inclination.

Becoming a member or fan refers to the status of the consumer labelled as a member or a fan. Their membership could be in the forms of official account members and members of brand authorized stores. Being a fan could happen when consumers subscribe to the brand official account, become Hudongba followers, or turn Weitao fans, etc.

Interaction occurs in the cases of consumers participating in interaction within the brand official account, successfully verifying their appointments and receiving samples of new products, completing new retail orders, and applying for brand samples in the trial center; it also includes customers commenting, liking, sharing, bookmarking, and forwarding the brand content from Weitao, as well as those participating in the brand interaction in the Tmall pop-up store, or receiving samples in the Tmall baby care room and later becoming members.

Searches with a brand inclination refer to customers viewing twice or more times of brand products within 15 days.

Adding items to collections or shopping cart involves the customers who have added brand products to their collections or shopping carts within 15 day and the customers who have made advance deposits.

Compared with the awareness group, the interest group is the population who has been attracted by the brand and has entered an interactive relationship. Different from passive browsing, becoming a member, following a store, bookmarking and adding items to shopping cart all indicate that consumers have purchase intentions. Searches with a brand inclination and interaction with brands on the content

platforms all demonstrate their interest. Such a group should be regarded as potential consumers with strong intentions. Reaching, activating and converting this interest group in a right cycle ensures the most effective and efficient input and output.

3. Purchase

Purchase groups refer to all consumers who have purchased branded products in the last two and a half years (2×365 days $+$ 180 days) minus the "loyal" consumers. In various categories, products with high repurchase rates own larger purchase groups. So, the key operation lies in designing various benefits and marketing programs in an effort to convert the purchase groups into loyalty group.

4. Loyalty

Loyalty groups refer to consumers who have had positive reviews within 365 days, or have purchased the brand's products at least twice within 365 days. Loyalty groups are the core of the brand equity and determine the fundamentals of brand sales.

The numbers of customers in the awareness, interest, purchase, and loyalty groups within a unit time span is the manifestation of the brand's influence on consumers, so the flow data of awareness, interest, purchase, and loyalty groups in a unit time is the expression of the brand's operating ability. The unit time can be defined according to purposes. Different time spans can be chosen to observe different brand operation concerns, as shown in Fig. 8. For example, the monthly change of flow data can show the planning and execution of activities in a particular month, while the annual change of flow data displays the overall development of the brand, rise or fall of the brand influence, the growth factor being new customers or old customers in a particular year.
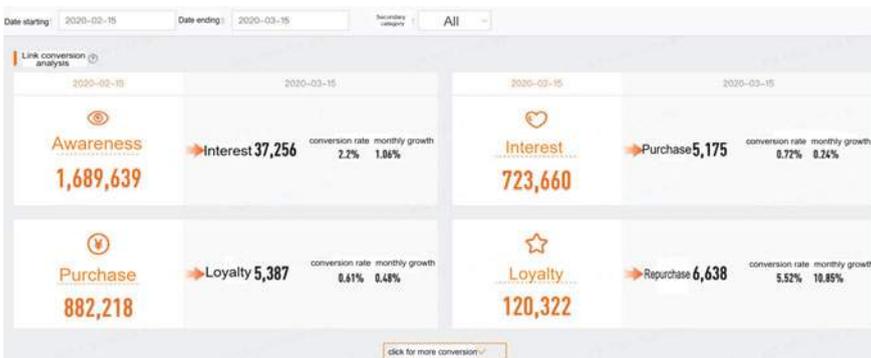
Fig. 8 Different concerns of brand operation

4   The FAST Model for Digital Brand Equity Assessment

The deep mining of consumer assets represents a major change in the operating model, to wit, the transformation from the previous "traffic operation" to "consumer operation". This means that the operational reference system needs to change from the traditional GMV indicator to a more comprehensive and brand-new indicator system that can show the dynamic path of consumers. The FAST model developed by Alibaba empowers a digitally oriented consumer management system with quantifiable, comparable, and optimizable attributes.

The FAST model consists of four main components.

(1) Fertility (F)-AIPL. Fertility (F) (consumer size, or the index of the total population size) is the indexing result of the total number of consumers who have reached AIPL status, with the redundancy reduced. Among them, AIPL refers to the number of consumers in different stages of Awareness, Interest, Purchase, and finally Loyalty in the consumption journey.

(2) Advancing (A)-AIPL. Advancing (A) (consumer conversion, or the advancing rate of the crowd) is an index of the percentage of the total number of consumers (redundancy reduced) who have improved their AIPL status (including advancing from A to I, P, L, from I to P, L, and from P to L) in the total AIPL population.

(3) Superiority (S). Superiority (S) (core user scale, or the total super user population index) refers to an index of consumers with high net worth, high value and high communication power, i.e. people who are interested in interacting with the brand, as members for example. These people represent the group that brands can reach or convert with low cost and high efficiency, regardless of whether they have already made a purchase.

(4) Thriving (T). Thriving (T) (active degree of core users, or the active rate of super users) is an index of the percentage of the total number of super users who have had active behaviors (including adding items to shopping carts or collections, collecting rights or points, and interacting, within 180 days) in the total super user population.

In traditional advertising, the three indicators of a brand are brand awareness, brand reputation and brand loyalty, which are from sampling-based qualitative studies. With digital tools, the brand awareness index is no longer reflected by whether the brand name can be recognized on the questionnaire, but by the total number of people reached by the brand within a unit time. Brand loyalty is also transformed into tangible membership data, while brand reputation is a perceptual indicator, and favorability and transaction conversion cannot be proportionally fitted. Through the layer-by-layer conversion rate of the AIPL model, the operational capability of the brand can be completely observed. Similarly, the FAST model can measure the efficiency of brand marketing and operation more accurately. At the same time, the FAST model orients the perspective of brand operation from the static data (GMV) that values results to the healthy and lasting maintenance of brand value,

Fig. 9 FAST model of digital brand value

Fig. 10 Schematic diagram of quantitative and quality indexes of FAST model

from the managing results to managing process. The FAST model of data-based brand value is shown in Fig. 9, and the quantitative and qualitative indicators of the FAST model are shown in Fig. 10.

The FAST model provides a favorable reference indicator for brand owners to better manage consumer assets by simultaneously monitoring the dynamic conversion of all and sub-groups in the consumer journeys, solving the problem in the past that GMV indicator could not take into account dimensions such as consumer conversion time and consumer quality. The GMV indicator is the expression of results and works in this equation GMV = traffic × conversion rate × transaction value per customer, while the conversion rate varies greatly due to the different attributes of customer traffic in AIPL. For example, when predicting the sales of "Double 11", the traffic volume in October of the previous year was 100,000 UVs per day (Unique Visitors), and there are 200,000 UVs this year. Under the condition that the products and operating capabilities remain unchanged, can it be determined that the sales can achieve 100% growth during this year's "Double 11" period? The answer is negative because it depends on which cycle of consumers these 200,000 UVs are and whether the data are accurate. If 150,000 of these
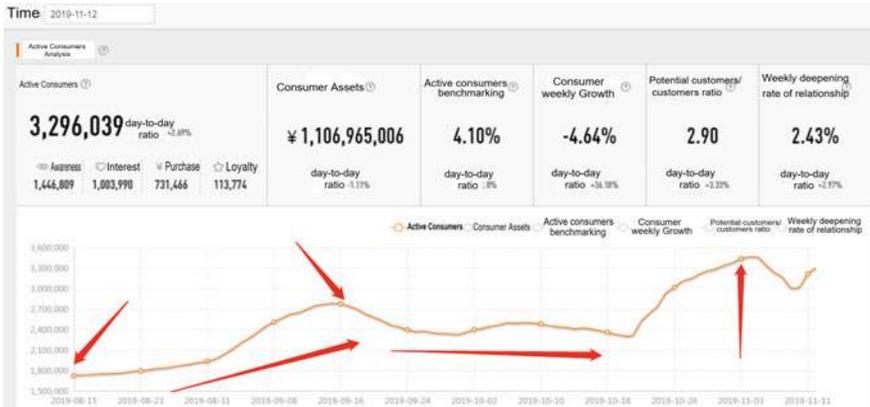
Fig. 11 Fluctuation of numbers of active consumers of brands from August to "November 11"

200,000 UVs are new consumers brought by the Tmall Co-branding Plan, while last year's 100,000 UVs per day belonged to interest groups and loyalty groups of the brand, then it is high likely that GMV will decrease, rather than increase. The evaluation based on the FAST model is, however, much more accurate, and as it turns out, the prediction accuracy of many merchants on the "Double 11" sales has been greatly improved.

Figure 11 shows the fluctuations in the number of active brand consumers from August to "Double 11". It can be clearly seen from Fig. 11 that the brand began to "store water" in September (increase its exposure to new crowds and enhance the conversion from A Group to I Group), and "harvest" since October 20 (reach I Group multiple times to prepare them for the "Double 11" conversion). The brand's market exposure budget was mainly spent in September, while the e-commerce promotion budget was mainly spent in the middle and late October. This rhythm aligns with the consumer's conversion cycle. With reference to the day-to-day ratios of consumer assets in the previous year, the target GMV value of this year's "Double 11" can be estimated every day, so as to determine which operational elements to increase.

5 The GROW Model of Digital Brand Growth Path

The GROW model that focuses on brand growth is shown in Fig. 12.

If the FAST model digitally expresses the real-time status of the brand, how can we find future increments for the brand? Alibaba's GROW model is a tool to find the data-based growth path.

The GROW growth model identifies four major factors that can drive the continuous category growth: Gain (G), which refers to the contribution made by

GMV increment＝customer number × purchase frequency × customer unit price＋category exte

current category increment ↑ extended category increment

GROW

Gain(G)   Retain(R)   bOOt(O)   Widen(W)

penetration opportunities   opportunities of improving   opportunities of enriching   extension opportunities
of current categories   category repurchase   category items   in TOP related categories

Fig. 12 GROW model of brand growth

consumers in total growth of the brand, by purchasing more types of categories/commodities.

Retain (R), which refers to the contribution made by consumers in total growth of the brand, with more frequent/repeated purchases of products.

bOOt (O), which refers to the contribution made by consumers in total growth of the brand, with purchase of price-upgraded goods.

Widen (W), which refers to the total growth contributed by the brand offering other related types of products outside the existing category.

A children's clothing brand can be taken as an example. Gain increases when consumers buying skirts also purchase trousers and shirts. Retain is about frequency of a customer's purchase from the brand in a year, whether he buys every quarter or at every new release. BOOt is displayed by the increase in price after the leggings are upgraded with better fabrics with a stable conversion rate. Widen refers to the increment brought by the introduction of children's shoes into this brand. These growth patterns can now be expressed digitally. By analyzing the GROW model, we can find various growth opportunities for each category/brand, and then choose the best growth path.

As shown in Fig. 13, the analysis of the six major industries of fast-moving consumer goods through the GROW model shows that in the case of mom and baby care industry, improving the growth of products within the category is the biggest opportunity, since there is high brand loyalty from customers and high correspondence between the brand and the category. On the contrary, data indicators show that the food category has the greatest opportunity for repurchase growth, so food merchants should grab their best opportunity point by pulling up the repurchasing possibilities of existent customers. On the other hand, the pharmaceutical and healthcare industry can perform refined operations on consumers and provide better products according to the physical state of consumers, thereby increasing the unit price of products. From an operational point of view, there is indeed low-price competition that is not supposed to occur in this industry. If the price competition is replaced by the quality competition, considerable sales increments could happen in this sector.
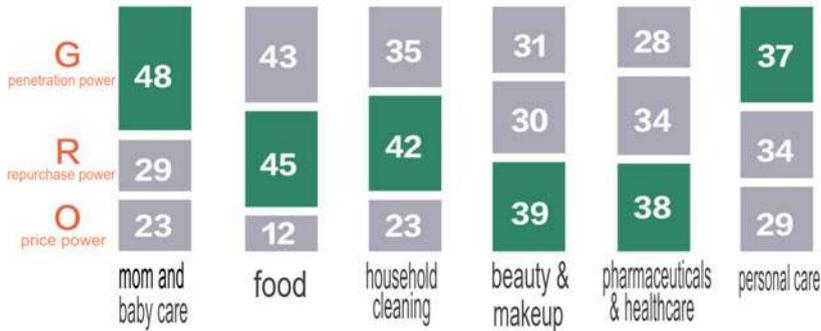
Fig. 13 Analysis chart of 6 major fast moving consumer goods industries through GROW model

Both the FAST model and the GROW model have given us a new way of recognizing and evaluating brands, as well as an innovative approach in operating brands. We have switched from the wasteful bombardment of carpet advertising and the operational style of making sales targets on a whim, to a brand operation cycle based on big data. However, in order to really transform to consumer operation, increase the brand equity value in the FAST model and realize the brand growth potential in the GROW model, the core is to carry out group operation and refined management of consumers, and offer personalized interfaces and recommendations to meet the individual needs of consumers to the greatest extent.

6   Digital Brand Communication Path

The most essential difference between traditional brand communication and digital brand communication is that the former works to consumers' mental cognition, allowing consumers to gain brand recognition before they have no demand, and then distribute goods through various channels to complete sales. Contrastively, digital brand communication can achieve target groups accurately and predict whether consumers have generated demand, so brands can directly connect with consumers without channels, and even predict whether consumers will have demand for this product through data. For example, the traditional practice of a baby pillow brand is that the brand owner recruits agents through professional mother and baby magazines and exhibitions, and the agents send the baby pillow to distributors or related retail channels. Why are retail channels willing to sell the product? The most important thing, besides the quality of product, is the brand itself, including brand awareness and trust. This requires brands to conduct mass communication before entering the market, such as seeking celebrity

endorsements, dropping commercials on magazines and TV stations, etc. There-fore, under the traditional brand development model, each new product entering the market costs a huge amount, and enterprises have to take huge risks. Once the commodity is successful, it needs to sell like hot cakes for several years or even decades to recover the cost. Therefore, a brand usually focuses on a single category of popular demand, which on the one hand facilitates the formation of consumer awareness, and on the other hand allows products to reap the maximum market value.

Digital brand communication does not need to reach out to the masses, but only to the target groups, first offering merchandise education and dissemination on content platforms and then directly linking to the purchase page. The entire process is a complete closed loop, and a chain without breakpoints, achieving consumer cognitive shaping in a short period of time, instead of repeated mental cognition for many years in advance. Again, the baby pillow brand can be taken as an example here. The brand can first create influence with content on Little Red Book and TikTok, not by talking about product design, function or quality first, but using a topic of "Thank Goodness! I haven't thrown it away!" to compare the "ugly" new born baby and the "pretty" grown-up, so as to naturally bring out the key commodity value point of shaping the head shape. And then the endorsement of big KOLs (key opinion leaders) or experts are introduced to increase trust. Finally, directly link viewers to the transaction page through the shopping cart, and the whole communication process is completed in one go.

Today, the traditional mode and digital mode of brand communication are in parallel. While digitalization challenges traditional media, traditional media also arms itself with digital means. In the digital age, the growth path of brands is very different from the past, shifting from working on human minds to AI tag recognition, from cramming and repetition to content immersion and "planting grass" (to activate desire) and "raising grass" (to cultivate and grow desire) with content step by step. The relationship between brand enterprises and consumers has also changed from a relationship isolated by channels to a relationship of mutual integration, with consumers coming to the center of the entire business closed loop.

7 Summary

This chapter introduces the way of carrying out brand management through digital intelligence.

(1) Data should be used to select markets. Enterprises use data to evaluate market size, entry timing, competition intensity, channel trends, etc., and ana-lyze industry development trends in order to enter the market at the most appropriate time.

(2) The unique development path of fast-growing brands using digital marketing technology is revealed. Enterprises should carry out full-link digital marketing, use the hacker growth model to quickly iterate products, and form a private domain traffic pool to expand in a rolling cycle.

(3) Three major brand operation models are introduced, namely the AIPL model for full-cycle digital management of consumers, the FAST model for digital brand equity assessment, and the GROW model for digital brand growth paths. Through operational "data modeling", companies can gain insight into various marketing behaviors.

(4) The difference between the traditional brand communication path and the digital path is analyzed. Brands and consumers can be directly connected, and consumers' needs are no longer mysterious but transparent before data. The new path creates a precise, immersive, and rolling business closed loop.

New traffic constitutes a new brand battlefield, and new customer groups form new market opportunities. The huge energy of digitalization has destroyed the walls of the brands that have originally formed advantages through channel occupation. The newborn disruptors challenge with their new weapons, and traditional brands also take up digital weapons to address the challenges. The main competition of brands is centered on commodities, so how to develop, select and create popular products through digitalization? The next chapter will introduce the new product innovation with digital intelligence.

Digintelligent Commodities

Ye Tian

Every brand, under the pressure of competition, is constantly developing new products to meet the updated demands of people. A brand lagging behind in innovation is menaced with the fate of being kicked out by rivals. New products are always the focus of competition and the engine of growth. However, it is easier said than done to develop new products. How to find the market direction? How to improve the success rate of product development? How to shorten the development cycle and quickly seize market opportunities? These remain greatest concerns for every developer. Traditional product development relies on excellent designers, but what designers obtain is quite limited information; designers can get rusty and eventually fail to grasp brand new consumer needs. Without big data insights, no one would have imagined that the prioritized demand of young people for shampoo has changed from suppleness to anti-loss effect. Without the support of real-time data, no one could have predicted that the price of an ice cream could overtake that of a meal. If there had not been data support, numerous R&D, marketing and sales personnel would have been still arguing fiercely about this year's fashion trends, while other brands have already swum joyfully in the digital ocean, with the ability of rapid development and flexible production. In the meantime of debating inside some brands, the products of other brands have been launched online, sold like hotcakes and made a fortune. This is the era of data, when new products are surging like volcano eruption, with overwhelming emergence of the "Internet best-sellers" in short spans of time. See Table 1 for the comparison of traditional development and digintelligent development of commodities.

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

Table 1 Comparison of traditional commodity development and digital intelligence commodity development

Traditional commodity development	Digintelligent commodity development
Product development information-directed design, with low success rate	Data-based mining of new product development opportunities
Isolated and closed new product development process	Consumers participate in new product development, and crowdsourcing
18–20 months of new product development cycle	Development cycle compressed to 6–8 months or even shorter
Reliance on vision and luck in selecting hit products from new products	Data-based monitoring and selection in the entire process

In summary, the innovation of digintelligent development of products involves using data to gain insight into the trend of the market to determine the direction; utilizing digital methods to screen consumers and allow them to participate in product development and selection, greatly reducing development costs and shortening the time cycle; and applying digital operation means to start new product development and monitor the marketing data, conversion data, evaluation and public opinion of new products. In this way, the success rate of new product development can be improved through data operations, in the spirit of "racing horses bigger than selecting horses".

1 Data-Based Discovery of New Product Opportunities

Listerine has broken the 100-year-old taste perception and launched a mouthwash with flower and fruit fragrance, which has won over a large number of female consumers, as shown in Fig. 1. Since the formulation of Listerine mouthwash was formed in 1881, the slightly spicy taste has been the brand's taste perception, and this stimulating sensation has brought users a sense of strong effect, as a memory trigger of the brand. "If only Listerine could be less spicy!"—many consumers may have felt this way when they tried Listerine products for the first time. In the long history of 100 years, Listerine may have also considered introducing new flavors, but worries still existed. Would the new flavor destroy the original brand perception? Were there really market demands for new flavors? If the demand was just from a niche group, how to sell it in the originally big channel of FMCG? These questions presented themselves as challenges.

All new product innovations face the same challenges. Innovation itself is a process of trial and error, and risks are intrinsic. Despite the fact that all mature brands avoid risks as much as possible in terms of mechanisms, progress could only be made when companies launch new products on a continuous basis. Yet, there are so many factors leading to failures in the due process—channel adaptability, marketing timing, and competition intensity. Each of them is strong enough

Fig. 1 Lischdrin's mouth rinse for women

to nip new products in the buds. In nature, new product has only been given a slim chance of surviving.

Luckily, Tmall Innovation Center (TMIC) has served more than 1,000 leading strategic brands, shortening the incubation cycle of new products by more than half, from the original 18–24 months to 6 months. Against the increasing number of brands and products, its rate of successful product incubation still reached 70% in 2019.

The foresight into consumers provided by the Tmall New Product Digitalization System, along with Tmall's digital capabilities, has offered merchants with one-stop data-driven solutions in the process of new product development through four steps: opportunity mining, ideas producing, concept verification, and iteration with trial sales. In the past, merchants relied on empirical intuition, small sample research, and one-party data, with extremely high development risks and difficulty in replication. With the support of TMIC's data system, human decision making has shifted to smart decision-making with big data. Data prediction can be made in advance regarding which category to develop new products in, how large the market size of the product is, what the core group is, etc. Before the new product is launched on the big market, it can be tested on a small scale, and then iterated in accordance with the data obtained. Only when the data reaches appropriate targets could mass production be carried out. So the development cycle of a product can be greatly shortened, leaping from a maximum of five new products launched yearly in the past to over 30 new products a year. Previously, orders of tens of thousands of pieces were required to start the production of a new product, but

now the innovation plants can carry out flexible production to manufacture only several thousand pieces, facilitated by big-data-based decisions.

TMIC can also refer to the four key actions in the development and growth of new products:

(1) Targeting Segmentation (T).
(2) Market Foresight (M).
(3) Innovation Guidance (I).
(4) Collaborative Tactics (C).

These four actions correspond with the four services of TMIC: Crowd Research Institute, Tmall Trend Report, C2B Innovation Plant and New Product Launching Strategy, as shown in Fig. 2.
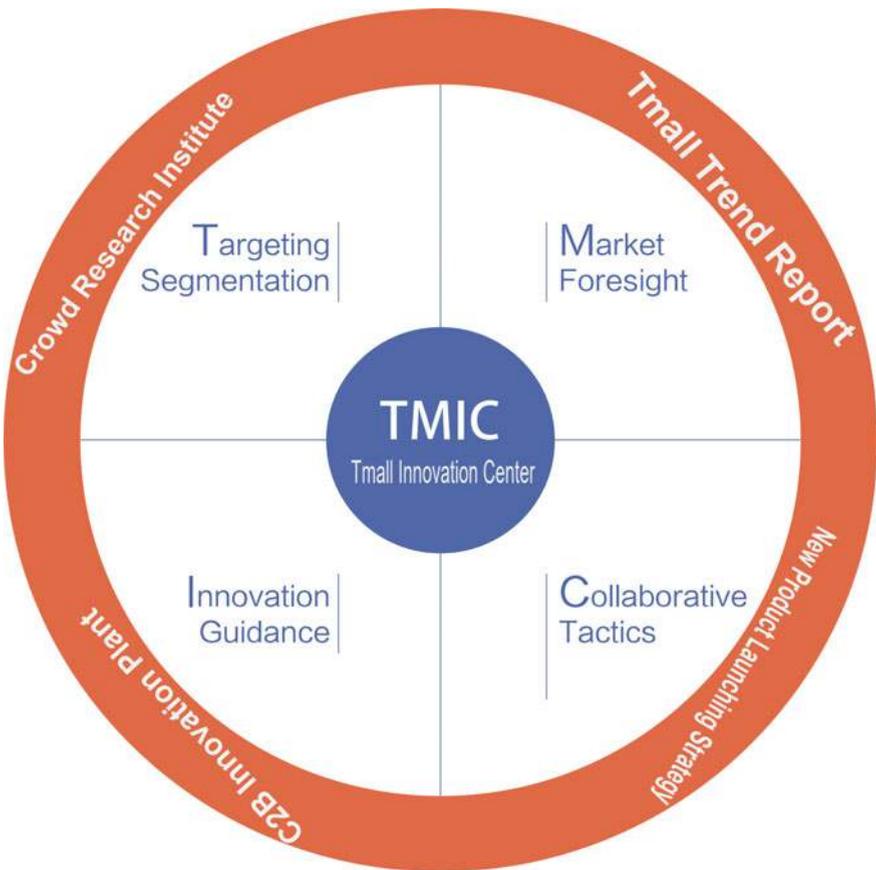
Fig. 2 Four key actions of TMIC

These four products of TMIC effectively solve the four problems encountered in the process of brand innovation: difficulty in trend prediction, lagging new product feedback, hardship in sales forecast and low survival rate.

The success of all new products is achieved by adapting to the general trend of consumer demand. So how can we judge the big trend? Half by experience, half by luck. Take the apparel industry as an example. The commodity design department of a clothing brand, functioning as its soul department, should study international trends, popular colors, fabrics and crafts, etc., and then design new products based on the particular style of the brand before launching three or four seasons of merchandise every year. Whether the product is successful mainly depends on how many orders are placed. Agents who place orders should also have keen insight, being able to predict through experience which product will sell well in their own area, and then determine the order volume based on historical data. So what will be popular in the coming future is the core problem over which all fashion designers agonizes. From 2010 to 2020, there have been various style trends in the women's clothing category, with street style, Mori girl style, Chanel style, vintage style, Nordic style, and retro style emerging one after another. New categories have continued to emerge, with Lolita clothing, Japanese high school uniforms, and Hanfu (traditional Chinese clothing) becoming standard items in the "Generation Z" wardrobe. Is there any way to predict the popularity of these styles and categories with data? The answer is positive. All styles have a long quiet period before quickly getting trendy along with the occurrence of certain events, such as the celebrity circle suddenly embracing some item or the push of mainstream fashion brands. During this stage there is an obvious "climbing period" for the search keywords popularity related to this style and category. So the newcomers in the weekly buzzword list likely mirror the next popular products, and hence commodity developers have an important job in monitoring industry buzzwords, including category words (such as white sneakers and clunky sneakers), attributive words (such as giant sleeves, tassel), and descriptive words (such as oversized, chic, etc.).

In addition to directly observing emerging trends, certain potential demands can also be observed in the market hot search terms of Business Advisor. For example, in the search terms for cat food in the pet supplies category, the search volume of the related word "import" is increasing, which means that the demand for imported cat food is increasing, hence business opportunities. In contrast, combined terms with dog breed names appear quite often when people search for dog food keywords, for example, husky dog food, golden retriever dog food, and teddy dog food. The dog food brand Navarch discovered this and has formulated a product strategy of "breed specific" and produced breed-based customized dog food. For instance, Golden Retriever dog food makes brighter coat color, while teacup teddy dog food contains collagen nutrition to reduce fracture. A series of innovations in commodities have helped Navarch rise rapidly and rank among the top ones in the pet food category.

Commodities are subordinate to categories and industries, the soaring or explosion of which give rise to a large number of new products. Hence how to grasp
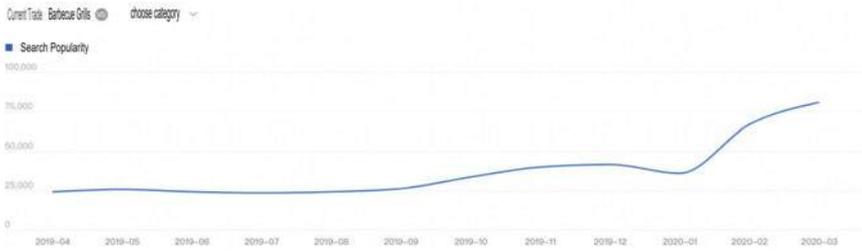
Fig. 3   Search trends of Barbeque grills

the industry development trend is a more important topic in the early stage of commodity development. With the help of Alibaba's data tools such as Business Advisor and TMIC's Tmall Industry Trend Report, we can clearly see the development of the industry. Here are a few cases to show how to apply these data tools to quickly understand business opportunities and trends.

In 2020, the Covid-19 dealt a huge blow to many industries. It was popularly imagined that the sales of the outdoor barbecue grill industry would definitely plunge since outdoor camping and picnics were not allowed, indicating no market for barbecue grills. Was the actual market shown by the data consistent with such a guess? Take a look at the search trend of barbecue grills in the market index of Business Advisor in that year, as shown in Fig. 3, one can find that the market index did not decline, but skyrocketed instead. The search popularity soared from 25,000 in April 2019 to 80,000 in 2020, more than tripling. As can be seen from the curve, the industry experienced explosive growth during the pandemic.

Judging from this trend, the barbecue grill merchants should sell very well. Now take a look at the composition of hot search keywords, as shown in Fig. 4, one can find that the real growth category was home grills, not outdoor grills. Demand for grills in the air fryer and for the stove surged. Search terms such as non-coal-fired grill, electric barbecue, and air fryer all ranked at the top of the 7-day search index. So the market for barbecue grills was growing rapidly, due to the impact of the pandemic that it was difficult for consumers to enjoy grilled food in barbecue restaurants, and hence turned to DIY barbecue at home. Additionally, new category names such as stove grills and gas stove grills also appeared in the soaring terms. So if businesses spotted this trend in February and launched the product on the market in March (possible to achieve in short span since the R&D threshold for this category is quite low), then they could possibly enjoy the growth dividends of this category.

If one takes a closer look at the crowd analysis of each keyword, he will find that although enjoying barbecue at home was a common demand, the crowd could be divided into two groups, the masses choosing to barbecue directly on the gas hood, and the high-end crowd looking for smoke-free grilling appliances. Merchants can develop different products according to their original user attributes and supply chain characteristics to meet these demands, as shown in Fig. 5.

Search terms	Hot search ranking	Search popularity	Click popularity	Click-through rate	Conversion rate	Operation
Non-coal/non-electric home grill	1	1,471	1,287	83.04%	1.72%	Search analysis Crowd Analysis
Non-coal/non-electric grill	2	1,423	1,232	81.00%	0.46%	Search analysis Crowd Analysis
Air fryer fitting	3	1,410	1,145	106.13%	9.38%	Search analysis Crowd Analysis
Air fryer baking paper	4	1,054	863	100.15%	17.21%	Search analysis Crowd Analysis
Air fryer silicon oil paper	5	949	682	59.50%	15.48%	Search analysis Crowd Analysis
Microwave grill	6	889	742	62.28%	9.38%	Search analysis Crowd Analysis
Air fryer accessories universal	7	831	682	91.94%	9.52%	Search analysis Crowd Analysis
Non-coal fired grill	8	713	533	65.78%	-	Search analysis Crowd Analysis
Non-coal/non-electric barbecue	9	661	477	58.96%	6.25%	Search analysis Crowd Analysis
Non-coal fired barbecue grill	10	580	490	64.61%	-	Search analysis Crowd Analysis

Fig. 4 Analyzing data through hot search words

Fig. 5 Merchants making different products based on user attributes and supply chain characteristics to adapt to new demands

We can discover market opportunities by monitoring search popularity and other data. To quickly seize the market, we also need a rapid system of design, R&D, production, and logistics response. From the decision-making system to the entire supply chain system, coordination should be accomplished in the shortest time. Small and medium-sized businesses are well suited to this approach, because their decision-making chain is short, their response speed fast, and their supply chain flexible enough. The challenge for big merchants is comparatively greater, because big brands need not only to consider whether there is a market opportunity, but also judge many other factors such as market size and trend cycle; in particular, the expansion of categories is an issue of strategic importance for brands and cannot be implemented with simple opportunism.

For strategic merchandising, it's not enough to just know the currently rising trend; it also requires the foresight into the reason why particular categories will be popular. To predict the future, the original market research method is faced with great difficulties, and thus calls for the strength of data and artificial intelligence. TMIC Trend Industry Intelligence can help brands tap potential market opportunities and predict industry development trends through algorithms. At the end of 2018, this TMIC service found through data prediction that there would be an outbreak of demand for beauty products in the body care category in 2019, and then launched this information on Tmall to the merchant group in the beauty industry. Upon such news, the beauty brand Little Dream Garden seized the opportunity and launched its body care products containing hyaluronic acid, niacinamide and other ingredients, focusing on body acne removal, whitening and other functions, and its sales saw a dramatic leap in 2019. Still in 2018, after TMIC predicted the outbreak of men's makeup market, men's skin care products ushered in a larger market blowout. Brands such as L'Oréal followed such a trend at full speed. During the "Double 11" period in 2019, L'Oréal men's skin care products won the crown of men's skin care category, contributing a huge market increment to the L'Oréal Group.

Category growth can also be estimated through data mining and analysis of related category demand. Consumers' demand for commodities is not isolated, and to fulfill a certain demand often requires multiple commodities, among which there are inherent sequences. We can analyze the sequence of relationship among commodities through data algorithms, and then figure out the new product opportunity in the relationship sequence before predicting its scale. Just as in the case of discovering Neptune, back in the early nineteenth century, scientists Alexis Bouvard predicted the existence of this planet through the pattern of disturbed motion of Uranus. A few decades had passed before scientists observed the third largest mass in the solar system through astronomical telescopes. Likewise, when there are no corresponding products for the needs of some categories, it does not necessarily indicate that there is no market. Through data mining of the relationship sequence between commodities, we can find blue ocean categories and occupy the blank market.

The relationship sequence among commodities can be divided into four different situations: the time sequence of demand, the synchronicity of demand and scenarios, the time sequence of scenarios, and the shared lifestyles.

The time sequence of demand refers to the demand of the same consumer in sequential time periods, as shown in Fig. 6. For example, the demand for oil control, moisturizing and freckle removal of skin care products shows different levels in the four seasons, but the consumers behind it are the same group of people. According to the time sequence of demand, finding a typical emerging crowd and comparing its demand against the commodity category distribution of a mature crowd can help discover and evaluate the gap markets for the emerging crowd. For example, the women's skin care market is a mature crowd market, while the men's skin care market is an emerging crowd market. Women's skin care products include face creams, night creams, serums, eye creams, acne-removing
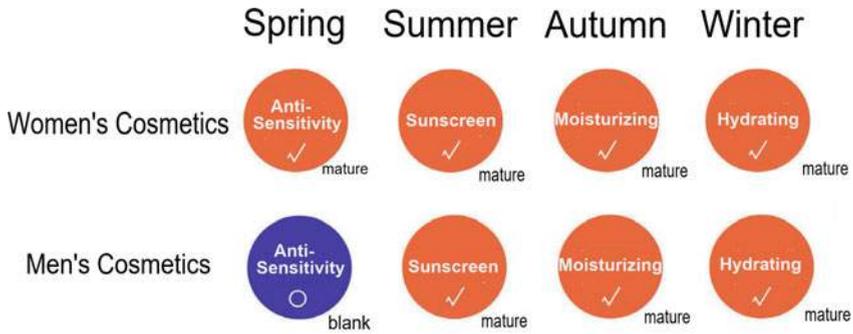
If the market size of women's sunscreen, moisturizing and hydrating products is five times more than that of men's corresponding categories, and women's anti-sensitivity products has a market coefficient of 200, so men's anti-sensitivity product has a market coefficient of 50.

Fig. 6 Demand time series

products, freckle-removing products, moisturizing products, oil control products, facial masks, lip oils, etc. The corresponding men's skin care products should also emerge in those categories. If the commodity market of men's acne-removing and oil- control products has matured, we can compare the scale of these two categories against those of women's and get the market size contrast coefficient of men's skin care products, which could be used to reveal the vast opportunities for certain insufficiently explored men's categories (for example, men's masks, eye creams, etc.), and the potential market size of men's masks and eye creams can be predicted by multiplying the contrast coefficient by the market size of women's corresponding categories.

The synchronicity of demand and scenarios means that multiple categories of products meet the same demand simultaneously in a particular life scenario or life stage, as shown in Fig. 7. For example, auto products and mom and baby products are strongly related categories, both of which satisfy the demand at same life stage of raising a baby. Then, if the manufacturers of auto products can develop and design according to the needs of mothers and infants, they will locate a large number of blue ocean markets in, for example, products like the bottle storage in the car, the car incubator, the diaper changing table in the car, etc., which are not complicated to develop and easy to find crowd labels during the promotion process. Such products, meeting the rigid demand with strong display effect, can quickly occupy the market through content channels such as Douyin (Chinese TikTok).

The time sequence of scenarios refers to the progressive cycle of consumption, as shown in Fig. 8. For example, the data shows that the wedding crowd basically turns into the mother and baby crowd in one year, and the people who bought building materials will view information about home appliances three months later. The demand above has a clear sequence, and the demand changes in the next scene can be predicted through the demand alterations in the previous scene. For example, if the overall size of the wedding market becomes smaller, the mom and
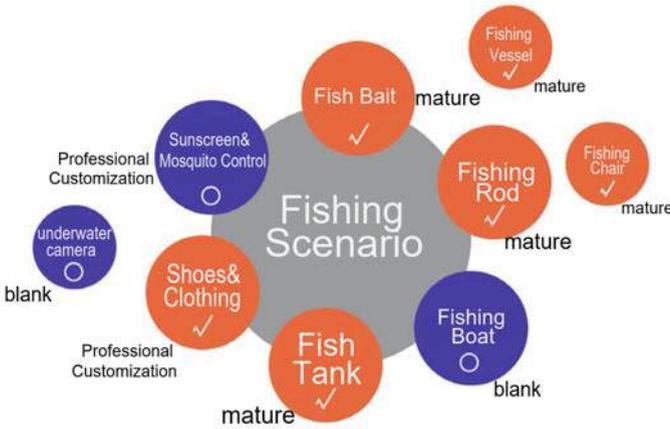
Despite the already existence of camera, shoes and clothing, mosquito control, chairs and other categories, the fishing scenario needs more specialized products.

Fig. 7 Synchronic demand scenarios
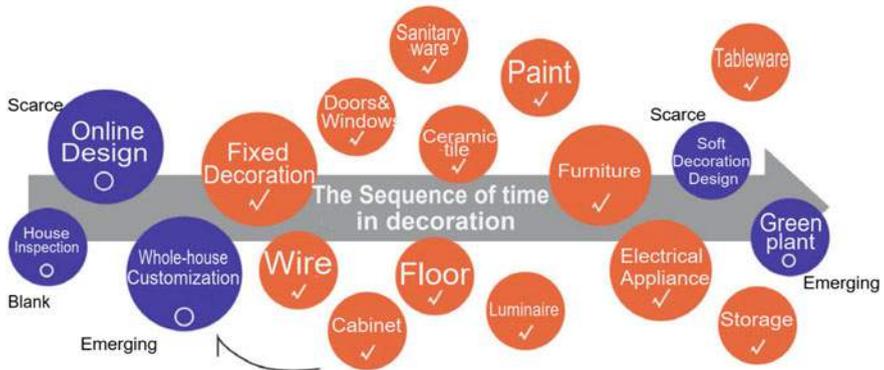
The reason why whole-house customization has become an emerging industry is that it is located earlier in the sequence of time.

Fig. 8 Scenarios and time series

baby market will also shrink in the next year, and the infants and kids' market will correspondingly size down in the next three years, all related to changes in the group size. With finer granularity in the data, if the aesthetics of wedding decorations shifts from the traditional festive red to Instagram-style ashy pink, then the mom and baby category will also have such an aesthetic trend in the future.

According to the time sequence of scenarios, Mars Group and Tmall teamed up in launching special food for puppies and elderly dogs, aiming at gastrointestinal

Fig. 9 Products launched based on scenarios and time series

care and easy digestion for puppies under one year old, and anti-oxidation and immune enhancement for elderly dogs over 7 years old, as shown in the Fig. 9. By lengthening the time cycle of full commodity coverage, the consumer's consumption life cycle is extended. Considering the longevity of many dog breeds and the year-on-year increase in the proportion of older dogs over 10 years, the development of such products plays an important role in consumer operations.

The shared lifestyle refers to the common way of living held by the population group of same demographic features, as shown in Fig. 10. For example, the male consumers of "Gen Z" are big fans of Chinese brands of traditional culture and style, and also followers of trends in smart appliances. They wear Li-Ning-branded garments, play drones, and wear VR (virtual reality) glasses.

The inspiration and direction in incubating new products often come from insights into the small trends in current market. Could those tiny trends possibly grow into truly mature markets? Is the new demand universal? To answer those questions, TIMC provides data indicators of market segments, namely potential index, size index, growth index and trend index, to quantitatively measure the performance of different market segments.

Potential Index: An index of estimated sales growth based on a combination of recent sales and short-term forecast sales in the market segment.

Size Index: An index of the monthly turnover of the market segment.

Growth Index: An index that predicts the month-on-month growth rate of the market segment's transactions in the next month.

Trend Index: An index of the overlap of the buying users with the trendy crowd in the market segment. The trendy crowd refers to users who are accustomed to

There are numerous gaps to fill in the markets targeting new lifestyles of certain emerging crowds. That's why Zulijian (a brand producing shoes for the elderly) could rank top of the elderly market.

Fig. 10 Lifestyle sharing

making purchases in the new product period of "hit products". They crave new products more than other consumers, and they are heavy users of channels such as Tmall Little Black Box.

2   New Product Partners, the Simulation Laboratory and the Dynamic Sales Diagnosis Platform

Mastering market trends is only the first step in product innovation. The product winning market recognition actually holds the key in the entire endeavor. Every year, brands launch various new products, most of which cannot be "hits". Numerous details determine whether a new product can become a popular winner, including the appearance, pricing, experience, convenience, packaging, taste, aroma, etc. These factors require simultaneous quantitative analysis and qualitative analysis, and only through the interaction of commodities and consumers could people make judgements and progress in such aspects as whether the cosmetic bottle cap is easy to open while the airtightness is satisfactory; whether the 5 kg-packed coffee beans need a seal that facilitates preservation; whether the weight of the hand-held electrical appliance is suitable for female consumers; whether the shoes cause foot pains; whether the matcha-flavored biscuits are favored, etc. So TMIC's new product partners, the real consumers selected by Tmall through data, come in to assist in improving the product experience and complement the qualitative analysis.

The new product partners can not only complete small data research, but also participate in the product creation process in the form of game questionnaires. Partners who have completed the game enter the Taobao group and have in-depth exchanges with brand product developers. Since the partners are real consumers screened out by data, the participation and accuracy of the survey are very high.

After a product plan has been discussed and formed in the community, more people will be surveyed, who can vote to test the plan.

L'Oréal, in the first stage of research and development of a mask for night owls, recruited and selected new partners through TMIC. It created 967 different ideas of a face cream with consumers in an entertaining way, and collected 1,400 proposals in four days. In the second stage, L'Oréal established a co-creation community, and through different consumer discussion groups, conducted in-depth consumer insights by gaining a comprehensive understanding of their lifestyles and their expectations for products. In the third stage, based on the deep insight from consumers, L'Oréal identified 14 feasible product directions in a very short period of time, and finally formed six preliminary product concepts. In the fourth stage, based on those product concepts, L'Oréal carried out product optimization together with consumers, maintaining their participation and interaction throughout the product development process, and further narrowed the concepts down to four, and eventually selected the concept of "Zero-hour Cream". The whole process only cost 59 days, which is impossible for traditional consumer research. The new product partner model has broken the previous small-scale consumer interaction model and used platform resources to trigger large-scale creative brainstorms. Consumers defined a new scenario of night owls, and contributed nicknames such as "zero-hour cream" and "stay-up-late cream". Eventually, this cream (as shown in Fig. 11) sold 450,000 pieces from its launch in September to the "Double 11" period, with sales exceeding 100 million yuan.

During the co-creation process with the new product partners, many micro-innovations emerged, such as partners giving products nicknames which are often more appropriate and vivid since consumers were not bound by a fixed mindset, so thousands of names became available for later screening in a short period of time. The great examples of L'Oréal's Zero-hour Cream, Clinique's Laser Bottle,

Fig. 11 Late night cream

Philips' Little Feather (an electric toothbrush), Chips Ahoy!'s Strength Stick, etc. have been the results of brainstorming with the new product partners. In this model, big data is combined with small data to complete product experience research and provide quick-response opportunities for product iteration and optimization.

After the concept test period, the product enters the simulation test stage, where TMIC uses digital twin technology to virtualize the real shopping scene, test the data with the simulated product webpage, and judge the decision-making factors and loss factors through consumer behavior, and determine the direction of product iteration. In the simulation laboratory, the goods can get fast feedback from the market without large-scale production. This not only reduces market risks, but also greatly improves the efficiency of information feedback, and even allows for multi-sample testing at a low cost.

The simulation laboratory has Three Reals for new product testing: real people, real test environment, and real consumer behavior. The simulated product webpage is literally in the store and consumers do not know it is a simulated product, so the consumer behavior is not interrupted. We can analyze purchase motivation and resistance through the interactive behavior of consumers with the page. The simulation laboratory can also conduct intelligent testing. The case in point is that VANS tested 96 new products in the first two months before the big promotion, and selected 36 new products with the most potential as their main models in "Double 11", as shown in Fig. 12. These 36 new products stood out among the 400 models of shoes, accounting for 44% in its sales volumes, with the sell-out rate reaching 70%. The best-selling model sold more than 4,000 pairs.

In the simulation laboratory, whether a product is popular is not manifested by what consumers comment, but what consumers buy. In addition to testing product

Fig. 12 Intelligent measurement made by simulation laboratory
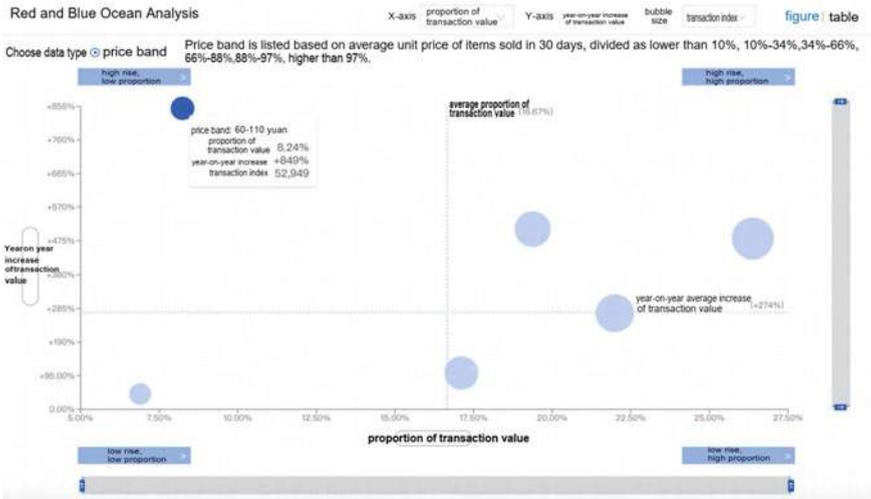
Fig. 13 Identify market opportunities through business advisor tools

models, we can also test prices through data to find the best price band. Tools such as Business Advisor could also be utilized to help discover the price band distribution and price band gaps of various categories, and find market opportunities. As shown in Fig. 13, the horizontal axis is the proportion of transaction amount, which represents the distribution status of the price band; the vertical axis is the year-on-year transaction amount, which represents the growth rate; and the size of the bubbles is the index representing the transaction size. In the data of a certain category, although the market share of commodities with prices in the range of 60–110 yuan is not high, they are in a state of rapid growth. Regardless of factors such as cost and brand positioning, pricing the product at the range of 60–110 yuan can not only effectively avoid competition, but also help obtain fast-growing dividends.

All key details of product development can be tested in the simulation laboratory, including product packaging design. Baicaowei has completed the brand's packaging upgrade through online consumer interviews, UA questionnaires, and cross-category opportunity research, as shown in Fig. 14.

When new products are officially launched into the market after iterative adjustments, the new product growth report can implement real-time data monitoring. We can use such indicators of new products as click rate, rate of adding item to shopping cart and purchase rate to fit the "hit product" curve so as to determine the likelihood of hot sale of a new product. We can also analyze the growth distribution of new products in the entire store to select the ones with the hit potential, a matter of highest importance in non-standard categories such as clothing, shoes and hats.

The new product growth report is shown in Fig. 15.

Fig. 14 Upgrade of packaging of Baicaowei

Fig. 15 Report chart of new product growth

The report discloses the growth of new products and compares it with the industry, so as to judge the health of new product growth, identify new products with hit potentials in the store, and then give new products a green channel through traffic increasing and reasonable optimization suggestions, so that the new products could blossom quickly in market.

The overall grade of a new product, affected by five dimensions (as shown in Fig. 16), could fall into five levels from A to E, and can be compared with the performance of other newcomers in the category and the top new products in the industry. The five dimensions are ① Reachability: the score of this product reaching out to consumers; ② Sales strength: the performance of this product in terms
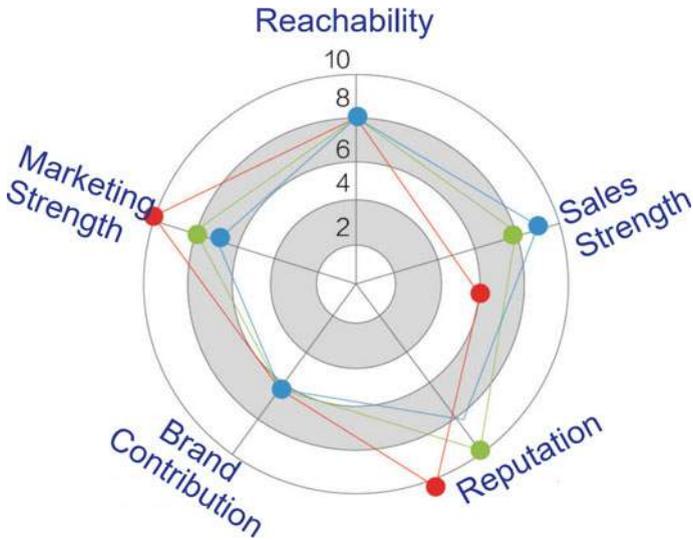
Fig. 16 Overall scoring dimension of new products

of sales; ③ Reputation: the score of this product in terms of consumer evaluation and sharing; ④ Brand contribution: the score of this product promoting the store as a brand; and ⑤ Marketing strength: the score of this product in marketing activities. The cosmetics brand Laneige ever rated new products through TMIC and Tmall Little Black Box. Within one month, it monitored the performance of single products, which were divided into five grades from A to E based on the overall score, then compared them with the top new products in the category to select key products, and invested resources on them during the 6-month new product support period.

3   Co-building the New Product Innovation Center

Tmall has established the new product innovation center with Mondelēz, Liby, Mars, JALA and many other brands. International brands such as L'Oréal and Shiseido have announced that 50% of their new products will be incubated on the Tmall platform. Data-based development and monitoring of new products have brought new growth opportunities for brands, improving the success rate, reducing costs, and shortening development span. Let's take a look at several cases of new products developed through digitalization.

1. Mondelēz's Hugging Nuts

Mondelēz is a top brand in the food industry, and its biscuit brand Oreo is a household name. Mondelēz has cooperated with TMIC to develop "future snacks". First,

it analyzed growth opportunities in the snack industry through data. As can be seen from Fig. 17, snacks featuring the mainstream concepts of health, such as "meal replacement" and "sugar-free", are in a zone with rapid growth in the number of consumers and the volume of sales. The analysis of the characteristics of biscuit purchasers found that this consumer group also has daily habit of consuming nuts or dried fruits. After establishing the concept of biscuits + nuts, Mondelēz completed the detailed design of the product through consumer co-creation, including the specific combinations of nuts and dried fruit and the quantity of each package. In the end, Mondelēz put the product design into the simulation test module to evaluate the future market potential and targeted its potential customer groups accurately.

On November 11, 2020, the Hugging Nuts launched by Mondelēz sold 550,000 packs and entered the top 10 pre-sale items in the nut industry. 85% of the buyers were new customers of this brand. In the first months of 2021, 85% of the brand's incremental customers were brought by this new product. From the product development to the emergence of a hit product, the process only took a few months, and it was just the first trial run of the new product incubation model in Mondelēz's flexible supply chain. The Hugging Nuts is not only launched as a new product, but also Mondelēz's first attempt to build the consumer-centric agile innovation culture and capabilities around the world, as shown in Fig. 18.

2. Liby's Heart Condensate Pods

Liby Group has joined hands with TMIC, from research to market launching, to carry out all-round and in-depth innovation in daily chemical products.

Fig. 17 Identifying consumer groups through the analysis on the characteristics of specific buying groups

Fig. 18 Consumer-centered agile innovation

With the help of big data and intelligent algorithms on the Tmall platform, Liby Group has obtained deeply customized insights analysis of the industry and consumers, shortening the original research time of one or two years to six months. Liby Group has also been enabled to communicate with more than 20 research and consulting giants around the world through TMIC's research eco-alliance, and combine it with the new product digital system to accelerate the incubation of new product concepts and product innovation.

Through TMIC's C2B innovation plant, Liby Group located new product partners, completed sales simulation and feedback, and constantly verified product concepts and crowd matching, thus achieving two-way precise positioning and matching of the "goods" and the "people".

The C2B innovation plant helps Liby Group realize the agility of the innovative R&D. Through business procedure transformation and system optimization, the innovative concepts can be faster incubated into products, which obtain quicker feedback from consumers. Liby Group carries out new product innovation oriented by the target group; it conducts targeted demand research, realizes refined and scenario-based group operation, and digs deep into the sore points of consumers and the demand behind them. In this way, it has achieved in-depth connection between consumer demand and product functions, provided scenario-based, differentiated, and personalized new products which glows with youthful features and joyful surprises. These products meet consumers' green and healthy life concepts, hence achieving higher success rate. The new product, Heart Condensate Pods, developed by Libai Group through TMIC, is shown in Fig. 19.

3. Colgate Men's Bursting Beads Toothpaste

Tmall and Colgate have announced the establishment of a C2B innovation plant. Tmall would help Colgate reduce the R&D-production cycle of new products from

Fig. 19 Libai's new product developed through TMIC

18 months to half a year to achieve rapid response to the market demand. The first co-creation—Men's Bursting Beads toothpaste—is the first toothpaste specially developed for men.

Through data mining, Tmall found that there are literally varied preferences for personal care products between men and women. According to Tmall's data, men have a stronger preference for cool flavors, while women favor variety and longevity of fragrances. Currently, the research and development of oral care products has been mostly carried out at the functional level, ignoring the personalized pursuit of the crowd.

Bursting beads, also known as fragrant balls, have been added with special element by Colgate to satisfy men's pursuit of extreme coolness. This product, combined with the idea of bursting-bead cigarettes, accurately impresses the target group of men. The creativity did not stop at the paste, but has been shown in the packaging, which adopts a bottled design in response to the cosmetic trend of this category, as shown in Fig. 20.

At Colgate's brainstorming meeting, nearly 40 people were divided into seven groups and asked to come up with their own ideas. Special illustrators were also assigned to create drafts on the spot. After the illustrators finished the drawings, Colgate immediately pushed them to the gender-and-age-differentiated groups through Tmall's new product test page. The brainstorming was completed at 21:00, and 1,500 questionnaires were collected before 23:00 that night. The poll showed that a toothpaste product with bursting beads for men and another toothpaste product for women were well received. Colgate immediately decided to put these two products into production. The entire process was conducted at a pace doubling the conventional speed.

In addition to big data and a flexible supply chain, Colgate also set up a flexible production line dedicated for manufacturing new products at the amount of only 500 kg in one batch, in contrast to 100 million kilograms from the conventional production line. In this way, it could realize small-scale production and test

Fig. 20 Product design

new products, and quickly collect feedback for iteration. Small batches, flexible customization, precise reaching out, and rapid iteration—that combination is the methodology that has enabled Tmall and FMCG brands to create classic successful hit products one after another.

On the eve of "Double 11" in 2017, Colgate and the Tmall jointly launched a heart-shaped mint chip toothpaste product suitable for couples, named "Bold Love". This product took only 100 days from conception to launch, but it immediately went viral on WeChat Moments and triggered fierce competition among buyers. Colgate had to urgently airlift heart-shaped mint chips from the United States for additional production. Many consumers said that they bought it just for the pink love chip inside. That was the first time for Colgate, a brand with a history of more than 200 years, to develop new products through Tmall big data. It is quoted from Colgate that "many multinational companies are still introducing foreign hit products into China, but now is not the era of Made in China, but Made for China."

Data plays an important role in the management process of the full life cycle of new products. Enterprises can get inspirations for the future product development from data analysis, determine development details with data testing, drive flexible production with data calculation, acquire new customer groups through channels like Tmall Little Black Box, and then refine crowd labels and place commercials accurately. Enterprises could determine whether a new product has the potential, according to the degree of growth curve fit between the new product data and hit product data as well as the new product rating. They can select products with excellent data, and use crowd expansion technology to reach target customers in
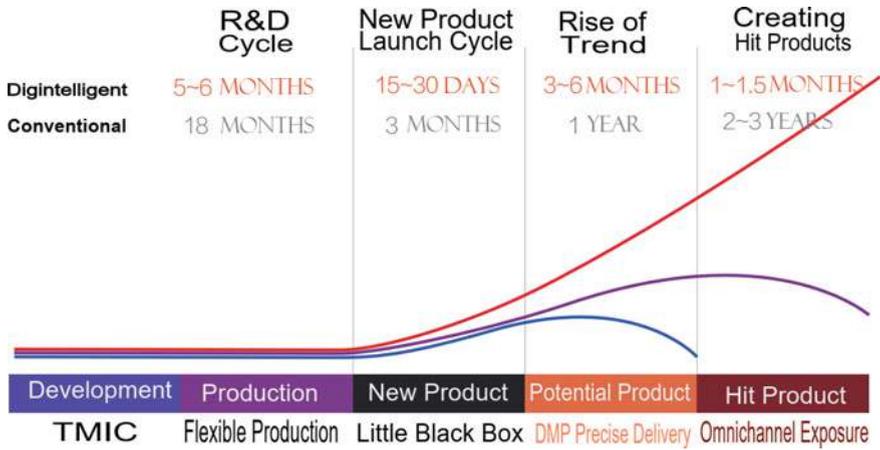
Fig. 21 Data management chart of new product life cycle

the entire network. After obtaining accurate large-scale customer data, brands can distribute goods through offline channels according to crowd attributes. The data management of the full life cycle of a new product is shown as Fig. 21. Years before 2010 was the period of online business enjoying their offline brand dividends, while the era since 2010 features the converse condition. It has become the consensus of many brands that they should first create hit products online, and then distribute products through offline channels with the help of brand volume and data. Enterprises such as women's shoes brand Belle, cosmetics brand Proya, etc., have all regarded online market as their main battlefield for new product innovation, and followed the digintelligent new path of product development to empower offline business through online operations.

4   Summary

This chapter introduces how to innovate new products through digital intelligence.

(1) AI algorithms can be used to predict market trends through big data, discover new product opportunities, and guide the development direction of new products on the basis of data insights.
(2) TMIC's service of new product partners can lend a hand in brands developing products together with consumers; companies can also use the simulation laboratory to test new products with data evaluation.
(3) The dedicated traffic channels like Tmall Little Black Box can be utilized to help new products reach high-quality customers, and judge the potential of new products becoming hits through the radar chart of the new product data evaluation, so as to determine the resource allocation for the new product.

It has become the mainstream layout approach that the new products should first make success online, and then expand to omnichannel development. So how should an enterprise choose channels and manage conflicts between channels? Please read the following chapters for a deeper exploration.

Digintelligent New Manufacturing

Dongying Hong

1　Inevitability of New Manufacturing in the Dilemma

Over the past four decades since reform and opening up, China has developed into the world's second largest economy, an unparalleled miracle in human economic history. The rise of China has even changed the world's perception of the value of manufacturing in global competition.

However, somehow, the cost advantage and scale advantage of China have gradually weakened with the progress of the times, with the manufacturing chain being extremely long. When each of those links (from equipment manufacturers, ERP systems, raw material supply chains, to on-site management and scheduling modes and methods, etc.) was designed for "scale", it would be a complex issue to turn to the model of "small orders and quick reorders", because that means the reconstruction of the entire industry chain which unavoidably leads to extensive changes. In this case, some international giants, with their powerful influences, have embarked on their own unique paths, showcased by the flexible and quick-reordering production of ZARA and UNIQLO, but other brands mostly do not have sufficient motivation, concerned with the compatibility between the new model and the original scale manufacturing model, as well as the huge investment and unpredictable risks brought about by the adjustment. In fact, for most giants, the global market they currently own can still support them to enjoy dividends of scale production, and there is no rush for adaptations and adjustments. However, for a large number of small and medium-sized factories that are struggling on the brink of survival, the ability to make difference simply by internal breakthroughs is lacking and it

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

is a high demand among them to grab new external opportunities which could be combined with internal efforts, and create a new model to live on.

"Made in China" requires new ideas and new approaches.

At the Apsara Conference 2016, Jack Ma (Ma Yun) first proposed the "Five News" strategy—New Retail, New Manufacturing, New Finance, New Technology and New Energy. It was the first time a Chinese Internet company made a clear claim to transform manufacturing industry.

For more than four years, "New Retail" has not only profoundly changed brand owners and the traditional retail industry, but also triggered a commercial revolution of online and offline integration, bringing new value to consumers. "New retail" has become the most popular business keyword in recent years, and the deconstruction and reconstruction of the traditional retail system has had a huge impact not only in China but also around the world. Yet despite the fact that the current digitalization level of China's consumer side leads the world, the digital level on the supply side is lower than the world average. This imbalance has resulted in a contradiction between a highly fragmented and personalized demand on the consumer side and the relatively low capacity on the supply side to meet such personalized demand. An efficient solution to this problem requires the top priority put on the cultivation of digintelligent capabilities and create New Manufacturing.

"New Manufacturing" was a key word that Jack Ma re-emphasized at the Aspara Conference 2018. He said that New Manufacturing would soon bring huge opportunities to the manufacturing industry in and out of China. The manufacturing industry was facing the pain of upgrading, but in the midst of difficulties and agonies, a group of excellent enterprises would face the challenges and achieve upgrades. "New Manufacturing" is precisely the new opportunity in front of the enterprises, among which the future winners must be the ones adopting new thoughts, new concepts and new technologies. New Manufacturing brings new opportunities for companies.

The development of digintelligent New Manufacturing is a brand-new project for enterprises, without any mature template or established path. Before taking action, enterprises should understand the historical background and characteristics of traditional manufacturing.

The following is a specific example of the clothing manufacturing industry used to further illustrate the differences and advantages between digintelligent New Manufacturing and traditional manufacturing.

Most of the traditional clothing manufacturing industry adopts an extensive operation mode, featuring B2C, push strategy, and open loop. The main phenomena and problems we can see in this mode are as follows:

(1) In terms of product development, it has a long cycle, with updates according to plan; it's function-oriented, and for general purposes, without effective analysis of historical data; there is no clear brand positioning or no product planning as the basis for development guidance; planning is lacking and product development is disconnected from the market.

(2) In terms of sales forecast, large error exists in the first forecast; the lead time is too long; it has large lot size and first order quantity, faced with high inventory pressure in case of stagnant sales.

(3) In terms of procurement, the single plant is less prepared for fabric and accessories, but usually prepared for conventional fabric and accessories in basic colors.

(4) In terms of production, all production orders need to be placed before the sales season, with all production capacity fully occupied; the delivery time is long; its production is based on plan, featuring centralized organization; the production is one-way, without consumer perception, mostly requiring manual intervention and lacking upstream and downstream management.

(5) In terms of commodity distribution, it features one-time delivery, with high cost of later deployment of goods, and difficulty in timely replenishment/transfer/return; it is impossible to effectively seize the sales opportunities during the transfer/return period.

(6) In terms of terminal sales, there are no serial products for matching display; no timely feedback causes problems in making in-time analysis and decisions (related to timely adding orders or promotions) in the administration.

In the case of hot sales, various reasons such as untimely inventory allocation, occupied production capacity, and insufficient stock of raw materials directly lead to out-of-stock situations.

In the case of stagnant sales, various reasons such as shelf occupancy, warehouse occupancy, and production capacity occupancy lead to inventory accumulation.

(7) In terms of external synergy, there is a separation of production and sales, with production and supply limited by the existing and limited upstream and downstream supply and demand capabilities; its own production capacity is limited by physical conditions such as factory buildings, equipment, and personnel, with inflexible capacity; there is high homogeneity rate in the industry.

In short, there are common problems such as open-loop systems (one-way push), long supply chain response cycles, and inability to respond to changes in market demand in a timely manner.

Alibaba, in addressing the problems above, has proposed a solution for this New Retail era, namely the end-to-end "smart supply chain adopting a push-and-pull combination to improve the accuracy and customer satisfaction and experience by starting all operations from needs of the end users". The key ideas and processes could be summarized as that New Manufacturing is about intelligence, personalization and customization, in contrast to the conventional scale and standardized manufacturing, thus completely different from the manufacturing model of traditional enterprises.

The comparative advantages of the solution are as follows:

(1) In terms of product development, product plans are formed based on data to guide the development and integration of products, and predictions are made

based on the best-selling models in previous years and fashion trends; the cycle is short, and it can be adjusted in real time for customers.

(2) In terms of sales forecasting, qualitative and quantitative sales forecasting is combined, and a complete order placing and review mechanism is established; the lot size of the first order is reduced.

(3) In terms of procurement, materials are prepared scientifically (for example, weaving first and then dyeing or dyeing first and then weaving, with fabric styles and colors purchased flexibly, reserving the purchase amount).

(4) In terms of production, it features flexible production, on-demand production, and personalized production organization, with the production process being online to synchronize with consumers' data.

(5) In terms of product distribution, high-frequency distribution is possible, with reserved products always; there is flexible distribution according to the mode of central store + multiple satellite stores, realizing timely replenishment/transfer/return.

(6) In terms of terminal sales, standardized series matching display is offered to the terminals, which send timely feedback for scientific analysis and decision-making (adding orders/promotions, etc.) in the administration.

When there is hot sale, it could achieve quick reorders, and can apply the buyer mode (to timely remodel the best-selling products, replenish the best-selling models of the current season at any time, and timely fill up the out-of-stocking categories, etc.).

In case of stagnant sales, it could conduct mid-season promotion analysis before it is too late, use strategies such as changing fields and re-matching to increase sales, and avoid previous slow sales, so as to maintain low inventory.

(7) In terms of external synergy, it could achieve the integration of production and sales, with sales determining the production, and integrating the production capacity of different supply ends, so as to unite all Internet resources to conduct flexible production. There is synergy among industrial peers, complementing each other in production capacity, jointly serving the customer side, thus forming a competition-cooperation relationship.

In short, a dynamic feedback system of multiple closed loops (a combination of push and pull) is adopted, and the accuracy of the first forecast is improved through data intelligence as much as possible (with consumers voting, pre-sales, and test sales), with the lot size (MOQ) appropriately reduced, and the lead time and supply chain response cycles shortened as much as possible, so as to respond to market demand in a timely manner, and be able to make changes on demand and produce on demand.

The contrast of the New Manufacturing/old (traditional) manufacturing is shown in Table 1. Here, we further elaborate on what is meant by New Manufacturing.

Jack Ma once said that New Manufacturing is not just about integrating the Internet or implanting chips into commodities. There are five criteria to judge

Table 1 Comparison of new/old (traditional manufacturing) manufacturing

Traditional manufacturing	New manufacturing
Long product development cycle	Short product development cycle, high efficiency, real-time adjustment, and customer-oriented
No effective analysis of historical data	Qualitative + quantitative sales forecast based on data
Large first-time forecast error, long lead time, and large batch for the first order	Accurate prediction, short lead time, small batch size for the first order
One-time delivery, high cost of future product distribution, and inability to replenish/transfer/return goods in time	Multiple high-frequency distribution, timely replenishing/transfer/return of goods
No timely feedback	Timely feedback
No analysis and decision-making made in the backstage	Scientific analysis and decision-making made in the backstage

whether it is New Manufacturing: on-demand customization, personalization, intelligence, clear target customers, and real-time data on means of production. These five standards have made up the profile of New Manufacturing.

2 New Manufacturing of Digintelligence: C2M

New Manufacturing of digintelligence has the characteristics of digitization, networking, and intelligence. It is oriented to the full life cycle of commodities, and has functions such as state perception, real-time analysis, independent decision-making, and feedback execution.

Compared with traditional manufacturing, the essential difference is that the result of New Manufacturing of digintelligence is not commodities, but the entire business chain of the enterprise, inevitably leading to an intelligent transformation of production, featuring the C2M model.

C2M (Customer-to-Manufacturer) is a new type of industrial Internet e-commerce model. The main logic beneath is actually reverse customization guided by big data. Specifically, C2M means that the platforms or the sales side transmit consumer data to the upstream factories, providing them with such feedback information as the categories, styles, and quantities that consumers prefer, and then the factories design and produce corresponding goods based on the feedback information (regarding their own conditions).

C2M has the following three advantages or features.

(1) There is no intermediate circulation or markup in the chain, directly connecting designers and manufacturers to provide users with personalized products. C2M keeps more profits in the designers and manufacturers while allowing consumers to enjoy relatively low prices.

(2) Consumer demand drives manufacturing, achieving commodity personaliza-
     tion. This feature is to meet the consumption patterns of the new generation
     of consumers. Consumers now want to have more initiative and more person-
     alized purchasing choices. In addition, the current main consumer groups are
     "post-80s" and "post-90s". They have grown up in an environment with abun-
     dant commodities and are no longer satisfied with standard products coming
     out of the assembly line.
(3) The inventory cost is completely eliminated by reverse ordering through the
     e-commerce platform and production according to the order. The production
     risk of manufacturers is greatly reduced, and waste is minimized due to the
     order-and-demand-driven production facilitated by information technology.

What needs to be clear is that even if the factory is intelligent, many production
processes still rely on experienced "veterans" in the industry. The integration of the
Internet and the industry cannot be achieved overnight. Data connectivity, process
control, management system, and employee proficiency all need to mature with
patience. The real realization of C2M not only means the Internet entering the
manufacturing industry, but also requires the transformation of the manufacturing
industry itself. Although many e-commerce companies are using C2M now, their
cooperating factories have not changed their mode of mass production, but just
shifted their supply from original large-scale distribution to small deliveries to
e-commerce companies. That is not C2M in essence.

   Regarding the deep transformation of the manufacturing industry itself, the
following is an example of Mengniu Diary's full-chain digital upgrade.

   According to Mengniu Dairy's 2019 financial report, its revenue was 79 billion
yuan and its net profit was 4.1 billion yuan, both of which achieved double-digit
growth. Behind such dazzling performance, one of the important factors supporting
Mengniu's strong "high-quality development" is digintelligence. With digitization,
informatization and intelligence as breakthrough points, Mengniu has promoted
digital transformation and upgrading in the upstream and downstream links of the
entire industry chain, becoming the most digitalized dairy enterprise in China and
even in the world, leading the entire industry to develop in a higher direction. Such
a digintelligent transformation has been demonstrated on the manufacturing side
as the digitization of its ranch bases, as shown in Fig. 1.

   First of all, here are the data on the source of milk. Alibaba Cloud has an in-
depth cooperation with Mengniu Diary. Nearly 1,000 farms have digitized their
milk sources of more than 1 million dairy cows through IoT devices. Mengniu
has completed the monitoring of the entire milk production process and the whole
life cycle of dairy cows. Through the smart ring hanging around the cow's neck,
the ranch monitors each cow in real time. Mengniu collects real-time data such as
daily activity, milk production information, and regurgitation data of dairy cows,
integrates it through a series of IoT hardware, and then uploads the collected data
to the cloud for analysis and processing through the IoT platform. From the selec-
tion, feeding and breeding of dairy cows to the final lactation, every step is strictly
controlled and monitored. At the same time, these data can be visualized to guide

Fig. 1 Digitalization of Mengniu's whole industrial chain

the farm to make more reasonable feeding decisions and improve the management level. For example, an algorithm model for estrus of dairy cows has been established. As long as the activity of dairy cows is collected, the estrus rate of each cow can be systematically tracked and the breeding rhythm can be accurately grasped, as shown in Fig. 2. To put it simple, this series of operations can help Mengniu to accurately grasp whether the cows are in good condition on any specific day.

Secondly, Mengniu's digintelligent plants arrange production based on customer orders. Through big data integration, they organically integrate order demand with material supply, manufacturing, warehousing and logistics, and market distribution, forming a management data ecosystem of the supply chain on the basis of interconnection. Based on Alibaba Cloud's data mid-end, Mengniu has changed the manual forecast based on order history to the intelligent forecast based on actual sales, so as to predict sales, reduce inventory, and provide the market with the freshest milk.

Finally, market sales data are collected to understand the specific crowd who has bought Mengniu's products this time, and how it overlaps with the customers who

Fig. 2 Controlling pace accurately through data collection

bought it last time. Mengniu has established a complete "collection-identification-analysis" intelligent marketing system, which can achieve global insight into the consumption link. There is no more guessing now as to the question who buys my milk?

From the perspective of the industry, Mengniu's transformation typically demonstrates the "digintelligent upgrading" in the dairy trade. In this case, through digintelligent management of milk source and circulation, Mengniu has realized the construction of an intelligent system for the whole chain of dairy production and circulation, effectively solving the pain points of supply chain efficiency and realizing the "up-dimensional reconstruction" from a "grassland cow" to a "digintelligent cow".

While there is still a long way to go in the application of C2M in various industries, exciting news came in September 2020, when Alibaba's officially launched "Rhino Factory", the first New Manufacturing Platform in the world to revolutionize traditional manufacturing.

3   Rhino Factory

As early as August 2017, Alibaba Group started to build the "Rhino Factory"—a digital and intelligent manufacturing platform serving small and medium-sized enterprises, and began exploring New Manufacturing with the clothing industry as an entry point. The New Manufacturing model does not have a deep moat, but

it can form a "leapfrog development" with its core technology; it is a qualitative change, rather than a quantitative improvement of the original model.

First of all, the New Manufacturing members of Rhino Factory have to meet requirements for hardware, which can be grafted with new technologies such as cloud computing, Internet of Things, artificial intelligence, etc. so as to realize flexible production. Flexibility here is reflected in the following two aspects: from the micro perspective, the system should be able to intelligently determine the amount of materials, labor and specific production line needed; from a macro perspective, it should be possible to realize cross-factory scheduling and intelligent team work so as to form group synergy. Batches of up to 100 pieces of clothing can initiate production, and one production line can handle several different types of orders at the same time. In the past, it took five minutes to produce 2,000 pieces of the same garment. Now, production in the same span of time could yield 2,000 different pieces of clothes.

Secondly, the production in Rhino Factory starts from data analysis results of the customer's retail side (Taobao, Tmall and other digital retail platforms), with rapid development of hit products based on trend prediction, while making production plans reversely based on sales so as to control inventory. The business system, equipment, management, and operations of New Manufacturing members are all online and completely cloud-based. From the consumer end to the production end, online collaboration can be truly realized.

Such two features of the Rhino Factory (the production capacity featuring small orders and quick reordering, and collaboration with super digital retail platforms like Taobao and Tmall) effectively solve the three greatest concerns for the business clients, namely "cost, delivery cycle and quality of rapid new product launch". That is also an essential leap for the Rhino Factory away from traditional manufacturing. In other words, the Smart Manufacturing Platform of the Rhino Factory utilizes Alibaba's cloud computing, IoT, and artificial intelligence technologies to endow factories with intelligence, and through ABOS consumption trend insights, it completes the combination of sales forecasting and flexible production, so as to build a new manufacturing system integrating cloud, terminals, intelligence and manufacturing, and realize the upgrade of China's clothing manufacturing industry with intelligence, personalization and customization.

Specifically, Rhino Factory provides corresponding solutions to the common pain points of the apparel industry in different scenarios.

1. The solution to serious overstock in the apparel industry

The apparel industry is highly volatile and influenced by fashion culture. The traditional gambling-style product development model is prone to overstock. Statistics show that inventory waste caused by overproduction accounts for 20–25%.

The Rhino Factory's solution is on-demand production, on the basis of sales. The flexible production capacity of Rhino Factory reduces the MOQ for production. Even if there is no sale at all, the maximum inventory can be controlled within 100 pieces. However, when mass production is required, it can quickly

coordinate the full production capacity from raw materials, labor to production lines, not affecting production efficiency.

2. The solution to difficulty in grasping fashion trends

In traditional trend forecasting, companies, in order to reserve production time, would make predictions 2–3 months ahead of the season change, exchanging time for operational space for production. This kind of prediction cannot include the changing trend in the 2–3 months before consumption, which leads to distortion of the results and difficulty in impressing picky customers. If the forecast is wrong, considerable loss usually occurs due to the cost and inventory already incurred in the production ahead of time.

The Rhino Factory's solution is to provide an auxiliary decision-making basis for the prediction of fashion trends through the consumption behavior data accumulated on the Alibaba platform, combined with seasonal factors, so as to improve the accuracy of the prediction, and shorten the lead time required for the prediction. After the forecast results are generated, the market acceptance of the forecast can be quickly verified by preordering, and targeted adjustments can be made. After there is certain feedback on market recognition, flexible production and small-scale trial production can be carried out. With multiple iterations, the match between the prediction and the fashion trend will continue to improve.

3. The solution to long cycle of clothing development and production

The entire development and production cycle of clothing includes all aspects of fashion trend prediction, clothing design and production. The production cycle of clothing includes the entire time required from putting raw materials into production to the acceptance of finished products into the warehouse. Under the traditional model, the overall process takes 2 months to half a year. One cause is that the prediction of fashion trends takes up time, and the other is that the process of scheduling and verifying adopted in traditional clothing manufacturing is manually examined step by step, with time-consuming procedures. For the first point, Rhino Factory has given a solution to the first cause. For the second, Rhino Factory's solution is to adopt to intelligent production, systematic order scheduling, and coordinated progress of various links, thus shortening the delivery time to half of that used the factories on the market.

As the "No. 1 Project" of Alibaba's New Manufacturing, Rhino Factory is essentially "digital factory" + "demand-driven production". All the production elements of Rhino Factory, from raw materials to equipment, are digitized, and even each piece of fabric has its own identification; all production links are online, tracking all links from raw materials entering the factory, cutting, sewing, to products leaving the factory; all production decisions are intelligent, and AI make decisions on pre-production rankings, production scheduling, and operational routes of hanging assembly lines. The work schedule only to be determined by counting materials and scheduling checking in the past could be answered within seconds now upon a click in Rhino Factory. On the other hand, through insight into consumers, Rhino Factory understands consumers' preferred categories, styles and

other demand, and based on such feedback, designs and produces corresponding products.

Rhino Factory is exploring a new industrial format by connecting digintelligent new manufacturing with the consumer Internet. It is foreseeable that other traditional manufacturing industries than clothing will follow suit in the future. A good show is just on!

Of course, although Alibaba has built a factory of its own, the future of Alibaba's New Manufacturing must not be to open a chain of factories. The core is "new" rather than manufacturing. As an Internet company, Alibaba will always present itself in New Manufacturing as a platform, and will not compete against enterprises in the real manufacturing industry. We can understand the true meaning of New Manufacturing from Jack Ma's statement at the Aspara Conference 2018.

New Manufacturing is a perfect combination of manufacturing and service industries. Its competitiveness lies not in the manufacturing itself, but in the creative ideas, experiences, perceptions and service capabilities behind the manufacturing. The manufacturing entities will never disappear, but the backward manufacturers will. New Manufacturing will not only serve large enterprises, but become a magic weapon for small and medium-sized enterprises in their endeavors for success.

In the future, manufacturing will have no borders; the networked manufacturing paradigm can be universal, when everyone can participate in trade. So Alibaba's New Manufacturing is not designed for Alibaba itself to enter this industry, but to empower the manufacturing industry to carry out reforms and changes.

The era of data tests the ability to produce different things and to produce on demand. Data is an essential means of production for New Manufacturing.

In short, New Manufacturing means human liberation and freedom. With the development of data analysis and data technology, new challenges and new opportunities have been created, and extended to traditional manufacturing. In the past, Alibaba did not want to sell things by itself, but built a service platform that allows e-commerce to prosper. Now New Manufacturing has developed a shared service system that can be reused in the clothing manufacturing industry. Similarly, Alibaba's New Manufacturing is not about running thousands or tens of thousands of factories by itself, but to create a new model to help numerous garment factories continue their digital transformation.

The cloud-based smart manufacturing represents a consumer-centric on-demand model, which is bound to drive the entire industry chain to build an ecosystem, which will likely change the low-end processing methods of traditional manufacturing, boosting quality, reducing costs, enhancing design, and improving commodity competitiveness.

4 Summary

(1) This chapter points out the significant differences between traditional manufacturing and New Manufacturing, the advantages of which are further illustrated with a specific case of the clothing manufacturing industry.
(2) The main logic behind the C2M model is the reverse customization guided by big data, and an example of Mengniu's full-link digital upgrade is cited to illustrate the deep meaning behind the transformation of the manufacturing industry itself.
(3) The Rhino Factory comprehensively showcases the innovation of New Manufacturing: the meaning of its innovation is not a simple single-point technological breakthrough, but in systematical upgrade of the traditional manufacturing with the technology and infrastructure based on the Internet, solving the chronic and severe problems in the industry.

The future direction of New Manufacturing is to remain open and inclusive, offering technology and solutions to help small and medium-sized factories enhance their competitiveness with digintelligent transformation.

Digintelligence in Channels

Ye Tian

Channels are the pathways that connect brands and sales terminals, and demonstrate a variety of characteristics in different industries. In the process of commodity circulation, business cooperation in each channel is also diverse: the KA channel (key accounts, exemplified by large supermarkets) is based on the sales system; the department store adopts the mode of unified cashier and sales commission; the Mall (comprehensive shopping center) adopts the rent mode, while the e-commerce adopts advertising and service charging model. The size of the channels is also varying. There are large supermarkets like Walmart, mom-and-pop stores on the street, and large online platforms like Taobao, and stores in Alipay mini-programs. Channels are like the blood circulatory system of humans. Blood is pumped from the heart, flows through the aorta to arteries of various organs, and finally reaches various tissues in the body through capillaries. This requires brands not only to choose the right channel, but also optimize channel efficiency continuously and coordinate channel conflicts.

To select the best brand circulation path, we can use digital crowd matching technology to conduct an analysis of the crowd of each channel, and then compare the result against the brand target crowd. At the same time, the channels themselves are also in the process of digitization, and most channels have been managed online. If there is no digital breakpoint in the chain, the entire channel can be optimized in terms of management, with inventory shared between online and offline distribution channels across the network, order sessions completed online, channel benefits evaluated in real time, and flows of commodity and capital predicted

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

Table 1 Differences between traditional channel management and digital intelligent channel management

Traditional channel management	Digintelligent channel management
Selecting channels based on experience and connections	Matching crowds and lay out channels digitally
Parallel channels online and offline are in contradiction	Shifting from single channel to omnichannel integration, with consumers as the core, regardless of online and offline differences
Channel management in forms of store tours and manual reporting	Channel management is mobile and in real time
Channel deep cultivation in forms of low-efficiency street-cruising	Linshoutong helps complete channel deep cultivation online
Experience-based location selection, with low store survival rate	Big data-based location selection with high store survival rate
Standardization with low matching rate of crowd and goods	Customization with precise goods matching

through AI and adjusted in real time. The efficiency of the circulation link can be effectively improved, with data regulating like the nervous system of human body, which directs more blood to flow to the digestive organs after dinners.

In terms of channel expansion, the development of some "capillary" channels (referring to extremely small and scattered channels, such as depth distribution channels represented by street shops) requires a lot of labor and material resources. Even giants such as Coca-Cola and Tsingtao Beer have spent years of hard work in depth distribution channels to yield some results. Alibaba's Linshoutong platform (LST), however, has integrated millions of small stores to directly complete the deep cultivation of channel on the mobile application. Through the development of overseas channels on platforms such as AliExpress and Lazada (the Southeast Asian e-commerce platform acquired by Alibaba), brands can directly complete the light layout of overseas channels online, instead of going to the local market to open up the market.

Table 1 shows the difference between traditional channel management and digintelligent channel management.

1   Channels Selection Empowered by Data

How should a foreign cosmetics brand land in the Chinese market? The quality of channel is the core of success. The complexity of Chinese market determines the sophistication of channels in China, and the difficulty in making the right choice. The offline cosmetics channels in China are as follows: ① CS (customer satisfaction) channels refer to professional cosmetics and household chemicals channels, such as Sephora, SaSa, Watsons, Gialen, T3C, etc.; ② Department store channels, such as Bailian, Intime, Wanda, etc.; ③ KA (key accounts, or large

retail customers) channels, such as RT-Mart, Vanguard, Lianhua and other major supermarkets; ④ DS (discount stores) channels, such as Outlets; ⑤ Distribution channels, such as small supermarkets and convenience stores such as FamilyMart; ⑥ Depth distribution channels, such as various small shops that are extremely scattered.

Online cosmetics channels in China are as follows: ① Large e-commerce platforms, such as Tmall, JD.com, Vipshop, etc.; ② Cosmetics specialty websites, such as Jumei.com, Lefeng.com, etc.; ③ Community distribution platforms, such as Yunji, Beidian, etc.; ④ Content e-commerce channels, such as Little Red Book (Xiaohongshu), Douyin (Chinese TikTok), etc.

In addition to online and offline cosmetics channels, there are also proprietary channels such as TV shopping, OTC (pharmacies, cosmetic medicine), beauty salons.

Figure 1 summarizes common commodity retail channels. Each channel has its own clear crowd positioning, and is also building its own consumer data capabilities. Selecting channels and allocating products based on brand positioning and channel demographic data can strengthen the channel's precision capabilities and open up the market quickly. For example, Leyou, a channel dealing maternal and infant products regularly shares the consumer analysis data of milk powder category to Wyeth and other brands, and Wyeth, in return, also shares the analysis data obtained from the sales of products in the e-commerce channel to Leyou.
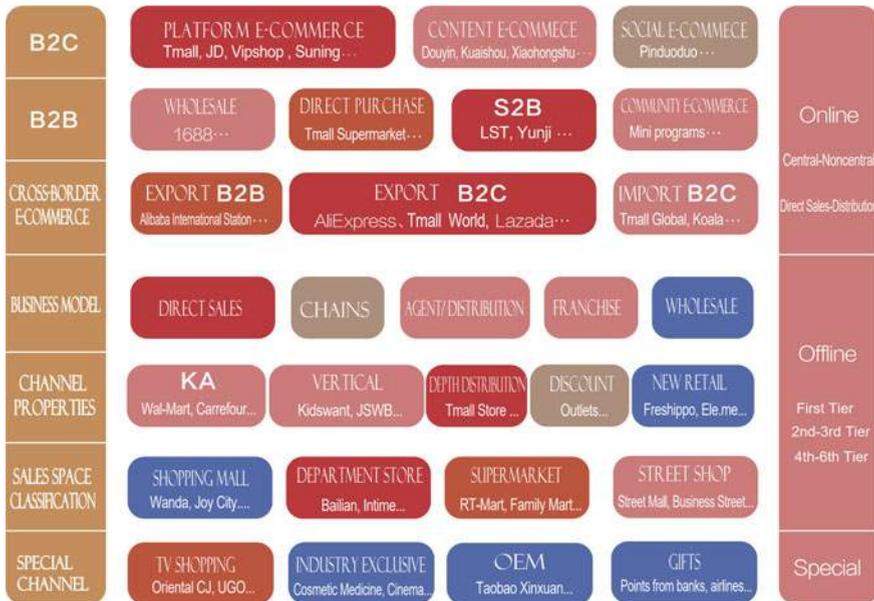
Fig. 1 Common retail channels for commodities

By the end of 2019, e-commerce channels had accounted for more than 25% of China's cosmetics channels, with e-commerce channels even making up more than 50% of those used by some leading brands. E-commerce channels are also the ones with the highest degree of digitalization. Many brands entering the Chinese market choose to start in the e-commerce channel first to quickly test the matching relationship between the product and the crowd, accumulate data, and then fit the crowd data with other channels to assist the selection and layout of offline channels.

The best channel strategy for a new brand to enter the market is to explore online channels before expanding to offline channels; to develop precision distribution channels for core customer accumulation before entering formal trade channels to spread to the mass market; and to step into channels with digital touchpoints for data accumulation before marching into channels with a low degree of digitalization.

Three Squirrels (a popular nuts snacks brand in China), taking the e-commerce channel as the main battlefield first, quickly captured the category awareness and created the IP of squirrels through online marketing methods. After gaining brand influence and consumer membership, it opened offline self-operated experience stores—the Feeding Store, as shown in Fig. 2, and accumulated offline retail experience. Since the brand has got enough experience and data, it entered large trade channels such as supermarkets and department stores after adjusting their products, and eventually directly entered hundreds of thousands of offline retail stores through Lingshoutong, thus completing the rapid layout of depth distribution channel.

The Three Squirrels is a native brand in e-commerce, and the channel layout can be designed according to the optimal path. However, most traditional brands usually have offline channels first before exploring online channels, constantly having conflicts between online and offline channels. So how could they coordinate the diverse channels?

2   The Omnichannel Integration Model

In 2010, Taobao Mall changed its name to Tmall, and many offline brands started their own e-commerce layouts, but some brands were hesitant even when they witnessed the huge traffic dividends of e-commerce. Why did they not start online business quickly? The fundamental reason was the issue of channel balance. 80% or even 100% of their original business relied on agents and distributors. Once the e-commerce business was launched, the brands would have the ability to directly sell to consumers, inevitably leading to the compromised interests of agents and dealers. Despite the low cost of e-commerce channel and the transparent price, it would definitely have a negative impact on offline business. What's more, offline channels are quite a complicated situation. Many dealers have grown with the brand, owning deep connections, seniority, resources, and a variety of intricate

Fig. 2 Offline self-operated experience store of brand three squirrels

interests; many dealers even have family relations with founders of private enterprises. In contrast, e-commerce first survived in the cracks, but has grown into a towering tree in a few years, bringing ever-rising sales sharing in the business, thus forcing brands to face up to the problem of channel conflict and seek a new model of omnichannel integration, as shown in Fig. 3.

Since the inception of e-commerce, in order to balance the channel relationship, many companies set up independent e-commerce departments. They prepared special products, independent logistics systems such as warehousing and express
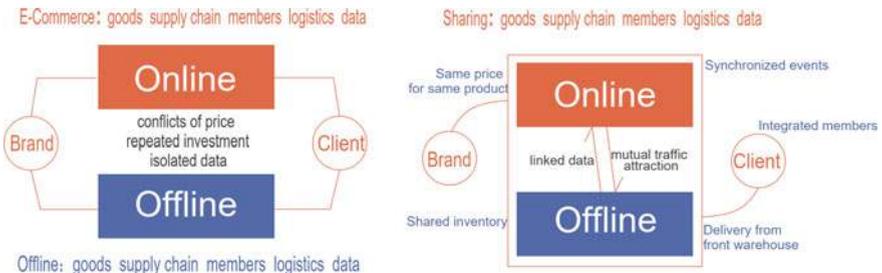
Fig. 3 New mode of omni-channel integration

delivery, and another membership system for e-commerce; quite a number of companies even set up wholly-owned subsidiaries for e-commerce. That was equivalent to the establishment of two independent operating systems. With the gradual expansion of the e-commerce sector, the contradictions have continued to intensify. First of all, the exclusive products allow e-commerce deals to have independent pricing power, making consumers see different price systems of the same brand in different channels. For example, the price of a dress from a famous clothing brand was 1,200 yuan in Jiuguang Department Store, while it was marked 299 yuan on Tmall. Although there are subtle differences in styles, how would consumers feel? Would consumers holding offline-store membership cards still be loyal to this brand? There are also contrary situations. A case in point is that there was 40% discount at the price of a liquor brand sold in offline stores, while it was sold in full price in the Tmall flagship store. Consumers who had purchased the products on Tmall would choose to ask for refund when they found about the in-store prices. In order to solve the contradictions between online channels and offline channels, the first step is to strengthen governance on commodities and prices. It is necessary to establish omnichannel products first, so that these products are labelled with the same price in online channels and offline stores. In terms of pricing model, the brand should break the original price division of tenfold pricing for offline channels and twofold pricing for online channels, so as to maintain consistent original prices (in-store tag price and Tmall fixed price). In the cases of events, the price is set according to the level of the event. For Class-A events (such as "Double 11", New Year's Day Sales, etc.), online channels and offline channels synchronize prices. For Class-B events (channel independent activities, such as Tmall's New Fashion and 99 Festival, etc.), set a promotion discount of at least 10% of the price of Class-A events and the channel can flexibly formulate promotion plans. With omnichannel products, online channels and offline channels can realize the coordination with "goods", so that it is meaningful for online channels and offline channels to attract traffic for each other. At the same time, keeping exclusive products for online or offline channels retains the flexibility of original channels.

Different industries have their own emphases in utilizing online channels and offline channels to attract customer traffic for each other. Unlike categories including the whole vehicle sales, car modification and others in the automobile industry, the Big Home Furnishing industry has high unit prices of furniture, whole house customization, doors and windows, building materials, etc., and customers have long decision-making cycles, requiring their on-site experience. So the focus of this industry is to divert traffic from online channels to offline channels. The whole-house customization industry can be taken as an example. Companies can first "plant grass" (arouse customers' interest) with content on Taobao, Little Red Book (Xiaohongshu), Liba Community, Douyin (Chinese TikTok) and other channels, and cultivate brand awareness through the livestreaming combination of showrooms, factories and designers. Through Tmall channels, it can carry on with product display and customer service consultation, allowing consumers to pay a deposit on Tmall. Then it distributes the demand to the nearest dealers through

geographic routing, or customers can choose the nearest store through the new retail system. After the dealer arranges door-to-door measurement, communicate the decoration plan, and customize the plans on production and construction delivery, it finally writes off the first payment in the "Fire Phoenix System". In this way, consumers first pay the deposit for Fire Phoenix products on the mobile Taobao App, and then pay the balance on the store cloud POS terminal or hardware POS terminal, with their first payment deducted.

In such an interlinked chain, the cost of online traffic attraction is low and it is easy to reach consumers. As for the conversion link, offline experience stores, door-to-door services, etc. can realize high conversion rate while offering amazing service experience.

On the other hand, the FMCG industry (such as cosmetics, mother and baby products, snacks) features low unit price, fast decision-making, and high repurchase rate. In the integration model of channels, two-way traffic attraction and resource sharing should be selected. For example, the offline "hit product" can be used to promote online new products so as to quickly complete the launch. Products like Totole granulated chicken bouillon, Angel yeast, Chacha melon seeds, Tsingtao Beer, Mengniu yogurt, etc. have more than one million daily omnichannel order volume, or tens of millions in some cases, due to their high channel density and coverage. As long as a part of their sales data is extracted in a planned way for precision marketing, huge traffic can be attracted. For example, Tsingtao Beer plans to launch a fruit-flavored craft beer for female customers. If this product is to be independently channeled online, the cost of obtaining accurate traffic would be quite high. Although the promotion effect of vertical KOLs such as Lady Penguin (Zuieniang) would be definitely magnificent, yet the cost could be high and also fixing the cooperation schedules could be intractable. It is quite easy, in this case, to draw traffic offline. A lottery QR code can be put on the inside of the bottle caps of Qingdao Pure Draft Beer, and customers can use their mobile phones to draw the lottery for new product experience. We can set high probability of winning for female customers, and low probability of winning for male customers, so as to obtain precise target customers, and then direct them to obtain experience packs, coupons, etc. from e-commerce channels such as Tmall. In this way, customers can be reached quickly at low cost, and the sales of new products on Tmall and other channels can be efficiently accumulated, so that more new customers can be reached by means of recommendations during their search on apps.

In view of the low unit price of fast-moving consumer goods, in the logistics and other links, the delivery model from the front warehouse or the nearest store can be used, and the cooperation model such as Tmall Supermarket and Taoxianda can be used for fresh food and other products that require cold chain transportation. Front warehouse delivery refers to the delivery from offline stores or front warehouses after the e-commerce order is placed. Why not use the e-commerce general warehouse for delivery? The grocery products can be taken as an example, which have the unit price between 35~50 yuan, with the gross profit rate ranging from 30 to 35%, while the logistics fee for each express delivery is about 4.5

yuan, accounting for 10% of the sales and 40% of the gross profit rate. Nearly half of the profits are spent on express delivery! If the logistics cost of chocolate, ice cream, fresh meat and other commodities that need to be transported in the cold chain is about 20 yuan per order, it must be shipped from the front warehouse or in cooperation with Taoxianda or Freshippo, etc., because those goods could be packaged with other items for bulk delivery to reduce the cost.

BESTORE (Liangpinpuzi, a snacks brand) uses Tmall's "Extremely Fast Delivery" service. Consumers can enter BESTORE's Tmall flagship store to select and order products labelled "Extremely Fast Delivery", and Tmall Logistics Team delivers the goods to consumers within 2 h after picking up the goods at the nearest BESTORE store. Similarly, consumers can place an order on the Freshippo app, and have goods delivered to their homes in about an hour. These are all achieved using the front warehouse delivery model. Such a model can not only reduce logistics costs, but also improve the consumer experience. Imagine the amazement that a customer can have when he could enjoy the delicious snack in less than an hour since he places an order, after watching the livestreaming of the anchor eating yummy duck neck! Such experience would definitely boost the conversion rate.

Commodities in the clothing industry (men and women's clothing, men's and women's shoes, children's clothing, etc.) are often non-standard products, and it is often difficult for them to be unified through all channels. Each region has different consumption power, operating costs, and degrees of competition, with individual companies even affected by internal factors such as inventory pressure, so commodities and prices should not be uniform across the country. For example, in October every year, the main commodity sold in the stores in Northeast China is woolen coats, while the counterparts in hot sales in the stores of Jiangsu, Zhejiang and Shanghai are windbreakers, and the stores in Guangzhou are still selling shirts and T-shirts, so in terms of selecting products that meet regional needs, offline stores should make decisions based on the actual situation. In the online shopping scenarios, customers in different regions can browse various products through the personalized interface technology. So even in the same flagship store on Tmall, the main products that customers in Shenyang see is down jackets, while customers in Zhuhai see dresses. Brands that have integrated online and offline channels can deliver livestreaming service and short video advertisements online to customers within 3–5 km to attract traffic to stores, and can also use virtual 3D/VR/AR to help online sales of some products which are actually out of stock in the nearest stores. In addition, the core of the omnichannel integration of apparel categories is to eliminate the wall between diverse types of members to form a model of self-consistent traffic and member sharing. For example, if an in-store member of a famous women's clothing brand consumes online, the offline shopping guide can also get a commission, and the offline store can also share a part of the profit. In this way, offline stores will not see e-commerce as an enemy for customers. As for member sharing, the first thing to do is to establish a unified member center, identify the unique IDs of online and offline members, manage members' data according to unified requirements, and use the source label of members as an important label to achieve unique membership, as shown in Fig. 4. With such
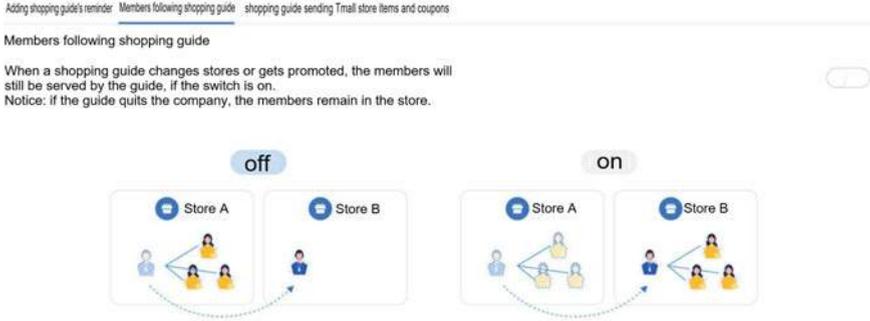
Fig. 4 Members-following shopping guide mode

efforts, customers can get unified services and rights in all channels, which is more conducive to customer loyalty to the brand, and can also accumulate comprehensive data of the customer to provide better services for them. For example, the store launches an exclusive birthday promotion on the birthday of the customer, but what if the customer does not have time to come to the store on the birthday? Such situation used to mean customers' loss of missing out on exclusive promotions. Now through membership sharing, customers who have no time to visit the store can also enjoy special services online.

Another phenomenon in the footwear and apparel industry is that 15–20% of the transactions are lost because some sizes or colors are sold out in the store. Such a problem could be neatly solved with the data-link shared warehouse. Also, promotions based on LBS (location-based service) such as online livestreaming can achieve explosive sales effect in short time can help stores to digest inventory in a timely manner and withdraw funds. This method does not destroy the price positioning of in-store consumption, but also relieves inventory pressure.

The connection of data helps achieve the integration of online channels and offline channels in terms of business elements such as commodities, membership, marketing, and logistics, realizing a shift from contradictions to complementary advantages.

From confrontation to integration, online and offline channels are in harmony with their own prosperity in distinctive advantages!

3   The Channel Management Tool: DingTalk New Retail Workbench

Traditional channel management has been often trapped in the following maze. The core competence of agents has been managing the relations of various channels, while the focus of brand owners' work has been pushing agents to place more orders, instead of helping them digest inventory. Actually, both parties have seldom engaged in real sales link, which have been actually undertaken by retailers who

can offer nothing but limited data of incoming goods and sales. In consequence, dealers usually make snap decisions when placing orders at the fair, and bang on the table in anger and upset when there were stagnant sales. Such issues could be solved through data tools, with the digitization of omnichannel business and all touch points.

The original offline ordering fairs held several times a year could be transformed into weekly online new product ordering fairs, where dealers choose products based on data and content material packages. Distributors can also delegate power to store managers to order directly in the mode of "back-end order". Distributors can order in small batches for community test sales, and quickly replenish goods based on data, increasing the turnover rate from 5 to 10 times per year to 30–50 times per year.

In the past, the data of the store management, inventory, financial management, and assessment of offline channels were not connected to each other, and the statistics, summary and tabulation were carried out by specialists. Through management tools such as DingTalk, stores can have mobile, real-time and visualized data. The sales of each channel and each product can be observed any time, and form comparative data and assessment data, such as store sales rankings, year-on-year growth, regional data aggregation, etc., directly improving management efficiency.

Since the end of 2017, DingTalk has begun to try to include front-line store clerks, store managers, and supervisors of terminals, so as to put originally loose and unsystematic offline store personnel management online. In addition to enabling the basic OA (office automation) function, brand owners can also accumulate data of store customers and members in DingTalk, and establish long-term communication channels with them.

DingTalk's New Retail Workbench takes the business behavior of offline stores online and forms digital touchpoints. After the store joins the new retail workbench, it has the ability of digital management. Enterprises can maintain store information, assess store operations, and train, assess, and motivate employees online. Originally, if the headquarters issued marketing instructions to the terminal, the message had to travel from the headquarters to the regional managers, then to the provincial and municipal commissioners, and finally to the store manager, causing information distortion during the layer-by-layer communication and the over-a-month time gap before the headquarters' new product policies and marketing policies reached front-line. Now with the online management tool available, the real-time communication of unprocessed truth is in place, with the "publicizing", "implementation", "evaluation" and "testing" completed in one platform and ensuring that all personnel truly master it.

With DingTalk, all activities starting from branch companies to dealers and in-store shopping guides, including the distribution of activity plans, new product promotion, marketing tactics, display operations, as well as activity target follow-up, activity review, shopping guide assessment, etc. can be directly completed online.

DingTalk's digital logistics collaboration enables brands, carriers, drivers, dealers, and logistics systems to collaborate and synchronize multi-party logistics in

real time, achieving coordination across stores, dealers, and ecosystems so as to share logistics information and inventory.

DingTalk's New Retail Workbench, DataV, QuickBI and other products can visualize management, allowing brand executives to observe the sales status of various channels and regions and monitor the operation process in real time. The high granularity of data can cover stores, shopping guides, and commodities.

4 Rapid Penetration in the Depth Distribution Channel: LST

There are more than 6 million small neighborhood stores in China, contributing 40% sales of the FMCG industry, serving 120 million consumers on the daily basis, and providing 15 million jobs. Depth distribution channel cultivation is a huge opportunity for FMCG brands, and it is also the most challenging channel development task. Although there are a large number of small stores, they are extremely scattered, often in the form of independently operated mom-and-pop stores, unable to offer a stable and abundant supply of goods. Alibaba's Linshou-tong (LST) has integrated these small stores. As of the beginning of 2020, there were more than 1.5 million micro-stores on this platform, as shown in Fig. 5.

The nationwide warehouse and distribution network of LST covers 193 cities and 13,370 townships. With four years of efforts, it has helped small stores

Fig. 5 Alibaba's retail platform

transform and upgrade into convenience stores, realizing "six unifications" of commodity supply, logistics, services, convenience facilities, management, and logo. Through Alibaba's strong brand supply chain system and digital capabilities, LST has become the supply chain and digital support behind the small stores. It has also established strategic cooperation with more than 50 major clients, and more than 3,000 brands are active on LST platform. In terms of maintenance and management in the channel, LST has offline urban partners with a scale of more than 10,000 employees, covering millions of small stores to help brand owners to complete the relationship management, product circulation, and marketing services for small stores.

In the aspect of logistics, LST has established five regional warehouses and more than 30 urban warehouses, covering 20 provinces across the country, and has already sunk to county towns. Urban warehouses have achieved T+1 (one day after the transaction) delivery time within the first ring area, T+2 delivery between the first ring and the second ring, and basically achieved T+2 or T+3 delivery in the county market between the second and third rings, serving these small stores in the B2B logistics mode of order fulfillment. In terms of digital capabilities, the LST App realizes the digitization of B2B as well as the whole link of B2B2C from small stores to consumers through the POS system. The combination of the App and the POS system could fundamentally digitalize a store, which allows LST small stores to get traffic from the Amap (a mobile digital map) and linked to Ele.me (a leading local services and on-demand delivery platform), breaking the limit of 3,000-m service radius and gaining the chance to serve more consumers.

Brands can quickly carry out deep cultivation of channels through LST, while small stores can order online, use LSP partners for distribution and relationship maintenance, being able to cover sales outside a radius of 3,000 m from the store with the help of Cainiao (a smart logistics network) and Ele.me, etc. Brands' endeavors in developing depth distribution channels at high costs now could be efficiently implemented through business digitization and network collaboration.

In addition to depth distribution channels, the 4th–6th-tier sinking market is also a new blue ocean market that can bring incremental value to brands. In 2014, Rural Taobao officially launched the "Thousand Counties and Ten Thousand Villages" project for the rural market. Based on the e-commerce platform to build a two-level service network at the county and villages, Rural Taobao gives full play to the advantages of e-commerce to break through the bottleneck of logistics and information flow, realizing the two-way circulation of "cyber popular goods entering the countryside" and "farmers' products going to the city". Another channel for the sinking market layout is Taobao Deals. This platform can connect 1,000 industrial belts across the country, enabling 100,000 factory-type merchants to have C2M capabilities, allowing manufacturers to directly connect with consumers and achieve the shortest business chain.

5 Online Expansion in Overseas Channels: AliExpress and Lazada

As Chinese e-commerce gradually matures and competition becomes more and more fierce, there is a consensus on going overseas as a new growth point. However, direct entry into foreign e-commerce platforms requires a professional team that understands the local market and culture, and domestic companies often encounter cultural shocks. AliExpress is Alibaba's B2C platform for foreign markets, covering 220 countries and regions, including the United States, Japan, Russia, Brazil, and Spain, involving 18 languages, with more than 150 million overseas buyers, and over 600 million installations of the AliExpress App, which was shortlisted as TOP 10 in the Global Applications. The web page of AliExpress is shown in Fig. 6.

Chinese merchants familiar with platforms such as Taobao can quickly get started with AliExpress. In particular, Tmall merchants can migrate to this platform with only one click. In terms of payment, sellers can withdraw money through international Alipay, safe and fast, with ultra-low handling fees. In terms of logistics, the official logistics jointly launched by AliExpress and Cainiao Network provides one-stop logistics solutions for collection, distribution, tracking, dispute settlement, and compensation. Brands can take advantage of its overseas warehouses, stock up on overseas warehouses, and ship directly to buyers to achieve faster timeliness and better service.

In terms of marketing, in addition to the through train service based on keyword bidding ranking, Daren Missions, Affiliate (overseas version of Taobao Spreader), Flash Deals, Windows (search recommendation), group purchase, trials, single product discount tool, store price-break discounts, merchant's coupons and other
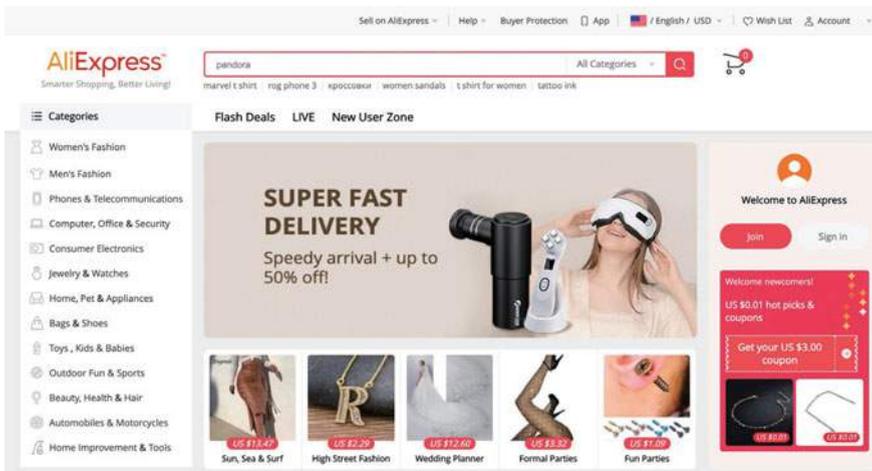
Fig. 6 Home page of AliExpress

diverse marketing tools can help increase traffic and conversion rates! It is particularly worth mentioning that the community marketing and livestreaming have developed rapidly on AliExpress. In 2019, more than 8,000 livestreaming sales were performed on AliExpress, which is twice the total number of 2017 and 2018 livestreaming combined. During the mid-year promotion in June 2020, nearly 1 million Russians watched AliExpress livestreaming online, and the number of viewers in Spain and France was also increasing rapidly.

Lazada, established in 2012, is one of the largest online shopping sites in Southeast Asia, covering 650 million consumers in countries such as Thailand, Vietnam, Singapore, the Philippines, Malaysia, and Indonesia. Since 2016, Lazada has become the flagship e-commerce platform of Alibaba Group in Southeast Asia. LazMall, the official mall of Lazada, has gathered more than 7,000 international and local leading brands in Southeast Asia and sells to consumers in this region.

Electronic goods, household items, clothing and other categories are extremely competitive in the domestic market of China. Some merchants have turned to the Lazada market by taking advantage of China's supply chain, and yielded marvelous results. Products such as kitchen appliances, drones, driving recorders, rotary mops, and home storage are popular. At the same time, Lazada implements the "Sell to China" plan in cooperation with renowned brands in Southeast Asia to bring these brands to Chinese consumers. Lazada's web page is shown in Fig. 7.

Through Alibaba's domestic and overseas e-commerce platform, the originally complicated channel expansion can be launched online with one click now. Payment, logistics, service and other systems are completed by the platform and the network of localized service providers. The ability to diversify channels at home and abroad, once only possessed by giant enterprises, now can be easily acquired by small enterprises through platform empowerment.

6   Summary

This chapter introduces how to manage channels through digintelligence.

(1) Data could be used to optimize the selection of channels. Channels with digital touchpoints should be given priority, so that the data of consumer tags could be acquired before accurately developing all channels of diversity.

(2) The relationship between online and offline channels can be transformed from confrontation to integration, achieving co-existence in common prosperity. According to the characteristics of the industry, different solutions and tools (such as the Fire Phoenix system, Extremely Fast Delivery Service, and the omnichannel membership card system) should be applied to remove the walls in various links between online and offline channels, and allocate the channel resources of the enterprise more efficiently.

(3) Through the DingTalk New Retail Workbench, agents and distributors have improved their business efficiency. Through Lingshoutong (LST), brands have quickly completed the deep cultivation of channels.
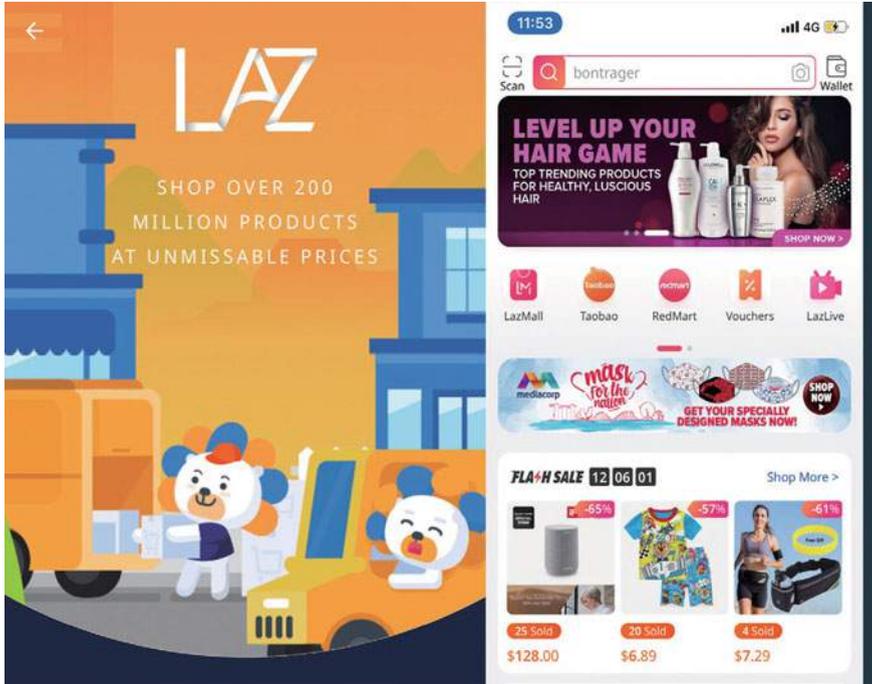
Fig. 7 Home page of Lazada

(4) Various platforms of Alibaba Group can help complete diverse channel expansion endeavors. Brands can use LST to expand depth distribution channels and enter millions of small stores, penetrate into the sinking market through Rural Taobao and Taobao Deals, and utilize AliExpress, Lazada and Tmall Taobao World to expand overseas markets. These channel expansion actions, once time-consuming and laborious, can now be done online.

With channels selected, how could enterprises promote the brand, market well and drive sales? The next chapter describes digintelligent marketing with Alibaba's big data and omnimedia.

Digintelligent Marketing

Ye Tian

The old saying that "I know half of my ads do not work, but I don't know which half" no longer applies in today's advertising circles. As consumer data continues to accumulate, consumer tagging deepens, and the reach of digital touchpoints expands, all marketing behavior has become transparent. Not only do we know which half of our ads isn't working, but we also know how to filter out the ones that aren't working in the first place. Now, instead of isolated branding, marketing's advertising behavior can be directly tracked to sales results. Through digital intelligence, the separated marketing and sales can be connected, and marketing endeavors has entered a new phase where the brand advertising campaign simultaneously progresses with sales success.

Every marketing element, from celebrities and IPs to an ad image, a short video and a copywriter, can be evaluated by data and fed back with data results. Marketing behavior has changed from "arts" to "science", and metaphysical issues such as human needs are clearly measured by numbers. Issues like the impact of different color backgrounds on clicks, the influence of promotional discounts on the entry into the best price-to-volume ratio, and the time when the effect of multiple ad placements in the same channel will begin to decay can all be displayed with figures. Data have become the weapon for precision marketing.

The differences between traditional marketing and data-based marketing are demonstrated in Table 1.

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

Table 1 Differences between traditional marketing and digintelligent marketing

Traditional marketing	Digintelligent marketing
Large advertising investment with unpredictable effect	Accurately reaching the target group with optimized iteration
Small customer analysis sample and coarse granularity	Comprehensive insight into consumer attributive behavior
Isolated brand campaign and sales promotion	Full-link data connection with campaign-sales integration
Failure to accurately assess the marketing effectiveness	All elements of marketing can be evaluated digitally

1   The Four Key Steps of Digintelligent Marketing

Just after the "Double 11" in 2019, a goat milk powder brand organized its distributors to attend a course on New Retail at Alibaba. In the class, a problem that had been bothering the attendees for a long time became the focus of discussion: How could they accurately find target customers? It is safe to say that such a problem has also been a core issue for all brand marketing, but it was more prominent for goat milk powder. In China, 14.65 million were born nationwide in 2019, and despite the fact that goat milk powder has advantages of easy absorption and low allergic reaction for humans, most parents still chose cow milk powder due to the taste and cognitive habits. So, which part of consumers would actually choose goat milk powder? How could the brand accurately reach these consumers before they made a purchase? Those questions can be summarized into the four key steps of digintelligent marketing, namely the identification, analysis, expansion and reach of consumer data, as shown in Fig. 1.

The very first step is identification, which is a prerequisite because to do consumer analysis one needs to have consumer information first. Unfortunately, the majority of brands do not have consumer information.
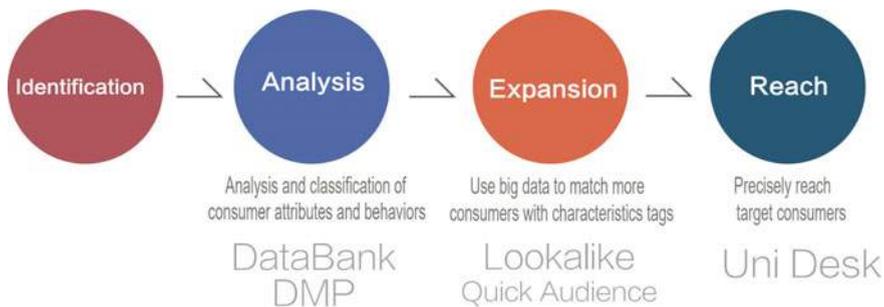
Fig. 1 Four key steps of intelligent marketing

2 From Channel to Consumer, the Shift of Marketing Focus

In traditional FMCG sales, goods were sold through channels, and it was the channels that really reached consumers. If brands wanted to have information about consumers, they needed to rely on professional organizations such as research companies. For example, if you were in charge of sales of a goat milk powder brand, your first priority was to spread the goods into the major mother and baby business channels as soon as possible, and to grasp the numbers of orders placed by the channels and volume of goods stocked in the warehouse, but meanwhile, you had no access to who the consumers were. This situation was quite common in channels like supermarkets, department stores, home appliances and digital specialty stores, and cosmetics CS channels. Since the channels were the real clients of the brand, all brand efforts basically revolved around channels. Channel management, agency franchising, and even brand mindset shaping, were all focused on the development of channels. Let's recall the Wanglaoji Herbal Tea advertisement. Why did it use the scene setting of hot pot restaurants and pizza stores instead of home scene? The reason is that this ad was made for the restaurant channel. Considering the pricing of Wanglaoji at that time, the catering business channel was a better breakthrough access than supermarkets. The 20 years from around 1995–2015 witnessed the massive development of Chinese brands, with "brand buildings" lined up, covering almost all categories. The 20 years also marked the era when "channel is the King", and who had mastered the most core channels had already gained advantage. Each channel iteration in street stores, department stores, supermarkets and malls produced a new group of leaders, so we can regard these 20 years as the channel era of branding.

The internal logic of competition in the channel era of branding is that customers went wherever the channels existed; and the offline business competition was centered on the occupation of the space of business resources. The breadth, density and depth of channels were based on the opportunity to reach more consumers in space. As a result, we could see a brand opened several stores on the commercial pedestrian streets of many cities. For example, among the shoe stores on Huaihe Road Pedestrian Street in Hefei City, there were seven Red Dragonfly stores, five Aokang stores, and four Yearcon stores. The Top 5 brands occupied almost all effective space resources, as shown in the Fig. 2. Similarly, the three major brands of Midea, Jiuyang and Supor were always in prime positions on the small home appliance shelves of RT-Mart, while other competing brands were placed at the bottom of the shelves, lacking space advantages.

In the era of channel brands, as long as the brand occupied the space advantage, it would generally do well without consumer analysis. However, the situation has been quite different since 2015. With the rise of e-commerce penetration rate, brands' competition for space has gradually given way to competition for consumers' time. Now, brands must reach out to the front end of consumer behavior and capture the cognitive time among potential consumers in order to complete brand promotion.

Fig. 2   Pedestrian Street brand store at Huaihe Road

So, is it possible to conduct consumer analysis if the channel is self-operated? In fact, even if the store is self-operated, the information that the merchant can gather about the consumer is very limited, which is generally the name, gender, phone number, products purchased, the time and place of purchase, etc. One may still recall the memory years ago of applying for membership card after buying goods in the store, when the shop assistant gave you an overwhelmingly packed list of options to fill out, and immediately said just it was just OK to leave a phone number because she saw the customer was about to give up, and then the membership card was ready. Many companies have taken a great lot of phone numbers of consumers, with an instance of a brand having accumulated 70 million phone numbers, more than the total population of the United Kingdom. But how did these phone numbers work? The answer is that they have never been used on a large scale. So why did a brand spend billions of dollars a year on advertising when they actually owned tens of millions of pieces of "consumer information"? Simply because having a phone number doesn't mean you have consumer information; it's just an unusable information element.

3   Precise Labeling and Demographic Operation Strategy

A test was ever done in Xtep stores. With two groups of 1000 people each, the first group sent mass SMS messages to consumers about the "Double 11" campaign, while the second group sent "one-to-one" messages, with different content for each person, based on the analysis of the customer's previous purchase attributes. The results showed that the recall rate of the second group was tens of times higher than that of the first group, which showcases the power of precise operation.

Previously, most brands purchased fixed positions to place advertisements, but the audiences of TV ads, outdoor ads and paper ads were hardly accurate targeted, and even if the audiences of building ads were relatively precisely reached, the determination of purchase intentions in the demographic could not be completed. With the development of marketing big data, it is now possible to operate the demographic according to precise tags.

Fig. 3   Rich population group tag library of DMP

Since consumers may use different usernames in different domains, it is important to first identify who the real people are behind the different usernames, and then integrate and analyze their behavior in each domain.

One of the most important things in business is consumer insight, i.e. knowing which consumers can buy your products. With the ability of consumer insights, all ad campaigns can accurately reach by selecting tags from the insights, and the rich demographic tags in DMP can be used to circle the precise demographic by various conditions, making consumer data "available but not visible", which can both ensure the data application and the protection of customer privacy. Figures 3, 4 and 5 show respectively the DMP's rich population tag library and classification, as well as the tagging options and population size estimation.

Once we have mastered the consumer insights, we have a whole new set of capabilities from product development to sales promotion. We can develop products based on demand, and before we do so we can both target people, know their size, habits and preferences, while reaching them precisely at the same time. The cooperation of Mars and Tmall to start a new retail innovation project is to use data as a guide for the design and production of products; the launch of spicy Snickers (Fig. 6), Snickers TF Boys limited edition set for examinees, chewing gum for driving scenario and other products was completed with marketing scenario innovation, and the sales of Snickers set for examinees peaked at 4.6 million sets in two days.

By building consumer data assets in the brand's private domain, brands can achieve accurate marketing to their members, without large-scale advertising and marketing investments.

Tag name	Tag description	Validity period	Coverage points	Popularity points
Acceptable price level in the whole network ⊕	Acceptable price scale (1-10), 1 is the lowest, 10 is the highest. The acceptable price is calculated based on the unit price of the purchased goods accumulated in the history of the user.	2099-12-31	5	4
Whether it is a high-end buyer ⊕	According to the buyer's certification qualification, shopping grade, credit rating, shopping frequency and amount in the latest year	2099-12-31	2.4	3.9
Alitrip active crowd ⊕	Users browsing visits in Ali-trip of Tmall (PC+ wireless data) are active in the last month	2099-12-31	2	3.7
Destination Preference new (Fliggy) ⊕ ☆	User's destination preferences calculated based on recent behaviors such as Fliggy trading and searches	2099-12-31	3.6	3.7
Holiday categories searched and browsed but unpurchased in recent 7 days (Fliggy) ⊕	Fliggy users' searched/browsed/unpurchased holiday subcategories in the last 7 days, multiple-choice	2099-12-31	2.7	3.4
Scenic spot type preference ⊕	The scenic spots are calculated according to the times of ticket purchase to various scenic spots on Taobao.com (PC+ wireless data) from May 2013 to now	2098-02-14	3.2	3.3
Recent Destination City in Hotel Room Transaction (Fliggy)	Calculateing the city where the hotel room was last purchased during the user's trades in the Fliggy hotel category	2099-12-31	3.6	3
Destination city in last day international ⊕ ticket purchase	Calculateing the city where the hotel room was last purchased during the user's trades in the Fliggy hotel category	2099-12-31	2.3	2.8

Fig. 4 Rich classification of DMP

Fig. 5 Estimation of population size

Fig. 6 Using data to guide design and production of commodities

4   Combined Application of Demographic Tags

By flexibly applying various combinations of demographic tags, brands can not only increase the efficiency of their campaigns, but also differentiate their campaigns for different consumers. The combined application scenarios are as follows:

New user expansion: the focus is on basic information tags, industry demographic tags and scenario tags.

Member relationship maintenance: the focus is on the Members and Super Users tabs in My Users.

Big promotion crowd harvesting: the focus is on the scene cloud map tag and the store, brand, content and ad tags in My Users.

Crowd differentiation marketing: the focus is on the characteristic crowd tags in the basic information tags.

New product launch: the focus is on category keywords, consumer behavior, life stage, consumption level, etc.

Content and IP interest targeting: the focus is on the two highly concentrated tab sets of channels and media.

Offline store marketing: offline data targeting can be adopted while selecting geographic crowds precisely to stores.

DMP provides seven crowd combination methods, such as circling people in tag market, new user expansion, custom crowd factory, circling people with keywords, offline data targeting, creating first-party tags, circling people with demographic combination, etc., so as to meet differentiated operational needs, as shown in Figs. 7, 8 and 9.

In new user expansion, one can choose the pull-newcomers for category tag to pull new users in from the industry demographic, or you can choose to pull in new users by targeting the people who follow the IP that the brand has recently cooperated with. My Users can circle users who have interacted with the store, such as store fans, high-frequency consumers, and users who have added and collected products.

Fig. 7 Different population group combinations
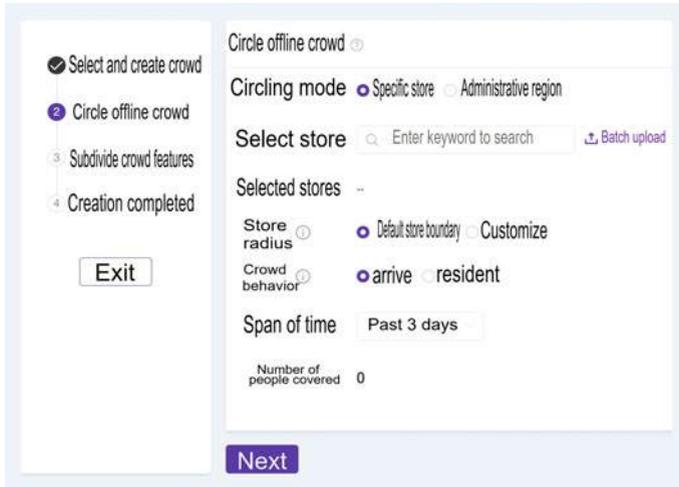
Fig. 8 Covering following population groups
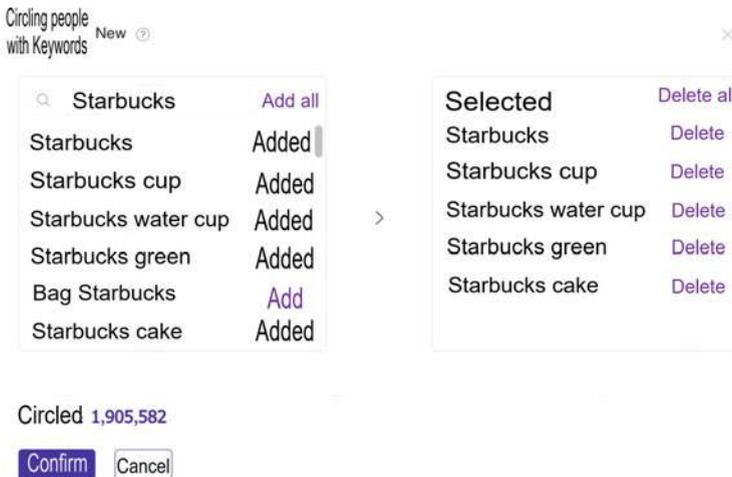
Fig. 9 Number of population covered by key words

5   Demographic Expansion

Through the tag combinations, we can complete the circle selection of accurate demographic. However, with the narrowing of the filtering conditions, the population that can be reached significantly become smaller, with a minimum of only tens of thousands of people in certain cases, then the meaning of ad placement is not significant and even the budget could not be fully spent due to the limited size of the selected group. For example, if a chocolate brand has sought TF Boys' Wang Yuan to be its spokesperson, the most accurate way of demographic selection is to take the intersection of the store's regular customers and people who like the celebrity. But if this store has just opened with only tens of thousands of customers, then the intersection selected narrows down to 10,000 or even several thousand. When this happens, we need to use the next core ability of digintelligent marketing—demographic expansion, as shown in Fig. 10.

There are many tools for demographic expansion, such as DMP and Quick Audience. DMP, focusing on Alimama's selection of advertising target groups, is more suitable for e-commerce departments, because they have more accurate tags and faster iteration. Quick Audience is an intelligent product from Alibaba Cloud, providing data building, insights, and scaling capabilities, which can be applied not only to consumer brands but also to marketing management on users in various industries such as retail, healthcare, education, food and beverage, and services. The first user tests have already begun since December 2019 and will be gradually open to more merchants.

When doing demographic expansion, merchants can adjust the degrees of scaling. Since the crowd size increases rapidly as the matching accuracy decreases
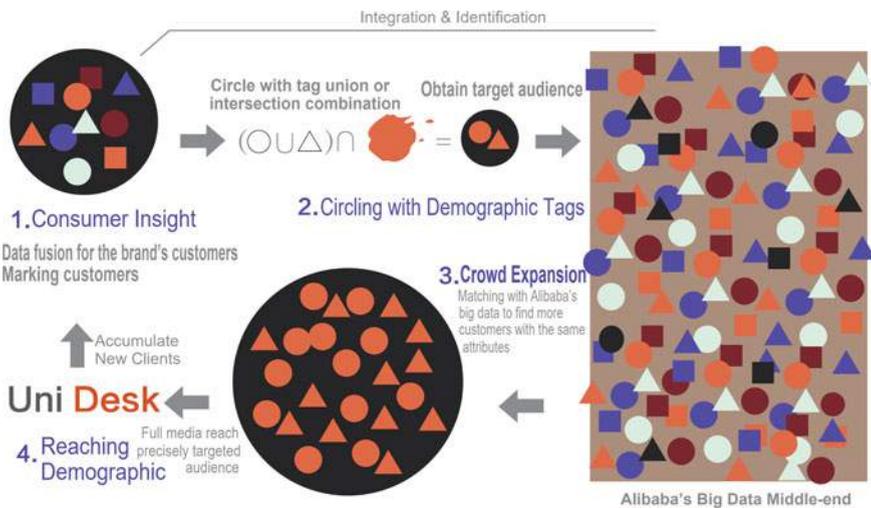
Fig. 10 Core competence of digital intelligent marketing—crowd expansion
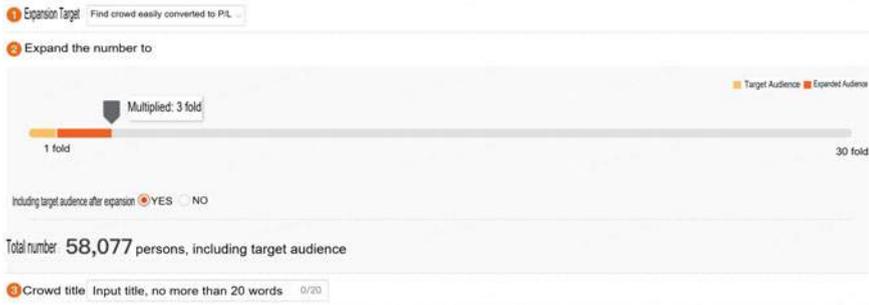
Fig. 11 Reducing the precision to increase the population multiple

slightly, merchants can operate easily and directly by decreasing the accuracy to enlarge the demographic size, as shown in Fig. 11.

When creating a demographic with the DMP, one can first circle the conditions for tag combination and then **select the demographic preference** for expansion, which can be achieved by manually adjusting the multiplier, or you can entrust the AI to make a hassle-free selection. Whether the expansion is needed and the selection of the expansion multiplier can be based on the number of people covered and the estimated number of people that can be reached by each promotion channel. For example, before the "618" Shopping Festival, if a brand needs to have large-scale exposure to accumulate momentum among customers as much as possible, then it should prepare an ample budget, and the multiplier can be chosen between 15 and 20. If a brand wants to do new product promotion and wants to reach precise users, then the multiplier can be adjusted to about 10. Generally speaking, the ROI (Return on Investment) will not change too much if it is placed within 10, according to the author's experience.

Quick Audience, with consumer operations as the core, is a way to help companies achieve user growth through multi-dimensional insight analysis and multi-channel reach with various user insight models and easy strategy configuration. Quick Audience includes the following six modules: data source access, data set creation, user insight, audience circle selection, audience management, and marketing delivery.

Data source access: It provides access to multiple data sources and multiple data sets, completes the import and management of data sources, supports access to AnalyticDB for MySQL 2.0, AnalyticDB for PostgreSQL, AnalyticDB for MySQL 3.0 and other databases.

Data set creation: It provide model configuration capabilities for tag data sets, behavioral data sets, AIPL and RFM, and could independently configure the scoring rules and thresholds for AIPL and RFM models, as shown in Fig. 12.

User insights: It provides demographic perspective analysis, RFM analysis, AIPL analysis and flow analysis capabilities. It can complete the audience insight through tagging perspective and salience analysis functions.
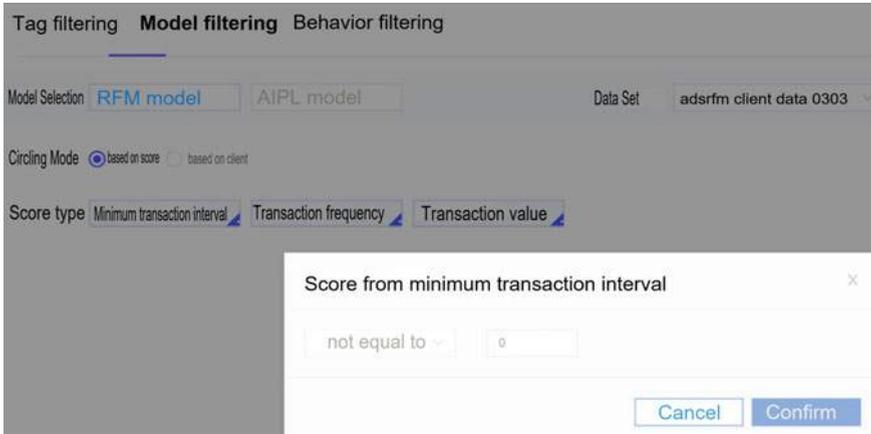
Fig. 12 Dataset creation

Audience circle selection: It supports users to quickly circle a target audience in a specified number or with specified filtering conditions in the process of crowd analysis.

Audience management: It completes the management of circled audiences, including audience analysis, editing, downloading, updating, pushing and other functions. Further insight analysis can be made based on the circled audiences, including perspective analysis, comparison analysis between audiences, and significance analysis.

Marketing delivery: It supports crowd delivery and content operation in multiple channels, such as advertising channels, private channels and private operation positions. Through the underlying automated marketing engine and multi-marketing components, one can independently configure the marketing chain and complete automatic marketing execution.

After the combined demographic tagging has completed the precise circle of the target audience, how do we reach these consumers? How could we evaluate the effectiveness of advertising in the reaching-out process? How to do the effect attribution while placing multi-channel ads? We will answer these questions in the next section.

6   Universal Precision Placement and Marketing Effect Evaluation

1. The working desk for universal precision placement—Uni Desk

Uni Desk is a "brand digital marketing" working desk created by Alimama, providing a universal solution for brands to reach consumers, achieving marketing coverage in "universal chain", "universal media", "universal data" and "universal
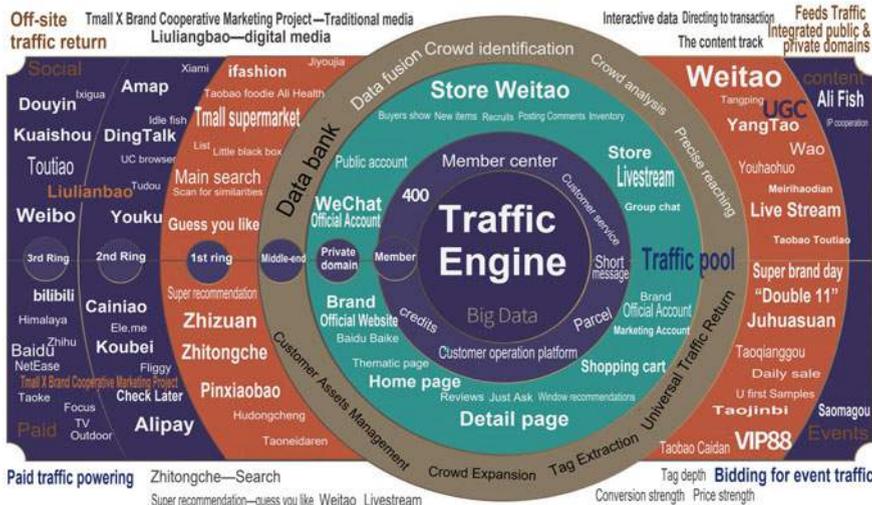
Fig. 13 Marketing field can be divided into two parts: private domain and public domain

channel". Ali Mama can reach not only the domain of Taobao, but also many marketing fields in the entire network. The marketing field can be divided into two major parts: private domain and public domain, as shown in Fig. 13.

Private domain is the brand's free traffic pool, including members, fans, Brand Hub, Weitao, online store page, official microblog (Weibo), Wechat account, group chat, brand community, etc.

The public domain can be roughly divided into three rings of traffic. The first ring is the traffic within the Taobao system, such as free traffic in the forms of search traffic, Guess You Like traffic, live streaming, Youhaohuo, Wao video, Yangtao (buyers show), etc., as well as paid traffic in the forms of Zhitongche, Zuanzhan (diamond booth), super recommendation, Pinxiaobao, etc., along with the traffic from various activities. The second ring is the traffic in Alibaba ecosystem, including Alibaba Entertainment's Youku Tudou, UC Browser, etc. It also includes the traffic in platforms and tools such as Alipay, Fliggy, Idlefish, DingTalk, Koubei, Amap, etc. Such traffic can be reached through tools such as Liuliangbao, Yunma, Pinxiaobao, and Zuanzhanwaitou. The third ring is the traffic in the entire network integrated by Alibaba, including Weibo, Douyin, Jinri Toutiao, Focus Media, Netease, Kuaishou, Bilibili, etc. These channels can also be reached by Taoke and other placement tools.

Each large-scale Internet platform has its corresponding digital marketing tools, such as Taobao's Zhitongche, Zuanzhan, Super Recommendation, Douyin's Dou+, Baidu's Baidu Yingxiao, Tencent's Guangdiantong (renamed Tencent Advertising), etc., all with their own focus and advantages.

2. Evaluation of digital marketing effectiveness

The evaluation of marketing effectiveness has always been a challenge, and digital marketing effectiveness evaluation solves this problem to a certain extent. First of all, we can set different effect goals and assessment modes according to the purpose of marketing and the operation cycle of products and brands. Second, all marketing activities can be digitized, visualized, and even monitored in real time, so individual element of the marketing campaign can be evaluated in a data-based manner, such as celebrity, IP, channel, promotion, membership, etc. Finally, digital marketing tools provide a new mode of operation; the mode of testing and fine-tuning combined with rapid iteration is used to replace the original precision planning, step-by-step implementation, with the frequency of effect feedback accelerated, from originally on the monthly or yearly basis to daily or hourly.

Now, several issues are to be discussed in relation to marketing effectiveness evaluation.

(1) How should the advertising budget be made? The three typical ways of budgeting marketing expenses are rate ratio, ROI and ARPU (Average Revenue per User), as shown in Fig. 14. The rate ratio is one of the most common advertising budgeting methods used by traditional enterprises. It works like this: If this year's sales target is 3 billion yuan and the advertising investment ratio in the past year is 8%, then the advertising budget should be set at 240 million yuan for this year, and the staff should strictly control the expenses to keep this ratio according to the actual implementation of each single month. The biggest advantage of this approach is strict financial control and simple implementation. However, it also has obvious problems due to the fast-changing business environment. If the sales target for March is $30 million and the actual achievement is $20 million, then the advertising budget for April is compressed from $2.4 million to $1.6 million. With such compromised advertising budget, the April target is also challenged, thus entering a vicious circle. Therefore, the rate ratio approach is better suited for companies where there is a very stable business, and budgets are planned on an annual basis and executed on a monthly basis, without yearning for sales growth or new market opportunities. It is not a right choice for start-up brands or those growing at a rapid pace.

ROI is the most common way to budget for e-commerce. It is based on profitability to measure whether each input has a direct profit output; if there is, one can gradually enlarge the advertising input budget, without an upper limit. For example, if the gross profit of a product is 50% and the ROI is 1:3, then for every 10,000 yuan invested, 30,000 yuan of sales will be generated, and when 50% of the cost of producing goods, i.e., 15,000 yuan, is deducted, 0.5 million yuan of profit is left. Then, this investment is a positive cycle; as the investment increases, sales and profits rise simultaneously. To achieve high ROI is not easy. In the e-commerce environment, most of the placements are in bidding mode, which means that once there is a high ROI channel, many merchants will surge in for bidding, the price of placement will then go

Fig. 14 Three typical marketing expense budget methods
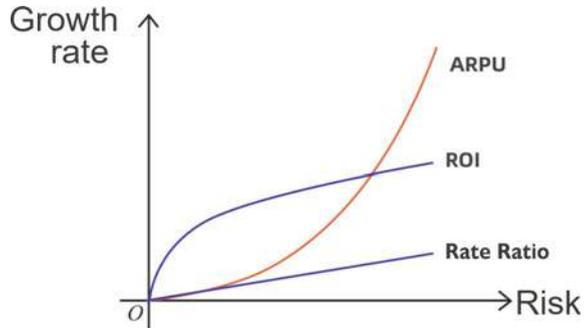
up, leading to lowered ROI. In addition, if one wants to increase placement, he needs to expand the demographic scope, either through manual selecting a new demographic or using AI, but there is a threshold value for the expansion, beyond which ROI will rapidly decline, and finally stand on just the right point to balance input and output. In the trade-off between sales scale and profit, that balance point is the pursuit of digital marketing. The ROI approach to dynamic marketing budgeting allows for quick testing of the best marketing breakthroughs and the optimal marketing path through multiple sets of single variables. Furthermore, this approach does not limit performance and allows e-merchants to seize market opportunities and take immediate actions once ROI profits are positive.

ARPU is a term first used among Internet companies, which calculated valuation according to ARPU before any profit or a clear profit model emerged. ARPU refers to the value that a user can create for the enterprise per unit time; by multiplying that value by the number of users, the current value of the enterprise can be estimated, and the development capacity of the enterprise can be determined according to the growth rate of users. ARPU is a high-risk marketing budget method, because the value of users per unit of time is in fact not a constant, but highly affected by internal and external factors, with large fluctuation range. Companies generally dare not use the ARPU method to do marketing budget, except for double high categories (high gross profit, high repurchase, such as games and cosmetics). However, a large number of companies have emerged since 2016, and adopted the Internet companies' approach to sell goods in retail, such as Perfect Diary, which has soared to No. 1 in Chinese national makeup market in just over 3 years, a success closely associated with its marketing model. It chose Xiaohongshu as a breakthrough, quickly accumulating users, and then began its layout on both Wechat and Weibo to gather users in the private domain traffic pool, effectively maintaining the repurchase rate and ARPU at a high level and achieving terrific snowball growth.

(2) How to evaluate the effectiveness of a marketing campaign? The success of a marketing campaign was previously based on a single criterion, namely the sales performance, which was the only reliable data that the brand could

record. But with this as the only assessment point, the operation team would focus on how to harvest old users, easily leading to the loss of development potential. The brand assets would be constantly consumed, while no one was encouraged to create increments, because whoever did it was taking the wrong path.

Nowadays, marketing assessment can be implemented by measuring data from multiple levels. For example, in the earlier-mentioned AIPL model where the number of consumers experiences changes in the cycle, if the goal of a marketing campaign is to reach more consumers, then the assessment should focus on the increase of value A (awareness), such as in new product trials, samples distribution to new customer, etc.; if the goal of a campaign is to get consumers motivated to buy, then the assessment should focus on the number of A-I conversions during the campaign cycle, such as in platform content campaign, cooperation with celebrities and other marketing activities; if the goal of a campaign is to achieve more conversions to loyal members, i.e., converting users who have purchased into ones with membership, then the focus should be on P-L conversion, examining how many purchased users are converted into members or users with a second purchase within a unit of time.

During the assessment, it is also advisable to pick one variable for test, while keeping other variables unchanged, in order to know to what extent the variable being tested has affected the marketing results, and then make optimizations to that variable. One instance is the ad graphs used in placing ads. Several Alibaba tools have conducted black-box testing on multiple ad graphs in the same placement plan. After 30,000 exposures, the click rate of each graph shows stable results, and then the system will automatically allocate more exposure opportunities to the graphs with high click rates, and the ones with low click rates will not show up any more.

In addition to examining those absolute indicators, we can also look at relative indicators, like comparing with the past data, to judge whether a marketing campaign is successful. For example, during the "Double 11" campaign, we can evaluate and predict the marketing effect of this year by comparing the data of last year in multiple dimensions; we can also compare with the average of industry data or the excellent performance of the Top 10 merchants in the industry, so as to find the gaps and optimize the marketing efforts in the future.

(3) How to assess the value of placement in individual media? This is the most critical part of marketing, because media placement is the most expensive part, and the process of placement is also the most technical and testing part for the team.

All Alibaba's placement tools give specific data on the results of placement. Alimama's Strategy Center gives detailed data on the effectiveness of marketing tools such as Zhitongche, Zuanzhan, Super Recommendation, and Pinxiaobao, including the contribution to the flow of AIPL cycle, display volume, item adding rate, and directing to transaction, etc. Similarly, the placement data of the whole network can be viewed through tools such as Uni
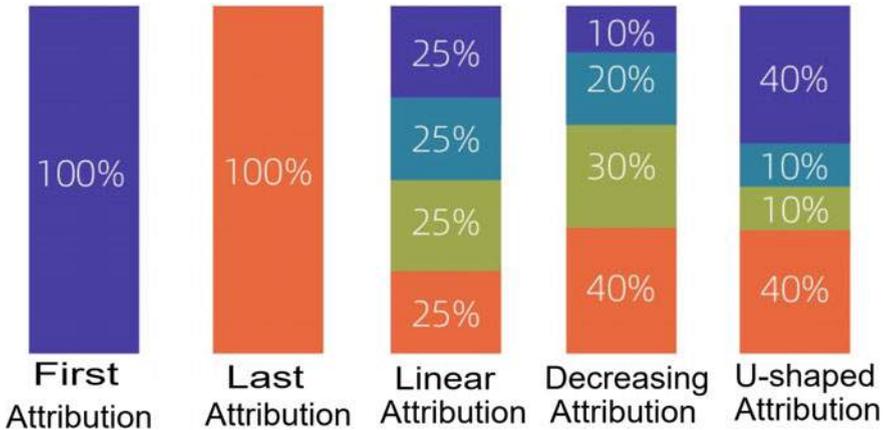
Fig. 15 Common attribution models

Desk. One can also adopt most proper attribution model to conduct analysis of multi-link ads. Common attribution models are shown in Fig. 15.

As the complexity of the placement grows, the simple weighting method for attribution is no longer sufficient, and we can then use algorithms such as Markov chains to create more complex attribution maps.

(4) How should the value of marketing elements be evaluated? How does a brand choose its spokesperson? How does it choose the IP to cooperate with? How could it choose a partner for cross-sectoral marketing to achieve the best results? Is it effective to implant a product in a hit web series? Which Taobao live streaming anchors should the brand cooperate with for the best marketing results? All those questions can also be answered with the aid of data.

When making decisions on the celebrities to cooperate with, we can look at the changes in the search trend of stars through Baidu index, such as the number of associated searches through demand mapping, some basic attributes through demographic analysis, public opinion through the consultation index and media index, etc., but these indicators are still relatively profiled and not clear enough.

Alibaba also has a professional IP trading platform, Alifish (ip.alibaba.com). Merchants can work directly with IPs on Alifish, which could help get around the disadvantages of layers of agents and price hikes in working with IPs, as shown in Fig. 16.

Alifish is constantly enriching the variety of IPs, including drama and shows IPs, animation IPs, art IPs, game IPs, sports IPs and so on. Traveling Frog, CBA, Summer Palace, National Museum of China, 12 h of Chang'an, etc. are all popular IPs in recent years.

The Van Gogh Museum in the Netherlands has joined hands with Alifish to launch a new derivative crowdfunding campaign "Flaring Van Gogh" on Taobao Zhongchou, bringing to Chinese consumers authentic derivatives of Van Gogh's
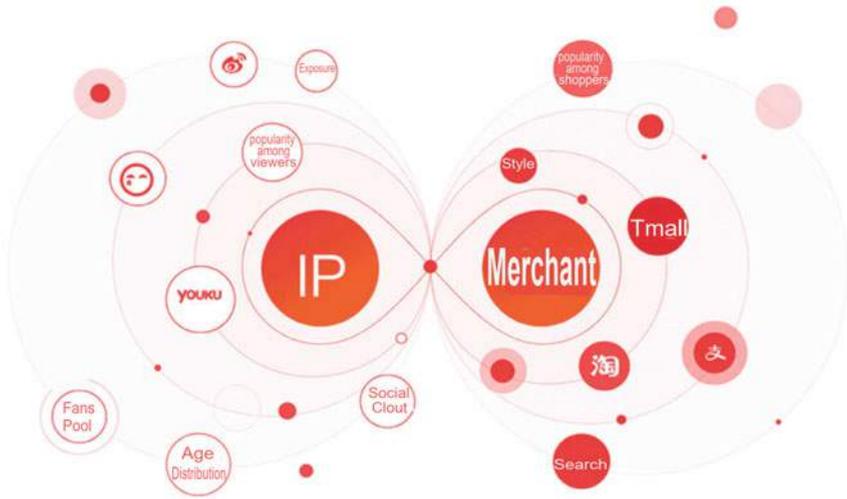
Fig. 16 Alifish making merchants convenient to cooperate with IPs

classic paintings, including "Sunflower", "Almond Tree in Bloom", "Iris", and "Bedroom in Arles", as shown in Fig. 17.

The campaign was warmly received after its launch, with sales reaching 3.58 million units on the first day and the total number of Taobao crowdfunders exceeding 20,000 in less than 48 h, making it the largest single domestic art derivatives crowdfunding campaign. Among the items, 8,000 Paradise brand umbrellas were sold, with the crowdfunding amount exceeding 1 million yuan.

Fig. 17 Crowdfunding activities

By cooperating with the movie "A Dog's Mission", the brand Myfoodie raised its unit price from 49 to 99 yuan, and transitioned its main product from pet snacks to pet food, achieving increases both in brand awareness and sales. The marketing model of free movie tickets with the purchase of dog food for 99 yuan not only increased the conversion rate but also raised the unit price. With more than two years of cooperation with various pet movies and variety shows, Myfoodie stood out in the dog food category.

It is important to grasp the timing of cooperation with celebrities and IPs. Once a celebrity participates in a popular variety show or a hit web series, the popularity will climb quickly, and the same goes for IPs. Some IPs have relatively stable popularity, while others have explosive power but a short impact cycle. For example, similarly being cartoon images, Doraemon's popularity is basically constant, with a big movie coming out every once in a while and a relatively fixed fan base, while Traveling Frog, on the other hand, has a high peak of popularity, but it quickly fades after three months. Data-based judgement of IP can only apply to stable IPs, and for certain more volatile IPs, the old model of "intelligence plus luck" still works. Aside from cooperating with celebrities and IPs, is there a more stable marketing method, which can, for example, expose the products to tens of millions of people at once while selling millions of goods, gaining both fame and fortune?

Taobao Live is such a marketing channel that could integrate brand campaign and sales performance. With the rapid development of Taobao Live since 2017, many brands have gained an advantage on this new track. In addition to the store's own livestreaming, cooperation with Darens (industry experts) is also a very important form. So how does the merchant find a Daren? Thanks to the completely transparent data on Taobao Daren, we can search directly on the V-Task website (v.taobao.com/).

7 AI-Assisted Marketing Tools

During the "Double 11" in 2016, Alibaba's artificial intelligence designer "Lupan" created 410 million ad images, which is equivalent to 200 designers working for 200 years non-stop. In 2018, Alimama officially launched the "AI-powered copywriter" product at the Cannes Lions International Festival of Creativity, which combines the massive high-quality content of Taobao and Tmall with natural language algorithms, and can generate 20,000 pieces of ad copy per second.

Artificial intelligence has not only involved in advertising placement, but also gradually becomes an assistance tool in marketing, helping us to make pictures, shoot videos, generate copy, manage materials, and so on. In Alimama's Creative Center, one can experience these AI products for free, as shown in Figs. 18 and 19.
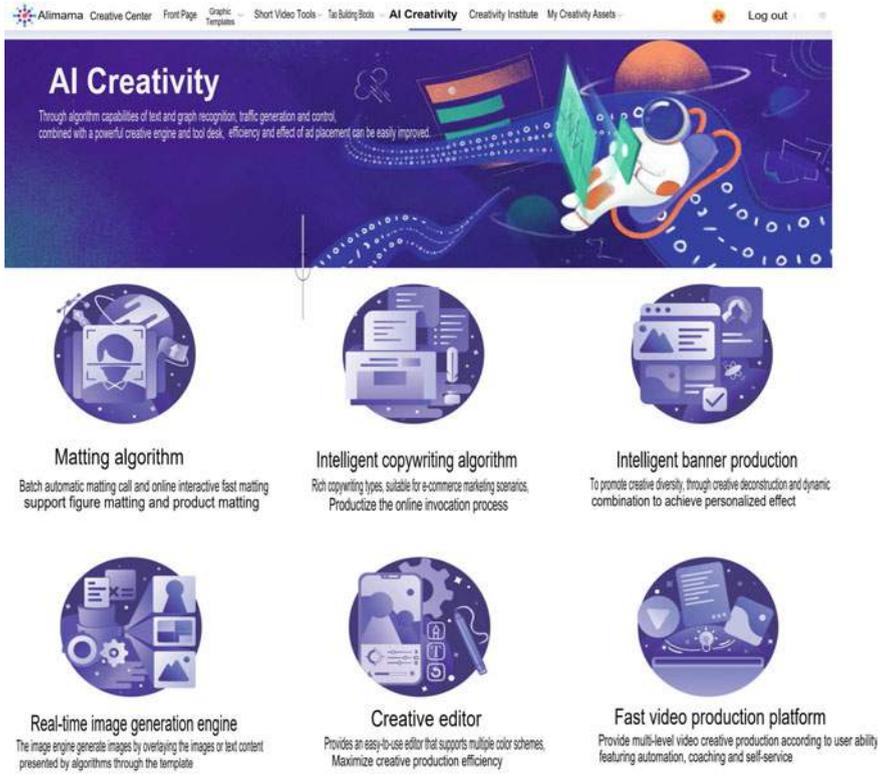
Fig. 18 Ali Mama creative center

8   Summary

In this chapter we focus on the following points:

(1) Digital marketing has solved the problem of imprecise advertising and the lack of timely evaluation of advertising effects. Through the filtering of labels, the accuracy of marketing can be greatly improved, with the frequency of marketing behavior accelerated, from originally on the quarterly or monthly basis to hourly.

(2) With digintelligence, three different models of rate ratio, ROI, ARPU can be used for budgeting marketing cost; real-time observation of marketing effect can be conducted with DMP and other tools; digital attribution can be achieved; and the value of marketing resources such as stars, IP, live broadcast, etc. can be maximized.

Fig. 19 Experiencing commodities for free

(3) AI can assist marketing creativity, such as "Lupan" intelligently creating graphics, and AI-powered copywriting products, completing creative work through human–computer interaction.

Digintelligent New Retail

Wenya Yang

Retailing is a transactional activity in which a commodity operator or producer sells a commodity to an individual consumer or a social group of consumers. According to this definition, retailing arose after the existence of group activities, i.e., the creation of barter transactions, among ancient human ancestors. Regardless of the period of retailing, it is essentially a business, with the act of buying and selling, solving the problem of supply and demand, and inseparable from the three elements of "people, goods, and fields". In different periods, there are different characteristics of "people, goods, and field", especially when retailing is powered by digital intelligence, which has brought radical changes, as shown in Table 1.

In traditional retail, salesmen are basically "holding the tree and waiting for the rabbit", receiving customers when they come, and most of salespersons disable their cell phones during work. In contrast, New Retail salesmen can take the initiative to acquire customers, from various channels, use their cell phones to contact clients when they are not engaged with a customer, or conduct live streaming; they can even set up and participate in the mechanism of universal sales, universal customer service, Internet celebrity live streaming, and all-staff brand ambassadors.

The performance of the salesperson in traditional retail can be heavily influenced by weather, and has fewer customers from Monday to Friday or when it's too hot, cold, rainy or snowy. Traditional retail has low time efficiency, low human efficiency, and low sales per square meter in the store, in which "people, goods, and fields" are like isolated islands, relatively fragmented and limited by time and

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

Table 1 Differences between "people, goods and fields" in traditional retail and new retail

Traditional retail	New retail
Salespersons waiting passively for customers, with cell phones disabled during work hours	Salespersons actively acquire customers online and offline, and conduct effective operation on regular customers; Instead of waiting passively, the salesperson is encouraged to use mobile phones to make contact, and set the mechanism of universal sales + universal customer service + Internet celebrity live streaming + all-staff brand ambassadors
The sales performance relies on weather conditions, influenced by heat, coldness, rainfalls, snowfalls, etc	Salesmen can achieve daily 24 h on-site and off-site sales, less affected by the weather, and can conduct active marketing (in-store sales + out-of-store sales)
The elements of "people, goods and fields" are relatively isolated, limited by time and space	The business is online, with efficient and precise connection, and customers are identifiable and reachable, with their demand understood and served
Channel is king; commodity is king	Channel is king; commodity is king; user is king
With clear uniformity, lacking personalized service	Smart reminder, heart-warming service
"Customer first" remains a slogan, without literal emphasis on customer feedback	Stress on customers' voice, and use it to optimize internal processes and improve quality
Employees and retailers are in a pure employment relationship, so employees lack career planning, with very high frequency of quitting	Employees are business owners and partners; employees and retailers are a community of interests and a community of a shared future

space. In contrast, New Retail can realize 7×24 onsite and offsite sales, which are completely online; it can remain connected with customers efficiently and precisely, and are less affected by the weather, featuring active marketing behavior. All these have greatly improved the time efficiency, human efficiency and sales per square meter of the store.

In traditional retail, channel is king and commodity is king. New retail, on the other hand, starting with the user, not only connects more users, but also considers their activity, repurchase rate and lifetime value, because only in this way could the company gain opportunities in launching new brands and category expansion. Bestore has more than 30 million members in its Tmall flagship store and has more than 80 million members worldwide in its universal channel; Haidilao also has more than 50 million members. All those companies that are able to keep their users have the capabilities to recover quickly during the COVID-19 period, when digital user assets are particularly critical.

In order to keep standardization and continuity, traditional retail has formed a uniform interface with customers and a uniform style of store operations, without

differentiation. Contrastively, through digitization, New Retail can achieve "thousands of versions for thousands of consumers", offering various services tailored for consumers' needs, and even intelligent reminders and touching services.

Most traditional retailers only claim that they stress their grassroots employees, but the reality is opposite. Due to their purely employment relationship, most employees have the mentality of wage earners, without systematic career planning, so both the employee turnover rate and mobility are high. In contrast, New Retail can make employees see that "everyone is an anchor", or even feel like a business partner with the loans, financing supports, and direct matched goods from the headquarters, so that salespersons can always contribute in sales by livestreaming whether they are at home or out playing. In this way, employees and retailers have become a real community of interest and future.

In traditional retail, fewer people visit the store every day, and hence fewer transactions are made; and there is low possibility of establishing a relationship with the store after the transaction. New retail, opposite to such a situation, can get more in-store customers and have more deals, thanks to the demand analysis and LBS diversion based on big data, and through universal operations like Tmall flagship store 2.0, light store, traffic-drawing with interaction and out-store transactions. Those operations can also cover potential customers and locate pan-potential customers within its business scope.

In the era of industrial economy, oil is the energy that drives the development of society; in the era of digital economy, data is the new energy boosting social development. But unlike oil, the more we use data, the more data we can gain and the more useful data can become. Data is the key factor to drive retail upgrade. Combined with the restructuring of "people, goods, and fields" by big data, the universal integration of the networks and channels with consumers as the core has realized the onlineization and reconfiguration of "people, goods, and fields" and connected them in efficiency and precision, breaking through the limitations of time and space, as shown in Fig. 1.

1 Reconfiguration of "People" with Digintelligence

In all aspects of retail business, "people" is an element, which consists of consumers, shoppers, store managers, distributors, brands, partners, investors, etc., all in need of reconfiguration with digintelligence.

Consumers, with the reconfiguration, remain no longer just as a type of physical humans, but individuals described by series of data tags in terms of gender, preferences, habits, etc., which can profoundly reveal the real state of consumers. The interaction between "people" and "goods" is digitalized by using AR, VR, Magic Mirror and other shopping guides, so that consumers can understand the information of goods more comprehensively. The digitalization of transaction is through smart POS and face-recognition payment to improve the payment experience, so that consumers can complete shopping transactions more conveniently and register themselves for membership. Operation digitization is to serve and reach users

Fig. 1 Reconstruction of "people, commodities and fields" under new retail modes

away from the store through the brand official account, mobile Taobao, DingTalk and other tools.

The shopping guide, with the digintelligent configuration, changes from just a passively waiting teller to an "expert" who can integrate the roles of guide, advisor, livestream anchor and customer service, and meet consumers' demand precisely in real time online. Over 2,000 salesmen in more than 300 stores of Forest Cabin (Linqingxuan) have all turned popular livestream anchors in the New Retail transformation. During the Spring Festival in 2020 when the COVID-19 pandemic was in full swing, all offline stores of Forest Cabin were almost completely shut down, but the frontline staff all switched to DingTalk online sales; the shopping guides offer exclusive service to their customers by sending messages on DingTalk to consumers who could receive information on mobile Taobao. So the "road" between the guide and the consumer was always through, even if the consumer did not access the physical stores. As the result of such accumulation in recent years, Forest Cabin has owned a few million fans, all digintelligent consumers. During the pandemic, founder of the company led all the shopping guides to conduct all-staff live streaming, seizing the opportunity to develop the new online economy. Forest Cabin has not only survived, but also achieved a performance soaring against all odds. Benefiting from the rebuilt connection with consumers through network platforms, Forest Cabin had a year-on-year increase in online sale of 400%, with

its growth in physical store sales over 140% from March 1 to 8, 2020. Furthermore, this brand topped "China's Best Price" list during Taobao's first livestream shopping festival.

The store managers will no longer be the director in charge of daily morning meetings and statistics of store staff performance, but a cross-channel "hub" of comprehensive consumer services, online and offline. They have a comprehensive grasp of consumers' daily consumption data, constantly improve the data tags, and accurately predict the daily sales with the help of various data reports. They locate the problems in the whole consumer chain of "awareness, interest, purchase, loyalty" to improve the conversion rate of each link and bring consumers a better service experience, while providing data support for new product innovation at the back end.

Distributors will no longer be just the "buyers" who attend the annual fair to place orders. They have always been the group with the closest contact with consumers. In the past, brands did not have a sufficient insight of consumers, mainly due to the fact that distributors sold most of the goods to consumers but failed to synchronize their data to brands, causing the gap between the brand and consumers. With the digintelligent transformation, dealers can fully understand the consumer groups through a variety of systems, accurately reach them, and increase sales, while the brand can also better develop goods to meet the demand of consumers through the authentic data from frontline sales.

In addition to the digintelligent transformation of consumers, shopping guides, store managers and distributors, there is an array of other digitalized changes related to "people". Retailers can use data to judge the quality of each supplier's products and services, delivery cycle, level of service response, etc., and can also use data to select a more suitable supplier. Partners and investors can also establish data models and use the analysis as a reference of intelligence, which can be achieved through a large number of data accumulated and calculated with algorithms.

The concept of "people" can be expanded to organization, which also needs to be digitalized. In terms of organization, retail needs to achieve "Five Onlines": Organizational relations online, that is to achieve a modern management model, with clear rights and responsibilities, flat and visual structure, and human resources sharing; communication online, which refers to members of the organization having efficient communication in a safe environment, with mutual respect and the separation of work and life; collaboration online means members of the organization achieve collaboration in team task and workflow in a secure environment, instilling and sharing knowledge and experience; business online, which is to realize the enterprise's decision-making and analysis capabilities with big data, through digitization, intelligence and mobility of business procedures and operations; ecosystem online, which turns the interactions between the enterprise and its upstream and downstream companies and customers online, digital and intelligent, based on the foresight that mobility can generate big data and drive the continuous efficiency optimization of production and sales, while people-oriented transparent management will promote the creativity of each person in the ecosystem. In 2018,

Red Dragonfly established cooperation with Alibaba and now it has transformed its more than 1,000 offline self-operated stores into smart stores, digitalized goods, and adopted intelligent shopping guide. At the same time, more than 3,000 franchised stores have all moved onto DingTalk, completing the digitization of the organization. In more than a year, Red Dragonfly's offline store guides directed customers to scan the in-store code, accumulating more than five million pieces of data of offline members, which is the basis of off-store sales. It is guided by Alibaba's full-chain model of consumer operation that Red Dragonfly has grouped these members as communities, and then carried out one-to-one reaching, marketing, converting and pulling in new ones. During the Pandemic, the Red Dragonfly Group's R&D, finance, administration, and even data engineers joined the sales force. With the effort of all-staff sales, Red Dragonfly's off-store sales recorded a breakthrough of over one million yuan for the first time on February 14, 2020, and the annual off-store sales attained nearly 200 million yuan.

2   Reconfiguration of "Goods" with Digintelligence

Commodities can meet the needs of consumers, which is the landing point for delivering the brand's value proposition. When considering initiatives to add products, brands should examine whether its overall layout of products could meet the needs of consumers. By gaining insight into new trends in the market and consumers, brands can sort out their product portfolio strategy to identify existing categories that need to be cultivated, as well as new categories that it should enter and trending categories that may bloom in the future. Brands should be flexible in formulating promotion strategies in relation to product innovation, upgrading and pricing to truly meet consumers' demand for "high quality at a good price". When brands innovate and upgrade their products, they can integrate Alibaba's big data insight technology and use the functions of Tmall Innovation Center, so as to swiftly connect various functional departments such as R&D, marketing and sales to achieve rapid iteration. When digintelligence is ushered in the domain of "goods", new product creation, personalization, flexible supply chain, etc. have already seen revolutionary changes.

In terms of new product development, the previous procedure was finding raw materials according to the designer's idea before carrying out production. Nowadays, since consumer data can be utilized to form consumer insight and real-time feedback on market demand and expectations, product development is data-driven and a flexible supply chain strategy of small batches and multiple batches can be adopted to avoid risks from stagnant sales and overstocking. In addition, the universal precise marketing can help target more accurately, turning each new product into a hit and truly tap the full potential of consumer assets, as shown in Fig. 2. Tmall data shows that the new product development in FMCG category has been shortened from 18 to 24 months to 9 months; new product launch in cosmetics category has accelerated from previous every six months or once a year to
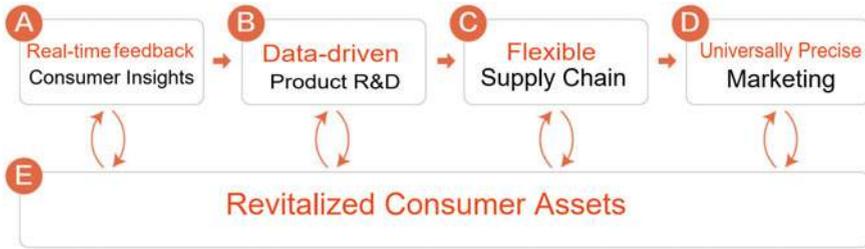
Fig. 2 New model created by new products

every month; in clothing category, companies has abandoned the quarterly fairs and attended monthly or even weekly online new product launch events.

When analyzing the trend data, Joyoung compared cycle data and found that sales of new storage tools increased by more than 100%, new small household furniture over 115%, and new all-in-one appliances reaching 417%, which led to its development of a series of small appliances for one person to cook. Joyoung targeted the users as students, singles and small families, and launched a soy milk maker with only 300ml of capacity, the volume just right for one person. As a personalized product developed completely based on consumer data, it sold out upon the launch and remained popular, bringing in a large number of targeted fans, as shown in Fig. 3.

At the "goods" level, big data can optimize the supply chain and accurately predict sales. For example, RT-Mart's initial manual prediction, with around 70% accuracy, can be substituted by data-based forecast, with over 90% accuracy.

Tao Factory, by matching fragmented demand with idle capacity, can achieve large-scale customized production. Tao Factory integrates and maximizes the interests of designers, brands, Taobao store owners, and manufacturers, which satisfies both the personalized needs of consumers and production requirements of store

Fig. 3 Jojoung one-person cookware series
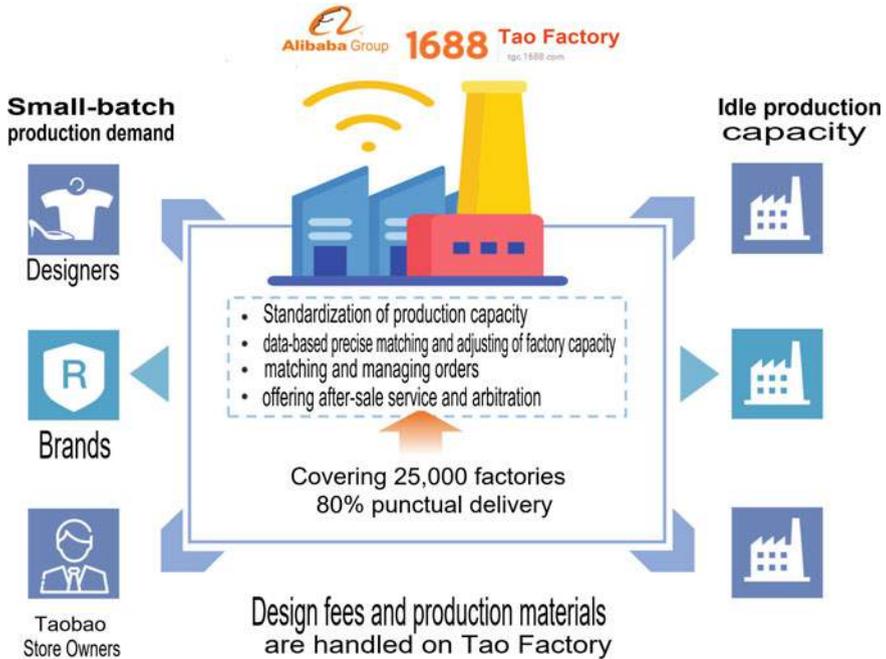
Fig. 4 Integration of Tall C2M

owners for small-scale but multiple orders, while releasing the idle production capacity and generating value, as shown in Fig. 4.

The commodity has long been the physical and tangible goods, but now it has been virtualized by the network. For example, when the consumer purchases a commodity on Taobao, the item exists in some virtualized form through all the links before it is delivered to the hands of consumers; the commodity is perceived multi-dimensionally by consumers through texts, pictures, video, livestreams, etc.

What is also experiencing digintelligent transformation includes raw material procurement, manufacturing, supply chain, logistics and other links, manifested by the intelligent replenishments for stores which could also make delivery from proximal warehouses for customers, as well as flexible and personalized production with high efficiency, thanks to big data and constantly iterating and upgrading algorithms. As for large supermarkets, the traditional work of manual inventory and making tables to predict sales and orders now has been replaced by the utilization of big data to control all the flow of goods in real time, with robots doing automatic inventory, out of stock warning, intelligent predicting and replenishment. Details will be introduced later, with the cases of Bestore and RT-Mart.

Today, 5G and blockchain technology can visualize all the circulation links of commodity design, production, logistics and sales, and achieve real-time traceability of each node, while the traceability system will also be upgraded to achieve

visualization and transparency. In the era of Internet, opportunities are created because of the inequality of information, while in the era of IoT, opportunities are created because of the transparency of information. Facilitated by digital intelligence, everything around the "goods" will become increasingly transparent, while consumers will embrace excellent goods with more willingness to pay.

3   Reconfiguration of "Fields" with Digintelligence

The dimension of the "fields" does not only cover shopping malls, stores or online stores, but refers to the collection of all the scenarios where consumers' life and work intersect with retailers. Such an understanding means that on the enterprise side, companies need to conduct more refined operations around the fields reflecting the consumer demand, in terms of channels, terminals, scenarios and capabilities. The "fields" of New Retail include both the "fields" in the consumer Internet and the "fields" of the industrial Internet on the supply side. For the former, "people, goods, and fields" will all be redefined, whether their demand is clothing, food, housing, transportation or food, drink and entertainment. For the latter, merchants serve consumers and behind merchants are store guides, managers, dealers, brands and factories. Only by connecting these links can merchants perceive consumers' needs and help design and produce goods to satisfy the needs of customers. As for the "fields" in the current offline retail, they are still faced with the biggest problem in breaking through the restrictions of time and space, as well as the consumer experience in urgent need of an upgrade. Hopefully, powered by new technology, retail stores can realize the lift of data operation, supply chain efficiency and customer shopping experience. With multi-faceted digintelligence, store-based retailing can be transformed to enhance business efficiency.

Although the online retail has great advantages in data acquisition, consumer analysis, with the breakthrough in time and space, its intrinsic barrier is still failure to offer experience to customers. In this sense, the merge of online and offline operations has become inevitable, and the complementary advantages of the merge is bound to drive the reconstruction of "people, goods and fields". Reconfigured with big data, the fields can become universal in spaces and scenarios, unrestricted by time and space; combined with a variety of futuristic technology to offer strong experience and interaction, such fields can create enjoyable shopping experience for consumers. At the same time, the universal field without limits of space or time can also greatly increase the traffic, attracting old customers back to consume and experience, improving the efficiency of human resources and space.

In fact, during the Pandemic, enterprises have come to a realization about the importance of digital intelligence. When the disaster is over, the business environment will usher in new changes, with the new "fields" fully embracing digital transformation to create a brand-new space for experience and transactions, boosting growth opportunities.

1. The new "field"—Taobao Live

Taobao Live has covered various industries, transforming traditional industries with the vitality of the new economy and creating many growth opportunities. Among the Top 10 fast growing industries, categories that require offline integration, such as automobiles, home appliances and books, have the fastest growth rate in livestream-directed transaction.

As of the end of 2019, Taobao Live has accumulated 400 million users with its annual GMV exceeding 200 billion yuan; the GMV from livestreaming on the single day of "Double 11" surpassed 20 billion yuan; 177 anchors in this sector reached more than 100 million yuan of annual GMV. In the first quarter of 2020, the scale of China's livestream users reached 560 million, accounting for 62.0% of all Internet users in this country. Data from the Ministry of Commerce and the China Internet Network Information Center show that more than 4 million e-commerce live streams were broadcast in the first quarter of 2020, and the annual market size was expected to reach trillions. During the Tmall "Double 11" event in 2020, Taobao Live skyrocketed, with nearly 300 million users flocking to the rooms to watch and buy, and the GMV of Taobao Live doubled year-on-year, with turnover of 33 Taobao Live rooms each exceeding 100 million, nearly 500 rooms exceeding 10 million, and the Top Taobao Live anchors creating over 10 billion yuan of GMV.

Taobao Live should also be regarded as a "field", which not only has UGC (User Generated Content) from anchors and merchants selling goods in the live stream, but also has PGC (Professional Generated Content) from various organizations, TV stations, celebrities, etc., officially organized by Taobao Live. From the Poverty Alleviation Livestream Event to the Online Spring Festival Gala, to the cherry blossom live stream at Wuhan University in the context of the 2020 epidemic, all the content has met the diversified needs of users. In the era when "everything can be broadcast", more than 100 professions have turned to Taobao Live in 2020, with not only Tmall merchants, new farmers, handicraft artisans and tea masters, but also bazaar stores operated by practitioners in various industries shining in their live rooms. Live streaming has become a new engine for merchant growth, with national and international brands all growing rapidly in Taobao Live, consolidating its position as a typical new field. With the further upgrade of live technology, the virtual live room generated by new technologies such as 5G and virtual reality is churning this industry for a new scenario revolution. Virtual live room can present and switch more conveniently between scenes with higher reality resemblance, creating even better live shopping experience.

2. The new "field"—pop-up stores

The pop-up store is also a new field that has emerged in recent years in first-and-second-tier cities. It is the temporary store that opens up in the plaza or atrium of a shopping mall so that it can focus on a particular scenario. For example, for a certain IP image, there are all kinds of peripheral goods based on the IP such as

The Links in New Retail Creative Pop-up Model——
Traffic+Experience+Conversion+Sustained Operations
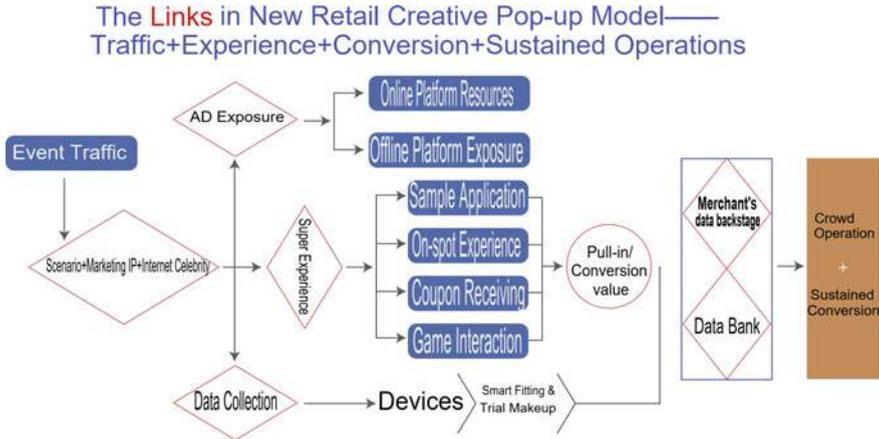
Fig. 5 New retail flash innovation model link

clothes, shoes, hats, accessories, household items, etc. Although these goods are not from the same merchant, but they are based on the IP image, then one can focus on these different kinds of goods and present them in the pop-up store, so as to gather on the spot the fans of the IP to try and experience products in different kinds of categories, enabling strong fan interaction to be established. Malls can organize such pop-up stores to form different "fields", and can use data-based equipment and tools to conduct comprehensive analysis of consumers, so as to conduct better crowd operations and sustainable conversions. Such stores can also be further combined with new technologies such as 3D, VR, AR, etc. for global live streaming, so that a 24 h nonstop online business entity can be formed, as shown in Fig. 5.

Through the pop-up store, the online traffic can be led to an offline "field" with experience and interaction; consumers can gain brand new sensations with the deep communication and interaction, such as skin testing, makeup trial mirror, smart fitting mirror and other digital technologies. Meanwhile, comprehensive analysis of consumption data can be conducted. Such a strategy could truly combine online data and offline experience to form a New Retail "field", as shown in Fig. 6.

3. **The new "field"—integration of virtual space and reality**

Currently, virtual and reality are becoming more and more closely integrated, and the boundaries between online and offline are becoming increasingly blurred. How to make online users have more vivid sense of what they have in reality is the future direction of technology development in driving social progress. For example, Alibaba Cloud's "Linyunjing" is a solution similar to this; it continues the digital reconstruction of 3D space and conducts panoramic photography and realistic reconstruction of space through panoramic photogrammetry equipment and

Fig. 6 "Field" of new retail

3D space reconstruction tools, in order to realize space 3D Model construction. This can help brands and platforms to complete the rapid collection of space at a lower cost, and support 3D panoramic display and roaming of indoor and outdoor spaces; it also supports VR browsing, access to equipment, so as to achieve the collection, management and marketing of spatial data. Through the reconstruction of 3D space, VR house-viewing can help users examine 3D real-world houses online and fully experience the layout and structure, which not only reduces the number of invalid house visits, but also improves the business efficiency of the real estate rental and sales platforms and reduces operating costs. The 3D panoramic model of decoration model rooms can improve consumers' realistic perception of space and push up the conversion rate of the property decoration industry. Using 3D reconstruction technology, hotels, resorts and other places can conduct 3D modeling to facilitate users in online viewing and booking of rooms, and ensure that their expectations and actual stay experience are as consistent as possible, so that user satisfaction as well as the brand reputation and image can be enhanced; retail enterprises can make online users obtain the experience of offline physical stores, thus advancing the merge of online and offline in New Retail.

"Linyunjing" can realize 3D roaming, which can be displayed through the browser, and users can walk freely in the space by clicking, simulating the real experience; the 720° 100% restoration of the real space, can ensure no dead angle or obstruction; merchants can freely embed audio, video, goods, locations, links and other information to create diversity in the display and various connections to the real world; it supports immersive browsing with VR devices; it can offer indoor real-world navigation, as shown in Fig. 7. Through the panoramic display link, it can be adapted to PCs, wireless terminals and VR terminals at the same time to realize the integration of virtual space and reality in retail, hotel, factory and real

Fig. 7 Alibaba cloud's "LYJ"

estate industries, to name just a few; users can have an immersive experience of 3D scenarios reconstruction based on the 3D space.

4   Upgrade of Retail Terminal Experience

The service experience of retail terminals is being upgraded and iterated rapidly, powered by digintelligence. Cloud shelves can offer fully visualized interface for the production of interactive content, animation, 3D display, etc., realizing easy demonstration, exchange and communication with customers. The previous data fragmentation and inefficiency permeating between online and offline business and among different channels has now changed, thanks to the business mid-end and the data mid-end that share data synchronously. The upgrading of retail terminal experience is manifested in Fig. 8.

Fig. 8 Retail terminal experience upgrade

1. **Upgrade of interactive experience**

In the past, consumers in the retail terminal almost experienced no interaction; consumers selected goods and checked out, with the help of a shopping guide sometimes, which did not make customers feel comfortable. Now, through interactive screens and guides, consumers can have a new experience. With high-tech interactive devices, they can learn about the products and choose their favorite styles and models on their own. For example, when buying lipsticks, the intelligent makeup mirror allows consumers to choose and match at will, without having to apply them on their hands to compare the colors; the magic mirror efficiently facilitate consumers when they have an interest in trying certain garments on.

2. **Upgrade of payment experience**

Paying by swiping QR codes or human face is convenient and can save the trouble of using cash and getting coins. Now many retail terminals adopt the self-checkout service, which is popular among young people. Consumers can swipe their selected products through in the self-service cashier area and complete the purchase, with impressive convenience since no human labor or time-wasting waiting is involved in the entire process.

3. **Upgrade of service experience**

Smart mother and baby room have changed from the previous design of a small space to a new setting where they can do more than just feeding babies, changing diapers, but trying a variety of mother and baby products and purchase any products they favor by scanning a QR code. In airports, train stations and office buildings, unmanned vending is also becoming more and more popular. According to the analysis of big data, the goods sold by automatic vending machines are the most frequently bought goods by consumers. Contactless parking also makes people's driving shopping experience smoother, saving their time.

4. **Upgrade of Shopping Guide Experience**

In the past, many shoppers in retail terminals were non-professionals, mainly playing the role of sales promotion. When asked professional questions, the shoppers sometimes could not produce answers to meet the needs of consumers. Nowadays, retail terminal shopping guides are more professional, and most of them adopt non-intrusive customer service. If the consumer has a question, they give a professional answer; if not, they do not interrupt the customers. At the same time, the current guides can also engage in live streaming, so as to offer multi-dimensional service to consumers. In addition, the guides can also become a member of the

distribution force, continuing their sales off work. Now the guides can also function as the consultant, serving customers with a variety of professional tools and data.

5   Digintelligent Transformation in the Supermarket and Department Store Industry

For retail merchants such as supermarkets, department stores and shopping centers, the transformation of digital intelligence is more complex. Shopping centers can establish the operational competence center by integrating business operations, store operations, membership operations, service operations and other departments through the business mid-end and data mid-end, so as to facilitate various links, such as site selection, asset management, property management, investment, marketing, payment and channels.

Currently, with the empowerment of Alibaba Business Operating System, industries including apparel, FMCG, home furnishing, consumer electronics, catering, hotel and tourism have undergone digital intelligence transformation. They utilize Alibaba's rich business ecology to reconstruct 11 business elements and empower the supermarket and department store industries with the platforms, as shown in Fig. 9.

Currently, data intelligence based on the digitization of customer flow is supporting smart business. Through big data analysis, merchants can supervise the conversion rates of certain brands of particular categories at specific locations,
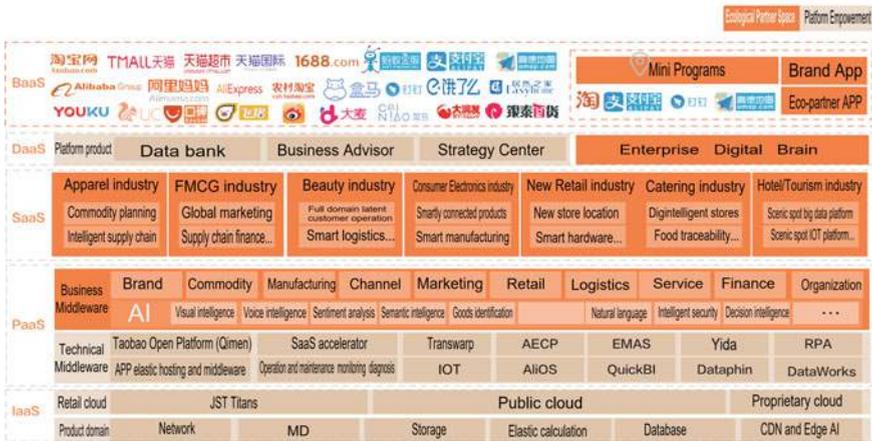
Fig. 9 Alibaba's commercial operating system empowers digital intelligence transformation of the department store industry
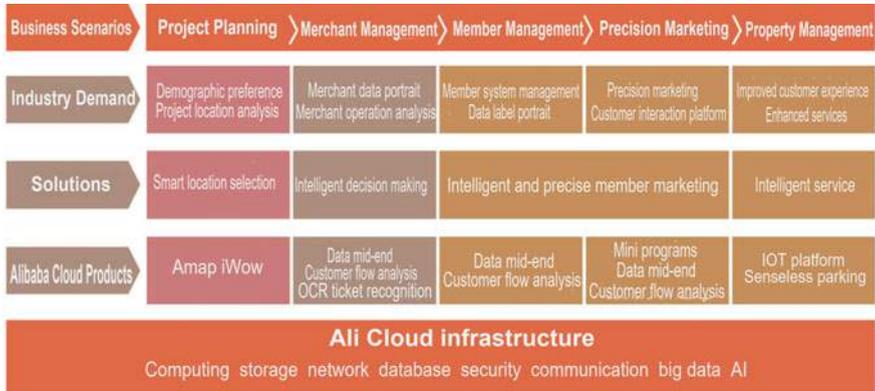
Fig. 10 Alibaba cloud infrastructure

while different dimensions can be analyzed and compared in various parameters and against the benchmarks to make adjustments and optimizations in areas with high loss rates. That means that just like online business, offline customers' behavior of all kinds has to be digitized, starting from the consumer entering the shopping center's parking lot, to the shopping route among different stores, the process of selecting products, the use of coupons, the form of payment, until consumers leave the place, forming a closed loop with all links integrated.

In addition, terminal consumers can be better serviced through various high technologies applied in smart parking, smart property, smart finance, smart invoicing and other services in the shopping center, bringing smarter and easier experience to customers, as shown in Fig. 10.

6   A Typical Case of "People, Goods and Fields" of Digital Intelligence

1. **The new mall of Intime Department Store**

Intime Retail has instilled the New Retail capabilities it has practiced for many years into the "New Mall Operating System". This system is more like a subsystem of Alibaba's Business Operating System: the core service runs on Alibaba Cloud; through Miaojie App, Intime Tmall flagship store and offline counters, it ensures genuine goods at the same price online and offline; through cloud POS offline cashier, online sales channels sell goods to the whole country; and using IoT hardware infrastructure to enable membership links with mobile Taobao and Alipay, and the software and hardware interconnection of ISVs, it forms the New Retail capability of scale. After the initial completion of digital transformation, Intime is more like a data-driven shopping mall where goods "find" people. For example, the heat map analysis of consumer movement shows that the mall routes

of new customers, regular customers and digital members are very different, and based on Alibaba Cloud's cloud AP and IoT devices, Intime can optimize the presentation of products and brand layout based on the movement trajectory and transaction heat of customers in the mall. The value of the original location-based physical stores has been redefined in the era of digital intelligence.

Intime has also optimized the mother and baby room. In the past, such facilities in shopping malls were generally just a simple place for mothers to change diapers for their babies next to the restrooms, but now the newly upgraded version is a relatively independent "field" in the New Retail. Located on the 4th floor of Intime Beijing's Dahongmen Store, the mother and baby room not only has comfortable sofas, cribs and water heaters, but also a large Tmall mother-and-baby product vending machine at the entrance. By scanning the code on the screen, consumers can pay just one cent to buy capsule milk powder, diapers, anti-overflow pads, milk storage bags and other necessities for breastfeeding or nursing their babies. In addition, the mother-and-baby room also offers the latest smart brewers, electric breast pumps, milk powders and other best-selling products from well-known brands exclusively available at Tmall for mothers to experience, as well as a formula preparing area, nursing area, lactation area and public rest area, accommodating multiple visitors at the same time.

For shopping malls, mother and baby rooms solve the problem of these particular customers. For brands, mother and baby rooms are an excellent platform for scenario-based new customer acquisition. As the largest mother and baby e-commerce platform in China, Tmall Mother and Baby provides direct access to consumers for top-tier maternity and baby brands such as Wyeth, Mead Johnson, Huggies, Medela and Gb in the mother and baby room.

2. **The new species named Freshippo**

Traditional fresh food supermarkets treat stores as a sales "field", allowing "people" and "goods" to meet in the store and complete the transaction. In such transaction structure of "people, goods and fields", the store is the end of the transaction. Therefore, all the efforts of traditional fresh food supermarkets are to attract people to the store. Yet as long as the transaction is done offline, it is upper-limited in terms of the sales per square meter; the only way to break the limit is to complete the transaction online. This is what Freshippo is doing. The task of its offline stores is to collect traffic, attract people from the neighborhood to the stores through amazing experience, and then convert them into online members. Consumers who visit for the offline experience during weekends can shop online when they don't have time on weekdays.

This new "daily sales" model is a huge upgrade to the traditional "weekly consumption" model, explaining why the sales per square meter of the New Retail is much higher than that of traditional retail.

Compared with traditional fresh food supermarkets, the most important difference of Freshippo is "dining-in".

Freshippo not only has a merchandise display area, but also a dining area (about 1/3 of the business area), as well as several food processing stalls. Customers can buy seafood in the store, send it to the stalls, and pay a small processing fee for the chef to process it into dishes before enjoying the dish in the dining area. The experience of having fresh seafood on site at supermarket prices is undoubtedly attractive and cost-effective compared to traditional seafood restaurants.

Freshippo is not doing this to earn processing fees, but to gain users' trust and preference for its fresh goods by creating a distinctive experience and dispelling their doubts over online orders with Freshippo.

In traditional fresh food supermarkets, users can pick and choose the products, but it is difficult to see the same fresh food online as they can in the supermarket. When buying fresh food on an Internet platform, consumers can't pick and select, and naturally they lack a sense of trust in buying fresh food online since they don't know what kind of products will be delivered.

The emergence of Freshippo perfectly solves the dilemma that neither online nor offline is good enough. It allows consumers to have personal experience of enjoying freshly made food on site and feel the "Freshippo quality", with concerns dispelled and trust built; in the meantime, it provides instant delivery services within three kilometers in 30 min to their homes.

The top-level design of Freshippo was determined at its inception: first, online transactions should be larger than offline transactions; second, online transaction should achieve more than 5,000 orders per day for a single store; third, the app should be able to survive independently without other traffic support; and fourth, within the controllable cost of cold-chain logistics, 30 min delivery should be achieved. In addition, there are five online and offline universal criteria in terms of membership, inventory, price, marketing and settlement.

The traffic infusion from being offline to online is the most important leap to complete the four-point top-level design. The essence of Freshippo is a fresh food e-commerce company empowered by offline stores, and also the embodiment of the ultimate supply chain driven by big data.

In terms of commodity procurement forecasting, Freshippo relies on Alibaba's big data and its own app data to accurately plan product selection and purchase, and allocate inventory for its stores, as well as to match, reach, and transform customers with personalized interfaces in its app. Its warehouses are divided into two levels: one is the regional central warehouses which have the functions of quality inspection, commodity standardization and live seafood breeding, and the other is the store warehouses. The store warehouses play the role of a store retailer, using electronic price tags to ensure real-time price parity between online and offline channels, and synchronization of sales and replenishment; each store's product location and inventory information can be transmitted back to the central warehouse in real time, and inventory is intelligently adjusted between the two levels of warehouses, with all data synchronized in real time. The fact that the order parcels can reach consumers within 30 min is also the result of optimization based on big data.

On the basis of the order timing node sequence, order address and other information, the system of Freshippo will connect different orders of the same route to make the best delivery batch, and then calculate the delivery task order including better delivery path according to the order batch, category, customer requirements, delivery area familiar to the delivery staff, the specific location of the delivery staff at this time and other information. The task is then submitted to the delivery staff more suitable to receive orders, and the delivery driver's back and forth trajectory is planned by Amap for optimal paths. The whole chain of reaching, purchasing, and delivering is based on big data, which is the embodiment of Freshippo as a "new species".

The reconstruction of "people, goods and fields" under the digital economy is all about concepts, approaches and methods. Such a transformation can increase near-field, far-field, and off-store transactions, expanding time and space. Meanwhile, the improvement of people and time efficiency can also drive the enhancement of sales per square meter and store efficiency, lifting consumer satisfaction and business operation efficiency at the same time. The 2020 Tmall "Double 11" is also the centralized embodiment of the New Retail of digintelligence. During this period, the turnover reached 498.2 billion yuan, with the peak at 583,000 orders per second, and there were more than 15 trillion AI calls and 2.321 billion logistics orders in just 11 days. All these figures reflect the improved business infrastructure in the era of digintelligence. In addition, AI virtual anchor has appeared in Taobao live rooms to replace the human anchor. The virtual anchors resemble their human counterparts both physically and mentally, with voices, emotions, actions just like a real person; not only can they listen and speak in response to the questions of millions of viewers, but also dance, sing, and complete a variety of complex movements. Imagine the future of retail. It will be a new "field" centered on people and integrating the consumer side and the market side, including both the consumer Internet and the industrial Internet on the supply side. Driven by big data, a new form of production, operation and consumption will be reconstructed. The era of IoT has ushered in the upgrades of all "fields", and everything will be iterated under the impetus of digital intelligence, leading to new growth.

7 Summary

This chapter focuses on the digintelligent transformation of retail, with its impetus core being the application of new technologies such as big data, cloud computing, 5G, IoT and artificial intelligence. Along with the penetration and commercial application of these technologies, the digintelligent reconstruction of "people, goods and fields" is getting deeper and deeper.

Reconstruction of "people": It can identify, reach, understand and serve consumers, and bring better consumer experience for brands and stores. Consumers can buy the products they want anytime, anywhere, with precise matching and upgraded experience. Shopping guides, store managers, distributors and brands can be empowered by digintelligence to meet the diversified needs of consumers,

improve efficiency and enhance consumer satisfaction. From the organization's point of view, online operations in five arenas have to be achieved: organization, communication, collaboration, business, and ecology.

Reconstruction of "goods": With new digintelligent technology, new product innovation means developing and producing goods that better match consumers' needs; the supply chain can achieve online inventory, intelligent forecasting, smart replenishment, and nearby delivery; manufacturing can be flexible, personalized, and customized; and the whole chain in relation to "goods" can be made transparent.

Reconstruction of the "fields": The previous definition of "fields" solely as shopping malls has been replaced by the "fields" involving the universal network, channel, scenarios, touchpoints, existing anytime, anywhere, regardless of time and space. In addition to online and offline stores, live streaming and pop-up stores have become the "fields" in the new era of digital intelligence.

The upgrade of retail terminal experience: The experience upgrades in terms of interaction, payment, service and shopping guides are all driven by digital intelligence to give consumers' more conveniences and easier access to the products they desire, making shopping an effortless and enjoyable experience.

Intime department store and Freshippo are classic cases of digintelligently reconstructed "people, goods and fields". In the era of digital intelligence economy, such new species will emerge in all industries.

Intelligent management of shopping malls can also be achieved; digintelligent technology brings smart parking, smart property, smart finance, smart invoicing, etc., which saves troubles and creates conveniences for consumers.

New Service with Digintelligence

Dongying Hong

1   Alibaba Listens to Voice of Customers

Alibaba CEO Zhang Yong proposed at the 2019 Wuzhen Internet Conference that "the essence of the new business civilization in the digital era is to return to man, on the basis of open sharing, shifting from focusing on traffic and transaction volume, to focusing on users and consumers, then on individuals, on benefits for the society as a whole, and on win–win results". "Being customer-centric and listening to the voice of the customer" has always been a long-standing value honored by Alibaba executives!

Alibaba's CCO (Alibaba Chief Customer Office) is the department with highest status internally, which is pretty explicit when Jack Ma and Zhang Yong visited CCO to listen to customers' complaints and inquiries. Alibaba has always adhered to the concept of "customers first, employees second, shareholders third", and CCO is responsible for customer experience, which is the business front line between consumers and tens of millions of merchants.

As to "Listen to the voice of the customer", what exactly should be heard? The focus is on the user's consultation for help, their feedbacks on the sore points, and their emotional expression. The sales staff will go to the front line of customer service and listen to the needs of users under the guidance of the CCO colleagues. The original intention of this project is to "let people who make decisions hear the sound of gunfire". Once the project was launched in Alibaba, it quickly received positive response from all departments. Now such listening has become a mechanism and a culture in Alibaba and is a daily routine. Through the listening everyone can hear, see and solve problems together. At present, Alibaba's Listening Program

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

has affected the entire ecology and industries, and more and more companies are joining and carrying out this program.

In the era of digintelligence, the business value of "customer first" is still valid, but now consumers have gone through from "I know where to buy" and "It's a good bargain" to "Awesome purchase experience". How has this been accomplished? In fact, in addition to the adherence to the values, there are also a number of intelligent platforms offering strong support. The double core of data and intelligence embedded in Alibaba's digital intelligence service in the new consumer era is being upgraded from a single solution to consumer's problems to guarantee customer service experience, carrying the dual mission of a digital intelligence operation position for consumers.

Among the eleven business elements of an enterprise, service is the only one that has a synergistic effect with all other elements.

Customer service is to accumulate credit, and in turn to establish the brand. Besides the traditional word-of-mouth effect, credit should be built up with optimized services to customers, whose problems, be it the quality of goods, appearance and design, or feedback on logistics, should be collected and processed by means of digital intelligent customer service, and then classified and allocated to the corresponding departments.

Service and goods are an important parallel, two equally important factors in creating value for customers, like the tails of a coin. The best service is "no service" when the product is the best. Imagine the multiple guarantees provided for businesses and the enhanced user experience when data can be obtained from the business front line, helping the company quickly react to create hit products, achieve real-time replenishment and transfer, adjust the warehouse layout, optimize logistics cooperation, and even predict the next cycle of fashion trends and make advance decisions.

Decision makers of all relevant elements need to hear the "sound of gunfire" from the service department, and quickly transform the first-hand information and data into guidance for the next action. This level of transmission and response, cannot rely on traditional methods or human resources, or on self-building a set of service data analysis and feedback system, considering the big threshold of investment and system design, not to mention that enterprises can only have their own small data in this way, and cannot compare it with big data of the entire network of or make analysis.

The New Service of digintelligence provided by Alibaba to merchants is one of the key elements of Alibaba's Business Operating System (ABOS), which requires that customer feedback is processed by digital intelligence and then transmitted to other elements as a closed loop, thus enhancing the business operation capability of the whole system.

2   A Closed Loop of Feedback Formed by Data Intelligence

Before digintelligent transformation, the customer relationship management (CRM) and services are fragmented online and offline, with poor user experience; little attention is paid to consumer evaluation, which is only used by the customer service department; no closed-loop evaluation can be formed, with compromised after-sales service; the connection with customers usually ends since after-sales service is completed.

With digintelligent services, online and offline CRM and services are integrated, with intelligent agents, smart store assistants, AliMe and other mechanisms to offer timely responses to improve the user experience; offline after-sales service can form online closed-loop evaluation, forming a transparent virtuous circle; great attention is paid to omnichannel consumer opinions, which would be classified as real-time feedback to the branding, commodity, manufacturing, logistics, customer service and other departments, forcing enterprises to optimize internal processes and resource allocation.

The comparison of traditional services and New Services of digital intelligence is shown in Table 1.

Alibaba's service experience has developed from the 1.0 stage of "ready to answer", leaping over the 2.0 stage of "good answer", and reached the 3.0 stage featuring member-centric and full-lifecycle experience. It is now moving towards the realization of service facilitating front-end business. So, what should be the best conditions for merchants to enhance user experience and provide good service?

(1) Merchants should think as consumers think, do before consumers think, and understand customers better than themselves.

Table 1 Comparison of traditional services and new service of digital intelligence

Traditional service	New Service of digital intelligence
Online and offline fragmentation, without closed-loop evaluation	Connecting online and offline to form a closed feedback loop
Untimely customer service response and poor customer experience	Intelligent customer service agents, store assistants, AliMe offering timely response to enhance the user experience
Completion of the sales means ending connection with the customer	Maintain a strong connection with users; sales are just the process; value the lifetime value of users; value user sharing and benefit sharing
Transmission of customers feedback is not timely internally, and often stops at the customer service department; the links are broken between feedback and improvement	Emphasis on universal consumer opinions; classified real-time feedback sent to the whole chain; forcing optimization of internal processes and resource allocation

(2) Merchants should be able to solve consumers' problems, offer daily surprises and can be trusted.
(3) Touchpoints and consumer insights should be combined to improve the efficiency of consumer operations and the value of each contact.

Only by doing these three things can merchants dig deeper into the value of their customers and enhance the efficiency of their traffic, making it possible for them to launch a full range of consumer operations before, during and after the sales to maximize their service values.

With digintelligence, the customer service representative no longer simply answers the phone and offers minimum service. The term "Alibaba Soft Troop" has been used to describe Alibaba's customer service staff; they are just like an "army" weaponed with intelligent support capabilities and adhering to the value of customer first. The experience engine is the tool that arms the customer service staff to "hear" and "perceive" the voice of the customer. Such a "superpower" allows a large number of customer problems to be solved upfront, instead of being dealt with passively when they occur.

Simply put, now consumers and merchant have a digintelligent butler that helps offer consumers thoughtful services in two dimensions: (i) enhancing consumers' experience in all links during a single shopping experience; (ii) providing the best service to consumers once they become the crowd reached by the digital intelligence service, whether they purchase or not. The former is called whole-link management, while the latter full-lifecycle management.

In a word, digintelligent service is to set a digital touchpoint for each consumer in the process of consumer-merchant connection, which could help the merchant gain both insight into the customer and their trust, allowing every touchpoint between consumers and merchants to maximize the efficiency and value of traffic.

Most importantly, the "butler" should bring the traditional offline services up to online arena and realize the three transformations as follows:

Onlineization of service process; (ii) digitalization of service elements, and (iii) intelligence of service capability. For example, to improve pre-sales conversion rate, it provides intelligent agents for FMCG industry which has more new products and activities with higher service difficulty; the intelligent agent could cover pre-sales consumer consultation about products and promotions, and post-sales conversion, retention and dissemination.

A showcase is P&G's early warning and active service system adopted in recent years. On the eve of the "618" shopping festival of one year, the early warning system found from the backstage a large number of users inquiring about separate delivery of goods and gifts. Therefore, by quickly matching the order and user information, the company coordinated delivery and voluntarily notified users, which finally achieved smooth sales during the shopping festival. The data shows that the refund time of P&G's during Tmall "618" dropped by 30% that year.

3   Digintelligent Service Solution

According to the differences in addressing specific sore points, the integrated online and offline service solutions can be subdivided as follows:

(1) Pre-sales conversion rate program.
(2) Consumer experience barrier monitoring and proactive services.
(3) Business improvement facilitated by experience insights.
(4) Member full-lifecycle MOT assistant program.
(5) A new generation of intelligent store chat robots: Alibaba's AliMe 3.0, in which each solution can either function individually or be combined as a system.

We can finalize the solution by taking into account the size of different companies, their development stages, and the types of problems that need to be solved, such as immediate issues or long-term plans. Below are some basic functions and usage scenarios of each solution mentioned above.

3.1   Pre-Sales Conversion Rate Program

Customer service representatives often encounter the following situations when receiving consumers:

(1) Consumers do not know what to buy, and care not to understand the performance, specifications and other information of the goods, hoping that after making their demands, the customer service agent can recommend the right goods.
(2) Nowadays, there are multiple store activities applying various forms of rules. When there are discounts or other promotions, consumers may often need to consult customer service for recommendations for add-on items.
(3) When consumers tend to buy products with special offers or in hot sale, sometimes they also want customer service agents to give recommendations.
(4) When an item of interest to the consumer is out of stock and there is a possibility of sales loss, the customer service agent is required to recommend a substitute that meets the consumer's needs in a timely manner.

In summary, it is necessary for customer service representatives to offer precise recommendations meeting the needs of consumers in the first place.

At the same time, this requires high capabilities and qualities of customer service staff, because only when they know consumers, store goods and activity rules very well, could it be possible for them to accurately recommend goods for consumers. The customer service agent with such keen observation and judgment is often hard to find, and their sales and conversion rate are higher than the average level.

   That's why AliMe comes in, as a powerful aid to customer service staff. After developing functions such as intelligent summary, smart conversation, and ending prediction to improve customer service efficiency, the system continues to develop the intelligent "Guess you like" function, from the perspective of improving the conversion of customer service inquiries. And such a function has indeed achieved its goal in the four application scenarios including stock-based recommendation, active request recommendation, special offers (merchandise) recommendation, and default recommendation (minimum recommendation). Compared with the inquiry conversion data before using AliMe, customers have a stronger desire to place orders, with sales rising nearly 20% and customer experience enhanced, after this new function predicted and recommended products to them.

3.2   Consumer Experience Barrier Monitoring and Proactive Services

In the process of connecting consumers with merchants, the system will give consumers a touchpoint that understands them and can be trusted at the same time, and this point can maximize the efficiency and value of each contact between consumers and merchants. Whether the consumer understands what the consumer wants and whether the touchpoint is trustworthy directly determines how good the consumer experience is and how efficient the interaction between the merchant and the consumer is. Inside the consumer chain, after placing an order, there may still be non-payment situations for various reasons, when merchants are keen to know whether it is caused by the product, the price, the offer, or the promotion. Based on consumer insights, the consumer experience barrier monitoring function allows merchants to "see" where the problem lies and provides solutions to help them improve conversion rates. The system combines online data and offline intelligent outbound calls to provide a quick insight into the problems consumers encounter in all nodes, and provides quick feedback to the merchant on these insights. Through such a set of combined operations, in just one scenario of unpaid orders, digintelligent services save tens of billions of yuan in GMV for merchants in Tmall each year.

3.3   Business Improvement Facilitated by Experience Insights

Experience insight is the guarantee of brand vitality, and consumer insight can pull brands out of blindness. In actual operations, however, they are not easy tasks even for the international giant chains. Previously, most companies sought for professional help from consulting firms to gain insight into trends, markets, and users. This has two obvious flaws: first, the cost is too high, often hundreds of thousands of yuan, or even millions of yuan; second, the valid timeframe of the results can be as short as one to three months. Considering the current speed of change in today's consumer market, before such market research is half finished, the trends

have already shifted. Now, the Alibaba platforms have built a consumer-oriented NPS (Net Promoter Score) based on omnichannel data, voice and behaviors of the consumers, and merchant-consumer interaction, so as to offer feedback on consumer experience. The system can automatically generate product insights, service insights and marketing insights, so that the key factors affecting consumers' purchasing decisions can stand out from the massive amount of data, thus helping merchants to quickly improve their product operation strategies.

3.4   Member Full-Lifecycle MOT Assistant Program

Members are an important asset for a company, so how can the company reach, accompany, retain, and convert them, instead of losing them? And how could it achieve the full lifecycle management of members? There are several key indicators for the full lifecycle management of members. The first one is the initial flow. The larger the initial acquisition of members, the larger the entire membership base; the second one is the length of member lifecycle—the longer the life cycle of members, the greater the value provided by them; the third is the churn rate— the lower the churn rate at each node, the higher the percentage of members with viscosity and loyalty. These three indicators are also the three core factors that determine an effective and successful membership operation system. The member full lifecycle MOT assistant solution can achieve the whole process from attention to registration, to purchase, and to repurchase, so that consumers can feel the comfortable experience in each link, with the conversion rate from attention to registration improved, as shown in Fig. 1. This solution will reduce member churn at nodes with high churn rates; it maximizes the introduction of initial traffic, so that more members can be converted into loyal members; and operate deeply on loyal members as a way to infinitely extend the life cycle of members and provide more value.

In July 2018, the black tea Yuanyang latte was still just a coffee that appeared in Starbucks offline stores, not receiving much attention from the store staff. When some customers ordered it in Starbucks stores and liked it, they began to express their affection for it in the virtual world. They left comments on the Starbucks app, reviewed it on the Ele.me platform, and expressed compliments on Starbucks' WeChat public account and Weibo, etc. Various online platforms have become windows for the lovers of this coffee to express their opinions.

In July 2019, all reviews about Starbucks goods were collected by a virtual big data center and the information was categorized and organized. In one set of classifications, it used some of the focus words describing consumer experience as key factors, which in turn formed a new set of data to draw a conclusion: this Yuanyang coffee is popular and many people want to be able to buy it online.

Members of Alibaba's digintelligent services team informed Starbucks of this conclusion as soon as possible. The next month, Starbucks launched this coffee online. Its fans suddenly discovered that they could buy the coffee from Starbucks'
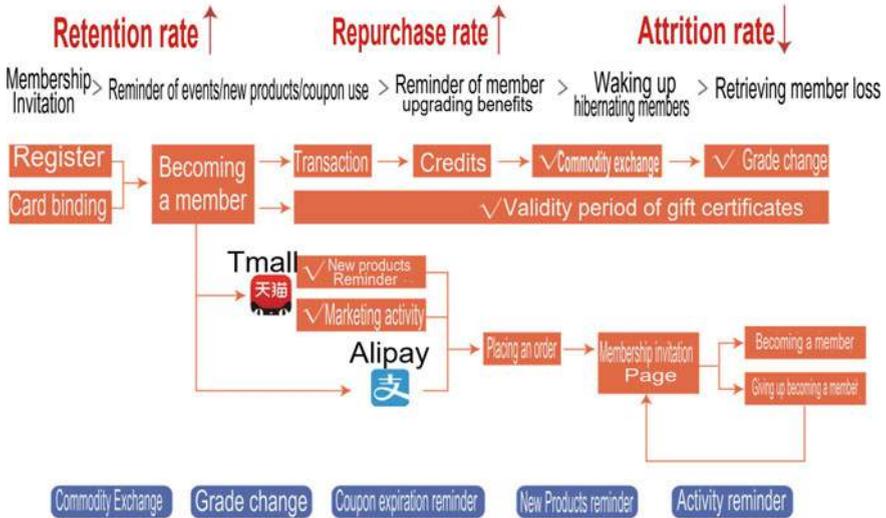
Fig. 1 Member life cycle MOT assistant program

various online ports. A wish that had not been explicitly stated in the real world came to fruition when the research in a virtual world was completed.

In the end of the story, Starbucks launched a new product and sold more coffee. More importantly, it was able to learn more about its consumers through such a report. The Black Tea Yuanyang Latte is just one convincing point in the NPS report, and a lot of data revealing needs and opinions recorded in this report were fed back to Starbucks, which improved the efficiency and increased the value of its service; consumers' hidden needs in the menu were quickly met, which was a very cool experience. The service provided by such report even gave rise to a new supply side, i.e., tapping into new demand for goods and generating brand new supply.

It was a perfect match, digintelligence empowering the service and sales experience. So, how did it all happen?

In brief summary, Alibaba Business Operating System helped Starbucks to integrate all the ports for online and offline products, from front-end sales to back-end services and then back to front-end sales. In this way, from one port, Starbucks can know the feedback coming in from all ports, and manage all online and offline sales and services through one port. Multiple small systems that work closely together in this big structure have formed a complete Alibaba Business Operating System.

Black Tea Yuanyang Latte showcases how the demand is found in one part of the service operating system (experience engine) and is quickly fed back to the merchant, which then transmits it to the market and meets the demand. The logic of the whole service solution is that as long as the service is generated with consumers, a touch point is created. From this point, as long as digintelligent service is accessed, it can do a good job in all the services in the chain of the customer's single purchase. In addition, as long as digintelligent service is accessed, it is possible to know what the consumer needs. Whether the consumer buys the goods or not, he or she will always get serviced. This is the whole chain and full-lifecycle management, the digintelligent support behind the explosive popularity of Starbucks black tea Yuanyang latte!

3.5   A New Generation of Intelligent Store Chat Robots: AliMe 3.0

AliMe 3.0 was officially released on August 13, 2020. The upgraded version would carry the commodity capability of the brand-new marketing service intelligence system, the efficiently compatible integration of the sales and service, and the commercialization capability offering new experience and deep empowerment. Over the five years since AliMe was developed, it has served nearly 1.4 million merchants. This upgrade has enabled this robot to transform from "able to sell" to "great sales", from "able to respond" to "amazing answers", from "OK with everything" to "professional at everything", and to open up the relationship with ecological partners.

When it comes to maximizing the value of each element of the incoming traffic and generating more value in each link, AliMe 3.0 gives a new answer. While the functions are comprehensively upgraded, its operation has become simpler. Through intelligent tasks, smart diagnosis, intelligent assistance and quality control training, it allows merchants to quickly get started and obtain better service and experience in a game-like leveling-up mode.

The following is an example of the interoperability of store data and Taobao Live data to illustrate the extension of AliMe's service capabilities in multiple scenarios, as shown in Fig. 2. Nowadays, Taobao Live has become an important channel for many merchants to sell goods, gain customers and showcase their brands. Therefore, AliMe 3.0 extends AI technology to Taobao Live, which actually empowers a large number of small and medium-sized merchants, allowing each seller to save more costs and improve efficiency to better participate in the new track of livestream sales.

Another scenario involves multiple stores. AliMe has upgraded in this aspect, from single-store management to group management of stores, which allows merchants to have more active marketing capabilities. It intervenes in store marketing since the customer service begins, upgrading from the previous simple reminder function to the full chain coverage, including actively waking up, reminding, caring and retaining customers to facilitate transactions in multiple links of browsing,
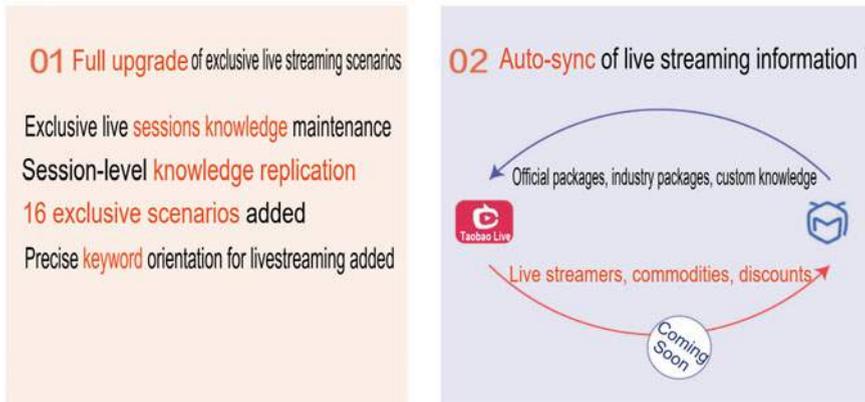
Fig. 2 Two-way intercommunication between store and Taobao live data

adding or collecting products, consulting, logistics, signing for the goods and after-sales service. At the same time, it will automatically follow up with users who are lost because it fails to follow close previously.

As a showcase of the merchants' experience, a brand dealing with disinfection and sterilization daily necessities saw an explosion of inquiries during the Covid-19 Pandemic. When enough manpower was not available, AliMe solved 80% of the inquiries by configuring keywords, welcome word cards, and associated order scenarios. Additionally, this brand has enabled AliMe in multiple stores, achieving average daily solution rates of over 55, and 2% higher in 2019 "double 11" conversion rate than human service. According to the calculation of a well-known e-commerce apparel brand, an AI customer service trainer is equivalent to 30 experienced manual customer service representatives, directly saving 50% of the store's manpower, and even 70% during the promotion. On top of that, AliMe also optimizes the structure of customer service team, thanks to its 24-h on duty service, which enhances the reception capacity of the store, reduces the loss of customers, and improves the shopping experience, as shown in Fig. 3.

In addition, AliMe 3.0 launched in 2020 features several other highlights worthy of merchants' attention.

Commercialization: It offers a new experience of deep empowerment, with accurate customer service questions prepared in advance in relation to associated order status, for instance.

Service upgrade: The intelligent Q&A configuration experience is upgraded, and analysis could be conducted in combination with the back-end big data, while offering a comparison with the level of the industry; intelligent auxiliary answers

Alibaba AliMe 3.0: a New Generation of Intelligent Store Robot
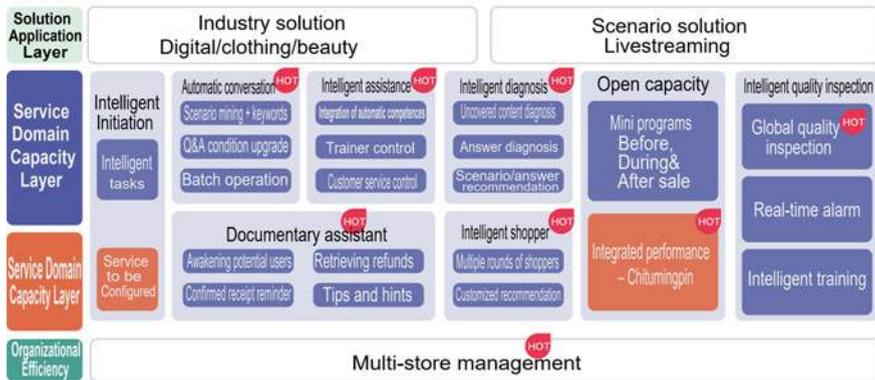
Fig. 3 AiliXiaomi 3.0 new generation intelligent store robot

are more accurate and fully cover automated scenarios (for example, when customers ask about the style of goods, AliMe can automatically call up pictures of relevant goods).

Deep cultivation in industries: Alibaba has developed customer service knowledge packages for vertical markets (e.g. in 3C electronics, apparel, etc.).

Matching with ISV (Independent Service Vendor): It could realize real-time connection with ERP (Enterprise Resource Planning) vendors in intelligent checkouts and refunds, connect with instruments of mini program service vendors, and interconnect with Chitumingpin's performance data, etc.

Now, AliMe 3.0 can be used in combination with Taobao live, mini programs, etc., ushering in new breakthrough opportunities.

4   Summary

This chapter mainly introduces the capabilities of New Service in integrating data and smartly forming closed loops of feedback in the era of digintelligence.

The soul of Alibaba's digintelligent service lies in its service culture: "Customers first, employees second, shareholders third".

Alibaba's digintelligent service integrates data and smartly forms closed feedback loops: Alibaba empowers the connection of online and offline CRN and services, and the data mined feeds back to brands, commodities, manufacturing, logistics, channels and other links, forcing optimization of internal processes and resource allocation.

The main functions of Alibaba digintelligent service solution: ① pre-sales conversion rate solution; ② consumer experience barrier monitoring and proactive

service; ③ experience insight facilitates business improvement; ④ member full-life-cycle MOT assistant solution; ⑤ a new generation of intelligent store robot AliMe 3.0.

The ultimate goal of service is the user, but the digintelligent service affects much more than the user. Through front-end service communication, users' feedback and suggestions will be delivered to the back-end business department in order to help them improve their business and processes, etc. From this perspective, "everyone is the customer service representative, and the enterprise is all about service."

New Finance of Digintelligence

Dongying Hong

Among the 11 elements of Alibaba Business Operating System, finance is a key element that all businesses cannot get around. From the establishment to the end of a business, from the opening of an account to the completion of liquidation, its life cycle is inseparable from finance. It is just that under the past technical conditions, traditional enterprises' perception of finance was mostly around the node where revenue and expenses occur, with limited services in other forms, often causing enterprises to face the following problems.

Inadequate financing ability: Because of their low gross margins and weak growth, traditional retailers find it difficult to finance their expansion.

High cash flow pressure: As a direct system, the expansion of terminal stores and production lines basically relies on its own funds, which leads to increased pressure on cash flow.

Weak risk control capability on the capital side: It is difficult to form a global risk control capability because companies cannot grasp industrial data, such as transaction data, inventory turnover data, and financial data.

As for the enterprises that have experienced the transformation of digital intelligence, such as the retail enterprises getting connected to service providers of digintelligent New Finance through the network, they can enjoy all kinds of financial services in the supplemented and enriched application scenarios, with more frequent presence of financial actions in the operation and management of enterprises.

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

Table 1 Financial actions of private enterprises in different environments of traditional finance and digintelligent New Finance

Traditional financial scenarios	Digintelligent scenarios of new finance
Enterprises settle only in cash or through bank channels, and consumers cannot use third-party funds immediately	Networked, diversified forms and channels of payment collection, gradually shifting to cashless forms, with high security and more conveniences
Financing is difficult, expensive, slow, and requires asset mortgages	With the supply chain financial services, there are various forms to choose for financing, such as payment before delivery, spot pledge, order financing, prepaid purchase, accounts receivable financing. With big data risk control, the whole financing process is online, instant and easy, and can be borrowed and repaid at any time. There are also new financing channels for self-factoring business
Few options and high threshold for financial products, requiring on-site processing	There are a variety of financial investment forms such as Yu'E Bao, fixed-term financial products, Alipay Gold ETF, funds, self-factoring business, all of which can be operated by cell phone
Weak corporate FinTech capabilities	Overall output of BASIC (blockchain, artificial intelligence, security, Internet of Things, cloud computing) technologies

The following is an example of the service of New Finance provided by MYbank, which can showcase the differences between various types of financial actions of general private enterprises in the traditional financial environment and in the environment of the digintelligent New Finance, as shown in Table 1.

1   Trends in Finance

Trend One: New Finance integrated with New Retail and New Business is the future development. In the first half of 2019, China's per capita disposable income exceeded 15,000 yuan, with a compound growth rate of 6.5% in the past four years, while the per capita consumption expenditure of China's residents also exceeded 10,000 yuan in the first half of 2019; during the same period, China's national savings rate dropped from 2008's 51.8% to 45.4% in 2018, as shown in Fig. 1. The gradually increasing per capita disposable income and per capita consumption expenditure of residents, as well as the steadily declining national savings rate, has formed the basis for the total capital of China's consumer finance industry.

Trend Two: Consumption has become the first driver of economic growth. In the first half of 2019, China's total retail sales of social goods reached RMB 17.4 trillion, up 8.3% in real terms year on year; online retail sales of physical goods reached RMB 3.8 trillion, up 21.6% in real terms year on year. The data show
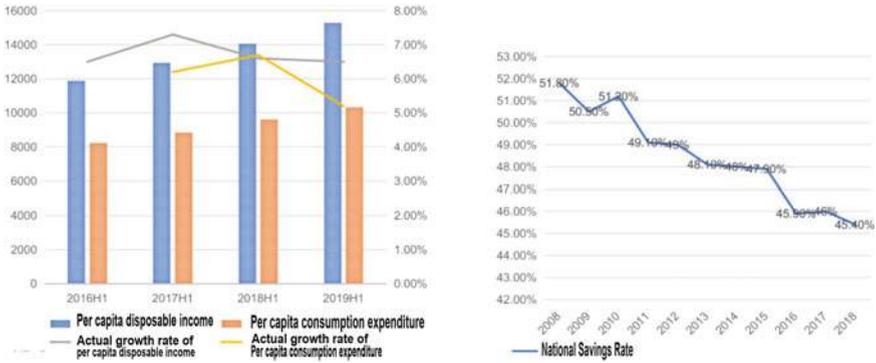
Fig. 1 Changes in per capita disposable income, per capita consumption and national savings rate of residents

that as of 2018 the contribution of China's final consumption expenditure to GDP growth has ranked first among the three major demands for five consecutive years, with the contribution rate in 2018 as high as 76.2%, a ratio much higher than the contribution of capital formation, and net exports of goods and services. It is no exaggeration that consumption has become the most important driver of China's economic growth.

Trend Three: Mobile payment has formed the basis for building a digital economy. Mobile payment realizes efficient coupling between C- and B-sides and shapes new scenarios of digital economy from the following three directions.

Borderless: The boundaries between online and offline are being broken and intermingled, so that the masses can get experience offline and then place orders online; or they can consume offline, and then, through payment, be included into online management. The boundaries of various scenarios are also being broken.

Scenario-based: According to the different services provided by the B-side to the C-side, traditional business can fall into specific scenarios such as retail, catering and livelihood. The type of scenarios determines the form of digital services offered.

In response to the new trends above, New Finance needs to join hands with New Business so as to build a brand-new closed loop of business, as shown in Fig. 2, where financial institutions can provide financial services, credit services, POS, marketing, loan services, etc., based on consumption scenarios.

Mobility: In the era of digital intelligence, "people, goods and fields" are constantly in the flow. Whether it is information exchange, customer acquisition, price negotiation, or payment access, they are no longer bound to a physical environment. Mobile payment builds and guarantees the credit foundation of the digital economy: mobile payment is not only the entrance of funds and users, but also the entrance of credit data, and it also promotes the digitization of the original industry, as in the following examples:
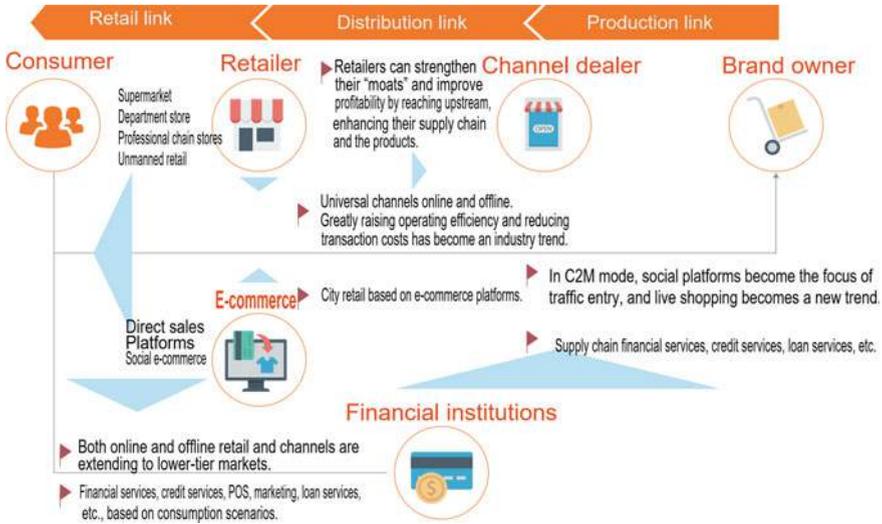
Fig. 2 New business closed loop under the combination of new finance and new business

Catering: "Remote order + order without queuing", showcasing the full route industrial reform from front-end to back-end;

Retail: Consumers can enjoy the efficiency of "scan and go", and the management of inventory, forecasting, diversion, membership system and logistics of enterprises are efficiently linked with consumers' payment behavior;

Finance: Consumers can enjoy convenient and safe inclusive financial services, and small and medium-sized enterprises have fast access to financing.

Government affairs: More online handling and fewer actual visits are encouraged.

Medical care: Treatments can occur before payment.

Transportation: The smart cities are shaped and presented to the public.

2 New Finance Empowers the Reconstruction of "People, Goods and Fields"

In this era, we are experiencing the transformation from "Internet+" to digital Intelligence, when mobile payment, facial recognition payment, consumer finance and other consumer-oriented (people) services can well enhance the user experience. Supply chain finance enters the commodities (goods) flows in terms of the existence, manufacturing and sales, solving the problems of difficult, expensive and slow upstream and downstream financing, and thus improving the efficiency of capital use. Since the merchants in New Retailers have adopted digintelligence in the whole process of business, from store opening, procurement to production and
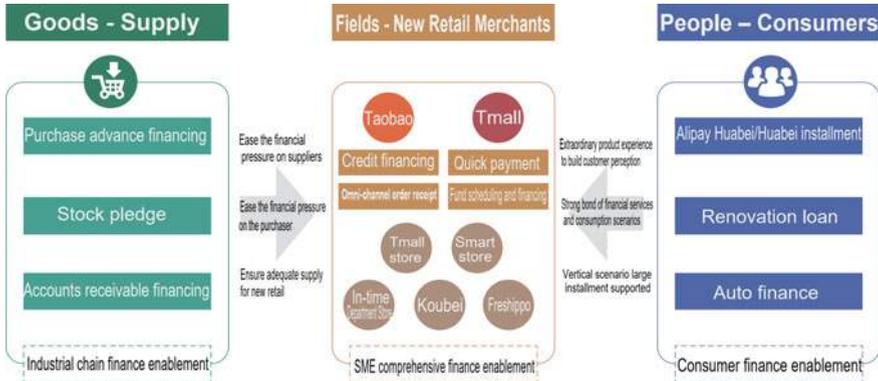
Fig. 3 Reconstruction of "People, Commodities and Fields" empowered by new financial

manufacturing, and finally to the return of funds, they can all experience the inclusiveness and conveniences of financial services in the small-and-micro integrated financial empowerment system, as shown in Fig. 3.

2.1 Consumer Finance: Boosting Sales Conversion on C-Side

When users consume online, settlement is among the real scenarios of financial business. This process actually can provide more development perspectives and traffic to consumer finance while breaking the limitation of time and space and meeting consumers' convenient needs. In such a scenario, consumer finance can be convenient and fast for consumers to enjoy the ultimate shopping experience; for merchants, it can effectively enhance the sales conversion of C-sides.

The deep integration of data and scenarios allows the digintelligent transformation of consumer finance to achieve the win–win effect for both customers and merchants.

As users' consumption behaviors and habits change, their demand for goods is also changing, which requires newer technical means to achieve real-time and high-frequency interaction between goods and users, and the ability to reduce failure rate through an intelligent risk control system, so as to gain the opportunity to provide distinctive service to customers.

2.2 Supply Chain Finance: Revitalizing Supplier Accounts Receivable

Some companies can finance themselves, but their financing is not efficient. If its upstream and downstream users do not have the ability to contribute enough capital, then its business will grow very slowly. With the development of supply

chain finance, not only capital but also financial leverage can be offered to both individual consumers and each of the merchants. Once the supply chain finance is connected, it is foreseeable that the competitiveness of the business users will definitely increase dramatically and the development will be greatly accelerated.

Alibaba supply chain finance can be taken as a showcase. It was jointly established by Cainiao and MYbank, driven by data and technology, as a collaborative platform offering supply chain financial service. Through data, it connects all aspects of the enterprise online and offline, and unifies the "five flows" of business, logistics, capital, data and credit, so that the exclusive supply chain finance, which previously could only be used for bulk commodities and digital home appliances, can also fully support FMCG, fresh products and other categories.

In this mechanism, Alibaba first applies risk assessment of the merchants' transaction flow and record data on its platform, then confirms the credit limit and finally issue loans, which helps Alibaba reasonably earn financial profits from upstream and downstream suppliers in the ecosystem while greatly safeguarding the healthy development of the ecosystem. Using the data of the whole chain of merchants from procurement to sales, as well as the logistics information of commodities (goods), Alibaba can provide different types of financial services in a timely manner in various aspects such as transportation, warehouse entry and delivery. These services are integrated in Alibaba's system as Cainiao Supply Chain Finance, whose panoramic model is shown in Fig. 4.

Cainiao supply chain adopts various modes of financing, such as inventory financing, prepayment financing and order financing.

Inventory financing collects goods value in the inventory through dynamic sales data on Tmall and Taobao, and then facilitates the platform in calculating and monitoring the real-time goods value by means of the collecting and controlling changes in the quantity of inventory through Cainiao warehousing and logistics
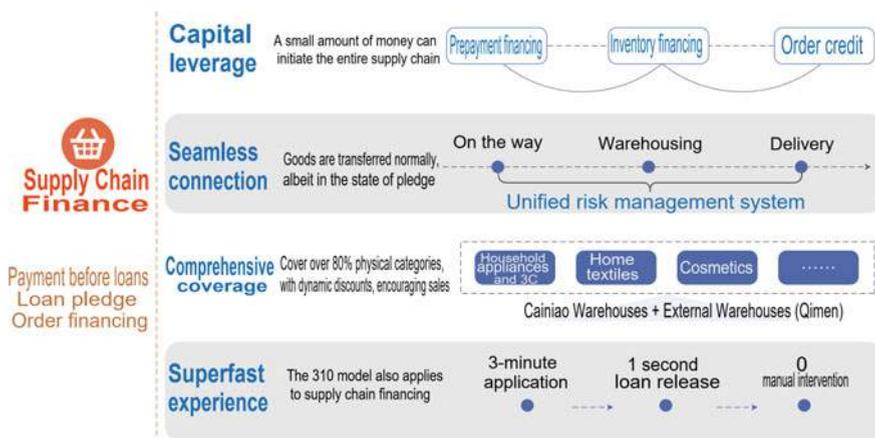
Fig. 4 Panoramic model of Cainiao supply chain finance

services, so that it could provide better financial services. This financial service can form a closed loop based on scenarios and digitization, with less overall risk and more room for application at the same time.

Prepayment financing is developed on the basis of inventory financing. On the premise that the buyer pays a certain deposit, the supply chain financial service company pays the full amount of the goods value as in the agreement to the seller, and then the seller ships the goods according to the purchase and sale contract, before the goods are turned into the collateral for the prepayment when they arrive at the designated warehouse.

Cainiao Supply Chain Financial Services cover the whole chain from the production side to the consumption side, and have already connected the credit of inventory and sales, and will subsequently extend from the sales side to the production side. In addition to merchants, logistics partners within the Cainiao ecosystem can also enjoy supply chain financial services; Cainiao will assess the financing amount through the data deposited on the platform, while the corresponding financing commodities include factoring, equipment loans, vehicle loans, etc.

In a nutshell, Cainiao Supply Chain Finance is both a receivables pool financing and a self- factoring platform for core enterprises. The three functions it fulfills are as follows.

Revitalization of receivables: Through data docking, supplier receivables can be converted into financeable credits in real time with up to 10% discount.

Minimalist operation: For online accounts receivable transfer procedures, MYbank has launched the "310" model (3 min to apply for a loan online, 1 s to complete the review and release, 0 manual intervention).

Empowering enterprises: SAAS-based services can enable core enterprises to carry out supply chain finance business and extend the boundaries of New Retail.

In addition, for the offline service industry, MYbank and Alipay are also upgrading their service model. With only a QR code, small and micro merchants can enjoy a number of services in collection, marketing, training, fund management, loans, insurance, etc. The small merchants who could not afford an accountant in the past now have a free CFO (Chief Financial Officer) and COO (Chief Operating Officer) and can also experience rapid release of funds online.

2.3 The Comprehensive Financial Services to Merchants in New Retail

Now the financial empowerment of the "fields"—the whole-chain comprehensive financial services to merchants in New Retail—is to be introduced. Specifically, the following services are provided.

1. Omnichannel Acquiring Empowerment
   ① It provides omnichannel acquiring support for Tmall, so merchants can achieve Alipay collection and automatic bill splitting; it enhances merchant experience by advancing funds to achieve acquiring those accounts.

② It provides the overall solution of smart POS aggregated acquiring + cloud fund account for New Retail merchants.

2. Fast Payback on Sales

   The order loan and early collection function provides merchants with fast payback services and optimizes the transaction structure, while revitalizing the Alipay guaranteed transaction funds and feeding all the savings back to the merchants.

3. Funds Transfer and Financial Management

   ① The online merchant fund transfer center can help merchants to transfer large amounts across banks in real time.

   ② Yulibao can help merchants to manage their idle funds, and has served 14 million customers in total.

3   Summary

This chapter mainly discusses:

The financial bottlenecks encountered by the development of traditional enterprises.

The insight into the future trends of New Finance.

How New Finance empowers enterprises and reconstructs "people, goods and fields" to achieve new growth: enhancing "people" upgrade and accelerating the conversion of C-side sales through consumer finance; revitalizing the sales of "goods" by means of supply chain finance services, such as the ones related to supplier accounts receivable; and empowering the "field" through the whole-chain comprehensive financial services to merchants.

In short, the innovation of technology and business model is just the beginning, with further improvement of analysis, management, risk control and expansion capabilities following. It is believed that in the near future, various types of dig-intelligent technologies, as the basis of enterprise interaction, will reshape the financial business model, bring more industrial breakthroughs, and usher in the dawn of innovation.

Then, digintelligence will contribute to establish a new financial system and integrate mainstream payment platforms to improve consumers experience and efficiency with consistency and fluency. Meanwhile, through payments in the whole chain, it will realize services in financing, account checking, quota and credit, offering a data foundation for industry-financing synergy and corporate financial services.

New Logistics with Digintelligence

Wenya Yang

With the continuous development of the logistics, digintelligent logistics based on a new generation of information technologies of 5G, Internet of Things, cloud computing, big data, artificial intelligence, etc. has become the new trend gathering momentum in the industry today. Through big data, New Logistics can accurately formulate commodity delivery plans and predict the goods needed by consumers, solving the problem of "finding people for goods". In the future, enterprises can combine self-driving technology to build a new generation of intelligent logistics transportation network, using unmanned trucks to replace some of the traditional manually driven trucks to achieve 24 h uninterrupted intelligent transportation, which will greatly reduce the replenishment time and transportation costs of goods in terminals like retail stores.

Meanwhile, some problems are detected. Many enterprises suffer from problems in logistics such as the large size of network incompatible with its strength, high cost, low efficiency, incomplete information and inaccessible data. On the other hand, the traditional logistics service, relatively limited in functions, lacks service consciousness, and implements tasks passively, only focusing on simple transferring service of shipping to where there is need for replenishment, with the supply chain centered on point-to-point or point-to-line models.

In contrast, New Logistics with digintelligence can systematically optimize the supply chain, record the production and sales situation in real time, and accurately determine the inventory for quantity replenishment, which can greatly improve the efficiency of supply and demand; it can also improve the synergistic efficiency

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

of product development, production and sales, and predict product sales, so as to help manufactures produce as the market demands, reducing the risk of business operation.

Traditional logistics has an array of warehouse distribution problems, including unshared inventory, unreasonable distribution and even nationwide delivery from one single warehouse. When it comes to holidays, a large amount of stock needs to be prepared in advance, with high inventory pressure, and too much capital flow taken, causing great operational difficulties to enterprises. If the inventory is small, then commodities can easily go out of stock, exposing the lack of flexibility in storage and distribution. In response to those problems, New Logistics with digintelligence can integrate online and offline logistics systems by incorporating all the product information into the network for share, and connecting stores with warehouses to realize pickup and delivery from the nearest location, which will improve the product turnover rate.

In traditional logistics, there is a separation in terms of goods and warehouses between online and offline operations. Consequently, the data of various channels is inaccessible, incomplete and inaccurate, especially with long sales cycle, which leads to imprecise and untimely decision-making. However, New Logistics with digintelligence applies big data, cloud computing, GPS, Beidou Navigation Satellite System and other sophisticated technologies in the links of warehousing, distribution, and packaging etc. to complete the online data accumulation and superposition, real-time aggregation, and visualization, to help companies make real-time analysis and formulate the right decision before it's too late.

Traditional logistics has low automation and digitization levels, and mostly relies on manual operation extensively, with high error rates and low efficiency. New Logistics with digintelligence uses a lot of digintelligent equipment such as intelligent robots, IoT devices, and smart sorting equipment, which greatly reduces manual operation and error rates, thus improving overall enterprise efficiency and enhancing user experience. Table 1 shows the comparison between traditional logistics and New Logistics with digintelligence.

1   The Transformation of Digital Intelligence in Logistics

In the beginning of Taobao development, when users purchased online, the transaction happened usually within the same city, with payment made at the delivery of the goods, until the delivery service appeared, which was quite slow over a decade ago. However, with the volcano eruption of online shopping, the delivery time has been significantly reduced, advancing by leaps and bounds, from previous three days to the same day delivery, or in the case of Freshippo, 30 min delivery within three kilometers. Such a rapid development of logistics is closely related to that of digital intelligence.

The globalization of trade is an irreversible trend in the twenty-first century, which also requires logistics to become more efficient, wiser and safer. Thanks to the Internet and digital technology, an open and transparent, shared and symbiotic,

Table 1 Comparison between traditional logistics and new logistics with digintelligence

Traditional logistics	New logistics with digintelligence
Passive logistics execution	Global optimization of supply chain with synergy in research, production and sales and rolling sales forecast
Single warehouse for nationwide delivery	Multi-location and multi-warehouse layout nationwide, with overall optimization
One-time delivery to all stores nationwide, with low efficiency of goods turnover	Multi-level buffer, multiple fast replenishment, high turnover rate
Separation of online and offline goods and warehouses	Online and offline integration with multi-level forward and reverse logistics; integrated stores and warehouses realize nearby pick-up and delivery nationwide
Self-owned warehouse with the highest configuration prepared for the peak, wasting resources in routine operations	Self-owned warehouse + Social warehouse, on-demand off-peak delivery with high overall resource utilization
Reliance on manual operation with high error rates	Use of smart robots, automated conveyors, IoT, etc. to reduce manual dependence and errors

efficient and convenient, green and safe intelligent logistics ecosystem has been formed, facilitating the profound and extensive application of information technology in the field of logistics; it has also significantly improved the intelligent level of warehousing, transportation, distribution and other aspects, and continuously optimized and innovated the logistics organization. Internet-based new ideas, new technologies, new models and new businesses in logistics have become the new impetus for the industry development. It has become a subject facing each enterprise to adopt digital intelligence to transform the supply chain and create a new competitiveness advantage.

Smart logistics in the era of digital intelligence features the wide utilization of advanced digital technology and IoT technology such as 5G, big data, cloud computing, bar codes, sensors, artificial intelligence, and global positioning system in operations of the logistics industry ranging from warehousing, loading and unloading, packaging, transportation, to distribution, through information processing and network communication technology platform, so as to achieve automated operation and efficient management of in transportation, improve the level and efficiency of the logistics services, and reduce costs and the consumption of natural and social resources. The challenges brought by the New Retail transformation will bring great revolutionary opportunities to all parts of the supply chain and also bring about innovation and progress in the logistics industry.

Improving logistics forecasting capabilities based on big data analysis, integrating online and offline logistics systems, putting a variety of logistics data online in real-time, optimizing the warehouse supply chain layout with big data, lifting the efficiency of transportation and distribution, and reducing labor costs through the use of the process-optimizing intelligent scheduling system and self-driving

technology… all these capabilities showcase how the IoT enables traditional logistics technology to accommodate intelligent systems, presenting a smart logistics system that can realize a logistic operation mode of informatization, onlineization, intelligence, automation, transparency and systematization in a better and faster manner. Smart logistics attach great importance to online data, network collaboration and intelligent decision making in the implementation process.

Empowered by digintelligent logistics, Cainiao achieved a new breakthrough during the "Double 11" shopping festival in 2019, achieving 98.8% order shipments within five days, 94% accuracy of warehouse capacity estimation, 73% sell-out rate, a reduction of hundreds of millions of pieces of prepared inventory, 0.18% complaint rate of Cainiao fulfillment orders, and savings of nearly 10 million yuan in warehouse rent, a significant improvement compared with 2018.

Also empowered by digintelligent logistics, Cainiao guaranteed the fast, precise, excellent service in big promotions. By "Double 11" in 2020, the logistics orders totaled 2.321 billion units on Tmall, with a prediction of another 1.115 billion pieces of goods entering warehouses, and the smart forecast of peak values for live streaming orders reached 50 million units every event. The data of "Double 11" in previous years suggests a rise in accuracy and efficiency in the intelligent decision of digital supply chain.

On September 17, 2020, Alibaba released the first logistics robot Xiaomanlv at the Apsara Conference, aside from launching the robot platform, which marks its official entry into the robot track. This robot integrates the most cutting-edge artificial intelligence and self-driving technology of the Alibaba Damo Academy, with human-like cognitive intelligence and a "brain" emergency response speed of seven times that of humans.

Xiaomanlv is Alibaba's first wheeled robot, which can easily handle complex road conditions and choose the optimal path; the "hard-working" robot can run more than 100 km on just four degrees of electricity, and can deliver 500 packages per day, without being affected by complex and harsh environments such as thunderstorms and lightning, high temperatures, rainfalls, snowfalls, garages, and tunnels.

The super performance of Xiaomanlv originates from the cutting-edge artificial intelligence and autonomous driving technology of the Alibaba Damo Academy. Its self-developed perception algorithm allows the robot to identify centimeter-level obstacles; its high-precision positioning algorithm allows the robot to achieve centimeter-level positioning where there is no GPS or Beidou signal; the intent prediction algorithm empowers the robot with superb intent recognition capability, which can discern the action intent of more than 100 pedestrians and vehicles in just 0.01 s; the robot also has a fivefold safety design with brain decision-making, cerebellar redundancy, anomaly detection brakes, contact protection brakes, and remote protection to ensure higher safety performance.

On October 30, 2020, 22 logistics robots led by Xiaomanlv entered Zhejiang University's Zijingang Campus. During "Double 11" in 2020, Alibaba built the

world's first robotic delivery site at Zhejiang University, with robots undertaking the delivery of more than 30,000 parcels in the Cainiao Station at Zhejiang University.

2   Digintelligent Logistics Infrastructure

To realize digintelligent logistics, it is essential to turn logistics-related business data into digital forms which can be transferred online, and to build the digintelligent capability of the supply chain by harnessing various IoT devices. Warehouses, aircrafts, vehicles, automatic assembly lines, order distribution, etc. should all be operated without manual labor, as shown in Fig. 1.

It is these unmanned logistics infrastructures that transmit the data from each business node to the logistics data center, completing online data accumulation and superposition to form logistics big data. Through complex algorithm models and efficient data operations, the omnichannel data is scientifically analyzed and visually presented to provide a reliable basis for merchant decision-making. Real-time data and clear analysis are presented to users, with data as the foundation and evidence for scientific decision-making, which could be accessed through terminals of PC or mobile phone.
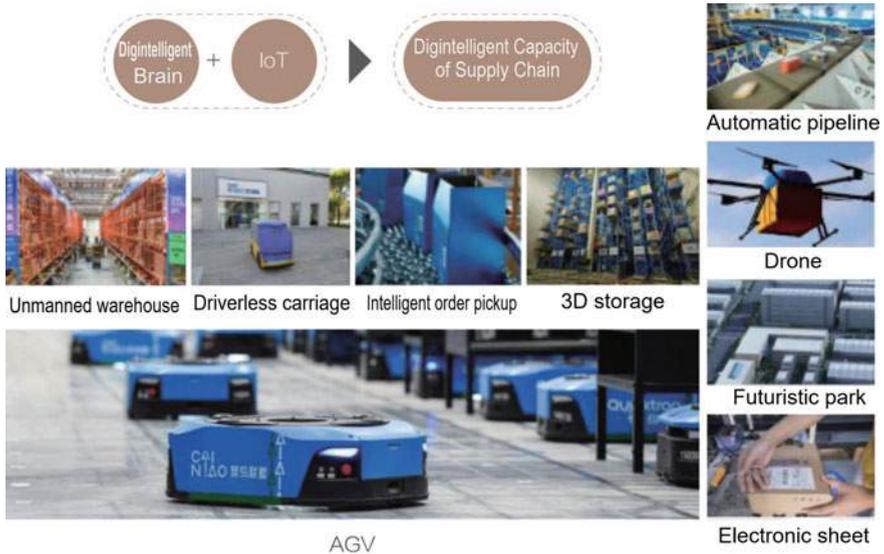
Fig. 1 Digital intelligence of logistics

3   Digintelligent Supply Chain

When logistics is equipped with the wings of digital intelligence, the supply chain has the ability to fly, not only in logistic warehousing and distribution, but also in conducting comprehensive digintelligent planning and layout design in terms of the height, breadth and depth of the omni-network supply chain.

The intelligent algorithms optimize the production planning in the manufacturing units and improve inventory turnover, so the efficiency of capital utilization rises dramatically; smart algorithms also enhance the ability of consumer fulfillment to ensure better consumer experience. Digitization assists logistics in accurate warehouse distribution, which facilitates merchants to achieve sales forecasting, pre-sale sinking and accurate replenishment. The optimized digintelligent supply chain solution plays the role of releasing capital and improving capital turnover, thus enhancing enterprise efficiency. With such a solution, warehouse supply chain is no longer just a logistics department, but the core hub of supply and demand transit. The synergy of Cainiao supply chain digital platform and Tmall platform can achieve true integration of the flows of people and goods. Now merchants have multiple channels, online and offline, and orders of different channels have to be fulfilled with timely performance, so the supply chain of universal inventory has to be established, with warehouse data in real-time synchronization. The supply chain should achieve universal real-time digitalization throughout omni-channels and the full link, and be able to make intelligent predictions and replenishment through various AI technologies. The moment consumers place an order, the supply chain should start its participation in data computing to realize multi-level warehouse distribution, multi-layer dispatching, and delivery from the nearest the terminal site, until goods are sent to consumers, during which the logistics data is transparent and traceable.

Freshippo is the ultimate showcase of data technology in supply chain. After the delivery staff picks up the goods, the system will plan the route based on the goods purchased by consumers, and give priority to fresh food to be delivered first. All these functions are empowered by digitalization.

4   Digintelligent Logistics Forecast

Through the data collected by the mid-end in each dimension, the forecast factors in each direction are formed. Daily sales forecast can be made based on the periodicity and seasonality of goods, as well as the temperature and the weather; promotion forecasts can be made based on channels, types, discounts, price elasticity, product attributes, etc.; product life cycle forecast can be conducted based on new product trial sales, growth status, etc.; regional forecast can be conducted based on local preferences in terms of category, brand and size, local climate, etc.; and big promotion forecast can be based on the identification of hit products, brand distinctions, warm-up period behavior, popularity coefficient of the same period last year and other data.

By combining the multiple predictors above, SKU and sub-warehouse sales can be predicted for the next week to several weeks. Based on the forecasts, companies can conduct the digital intelligent brain decision-making and tap the new value of digintelligent supply chain.

The Tmall store of a well-known FMCG merchant made a sales forecast of sub-warehouses for the "Double 11", with the prediction accuracy rate four weeks in advance reaching 66 and 72% three weeks in advance, over 90% accuracy in some hit products. Best-selling products, which accounted for 80% of total sales, had a 90% accuracy forecast rate in sub-warehouses, and the ratio of cross-region replenishment according to the forecast was less than 1%. The data shows that through the digintelligent brain decision-making, merchants can get be accurate guidance in allocating commodities to sub-warehouses.

Cainiao's product Juecebao makes it easy to visualize data. It can provide corresponding data analysis for different roles in the company, offer graphical display of key indicators as well as details and trends of a particular indicator, and can also send task instructions based on the data.

Based on a myriad of real-world cases, Cainiao supply chain has been able to provide integrated digintelligent supply chain solutions for various industries, such as digintelligent brain, digintelligent warehouse distribution, digintelligent full project, coordinated business and logistics, etc., so as to bring goods closer to consumers; it could also guide intelligent and real-time warehouse allocation, safety stock judgment and scientific replenishment frequency measurement for warehouses in light of product dimensions, so that merchants can make precise preparations, conduct joint sales forecasting, joint production and marketing plans, and joint replenishment plans. Scientific operation makes every decision of merchants more effective.

5   A Case of Digintelligent Logistics

AUX Group has been ranked among the top 500 Chinese enterprises for many years, and its businesses cover home appliances, electric power equipment, medical care, real estate, financial investment, etc. of which home appliances such as air conditioners are its important economic pillar. AUX air conditioners are a dark horse, with shipments breaking 10 million units every year, making it the fourth air conditioner brand with the performance of over 10 million units per year, only after Gree, Midea and Haier; e-commerce platforms like Tmall are AUX's important online sales channels. AUX is also facing high logistics costs; how to reduce logistics costs, how to improve logistics efficiency and how to enhance brand competitiveness are problems that AUX must solve.

Whether it's an auxiliary part or a finished air conditioner, AUX's logistics department needs to deliver the goods to the consumer smoothly. By studying this complicated logistics process, we found that a lot of links can be optimized or eliminated.

Before optimization, AUX's product supply chain was fragmented in terms of data sharing and department functions; the data deposited on the platform could not be used to help manufacturing companies produce and transport items efficiently and reasonably; the whole logistics chain was misaligned, and information and goods could not reach users accurately. Luckily, these problems could be solved with digintelligent transformation.

For AUX, there were two basic tasks to be accomplished with the help of Cainiao and Tmall. One was to use big data to make predictions, collaborate on production plans and inform merchants about material preparation and production. Alibaba's algorithm team made data forecasts by drawing on more than 100 factors such as consumer behavior, weather, and regions. After a period of collaboration, the accuracy rate of sales forecasts made by AUX with the help of Cainiao and Tmall exceeded 70%. The other task was to inform relevant parties that the goods would be warehoused, allocated, and shipped out. Cainiao's warehouse allocation function can inform merchants in advance of product distribution, with specific information concerning the quantity of a certain model of products to be prepared for a particular regional warehouse. If smart warehouse allocation is compared to a jigsaw puzzle, then Cainiao and Tmall constitute a part of it, AUX the other important part. If this puzzle is to be seamlessly put together, it requires every digital point of both parts to reach an aligned status.

AUX's previous business process was divided into three modules: scheduled warehousing, delivery and sign-off, and the entire process had a total of 18 nodes to go through, consuming 33 h. Through its cooperation and data connection with Cainiao and Tmall, the whole process has been shortened to six nodes in just past one hour, and the efficiency in procedure details was greatly improved.

An evident example is in the original manual operation nodes such as filling out reports, which have been cancelled now. Besides, the distribution of goods in sub-warehouses and replenishment plans have been streamlined and intelligently operated. Another instance is in the distribution of the goods from the warehouse in one region to the customer in a different region. Previously, AUX used manual calculation, which often failed to meet customers' demand in terms of process and time. In response to these problems, Cainiao upgraded and optimized the business process. With only preliminary calculations, the accuracy of AUX's intelligent warehouse allocation and in-advance warehouse preparation forecasts has been significantly improved.

Summer is the peak season for air conditioner sales, and it was common to see out-of-stocks situations in high-temperature regions like South China, East China and Central China. Through a series of process optimization such as intelligent warehouse division, AUX's out-of-stocks rate in these high-temperature regions has decreased by 10%, with the turnover rate of goods increasing by nearly 40%. After working with Cainiao, AUX has witnessed the significant warehousing and logistics cost drops, and as of December 2020, it has saved nearly 20% of its annual costs.

For AUX, the benefits of cooperation with Cainiao are not only the improvement of supply chain efficiency and the visualization and intelligence of logistics

information, but also the help it has offered to AUX which can quickly locate problems in the whole process.

Still, how to improve the distribution efficiency is a major problem menacing the manufacturing industry and even retail industry, due to the fact that it determines the speed of the flow of goods and affects the cash flow and profits of the company. The cooperation between Cainiao, Tmall and AUX has been an effort in search of breakthrough in this arena.

What Cainiao can offer is a series of technological advantages it has accumulated to efficiently deliver high-value information generated in logistics to producers and consumers. What Cainiao plans to do is to provide a new perspective for the manufacturing industry to reduce costs and increase efficiency through a series of transformation experiments. Figure 2 shows one of Cainiao's robot-operated warehouses.

With the development of economic globalization and the rise of the network economy, logistics technology continues to evolve and logistics functions continue to be refined. Logistics is no longer just a point-to-point transferring of goods, but a way to improve service quality and enhance the comprehensive competitiveness of enterprises through the development of logistics. The boundaries of all parties in the logistics industry are also gradually blurred, and for all parties in the logistics ecological chain, digintelligence is now playing a more important role in the industry competition. With the rapid iteration and upgrades in the logistics industry, the less efficient traditional logistics industry players will be replaced by digintelligent players with higher efficiency.

Fig. 2 Cainiao's robot warehousing

In the near future, vending machine robots may be able to predict the purchasing needs of a neighborhood's residents and automatically migrate to this neighborhood to meet the residents' needs of purchasing goods. The society with highly developed artificial intelligence, once staged in science fiction blockbusters, now is coming to us in big strides.

6   Summary

This chapter mainly describes how digintelligent logistics based on a new generation of information technologies such as 5G, IoT, cloud computing, big data, and AI has become new growth opportunities of consensus. Through the global optimization of the new digintelligent logistics supply chain, merchants can grasp the production and sales in real time, improve the synergistic efficiency of product development, manufacturing and sales, and conduct sales prediction.

(1) The transformation of digital intelligence in logistics. China's digintelligent logistics evolution has been proceeding at rocketing speed, from the volcano eruption in Taobao shopping craze, to Freshippo's 30 min delivery within three kilometers, to the release of Alibaba's logistics robot Xiaomanlv.

(2) Digintelligent logistics infrastructure. Smart logistics facilities such as unmanned warehouse, unmanned aircraft, unmanned vehicles, automatic assembly lines, intelligent order distribution have transmitted data from each business node to the logistics data mid-end to form logistics big data. The data from different sources are integrated to help merchants achieve data visualization, insight and smart decision-making.

(3) Digintelligent supply chain. In order to fulfill orders from different channels in a timely manner, merchants must establish the supply chain of shared goods. The digintelligent supply chain should achieve real-time digitalization of all channels and the full link, and can make intelligent prediction and smart replenishment through various AI technologies.

(4) Digintelligent logistics forecast. Through the data collected in each dimension by the mid-end, the forecast factors in each direction are formed to realize intelligent daily sales prediction, promotion prediction, commodity life cycle prediction, regional prediction, and big promotion prediction, significantly improving the accuracy and efficiency.

(5) A case of digintelligent logistics. With a series of process optimization, such as intelligent warehouse allocation, the out-of-stock rate of AUX products in the high-temperature area has been greatly reduced, with the turnover rate of goods greatly increased, the cost of storage and logistics dramatically reduced, and a big rise in the supply chain efficiency. Meanwhile, the digitization, visualization and intelligence of logistics information have also empowered AUX in quickly locating problems in the entire business process.

Digintelligent New Organization

Wenya Yang

The technological means by which humans transform the world determine how human collaboration is organized. The advent of the steam engine required humans to work with machines for the first time. As the number and complexity of machines grew, the scale of organizations expanded, and each small process was assigned to respective workforce, resulting in increasingly complex organizational structures and the gradual formation of rigid organizational structures.

In the wave of rapid development of digital intelligence economy, the traditional hierarchical organization, however, has failed to keep pace with the times. The current fast-changing market urges companies to "innovate" their organizational thinking. This innovation is not limited to internal reporting, team building or corporate strategy, but refers to breaking the traditional rigid organizational model to facilitate organization to be flattening, ecological, online, platform-based and data-driven, so as to reconstruct a brand-new liquid organizational operation model that empowers enterprises to cope with continuous competition and challenges. If digital intelligence is deemed as a great technological revolution, then the New Organization will be a great management revolution.

The organization of traditional business adopts a multi-level vertical model, with the upper and lower levels being fragmented and inefficient, thus making it difficult for decision makers to truly understand the first-hand information of the enterprise. By contrast, the New Organization of digital intelligence harnesses a flat network collaboration model with transparent information, through which business

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

leaders and employees can grasp the first-hand information of the enterprise, and spot the problems in time to make decisions.

The traditional organization can be compared to a composition of offline silos, functioning on their own with low communication efficiency, while the New Organization of digital intelligence realizes data-based operations with organization, communication, collaboration, business, and ecology online, trying to stimulate the creativity of everyone in the organization.

The traditional organization pays too much attention to management and control and KPI assessment, rather than front-line employees, resulting in poor initiative and insufficient source of motivation of employees. Most of them are prone to waiting, asking, and relying on others, with relatively low efficiency. The New Organization of digital intelligence, on the contrary, empowers the front-line employees, giving full play to the subjective initiative of store managers, shopping guides and customer service staff. By liberating production relations and releasing productivity, employees are encouraged to motivate themselves, delivering mutual benefit to both individuals and enterprises.

The traditional organization emphasizes personal experience, but neglects learning. Employees with experience can make a decent pay, but they are reluctant to share their experience for fear that their income will be affected in a way that "teach the apprentice, and the master will be starved". The New Organization of digital intelligence, however, prioritizes practice and effective training, and advocates learning for all employees. Combining experience with big data, personal wit with organizational wisdom, it aims to make tacit knowledge explicit, explicit knowledge standardized, standard knowledge systematized, and personal knowledge organized. Then, by virtue of DingTalk + big data + cloud classroom, the standardized and organized knowledge will be acquired to systematically empower employees, facilitating a virtuous cycle of learning and teaching. The comparison between traditional organization and New Organization is illustrated in Table 1.

1   The Evolution of Organization

In the industrial era, the division of labor in society was determined by the assembly line in the factory, and the organization was arranged by process, position and hierarchy. However, in the era of digital intelligence, the social division of labor system has changed from the social collaboration to a new organization model of non-employment system based on Internet thinking, which is flexible, shared, diverse and efficient. Cases in point are Didi Chuxing and Ele.me. The former attracts millions of car drivers, but these drivers are not employees of Didi; and the latter gathers millions of deliverymen, all of whom are not employees of Ele.me, either.

In industrial society, the organizational form corresponds to that of social stratification, presenting a relatively obvious pyramid structure, while in the digital and intelligent era of Internet of Everything, information and intelligent technology will replace more repetitive work, and organizations will need people to engage in

Table 1 Comparison of traditional organization and new organization

Traditional organization	New organization
Multi-level; Vertical; Fragmented; "Chimney"	Flat; Network Collaboration; Trust; Simplicity; Transparency
Strong Control; Low Efficiency; Self-interest	Organizational Empowerment; High Efficiency; Self-driven; Ecological Balance
Offline Silos; Low Communication Efficiency	Organization, Communication, Collaboration, Business, and Ecology Online to realize data-based operation, stimulating the creativity and innovation of every person in the organization
Neglecting store managers, shopping guides and customer service staff	Being consumer-centered and giving full play to the initiative of front-line personnel such as store managers, shopping guides and customer service staff
Individual experience varies greatly and is unstable	Tacit knowledge becomes explicit, explicit knowledge standardized, standard knowledge systematized, and personal knowledge organized
No emphasis on learning; little knowledge reserve	Focus on practical and effective training and learning to create a learning organization for all employees
Teaching the apprentice will starve the master	DingTalk + big data + cloud courses to promote full-staff competition in learning; encourage sharing to formulate a virtuous circle of teaching and learning
Employment relationship with insufficient source of motivation	Company as a platform: brand endorsement + empowerment of tools, methods, fund, and data to liberate production relations and release productivity

more creative, imaginative, and groundbreaking work. This is also likely to bring about changes in the entire social stratification, and bring forth new technologies and tools that that are smarter alternatives to basic work.

The infrastructure in the digital intelligence era has undergone a continuous revolution, from the PC Internet to the mobile Internet, where the mobile phone terminal has become the new starting point for connectivity, and the mobile Internet has digitalized knowledge, services, and products through online applications. Today, cloud-network-terminal (cloud computing + mobile Internet + smart terminal) has become the new infrastructure, making the office scenarios change dramatically. In the PC era, the office emphasized OA and ERP management, the essence of which was to systematize and automate the business process via software. It means that the efficient management methods and the established work processes in the past were preserved through the software, thereby improving management efficiency. However, this is a layer-by-layer ordering under the

hierarchical organizational structure, just an improvement based on previous management experience; in the era of mobile Internet, in order to meet the needs of rapid information transfer and real-time processing within the enterprise, the organization needs to enable more open and diverse work scenarios to unify internal technology and management language, break the resource barriers, and unleash individual potential. To this end, mobile office software in the form of an integrated platform is used to serve more enterprises and employees. On this basis, the market share of mobile office was estimated to reach about 50 billion yuan by 2021. As a micro carrier of the organization, the mobile office platform can promote the deep interconnection and transparent sharing of enterprises and accelerate the organization to be online, digital intelligent and agile from within.

An essential step in the digital intelligence transformation of an enterprise is to embrace the New Organization. Being the cornerstone of digital intelligence organization, digital intelligence technology can drive the innovation of organizational business models and the restructuring of industry ecosystems to realize business innovation and growth. Meanwhile, the digital intelligence management capabilities of an enterprise require the guarantee of New Organization, which appeals to managers to change their mindset and make the organization more digital intelligent and liquid. In a flat, open and flexible organization, front-line business data and feedback can be returned and analyzed in real time, and the core competence of the enterprise can be efficiently allocated to each front-line employee, which makes the process serve people and stimulates the initiative of team members, and on the other hand significantly reduces the cost of collaboration.

2 Priorities of Upgrading for Digital Intelligence Organization

The future organization will be customer-centric, and realize digital intelligence in the dimensions of customer experience, online interaction, group creation, interface transparency, intelligent drive, and network collaboration. The priorities of upgrading the digital intelligent organization are illustrated in Fig. 1.

2.1 Customer Experience

Customer experience is to describe whether an organization is customer-centric by measuring the intensity of interaction with external customers, the speed of response to customer needs and the degree of timely optimization for the internal system in an era of rapidly changing user needs that are highly different and personalized. Customer experience focuses on providing value-added, innovative and deeply personalized experience for customers.

Fig. 1 Upgrading direction of digital intelligence organization
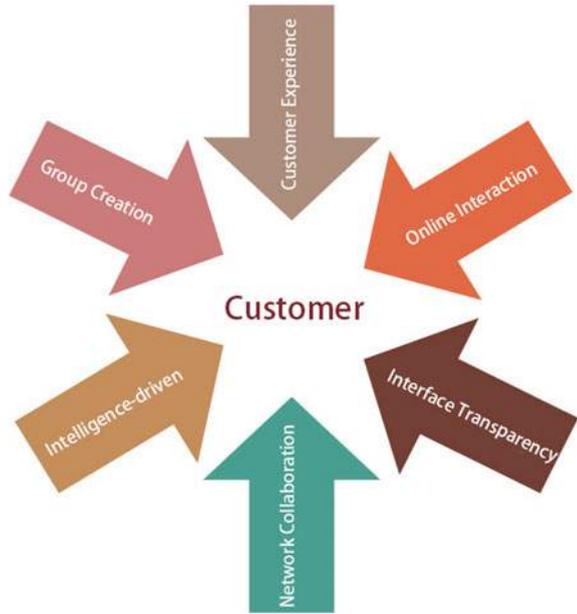
2.2   Online Interaction

Online interaction is to measure the "online" degree of the organization in the era of digital intelligence, covering product design, manufacturing, service, communication, and learning, etc., which urges the organization to pursue higher efficiency at a lower cost and eliminate the boundary of communication and interaction. Online interaction focuses on the online business and multi-directional value-added interaction.

2.3   Group Creation

Group creation refers to the stimulation of organizational capabilities and creativity, forming self-organization, self-replication and iterative upgrading. It is affected by three factors, namely individual ability, resource support, and organizational culture. In terms of individual capability, the potential and power of knowledge-based employees need to be further released; as for resource support, the requirements for opportunity provision, front-line empowerment, effective incentives and personalized development should be met; with regards to culture, it means breaking the employment culture to encourage internal innovation and embrace diverse voices and even possible failures in exploration. The focus of group creation is to achieve win–win co-creation across internal departments and external boundaries by integrating and attracting relevant resources.

2.4 Interface Transparency

Interface transparency weighs the degree of internal and external transparency and openness of the organizational structure. Internally, the standardization of governance structure and management language is prioritized, and the mid and back ends are built into a sharing platform, with real-time sharing of work information and results, open technical standards and flexible sharing mechanisms, so that core competencies can be cultivated more effectively. Externally, an open and transparent product and service platform is built to keep the communication and information flow smooth and timely, and promote the sharing of product resources, and the development of community-based integration. Interface transparency emphasizes the openness and scalability of the interface.

2.5 Intelligence-Driven

Being intelligence-driven means the driving effect of intelligent tools or related technologies on business in the context of technological changes such as AI, big data, and cloud computing, including technology accumulation and application capabilities, and technological innovation. Being intelligent-driven can better support the continuous innovation of enterprise products and models. For example, the organization has changed from the previous KPI cycle evaluation to real-time dynamic evaluation. Being intelligent-driven focuses on the iterative drive of data, algorithms and expert wisdom for business.

2.6 Network Collaboration

Network collaboration refers to a decentralized and flexible organization that is internally and externally oriented to meet personalized customer needs. The front-end of network collaboration enables the spontaneous dynamic combination, development and evolution of business units, which are closely connected to each other to achieve efficient resource deployment. Its focus is on the efficiency of collaborative work and the precision of decision making, as well as the effective stimulation and scientific governance of unilateral or multilateral network effects.

3 Agile Organization of Digital Intelligence

The forms or characteristics that the organization presents are essentially to adapt to the external environment and to meet its own development needs. The emergence and evolution of the digital intelligence organization is the inevitable result of business model innovation in the digital intelligence era, because the endless innovative business models need to be matched with a dynamic, flexible and

scalable organizational model to support them. The biggest impact of the digital intelligence era on the organization is the subversion of the business model. Driven by digital intelligence technology and co-creation culture, the traditional value chain-oriented business model gradually migrates to a platform-based one. Compared with the past, the way of competition in the era of digital intelligence has fundamentally changed, mainly because more and more consumers have developed different consumption habits, from zero to one, and then to personalized consumption.

Company that can meet consumers' personalized needs and provide individualized experiences will be able to win consumers and enhance the stickiness with them. Meeting the personalized needs of consumers requires a flexible and efficient organization. In this sense, a digital intelligent organization is the prerequisite for creating more digital intelligent products and services. Under the original organizational structure, it is difficult to create innovative digital intelligence products and services, and to form an agile new organization that can serve consumers more efficiently and improve the consumer experience. In order to respond quickly to products and services based on the real-time evaluation and feedback of consumers in the process of consumption, it requires the organization to be agile and efficient, being able to adjust strategies quickly, and preferably iterating and upgrading before the next delivery of products or services.

For example, Didi Chuxing will automatically pop up the notification, inviting passengers to evaluate the ride experience, each time it completes a taxi service delivery. With each evaluation being a piece of data, multiple data collected together can reveal the car condition, and driver's service attitude. According to these data feedback, a complete analysis of the vehicle and driver can be portrayed for agile adjustment and optimization, so as to enhance consumers' experience.

3.1 New Features of Network Liquid Organization

Network liquid organization is a new mode of division of labor and collaboration evolved in the network era, an organizational form capable of self-organization and self-adaptation. In Alibaba business operating system, organization is a very important engine, the core driver and carrier of the system. There are still departments in the liquid organization, but the boundaries of the departments are blurred, and the members of the organization are long in the state of "co-entrepreneurship", changing with the organization's varying goals. Externally, the ownership and right of use of the platform have been separated, making the well-defined, asset-specific organizational boundaries between enterprises being greatly blurred. A large number of business processes are driven by mobile data and flexibly combined among enterprises. The new organizational boundaries are showing a pattern of network integration, which will further open up the enterprise's organization and make it community based.

With the support of digital and intelligent technologies, the liquid organization can easily break through the shackles of boundaries, while maintaining vigorous

vitality. Just as an ancient Chinese saying that describes water goes, "There is nothing in the world softer or weaker than water, but nothing can overcome the strong better than water." Despite its softness, water is deemed as the most powerful and long-lasting form on this planet. The flexibility like water will set off a rapid change in the field of organizational management, greatly stimulating enterprises to release the innovation and creativity.

From management to governance, the liquid organization drives the change of corporate philosophy. Under this organizational form, enterprises will definitely move from management to governance. The former is concerned with how to manage, and the latter focuses on how to govern. Management is process-oriented and pursues order and efficiency, while governance is people-oriented and focuses on growth momentum and sustainability. In the flexible liquid organization, enterprises will realize a new digital intelligence governance model for the first time: all employees create, share, and govern together. The network liquid organization will be able to intelligently perceive the market and stimulate customer demand, and in turn dynamically allocate all business processes and resources to achieve on-demand action.

Specifically, the liquid organization brings three major changes to the enterprise organization.

Change of organizers. The role of the participants in the organization is no longer limited to the strict design of the hierarchical model. Each Member becomes a Driver, completing the transformation from simply passive participation to being self-motivating. Meanwhile, Managers become Leaders. What they do is no longer limited to managing members, but to set an example, motivate his team to challenge the status quo, and inspire a shared vision to pursue breakthroughs in business.

Change of organizational mechanism. First, it has changed from relying strongly on top-down process design, to a process mechanism that can iterate and optimize itself; second, everyone in the organization has changed from being driven by the process to being self-motivated, driven by data, computing resources and algorithm; third, people can assume several roles rather than one fixed role, being more multi-skilled and forward-looking.

Change of organizational form. In a liquid organization, firstly, the internal structure is dynamic, with only instantaneous balance being stricken; secondly, the boundary between the structures is also blurred, and the cost of reconstruction is relatively small; thirdly, the synergistic relationship between each member forms a sphere-like multi-directional network with shorter connectivity paths; fourthly, the organization is no longer driven by a single center, but by multiple centers simultaneously or in turn.

Liquid organizations usually have four distinctive features. First, there are almost no boundaries, and all members are equal, so it can be shared by all members. Second, it is fully data-driven, and information transparency is achieved through the flow and exchange of numbers, so it can be governed by all members. Third, members are self-driven, and they continue to break through the limits of

effectiveness by continuously stimulating innovation and creativity, so the virtuous mechanism of sorting by all can be realized fundamentally. Fourth, sense of mission is heightened. In such a governance model, every outstanding member can be seen and recognized. Therefore, the liquid organization enables an equal, transparent, efficient and happy way of working.

3.2 New Appraisal Mechanism of Network Liquid Organization

There is a basic law in management that most people may not necessarily do what you expect, but they will definitely do what you have set up for appraisal, reward and punishment. Different appraisal indicators are required in different business eras. In the past, the assessment was centering on stores and goods, covering KPI indicators such as the number of channels developed, sales generated by channels, sales of offline stores, and refund rate. Under the new consumer-centric business logic, the appraisal should focus on people, operating consumers and accumulating consumer assets. It is necessary to encompass cross-channel business indicators in an organized manner to operate the goods as a whole, not solely assessing online or offline business. Besides, online and offline membership data and services should be integrated in an organized manner, so that consumers can have equal access to their rights and interests, no matter they became members online or offline. Figure 2 illustrates the different dimensions of assessment.

Organizations need to be able to reshape distribution channels based on product and benefit strategies so that distribution also becomes part of the brand's customer operations. Besides, they also need to reconstruct the competency model and incentive system of digital shopping guides to change the fragmentation of offline and online shopping guides, and train them to become professional consultants and anchors to better serve consumers, and the incentive system needs to be rebuilt to stimulate employees' participation. Organizations also need to cultivate talents with both global business and digital capabilities, and select better talents through assessment to meet consumers' needs. All the regular reports by the employees should be made based on data, so that the organization can make quick decisions after identifying problems and discovering opportunities, and improve services, allowing the organization to gradually develop the habit and culture of digital intelligent decision-making.

4 Tools and Methods for New Digital Intelligence Organizations

Digital intelligence management tools are inevitable in building a digital intelligence organization. One of such important management tools is DingTalk, which excels in its powerful collaboration functions. By making the organization, communication, collaboration, business, and ecology online, DingTalk has created
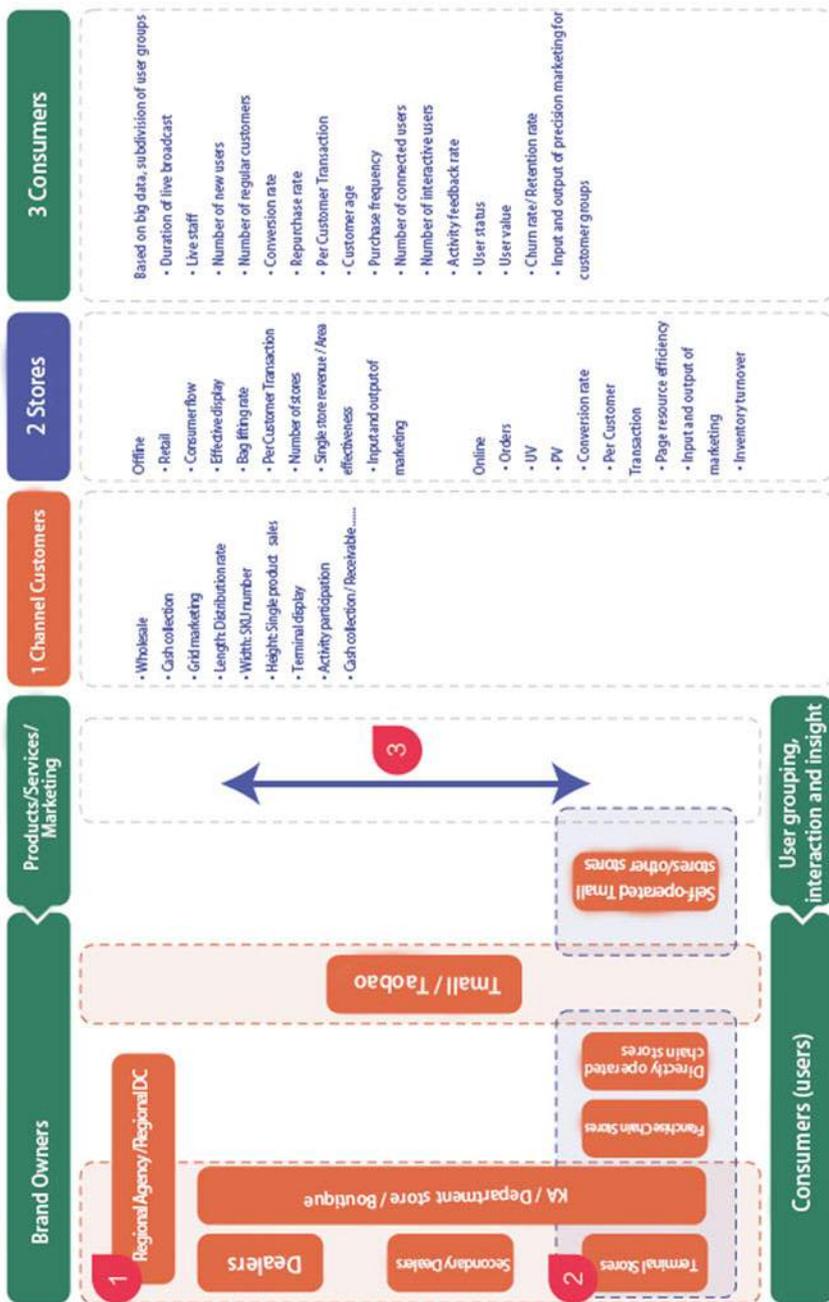
Fig. 2 Different assessment dimensions

people-to-people and people-to-things collaboration, forming a socialized collaborative body encompassing Digital Intelligence Office, Digital Intelligence Retail, Digital Intelligence Entertainment, Digital Intelligence Manufacturing, and Digital Intelligence Education.

In the future, digital intelligence organizations have to resort to digital intelligence technologies to create a transparent, fair and people-oriented work environment. DingTalk can empower these organizations in this respect. It can help enterprises to link the four scenarios of "people, money, things, and events" and reshape the management platform of enterprises, thus playing a vital role in the transformation of digital intelligence. Starting from the innovation of the concept, DingTalk makes the traditional way of working fully transformed into a digital intelligence fashion. First, by making the organizational structure online, the rights and responsibilities of staff can be visually seen in the flat people-oriented organization. Second, by making communication online, DingTalk has enabled efficient, equal, secure and mutual trust in information interaction, encouraging the self-motivation of employees. Third, by virtue of online collaboration, DingTalk allows the mutual support between each task management, which stimulates creativity of employees. Fourth, DingTalk enables the big data analysis and decision-making capabilities in business by making business behaviors and business processes online, freeing employees from the process. Fifth, by taking DingTalk as the center of the organization, enterprises realize the online connection between upstream and downstream and service objects, and can optimize the user experience of the entire ecology via big data, allowing each individual to become the engine that drives ecological progress.

The five aspects of business online, including organization, communication, collaboration, business and ecology, proposed by DingTalk, can directly improve the dimensions in the intelligence map to a large extent. For example, Organization Online, Communication Online and Business Online emphasize the data-driven, flat and visual organization with disintermediate communication and transparent process, which has greatly promoted the transparency of online interaction and interfaces. This indicates that the degree of online workflow and communication, mobility, and online/offline integration of DingTalk customers has reached a high level. Collaboration Online stresses the flexibility of the organization, and is supportive of interface transparency and network collaboration in the internal management of the enterprise. There are hundreds of applications for marketing, customer management, financial management, etc., as well as self-built micro-applications that have greatly enhanced the efficiency of organizational operations. The intelligent decision making of ecology online also lays a certain foundation for enterprises to obtain intelligent driving force.

By virtue of DingTalk's online collaboration, Liby Group is capable of seamlessly connecting its headquarters, sales team, and shopping guide management, and is deeply aware of the profound changes taking place in the way the company operates, from chain business in the process era (strictly following the process of information delivery and organizational collaboration) to business network collaboration in the digital intelligence era (user-centered network of multi-dimensional

connectivity and collaboration). As a result, Liby Group has fostered collaboration with more than 1,100 dealers, 1,800 sales teams, 35,000 shopping guides, and 5,800 delivery drivers in the ecological chain through DingTalk.

During the "Double 11" period, Liby Group's information delivery efficiency improved by 80%. It used to take a few days to hold offline meetings, but the duration was shortened to one day through group live broadcast and video conference functions on DingTalk, which greatly reduced the travel costs for conveying event policies and training; by making the virtual organization of multiple parties such as service providers, dealers, shopping guides, and logistics providers online, they can better collaborate online, improving operational efficiency and achieving efficient data collaboration. For enterprises, DingTalk helps them achieve efficient internal collaboration and establish external ecological links, forming a complete ecosystem inside and outside the enterprise. To build a digital intelligence organization, digital intelligence technology is the foundation, as technology can drive innovation of organizational business models, reconstruct the industry ecosystem, and achieve business innovation and the growth of benefits.

Easyhome has realized the successful transformation of digital intelligence through DingTalk, allowing more than 13,000 employees of the enterprise to be organized online and communicate quickly and effectively. They can hold audio and video conferences anytime and anywhere, and broadcast live nationwide during training sessions. On DingTalk, EasyHome's Sales, Procurement, HR, IT, and Finance Departments initiate more than 3,000 processes daily on average, generating 950,000 approval orders a year. Besides, its Finance, HR, and Administration Departments, ERP and store inspections are fully connected, making the organization online and transparent, and improving the efficiency of enterprise management collaboration.

Openness is another upgraded organizational capability of DingTalk. Aside from solid basic capabilities, DingTalk also possesses the ability to customize modules such as collaborative efficiency, supply chain, and corporate culture, and the ability to open up systems such as third-party ecology and Alibaba ecology. DingTalk's enterprise service ecology can ensure that "Service is what you get".

There are over 17 million organizations and 400 million users using DingTalk. The great number manifests DingTalk's strong ability to integrate hardware and software. Based on Ali Cloud, DingTalk integrates hardware capabilities of intelligent office to create an exclusive service platform and enterprise data analysis platform, and enrich various enterprise-level applications, empowering various industries, and exporting hardware and software integration capabilities. On December 9, 2019, DingTalk launched a new smart hardware product "DingTalk Smart Point B1". Within 10 days of its launch, it has enabled staff from tens of thousands of stores to clock in and out for work, conduct intelligent store inspections, and sign in to meetings. Targeting new retail, new manufacturing, and online education, DingTalk has created a digital and intelligent "field" where people and space collaborate.

5 Case of New Digital Intelligence Organization

In the era of digital intelligence, more and more enterprises realize the importance of organizational adjustment, and with the help of digitalization and intelligence, many enterprises have boldly carried out organizational innovation and yielded fruitful results, overturning the understanding and perception of organization in the industrial era. LKK Design is one of the typical representatives of the new organization of digital intelligence.

5.1 LKK's New Organization of Digital Intelligence

LKK is a 16-year-old design company whose main business is to provide various design services for enterprises. Since its establishment, LKK has made seven organizational innovations, as shown in Fig. 3. Between 2016 and 2020, it had undergone two rounds of iterative upgrading for digitalization and digital intelligence. When LKK transformed to a design sharing platform, the process was slow because the shared resource model required the organization to break the original structure to support efficient matching and delivery between the supply chain and the requesting parties, which was very difficult. LKK then started to use DingTalk to support its transformation of digital intelligence, and built a new digital intelligence platform based on its own design sharing platform—LKK-DingTalk. It managed to drive the company's business to complete the S2B2C model transformation. The liquid organizational form of DingTalk has well supported this business upgrade.

LKK-DingTalk has successfully helped LKK to implement the "five dimensions of business online", namely organization online, communication online, collaboration online, business online, and ecology online. These "five online dimensions" have helped the organization to become digital intelligent, and have brought significant results: the average efficiency of "Bond Girl" (project manager), a key player in the new business, has increased by 2.5 times, and the time efficiency has increased by 300%.

In 2018, LKK, as a design company, could not recruit as many personnel as it wanted to build unlimited cell organizations, given the volatility of the market business and the management costs associated with the increase in the number of employees. Therefore, it hoped to create a social platform for product innovation. Inspired by the concept of "sharing economy", it tried to match the various needs of innovation, product design and manufacturing at the industrial end with the supply team composed of designers and community users to finally meet various consumer needs. The new ecological platform is built with strong mid and back-ends processing capabilities, coupled with "Bond Girl" (project manager) mobilizing all kinds of design and service resources in the ecosystem to enable precise matching and demand and supply balance. There is no need to hire "Bond" (designers), thus reducing costs and improving efficiency. At present, there are

Fig. 3 Seven times of innovations organized by rococo within 16 years

about 40,000 registered designers, one million platform users and 3,000 industrial brands on the shared design platform LKKER.

LKK's shared design platform, LKKER is shown in Fig. 4.

DingTalk not only provides LKK with the basic needs of traditional organization and communication online, and office processing, but also deeply integrates with LKK's business to jointly build a "LKK-DingTalk" project workbench, where designers, customers, "Bond Girls" can complete everyday tasks. In terms of organizational intelligence, it further empowers LKK to enhance the competitiveness.

The core elements required for industrial interconnection include: a wide enough coverage of all upstream and downstream industrial participants, production relations based on the coordinated division of labor optimized due to a significant increase in productivity, an orderly ecology, and the organic integration and continuous empowerment of digital intelligence and intelligent technology. In view of the consumer Internet and industrial Internet, LKK has created a "park model" with DingTalk.

The "park model" consists of four key points.

The first one is "species symbiosis". Participants at the industrial and consumer ends can mutually benefit from each other in the ecosystem, and the roles of demanders and suppliers can be freely switched. In this regard, the LKKER platform has done a good job in that many of its industrial clients can both raise problems, and meet the demands by providing various industrial services.
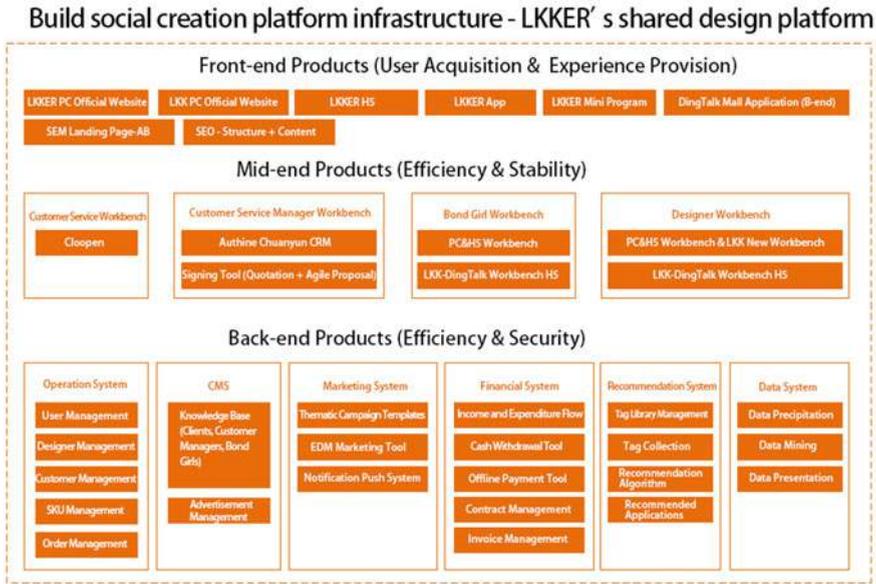
Fig. 4 Building the infrastructure of socialized creation platform—LKKER's shared design platform

The second is the "material cycle". The material here is the flow of services with value. For example, industrial customers put forward their demands; community users provide ideas; the platform helps find solutions, and the "Bond" at the industrial end offers services. The service flow must ultimately meet the needs of end consumers who may turn out to be community users. In the ecosystem, the value of the service flow is recognized by the ecological community after the cycle.

The third one is "gardener governance". A well-functioning ecosystem may not need an organizational manager, but a governance system and a "gardener" who assists the system in its operation. Through the system, the "gardener" ensures the ecological stability of the "park", resolves disputes, and enables the various "creatures" in the "park" to interact and circulate in an orderly manner.

The fourth is the "super tool". Relying on the governance system can only keep the ecology in order, and slow down the ecological "entropy". However, the accurate matching of supply and demand still requires the application of digital intelligence and intelligence technology. The "gardener" promotes more efficient cycle of materials in the ecosystem through iterative "super tools". In the social ecological "park" constructed by LKK, DingTalk plays a crucial role as a "super tool" for the gardener. Through the LKK-DingTalk project workbench, participants like clients, designers, and "Bond Girls" can break the hierarchical barriers and freely match around different work scenarios, thereby achieving a high degree

Fig. 5 Intelligent organization 3.0 park mode of LKKER

of online disintermediate communication and work collaboration. The communication and interaction between different groups also enriches common knowledge and experience, stimulates each person's source of motivation and creativity, and creates a cluster and complementary effect, which promotes the prosperity and symbiosis of "species" and the efficient cycle of "materials". The park model of LKK is shown in Fig. 5.

LKKER, a social product innovation platform with an ecological system, has more features needed for future organizational management.

5.2   More Mature Group Creation

In a sophisticated intelligent organization, all members involved in the "material" cycle in the ecosystem are groups, and they can freely switch their roles around supply and demand. The organization acts as a "gardener" to maintain order and promote a more efficient material cycle in the ecosystem, and a more precise matching of supply and demand. The interaction between groups on the LKKER platform is very active and frequent. When a luggage brand made a product design requirement, users on the platform proposed creative ideas for the brand, and "Bond Girl" found the ideal "Bond" to make the creative idea into a specific design plan for the product, which was handed over to the brand. After the product

had been be successfully launched, the user who provided the idea was rewarded and bought the self-created product.

5.3 A Deeper Sharing Ecosystem

The essence of LKKER is an ecosystem of sharing economy, with a high degree of openness and transparency inside and outside the system, and all "species" in the industry and consumer ends are attracted and involved. LKKER has built the mid and back-ends of the internal organization into an efficient and intelligent empowerment center, enabling the smooth communication inside and outside the system, the sharing of information and results of demand matching internally and externally, and the standardized language management and technical standards. All groups trust LKKER as a responsible "gardener" to maintain the ecological "park".

5.4 Wide Application of Intelligence-Driven Tools

In the initial stage of LKKER platform, the matching of users' design needs and design services was done manually by the "Bond Girls", whose rich experiences enabled both parties to find their ideal partners. However, due to the limited energy, it is impossible for the "Bond Girls" to match them indefinitely. Now, using intelligent artificial intelligence tools, once the classification tags of the brand's design needs match with the suitable designers on the platform, the system will automatically match or provide multiple designers for reference, and "Bond Girls" can complete the process solely with simple manual intervention, which greatly improves the number and efficiency of matching that can be made on the platform. In addition, the in-depth cooperation between LKK and DingTalk also helps the platform to improve the efficiency of "Bond Girls". They can follow up the project progress and report on a day-by-day basis through the DingTalk log, and the three parties can have a clear picture of the project execution process through the daily reports. LKK-DingTalk plans to shorten the average project delivery cycle from 3 months to 30 days, and increase the number of service projects from 40 to 100 a year per "Bond Girl". With the application of more and more powerful AI tools, LKK is bound to develop into a unified platform for smart product innovation.

By 2020, LKK once again upgraded its digital intelligence organization. The value of intelligent design is to break the boundary of innovation capabilities. Massive accumulated data combined with the data of various dimensions in the data mid-end can be harnessed to analyze the business of the enterprise such as market, industry, competition, category, sales, and traffic, and design popular products through digital intelligence, which is well received by the market. With multiple design scenarios to access the flexible supply chain and meet the high-frequency needs of platform customers, LKK now has taken the wings of digital intelligence
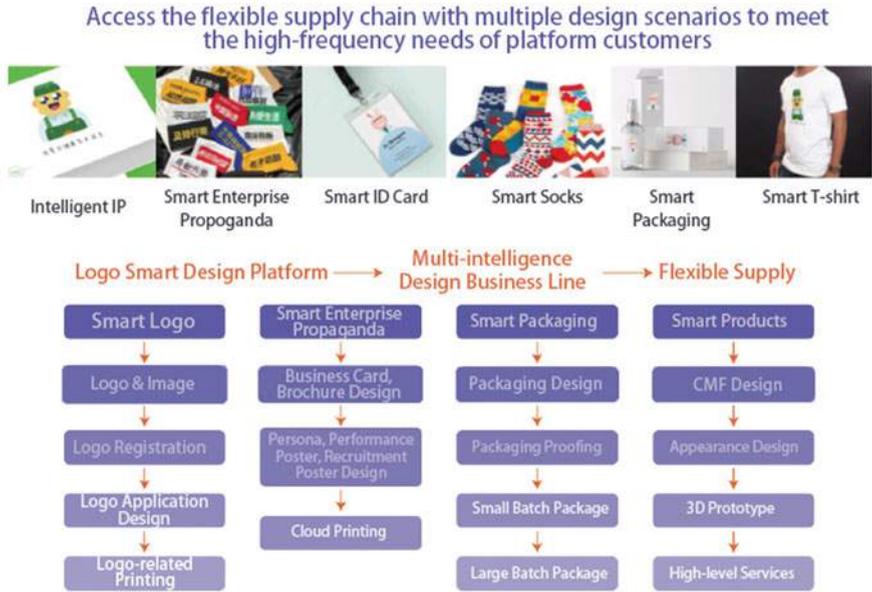
Fig. 6 New business form under new rococo organization

to soar. The new form of LKK's business under the new organization is shown in Fig. 6.

6   Summary

Having ushered in the era of digital intelligence, technological progress has changed the appearance of "enterprise organization" in social and economic activities. The endless innovative business models need to be supported by dynamic, flexible, and scalable organizational models. The capabilities of digital intelligence-based technologies can drive organizational model innovation and industry ecosystem restructuring to achieve business innovation and growth. Enterprises' digital intelligent business capabilities need to be guaranteed by new organization.

(1) From the industrial age to the era of digital intelligence, organizations are constantly changing and innovating with the social development, becoming more digital intelligent and liquid.

(2) The upgrading of digital and intelligent organizations will be customer-centric, and pursue intelligence in terms of customer experience, online interaction, group creation, shared ecology, being intelligence driven, and network collaboration.

(3) The agile new organization of digital intelligence will form a new form of self-organization and self-adaptation. Organizers, organizational mechanisms, and organizational forms will all change. Appraisal will also focus on assessment channels, store sales and people to better serve consumers.

(4) DingTalk creates people-to-people and people-to-thing collaboration through online organization, online communication, online collaboration, online business, and online ecology. It is an implementation tool for the new organization of digital intelligence.

(5) Practice of digital intelligence organization: LKK has made 7 organizational innovations in 16 years, and yielded fruitful results. The shared design platform realizes group creation and multi-directional interaction, significantly enhancing the efficiency of the enterprise.

New Technology of Digital Intelligence

Dongying Hong

There are 11 business elements in ABOS, and readers can learn about the first 10 business elements (brand, commodity, manufacturing, etc.) from the content introduced in Chaps. 5–14. The 11th element, "technology", is described in detail in this chapter in the timeline of past, present and future.

The element of "technology" originally refers to the information technology (IT) capability of enterprises, which is used to support the internal operation of enterprises and help with cost reduction and efficiency increase. In the era of digital intelligence, confronted with new challenges and opportunities, "Non-digital indigenous enterprises", those various traditional enterprises that do not take IT products or services or Internet services as their core business, need to build a new set of technology solutions to respond to uncertain, personalized and complex demands; and on the other hand, support innovation of enterprises in products, business, organization and management.

In the era of digital intelligence, in order to comply with the above-mentioned changes, the technology architecture has also entered the stage of great migration, from information management based on traditional IT architecture to "digital intelligent new technology" based on cloud-native, big data, Internet of Things, artificial intelligence, mobile Internet, blockchain and other digital new infrastructure architecture.

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

1   Necessity from IT to DT

With the development of new digital infrastructure, the era of digital economy has arrived. Along with the rise of consumer sovereignty, business growth paths and customer acquisition models are becoming more and more complex. This complexity stems from the personalization and fragmentation of consumption, the diversity of products and services, the differences in scenarios, and the new flexible requirements for supply chains.

The gap between the original technical solutions based on traditional IT architecture of traditional enterprises and the diverse needs to meet the current business complexity is widening. Therefore, it is out of sheer necessity to build a new set of technical solutions in the digital era to cope with uncertain, personalized and complex demands; and on the other hand, support the innovation of enterprises in products, business, organization and management.

China's business is evolving from a "consumer dividend" economy to a "digital intelligence innovation" one, with the development mindset changing from single-node cost and efficiency improvement to a whole-ecology reshaping of consumer goods growth. Digital intelligence technology has triggered the transformation of the full-link business ecology, and changes in the business environment drive the migration of technology architecture, which, in return, accelerates enterprises' transformation of digital intelligence.

There are evident differences between information management based on traditional IT architecture and intelligent operation based on cloud architecture. In terms of technical functions, the former serves management, while the latter is designed to realize intelligent operation and support innovation; in terms of driving factors, the former is process-driven, while the latter is data-driven; in terms of leading technologies adopted, the former is IT technology, while the latter is a collection of new technologies represented by cloud computing and AI; the former is management-oriented, while the latter is innovation-oriented. Other differences are manifested in Table 1.

2   New Technologies Drive the Dynamic Balance of Supply and Demand

Traditional enterprises should pay special attention, when facing their own IT technology upgrade and transformation: when they examine their own technical capabilities today to ponder on how to upgrade and make adjustment, the primary thinking should not be from the inside out, speculating which software and hardware to purchase or upgrade, but must be from the outside in, adopting the reverse thinking of reviewing the present from a future perspective. Here, they must first understand the digital economy era that will have come in the future, how digital technology drives the dynamic balance between supply and demand on both the consumer and supply ends, and how to create an organic connection between the two, as shown in Fig. 1.

Table 1 Comparison of traditional information technology and digital intelligence technology

Traditional information technology	Digital intelligence technology
CTO/CIO responsible for technology	CEO responsible for technology (top leadership project)
Business digitization	Data businessization
Local servers	Fully in the cloud
Independent system, lack of connectivity	Platform architecture, connected to each other
Data fragmentation	Data unification
Customized, closed, developed from scratch	Open & direct application
Business demand-oriented	Customer demand-oriented
Local, single tool delivery	Global, systemic empowerment to support business operations and decision-making
Hardware and software based delivery	Data + Algorithm empowerment
Management thinking	User thinking
Local digitization	Full-link digital intelligence
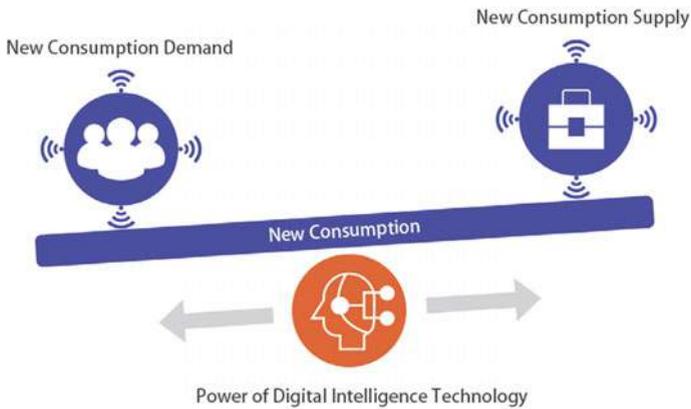
Fig. 1 Dynamic balance of supply and demand under new consumption

- Technology acts on both the consumption and supply ends, but as technology continues to evolve, the focus changes from transforming the supply end and empowering the consumption end to gaining insight into the consumption end and influencing the supply end, thereby stimulating dynamic alternation in new consumption.
- Supply and demand can be effectively connected to achieve a dynamic balance. On the one hand, technology empowers consumers, and stimulates new demands combined with more experiential, personalized and diversified consumer needs. On the other hand, technology empowers the supply end, making production and supply more flexible, intelligent and ecological, to meet the new

demand for personalized consumption that continues to change dynamically and form new supply.

- Digital intelligence technology drives the dynamic balance and new connection between new demand and new supply, giving birth to new consumption.

3 Full-Link Transformation and Upgrading of Digital Intelligence: One Cloud, Multiple Ports, Five Mid-Ends and Various Industry Applications

As introduced earlier in this book, Alibaba's business operating system includes e-commerce platforms such as Taobao and Tmall, and infrastructures like finance, logistics, and cloud computing, encompassing not only data and technology, but also the whole chain from retail, marketing, product development to manufacturing, which can run through all links of enterprise operations.

The "new technology architecture" of this business system that empowers enterprises is "One Cloud, Multiple Ports, Five Mid-ends and Various Industry Applications", as shown in Fig. 2.

Next, the features, application scenarios and values of "One Cloud, Multiple Ports, Five Mid-ends, and Various Industry Applications" will be introduced in detail.

3.1 One Cloud (Alibaba Cloud 2.0)

Alibaba Cloud has been committed to the cloud computing field for more than ten years and has developed a variety of technologies, among which cloud computing technology is quite fundamental. What Alibaba provides is not a mere cloud computing infrastructure, but a combination of new technologies of cloud computing, big data, and Internet of Things, thus being able to provide stronger services.

What does one cloud refer to from a business perspective? For example, enterprises, as brand operators, definitely want the back-end service functions to be applied to their own services, and all the ends to connect to the enterprise itself for the benefit of maximizing the value of the business. This is the One Cloud that Alibaba wants to emphasize, namely to support all the ends through the integrated cloud.

Alibaba Cloud's security architecture adopts a seven-dimensional design of "five horizontals and two verticals". Starting from customer needs, it covers all design points of the security architecture on the user side and the cloud platform side. Enterprise users can refer to these seven dimensions to determine whether their own security capabilities are missing, in order to strengthen the security system. "Two verticals" refer to providing security monitoring and operation management for account security, which also includes different implementations on the user side and the cloud platform side. The "five horizontals" include security at
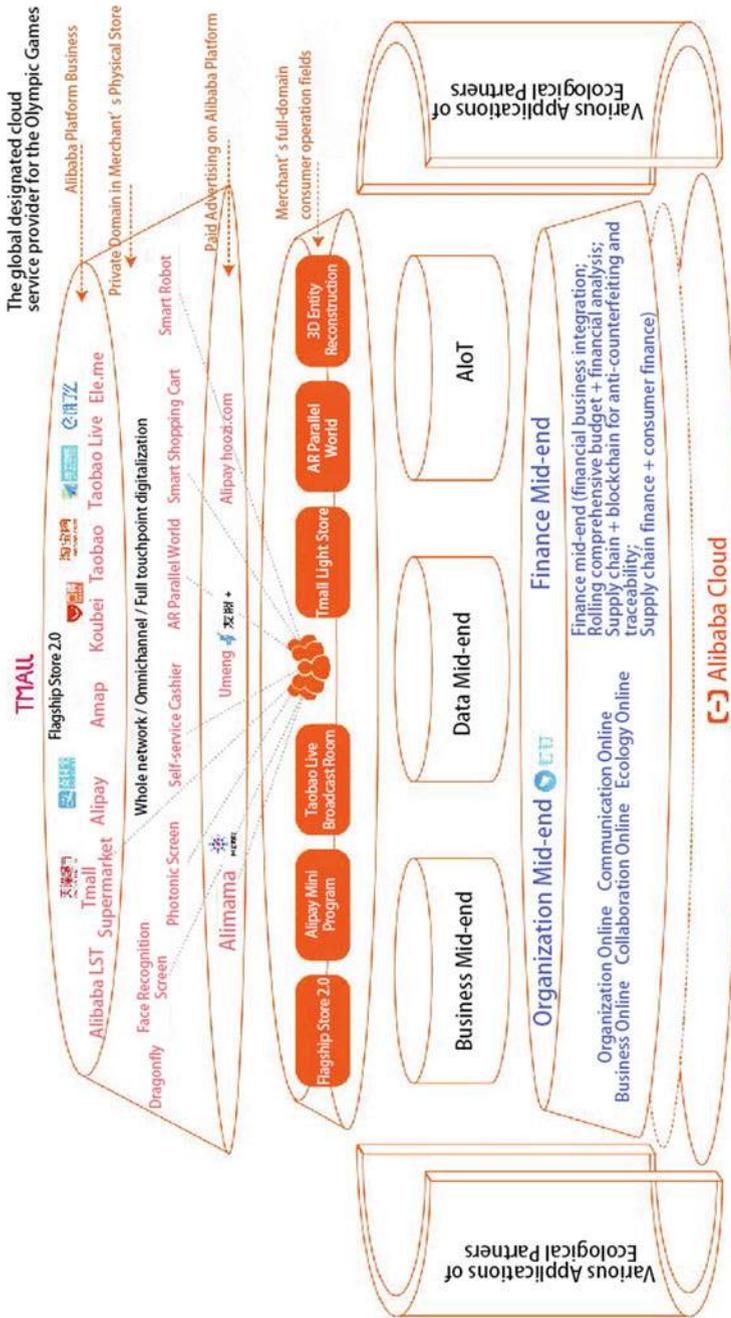
Fig. 2 N industry applications of one-cloud, multi-terminal and five central platforms

the lowest cloud platform level, as well as basic security, data security, application security, and business security at the external user side.

The resources of the Alibaba Cloud platform are dynamically scalable and virtualized, and are provided through the Internet. End users do not need to understand the specific details of the underlying infrastructure of cloud computing, nor do they need to have professional knowledge of cloud computing technology, nor to operate directly, as long as they understand what kind of resources they really need, and how to get the corresponding services through the network.

From the architectural point of view, "One Cloud" is at the IaaS (Infrastructure as a Service) layer, where IT infrastructure resources (computing, network, storage) are aggregated through virtualization and dynamization to form a pool of resources, which is a collection of computing capabilities. End users (enterprises) access the computing resources they need to run their own business systems through the network. In this way, users do not have to build these infrastructures themselves, but can use these resources by paying.

3.2   Multiple Ports

It is generally recognized in the industry that cloud platforms are mainly classified as IaaS, Platform as a Service (PaaS), and Software as a Service (SaaS), while Alibaba has the additional Data as a service (DaaS) and Business as a Service (BaaS). These are its unique intelligence-driven technologies developed through the integration of business acquisitions and its own cloud technology, as well as the data accumulation, in the process of providing core e-commerce and local services. The positioning of the multiple ports here is BaaS.

In March 2019, the CEO of Alibaba Cloud released a project of One Cloud and Multiple Ports to the public at the Apsara Conference.

The most common thing people see today is the WeChat mini-program. It is actually a system that calls for changing and modification, which means the mini program developed on WeChat can only be run on WeChat. People cannot help wondering is there any option? For example, after you write the front-end code for a mini program, it can run on WeChat, but also on other platforms like Alipay, Amap, Toutiao, and Baidu.

In this way, the cost of research and development is much lower, and this is the source of multiple ports.

Alibaba wants to build an open alliance similar to Android, forming a framework for mini programs that can be shared by the entire Alibaba ecosystem and some external companies, namely a system for sharing the mini programs.

What are the core values of multi-end mini programs?

(1) Scenario: The data shows that the Alipay Mini Program has the highest retention rate. The reason is that Alipay is a scenario-based app, which is mainly oriented to payment and local life scenarios. The people who use this app are actually its target user group. Based on this, it is easy to acquire customers

Fig. 3 Multiple applets corresponding to Alibaba's ecosystem

when developing an app. Moreover, the user retention rate and subsequent conversion rate are very high.

(2) Value of traffic: The value of multi-end traffic lies in gradually expanding the single WeChat ecological traffic to the traffic of the whole network, because more and more Apps join the field of mini programs and bring traffic for each other. In addition, companies such as AutoNavi, DingTalk, and Taobao of the Alibaba Group have accumulated a large amount of data on enterprise capabilities and equipment capabilities, which can better help everyone obtain traffic.

(3) Business: The Alibaba platform has a great advantage. Compared with other platforms, it has comprehensive business capabilities, covering financial payment, corporate service, and logistics. This series of capabilities can empower companies, enabling them develop their own business better and faster.

(4) User stickiness: The stickiness of traffic obtained through channels, be it a single channel or social channels, is not high, but if the traffic is obtained in a specific scenario, the stickiness is much higher.

(5) Cost: Alibaba mini programs are a new battlefield. When they first enter the new blue ocean, the probability of being chosen and used by customers is much greater, and the cost of customer acquisition is relatively low at this time.

(6) Brand effect: Alibaba platform can drive the brand of the entire mini program and reach the existing 900 million member groups of Alibaba, which can quickly realize the common knowledge of the brand.

The above is the background of the mini program, and the opportunity of multiple ports. Figure 3 shows the multiple ports of the mini programs corresponding to the Alibaba ecosystem.

Through the Alibaba Mini Program, enterprises can access all the business capabilities within Alibaba, such as Alipay, DingTalk, Amap, and Taobao.

In terms of the architecture, multiple ports refer to BaaS (Business as a Service) layer.

3.3 Five Mid-Ends

In 2015, Alibaba already had a large group of individual members and corporate members, and various business lines such as Taobao, Tmall, 1688, AliExpress,

and Fliggy were interdependent on each other. There were many teams, but they could not respond to business demand in a timely manner. In this context, Alibaba decided to upgrade its organizational structure by integrating its product technology and data capabilities, and establishing a "big mid-end, small front-end" organization and business system, so as to innovate the management model.

How does the industry generally view the mid-end? If it is to be depicted in a highly generalized expression, mid-end is "enterprise-level capability reuse platform". The idea of the mid-end is at the forefront of the world in the field of information technology and represents a new trend in the iteration of ERP. The popularity of this concept is not a flash in the pan, nor is it a coincidence. It will be a milestone in the development of Chinese enterprise informatization.

Like the cloud, enterprises can build their own mid-end, but they don't have to start from scratch. They just need to use the mid-end that is built by Alibaba.

1. **Data Mid-End**

At the 2020 Apsara Conference, Alibaba Cloud's Data Mid-end underwent major upgrades, adding new members to the core product family. As of the publication date of this book, the product matrix of Alibaba Cloud's Data Mid-end took Dataphin as the base and the Quick series as a scenario-based entry to the business. If the Data Mid-end is compared to an aircraft carrier, Dataphin is the power system of the aircraft carrier, which continuously strengthens the data foundation and provides kinetic energy to help enterprises realize "data assetization"; the Quick series are the carrier-based aircraft, providing different warfare power according to different business scenarios, helping enterprises realize "data value".

2. **Business Mid-End**

The so-called business mid-end is a system used to optimize business processes. It separates the public parts of the front-end business, abstracts and standardizes them to form common business modules, which greatly improves the utilization of R&D results and optimizes resource allocation.

For example, Taobao, Tmall, and Juhuasuan mentioned above have sorted out their common modules such as orders, transactions, product management, and shopping carts, forming a business mid-end dedicated to the e-commerce. Although the business mid-end does not directly provide services to end consumers, it can significantly improve the efficiency of building the front -end designed for end users. In the "business mid-end" mode, the products and technologies on the platform are modularized and can be accessed by front-end business departments on demand to quickly build new business scenarios.

More than dozens of business units of Alibaba (such as Tmall, Taobao, Juhuasuan, 1688, etc.) are not built independently on Alibaba Cloud, but have a "shared business division" (also known as business mid-end) between the back-end Alibaba Cloud technology platform and the front-end business. The business mid-end has accumulated the public and common section among various businesses, forming

a dozen shared units including user center, commodity center, transaction center, and evaluation center, etc., to complete the "true realization of thick platform". The back-end Alibaba Cloud has become an efficient carrier to provide computing resources and middleware PaaS cloud service capabilities. At the same time, Alibaba's highly reliable and stable operation and maintenance support capabilities of "Double 11" and "Double 12" in the past ten years offers the strong support for the entire system. The mission of the mid-end is to gradually improve Alibaba's entire system from bottom to top, including Alibaba cloud, data, middleware, algorithms, etc., to support various business solutions and build Alibaba's own core capabilities.

As shown in Fig. 4, it takes new retail as the main perspective and focuses on solutions for omni-channel, membership marketing, and supply chain business, highlighting the middle layer and lower layer of Alibaba Cloud's PaaS capabilities. The middle layer is the priority of the mid-end construction, including the construction methodology, the development and management of the mid-end, and the operation and management of the mid-end.

Alibaba's business mid-end has a significant role in empowering enterprises. Do traditional enterprises need to build a business mid-end in the process of digital transformation? The answer is positive, if an enterprise has one of the following problems.

- Duplicated system construction: Internal systems are built repeatedly, lack of stable core business, and the systems can only be discarded and rebuilt when they expire.
- Uncertainty in business: It is difficult to innovate oneself and cannot adapt to rapid changes in the market in the aspects of flat management, membership marketing, and omnichannel operation, etc.
- Business offline: The degree of informatization of the enterprise is insufficient, still with a lot of manual statistics. The core business is not real-time, online, or standardized. For example, member orders are incomplete, and dealers' sales and inventory data are not online.
- Business is closely related to the Internet: There is high degree of being online, large changes in consumers, and insufficient flexibility of the system to support an uncertain number of users.

There is also an argument that business mid-end is only for large enterprises, not for SMEs with less complex businesses and fewer staff. This is not the case. Regardless of the complexity of the business and the size of the workforce, enterprises can consider building a business mid-end, as long as the business is Internet-related, with uncertain consumer needs, and there is a need to connect the "chimney-like" systems for online business to improve enterprise innovation and collaboration.

What is the value of a business mid-end to an enterprise? Here is a brief list.
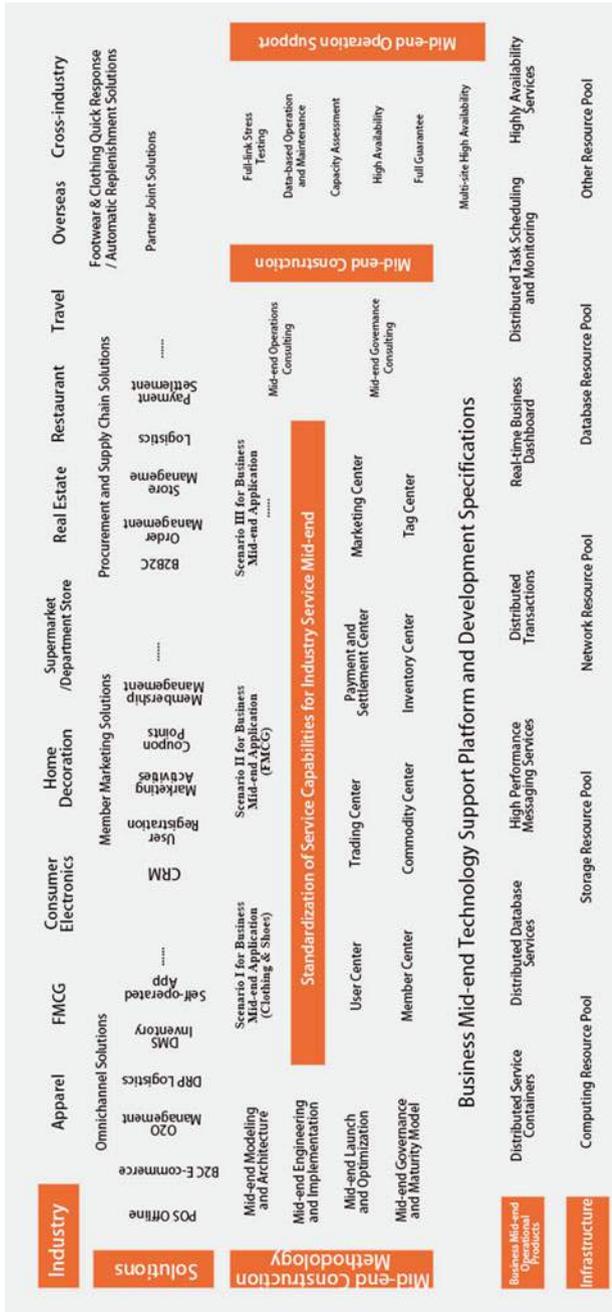
Fig. 4　Alibaba's central platforms business layout from the perspective of new retail

(1) Stimulating innovation: It allows enterprises to accumulate core capabilities. On this basis, it provides opportunities and resources for rapid innovation, connects the overall business from point to line, and reduces the cost of trial and error.
(2) Business online: The service-centralized architecture breaks the chimney-like IT architecture and effectively ensures core data to be real-time, online and unified.
(3) Personnel capability enhancement: Business is aggregated to the mid-end, which enhances the business operation capability and global awareness of IT personnel, facilitating the cultivation of core strategic talents who understand both business and technology.
(4) Monetization marketing: Through the mid-end, members can be assetized by omni-channel penetration, completing customer portraits, and inputting initial customers for new business, which improves the efficiency of accurate marketing.

On the whole, the business mid-end will bring many benefits to the strategic development of enterprises, the innovation of the business model, as well as to the efficient internal collaboration, creation of marketing increment, and personnel training and improvement.

The dual capabilities of business mid-end and data mid-end form a closed loop that promotes and complements each other.

In 2019, the concept of "mid-end" caused a sensation in business and technology communities. It would be bound to be like the ERP 20 years ago and the idea of "enterprise migrating on the cloud" proposed 5 years ago. After the "flame war", the mid-end will go through the iterative trial-and-error exploration process, and finally become the "infrastructure" for SMEs to replicate in scale under the leadership of the industry's head enterprises. The dual mid-ends will become the standard requisites for digital intelligence enterprises.

For enterprises at different stages of development, the mid-end model has different levels of application value.

For startups, the mid-end model can accelerate the self-positioning and business value verification of initial enterprises through initiatives such as user insight and precision marketing.

For expanding companies, the mid-end model can drive business innovation and provide value-added services, thereby contributing to the expansion of enterprise scale.

For the leading enterprises, the mid-end model will enhance the industrial driving force of the enterprises in the lean operation of various business elements from the perspective of intelligent decision-making.

4   Artificial Intelligence of Things (AIoT) Mid-End

Artificial intelligence and IoT technologies are constantly penetrating into modern business activities. From offline stores, department stores and supermarkets to factories and plants, various Internet of Things (IoT) platforms, Platform of Artificial Intelligence (PAI) and intelligent manufacturing platforms are already in application.

AIoT is a huge network that covers everything in the world by integrating intelligent information terminal technology, computer communication and control technology, and Internet technology with each other.

The architecture of the AIoT mid-end mainly includes three layers of IoT smart devices and solutions, OS layer and infrastructure, which are delivered through integrated services.

Intelligent devices are like the "five senses" and "hands and feet" of AIoT, which can complete the data collection of audio, view, humidity, and temperature, and perform actions such as grasping, sorting, and cleaning. Most of the actions are completed with the combination of IoT devices and solutions.

Operating system layer is equivalent to the "brain" of AIoT. Its main function is to connect and control the device layer, provide intelligent analysis and data processing capabilities, and make the scenario-based core business into multi-functional modules. This layer sets high requirements for capabilities such as business logic, unified modeling, full-link technical capabilities, and high-concurrency support capabilities, and usually exists in the form of PaaS.

The infrastructure layer is the "main body" of AIoT, providing IT infrastructure such as servers, storage, AI training and deployment capabilities.

5   Organization Mid-End

The transformation of digital intelligence is a comprehensive change of enterprises in terms of perception, strategy, process, organization, talent and incentives, which is a top-leadership project. Only with the attention and emphasis of core senior management of the enterprise can the primary productive force be guaranteed. That means the core senior managers must personally participate in it, promote the online and offline integration, and encourage the participation of all departments. Organizational change is, therefore, inseparable from the organization and people.

The front-line business is always in the midst of change, so the needs of the front-end are beyond the capacity of standardized middleware, leaving many needs for coordination. For example, an enterprise can arrange finance, human resources, strategy and other departments to form a Business Partner (BP), and send relevant personnel to join the small team of the front-end to offer suggestions from a professional perspective and provide efficient allocation of resources and policy support on behalf of the back-end.

The organization mid-end can be called a flexible team that empowers the successful transformation of digital intelligence. The BP can flexibly allocate

resources according to the business flow and become an effective "lubricating layer" between the front and back ends. For such a large number of cross-departmental and even cross-supply chain collaborative communication, Alibaba's DingTalk Mobile Intelligent Collaborative Work Mid-end plays a great role. Figure 5 shows the big picture of DingTalk's capabilities under New Retail.

Through the platform shown in Fig. 5, enterprises can realize organization online, communication online, business online, collaboration online, and ecology online, and then pursue data-based operations.

Through the cloud classroom, tacit knowledge is made explicit, explicit knowledge standardized, standard knowledge systematized, and personal knowledge organized to create an intelligent learning organization for all employees with teaching and learning promoting each other, and to stimulate the knowledge contribution, creative innovation and organizational vitality of each person in the organization.

6 Finance Mid-End

Finance mid-end is a new financial processing model. Its construction is to make the abstract design based on the needs of financial processing after obtaining transaction and detailed data, thus achieving automatic processing as much as possible by virtue of the "integration of business and finance". A large amount of work that relied on personnel can be completed by the system, such as fund reconciliation, price and tax separated, cost sharing, revenue audit, cost transfer, automatic generation of vouchers, and automatic issuance of reports. Through these automated processes, great value can be really created for sectors of the enterprise and achieve the goal of reducing staff and increasing efficiency. It further prevents finance staff from spending a lot of time on repetitive tasks and reduces the error rate caused by human intervention, which in turn allows them to be committed to the new application scenarios mentioned in Chap. 12 of this book.

The core purpose of the finance mid-end displayed by ABOS is to empower "business finance integration", such as rolling comprehensive budget + financial analysis, supply chain + blockchain, anti-counterfeiting, traceability, supply chain finance, and consumer finance …… These functions have been available in the relevant products (for details, see Chap. 12 "New Finance" element).

With such an organization and data processing, the traditional middleware + relational database ERP module design must be redesigned and developed. In terms of specific technologies, natural language recognition, OCR graphic recognition, big data analysis, cloud-based deployment, artificial intelligence, Robotic Process Automation (RPA), etc. are the ones that need to be used in the financial mid-end to make it more flexible, more automated, and more intelligent.

In terms of architecture, the mid-end belongs to the combination of PaaS and DaaS.
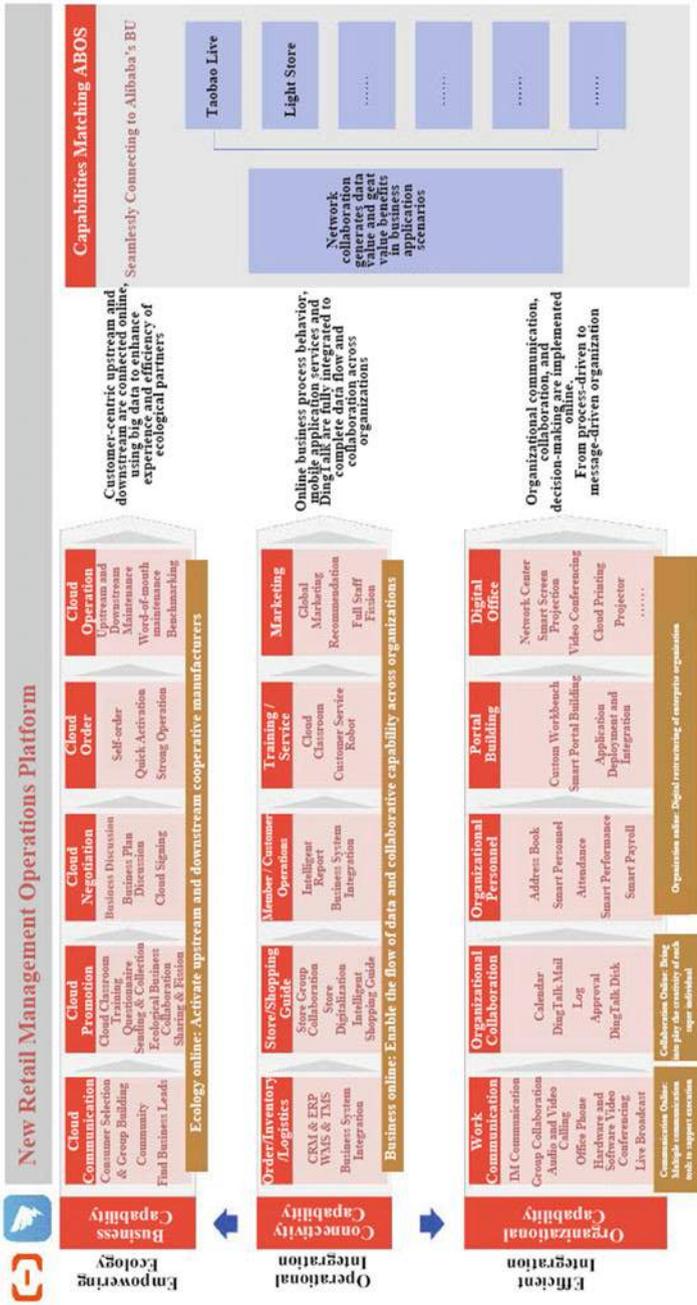
Fig. 5 Dingtalk ability map under new retail

The PaaS layer provides not only the basic computing capability, but also the business development and operation environment, offering IT components including application code, Software Development Kit (SDK), operating system and Application Program Interface (API) to individual developers and enterprises to embed corresponding functional modules into software or hardware to improve development efficiency. For end users, this layer of services provides a fast and cost-effective environment for business innovation.

DaaS converts data into common information to provide public information services to people.

6.1   Various Industry Applications

In different industries, there are exclusive processes that need to be embedded in the mid-end function. Therefore, Alibaba and industry eco-partners build SaaS for new business to empower brands, retailers, and manufacturers to realize the full-link, whole-process, and all-element digital intelligence. There are several types of industry applications as follows.

- General industry applications: At present, there are applications such as electronic price tags, consumer diversion, intelligent site selection, intelligent customer service, consumer diversion and digital payment.
- Exclusive applications for brand owners (FMCG/apparel/home decoration/consumer electronics): Currently, there are applications such as retail consultants, digital brand stores, ranch digitization, block chain traceability, industry smart trading platforms, consumer operation analysis, shelf product identification, store remote inspection, and 3D apparel planning.
- Exclusive applications for retailers: At present, there are applications such as digital supermarkets, store patrol robots, indoor maps, and smart shopping guide solutions.
- Exclusive applications for catering: Currently, there are applications such as intelligent see-through kitchens and ePOS.
- Exclusive applications for cultural tourism: Currently, there are applications such as digitalization of scenic spots.

In terms of architecture, the "various industry applications" (multiple applications) refer to the SaaS layer.

In fact, SaaS emerged before the concept of cloud computing, and has been better developed with the growth of cloud computing technology. SaaS software is "ready-to-use", meaning that it does not need to be installed by the user, nor does it require end-user involvement in software upgrades and maintenance. The most important thing is that it is an on-demand software, which has unparalleled advantages over traditional software that cannot be returned after purchase.

Digital native includes cloud native, AI native, blockchain native, IoT native, 5G native and other new technologies. The digital native business operating system

consolidates the infrastructure layer represented by cloud computing and connects the mid-end layer of digital innovation including business, data, intelligence and collaboration, making the upper layer of the full-link business elements comprehensively online and digital. Besides, the digital native business operating system accelerates the circulation of business elements with the capabilities of tools and products, and realizes a standardized and modularized assembly technology construction, which not only greatly improves efficiency, but also opens up more innovation space for society, allowing more new business species to emerge.

7 Summary

This chapter mainly elaborates the elements of digital intelligence technology from the following dimensions.

(1) Traditional IT architecture solutions: In the face of the complexity of business systems, the traditional IT architecture formed in the past 30 years, and the solutions based on this architecture have become increasingly difficult to adapt to the complexity of business systems, with the cycle time, cost and efficiency of demand response unable to meet the needs of customers.
(2) The new technology of digital intelligence drives the dynamic balance and effective connection of supply and demand.
(3) ABOS can be directly be applied by enterprises with the overall architecture of "One Cloud, Multiple Ports, Five Mid-ends, Various Industry Applications", empowering the full-link technology upgrade of enterprises. The process of maximizing the use is the process of enterprises constructing according to the planning based on the real scenarios.
   - One cloud: Alibaba cloud.
   - Multiple Ports: including Tmall, Taobao, Alipay, DingTalk, all offline stores, etc.
   - Five Mid-ends: Business Mid-end, Data Mid-end, AIoT Mid-end, Organization Mid-end, and Finance Mid-end.
   - Various industry applications: SaaS applications for all industries, the so-called "30% relies on technology, 70% on applications"; business datamation, data assetization, asset servitization, service businessization; convergence, communication, management, use, and evaluation of the process have to be connected.

Everything is based on data, algorithm and computing resources, driving the whole business operation process.

The "new technology of digital intelligence" is the ability that an enterprise needs to catch up with the era of digital economy and drive new growth. However, it does not have to be built from scratch. Enterprises can directly use the "new technology of digital intelligence" in ABOS.

Pentalogy of Full-Link Digintelligence Transformation

In the APSARA conference held in 2019, the idea of full-link digital-intelligence transformation was first put forward. It defined five first-level capabilities (hereinafter referred to as the pentalogy) in view of the framework of full-link digital intelligent transformation in the consumer goods ecology, namely infrastructure cloud migration, digitalization of touchpoints, business online, operation digitalization, and decision-making intelligence. The following figure shows the 11 elements of commerce to illustrate how the pentalogy empowers the business operating system.

Business operating system: 11 commercial elements

Pentalogy empowers the reconstruction of industrial full link value

·Digitalization of touchpoints, business online, operation digitalization and decision-making intelligence powers the intelligent closed loop from data acquisition, recognition, insight to application

·Infrastructure cloud migration caters for the elastic demand and the need for high computing power

accelerator · Pentalogy   Intellectualization

Decision-making intelligence — Yu

Operation digitalization — Zhi

Business online — Jue

Touchpoint Digitalization — Shan

Infrastructure cloudification — Gong

1.Brand
2.Commodity
3.Manufacturing
4.Channel
5.Marketing
6.Retail
7.Service
8.Logistics
9.Finance
10.Organization
11.Technology

Business operating system empowered by eleven commercial elements

·Reconstructing the value of each link of the entire industrial chain

·Effective integration of logistics, capital chain, organizational coordination, information flow and business flow

   The pentalogy empowering the business operating system takes the end-to-
end viewpoint to reconstruct the value of each section throughout the full link
of the ecology via the effective integration of business flow (brand, commod-
ity, manufacturing, channel, marketing, retail, and service), logistics, capital chain
(finance), organizational collaboration (organization), and information flow (tech-
nology), thus realizing the value resonance among all the elements in the entire
ecology and the incremental innovation growth.

   Functioning as the starting point and foundation of the pentalogy, infrastruc-
ture cloudification props up the elastic demand and caters for the need for high
computing power by means of migrating to cloud. On top of that, digitalization of
touchpoints, business online, operation digitalization, and decision-making intel-
ligence all add up to building the intelligent closed loop for the enterprises from
perception to action.

   However, the infrastructure in the era of the digital and intelligent economy is
no longer the physical structure cemented by the traditional reinforced concrete in
the past. It is a new digital infrastructure represented by cloud computing, big data,
Internet of Things, mobile Internet, artificial intelligence, and blockchain, which
together constitute the technology base featured with high efficiency, availability,
and reliability required for future economic development. Such technology base
is continuously integrated, superimposed, and iteratively upgraded. In this sense,
building a data-driven and platform-based ecological infrastructure is in no way a
single battle of any new technology.

   "Migrating to cloud", therefore, has become a buzzword nowadays. Enterprises
desire to use the cloud to drive process innovation and business innovation, creat-
ing new profit growth points for themselves. So, what is migrating to cloud? Why
should we migrate to cloud? How to eliminate obstacles for traditional enterprises
to fully migrate to cloud?

Infrastructure Cloud Migration

Dongying Hong

1 Why Companies Migrate to the Cloud

The core of traditional IT architecture solutions is to manage the resources and architecture within the enterprise, and the final result is to build a closed technical system, even after the optimization of internal resources.

Cloud computing is, however, fundamentally different from traditional IT architecture that merely offers a "hardware + software" solution. It's more of a set of complete infrastructure that provides consumer-centric and digital technology-based services.

"Migrating to cloud" refers to the IT infrastructure cloud migration of enterprises, which means that the IT infrastructure realizes the end-to-end cloud migration by resorting to the reliable and easy-to-use "cloud". Just like the transformation in the power sector from power generation by factories to complete grid power supply, it allows most companies to access to reliable IT resources and computing power with no necessity for building infrastructure indispensable for computing power in the digital economy era, which is highly efficient and economy.

That means once cloud computing is deemed as infrastructure and a new mode of technology systems, what cloud computing provides is no longer limited to its economy and quick response that is often mentioned. It is of high values for enterprises in six aspects in the market environment featured with new consumption and new economy.

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

- "Cloud" supplies enterprises with new technologies and resources. Aside from being the infrastructure to provide resources such as computing power, storage, and network in the digital economy era, cloud computing also offers clients with a reliable and easy-to-use cloud platform, global intelligent big data, cloud-based AIoT and mobile collaboration anytime and anywhere. It functions as a new technology platform with high economy. Take Alibaba Cloud as an example. It provides more than 200 industry solutions and nearly 40 general solutions, which are designed with cutting-edge technologies and are available to enterprises in the form of cloud services, significantly lowering the threshold of new technology application for enterprises.
- Businesses on the "cloud" manage to connect with customers faster. As the transformation of the digital economy enters a deep-water period, more non-Internet companies will choose to fully migrate to the cloud. The expenditure on cloud computing will be incorporated into their budgets, representing one of the important components and indicators of a company's basic capabilities. This means that in the process of the Internet permeating into the traditional industries, migrating to the cloud is the only way for enterprises to dock with customers in terms of business systems, product platforms and technology systems. At the same time, establishing data chain, technology and product links between enterprises on the same cloud platform to simplify the complexity of system architecture and business interfaces, is far simpler and faster than operating on physical IDCs and closed technical systems.
- Cloud computing architecture is more economical. Cloud computing is a large-scale distributed computing model, and the economy generated by scale is an important driving force for it. In this model, dynamically scalable and manageable computing power, storage, platforms and services that are abstracted and virtualized are aggregated into resource pools and delivered to external users on demand. Although a large initial fixed investment is required in cloud computing, be it infrastructure, platform or software, they can be used repeatedly with minimal loss, once these hardware and software are built. Therefore, marginal input costs can be reduced by sharing these infrastructure, platforms and software.

For enterprises on the cloud as users,

- Enterprises can obtain infrastructure in a more economical fashion, since cloud service providers greatly reduce the marginal cost;
- Personalized value-added business of the enterprise only requires an additional lower marginal input cost, allowing it to engage in a wide range of services, with no need to develop infrastructure, platforms and software from scratch;
- The initial cost of adopting a new technology is high and uncertain. However, migrating to the cloud provides enterprises with pay-as-you-go and rent-to-buy services, which can greatly reduce their investment cost.

- Leading technology lowers the threshold for its adoption. The development of IT technology is accelerating, and it is evolving far faster than the IT infrastructure iteration speed of average enterprises, which means that enterprises have to keep paying for phase-out IT infrastructure with decreased performance, efficiency and availability until the next update cycle arrives. Competitors, on the contrary, are more than likely to have obtained better IT resources and technology, the technical dividends of migrating to the cloud.

- Cloud computing drives business model innovation. The traditional IT architecture cannot effectively support the implementation of new technologies such as big data and artificial intelligence. Characterized by explosive growth and massive aggregation globally nowadays, data has become a new means of production, whose importance has merited many companies' attention. At the same time, the development of artificial intelligence has also led to changes in many fields. The transformation of "big data + artificial intelligence" into digital intelligence not only optimizes internal processes and enhances the efficiency of businesses, but also further promotes the innovation of enterprise management models. In addition, the cloud architecture brings about greater flexibility and mobility. Through the big data processing in the cloud, enterprises can conduct big data analysis on huge transaction and management to accurately gain user insights, and provide services such as hierarchical user management, member lifetime management, and precision marketing, thus adding value to data; artificial intelligence is based on big data, providing more advanced scene-based services to engage enterprises in intelligent business innovations in design, research and development, manufacturing, collaboration, marketing, decision-making, and customer service.

- The security and availability of the "cloud" avoids the potential risk. The security of cloud computing is much higher than that of on-premise servers. People no longer have to worry about losing critical data and business applications due to natural disasters or computer failures. To be on the safe side, some cloud service providers even back up data to other remote servers, so there is no chance of data loss. Compared with the security measures of the enterprise on the local server, the security measures of the cloud service provider will perform more regular security audits, which ensures data security and the confidentiality of the sensitive information of the enterprises. In 2019, CNCERT received more than 100,000 reports of cyber security incidents. With the acceleration of "Internet + " and industrial integration, security threats are evident both online and offline, posing more complex and larger-scale problems to enterprises than ever before.

It is an irreversible trend for enterprises to migrate to the cloud with distinct advantages and clear paths.

In addition to the above factors, the necessity for enterprises to fully migrate to the cloud is manifested as follows.

- A new technology system will be established based on cloud computing, enabling enterprises to enjoy the "upstream and downstream technology upgrade of the digital industry" when they fully migrate to the cloud. The new technology system with cloud computing as its core is completely different from the traditional IT architecture, with the hardware being changed from a single high-performance system to a mass customized and distributed platform; the middle-end basic software being replaced by cloud operating system and cloud software; and the front-end applications being transformed to a software-as-a-service model.
- Applications and intelligence in the digital native era will explode on the "cloud", making the "cloud" and the capabilities on the cloud the key for enterprises to deal with problems. As the digital native production mode is promoting the upgrading of various industries, the advent of the digital native era is sure to bring about the explosion of applications, intelligence, and enterprise users. IDC predicts that more than 500 million digital applications and services will be developed and deployed using cloud-native approaches by 2023, equal to the total number of applications developed over the past 40 years. Digital native applications such as urban brains, autonomous driving, technology-based anti-epidemic, and Taobao live broadcast are becoming more prevalent, and any traditional IT infrastructure we know can no longer meet the needs of the digital native explosion.
- The slack economic growth and increasingly fierce competition shortens the window period for enterprises to "migrate to the cloud with ease" over a long period of time. With the disappearance of three major dividends of population, capital and scale, the actual situation is that the overall economic growth rate is slowing down, which aggravates the competition. For a long period of time, enterprises will have to prioritize the production and marketing, and the efficient stimulus of business growth will be adopting new technologies and marketing strategies, and launching new products. Fortunately, business systems, front-end applications and even business teams on the cloud which focus on business models and innovation, help innovative enterprises to gradually reduce and completely eliminate the need for the underlying technology construction, and provide a convenient, fast and intelligent platform in the due process, thus realizing the digital native digintelligence construction, and the construction and deployment of digital applications. The IT team of enterprises will focus on the service needs of the team, leaving traditional IT infrastructure with limited and insufficient resources, and it is difficult to promote the off-cloud systems to migrate to the cloud in a short period of time, thus shortening the window period.

Take Alibaba Cloud as an example. It harnesses the "cloud" to gradually replace the traditional IT infrastructure system to realize elastic computing, distributed processing, large-scale storage computing and security services, when providing services to enterprises for their digital and intelligent needs.

- Use the data mid-end and big data platform on the cloud to help enterprises to collect, clean, archive and analyze data to enhance the data perception, analysis and prediction.
- DingTalk on the cloud helps enterprises to build mobile collaboration according to users' usage habits and needs.
- IoT capabilities and AI capabilities on the cloud are conducive to enhancing companies' perception, cognition, and decision-making capabilities.

2 How Companies Migrate to the Cloud

Migrating to cloud can be divided into four stages.

1. Infrastructure Cloud Migration

The infrastructure that migrates to the cloud involves five aspects, namely computing resources, storage resources, network resources, security protection, and office desktop. To this end, Alibaba has done a lot of work and launched a new server architecture X-Dragon Server, through which enterprises can migrate to the cloud at one time without transforming their own infrastructure. Besides, cloud new servers can use cloud-native services more easily in the future, including scheduling, monitoring, and cloud-native capabilities (described in detail in Sect. 16.4), such as storage and database.

2. Cloud Migration of Data

However, even if the entire system migrates to the cloud, it may be isolated like chimneys. The difference is that companies used to build "chimneys" on their own sites, but now "chimneys" are built in the same place, which is, nevertheless, a very big improvement. On top of that, it is necessary to link the data, which is essential.

3. Cloud Migration of mid-end

After many systems move to the cloud, the next thing to do is to connect all these systems, which necessitates the establishment of a new business mid-end. Alibaba itself is completely based on such business mid-end. Five years ago when Alibaba Group first proposed to establish a business mid-end, many people didn't know what it was and why there were front-end, mid-end and back-end.

The following is an illustration of the business mid-end. It provides the packaged basic services such as user services, billing services, and transaction services. They are business related, but not user specific. For example, if Tmall, Taobao and Ele.me, etc. move to the cloud, what they have in common is that they all need to make transactions and process bills. There is no need to customize the separate

systems, as long as a mid-end is available for them to use. Therefore, the system will greatly converge after the mid-end is provided.

The cloud migration of the mid-end means the applications of overall business moves to the cloud, including collaborative office applications, business management applications, operation management applications, and R&D design.

4. Intelligence on the Cloud

With sufficient data and adequate systems, some innovative and intelligent applications can be developed, which is the last step to cloud-based intelligence. At present, Alibaba Group processes a large amount of data every day, all of which are dealt through Alibaba Cloud's big data platform. After the data processing is completed, the intelligent application comes into play. For example, during the "Double-11" shopping spree in 2020, there were hundreds of thousands of pages on Taobao, and each user was scrolling different pages. These are all generated in real time by Alibaba Cloud based on the intelligent system on the entire cloud, and they are all intelligent Applications. There are many other intelligent applications, covering all walks of life.

3   Mistakes to Avoid When Migrating to the Cloud

Enterprises need to formulate priority strategies and goals when fully migrating to the cloud, and then find the ideal bonding points and the value of moving to the cloud in terms of technology vision, business needs and IT strategy to generate different investment returns in these three aspects. Besides, the impact of cloud migration on the financial situation and financial model of the enterprise must be taken into account.

Enterprises need to avoid the following mistakes when formulating priority strategies for cloud adoption.

- The cost of moving to the cloud is optimal in any case: Higher economy is the main driver for migrating to the cloud, so when formulating priority strategies for a comprehensive cloud migration, the CFO may expect its IT team to enjoy the optimal price under any circumstances, which, however, may not be the case. Especially in the early stage of cloud migration, conversion and application, some hidden costs are easily ignored. As a result, TCO (Total Cost of Ownership) may turn out to be higher than the gain, even though the price seems to be most favorable.
- Cloud migration should be done in a one-off operation: Cloud migration does not mean moving to the cloud all at once. Certain business factors may require companies to choose a hybrid and sequential cloud solution. Cloud migration is actually a journey that enterprises embark on to realize the Internetization of core technologies, dataization and intelligence of applications by means of the cloud.

- Ignore digital asset planning: Digital assets include virtual machines, containers, applications, algorithms, and data. Moving to the cloud is a transition from physical devices to (virtual) services. When enterprises formulate strategies for cloud migration, many of them tend to monitor the process, ignoring the asset planning, and the inventory and measurement of digital (IT) assets. Since the establishment of the cloud service billing and accounting mechanism still requires a certain period, it will be difficult for the IT team to quantify the relationship between digital assets and business benefits, but they can use digital assets to map business results in the release of plans and technical work.

4 Cloud Native Architecture: Agile IT Architecture

1. Definition and design principles of cloud native architecture

Cloud-native architecture is a set of architectural principles and design patterns based on cloud-native technology, which mainly strips the non-service code of cloud applications to the greatest extent, so that cloud facilities can take over a large number of original NFRs in applications (resiliency, elasticity, security, observability, grayscale, etc.), relieving the business of being interrupted by non-functional business. Besides, it also features with light weight, agility, and high automation.

2. Differences between cloud native architecture and traditional architecture

New computing architectures are changing the way companies build and leverage computing resources from physical machines to virtual machines, improving hardware utilization and making resource usage and changes more flexible. Cloud native technology further reduces the application's dependence on the operating environment, and improves application portability and delivery efficiency. According to Gartner's report, 70% of the world's enterprises will implement cloud-native deployment of applications by 2021, and the transformation of traditional IT architecture to cloud-native is the inevitable trend.

3. The value of cloud-native architecture for enterprises

(1) The value of cloud native from the perspective of IT architecture

Cloud native architecture inherits the powerful functions and design ideas of "cloud" to the greatest extent, and greatly releases the dividends of cloud computing. As the application development in the cloud environment is based on the native architecture, it enjoys better basic support in terms of resource orchestration service, distributed deployment, and high-availability architecture. In a word, the

new architecture and technical support enables the application system to become more robust, thus the cloud native maximizing the benefits of the cloud.

Cloud-native architecture has more extreme elastic capabilities, which can effectively solve the deployment inconsistency in heterogeneous environments, promote the standardization of resources, and provide a foundation for service and automation. The cloud native technology system leverages containers as the basic scheduling module. Compared with virtual machines, the segmentation granularity of resources is refined to the process level, and the lightweight design of shared kernels further improves the elastic efficiency of resources.

Cloud-native architecture is compatible with diverse technology stacks for application development. Compared with the monolithic application under the traditional architecture, which is forcibly bound to the language and technology stack, the applications under the cloud native architecture are independent of each other in terms of the division of business domain, which enables different business domains to opt for distinct technology choices.

Cloud-native architecture realizes the compatibility of using multiple technology stacks for application development, and the business team can flexibly choose the best technology route as required.

Cloud-native architecture can better improve business stability. With a high degree of automation and high fault self-healing capability, cloud native makes the application itself "resilient", to wit possessing the ability to relieve pressure and the ability to recover from the pressure.

(2) The value of cloud native from the perspective of enterprise operation

Cloud-native architecture dramatically reduces IT costs for businesses. They can avoid the waste of reserved resources caused by peak business by leveraging cloud-native extreme elasticity to improve the compound utilization rate of resources, thus reducing resource costs. At the same time, applications under the traditional IT architecture are bundled with a large number of non-business functions, with serious phenomenon of "reinventing the wheel" which makes R&D cost remain high.

Cloud-native architecture ensures faster business delivery. The urgent needs of digital transformation have facilitated more enterprise businesses to be digital, which sets stricter requirements on many aspects covering business channels, competition pattern, and user experience etc. The core competence of digital enterprises is reflected in faster responsiveness to user needs, as microservice development is adopted, and standard interfaces are used for communication between services. Cloud native technology enables agile application development, reduces business trial and error costs and accelerates business innovation. With greatly improved delivery speed, it can quickly respond to user needs to enhance user experience.

Cloud-native architecture brings enterprises a user experience of less mental burden. The middleware under the traditional architecture is usually bundled with the business, which cannot realize the effective general-purpose reuse. In the process of application deployment, it requires a lot of effort to repeat the construction and is prone to errors, resulting in poor user experience. Based on the cloud native architecture built on the public cloud, most of the cumbersome operation and maintenance work at the infrastructure layer is undertaken by cloud service providers. Enterprise users can deploy cloud native clusters with one click, and achieve rapid online deployment by using various standardized middleware services provided by the platform. It reduces the mental burden on users during use, and enables them to focus on business logic with higher value, improving the overall efficiency of R&D.

5 "Cloud Nail Integration" and "Cloud Integration" Make Application Development Easier

With the development and popularization of cloud computing and the wide application of cloud native, an increasing number of practitioners and decision makers have clearly realized that "cloud native will become the key for enterprise technology innovation and the most important way to complete digital transformation". Internet companies with forward-looking thinking have been rooted in the cloud from the inception of the application; enterprises and institutions with a high degree of digitalization in the fields of new retail, government, finance, and medical care have gradually migrated their business applications to the cloud to make deep use of cloud-native technologies and architecture, thus gradually influencing the whole industry. In different business scenarios such as architecture design, development modes, deployment and operation and maintenance, applications based on cloud-native architecture usually carry out technical life cycle design according to the technical characteristics of the cloud to maximize the benefits of the cloud platform's elasticity, distribution, self-service, and on-demand services.

1. "Cloud Nail Integration" and "Cloud Integration"

Based on cloud services, the capabilities of digitalization, intelligence, mid-end and mobility on the cloud are unleashed to redefine development modes of software application, taking capabilities as components, and replacing the "componentization pattern" in traditional software engineering that regards functional codes as components. After cloud services break through the physical limitations of IT infrastructure, its new mission is to help enterprises quickly develop any kind of software applications.

It is quite common that enterprises have a large number of applications, some of which are even with hundreds of them. In the past, enterprises used a vertical chimney method to build applications, which failed to take advantage of the

component-based methods for the benefit of resource reuse, and posed great difficulties to data linking, application interconnection, and process interoperability. Trapped in the dilemma, enterprises are often too busy dealing with complex application systems to spare time to consider the cloudification or digitalization and intelligence of their IT infrastructure.

The goal of Alibaba Cloud's "Cloud Nail Integration" (cloud service + DingTalk) is to provide more simple and easy-to-use cloud computing services for enterprise users who have no IT technology background. Just like Microsoft's Windows operating interface promoting computer popularization, it helps enterprises to develop applications more easily on the basis of "Cloud Nail Integration". Due to the more convenient and simple application development environment for enterprise users, the number of products (to wit the number of enterprise applications and even the number of applications that can be used in the entire ecosystem) will be greatly expanded.

Therefore, "Cloud Nail Integration" will make enterprise application development more agile and integrated on the basis of improving the level of mobile collaboration, forming an overall integrated and globally optimal application system. Besides, the enhanced agility improves the speed of trial and error and iteration, which is conducive to innovation and synergy capacity building, thereby sustaining sufficient vitality for enterprises in the digital economy era.

Meanwhile, "cloud integration" endows everything with computing power.

"Cloud integration" refers to the integration of cloud services and terminals. On the one hand, "cloud integration" provides cloud services for PC and mobile terminals so that they can enjoy the ultimate computing power, large-scale storage, and high security of the cloud; on the other hand, some edge computing terminals provide full-stack cloud computing products and services. The collaboration with the cloud ensures low-latency services and reduces network consumption. Besides, IoT devices use intelligent technology to process, collect, and upload the data to the cloud for large-scale computing.

The model of "Cloud Integration" provides solutions of the highest efficiency and lowest latency for various scenarios. Cloud services will form "cloud integration" with various terminals, including IoT, IT, and other emerging terminals, truly enabling the whole society to obtain and exert digital and intelligent capabilities, and endowing everything with computing power.

2. Alibaba Cloud 2.0

The forms and service capabilities of existing cloud computing products can no longer cater for the needs of "Cloud Nail Integration". It is, therefore, necessary to build a cloud-based operating systems capable of mobile collaboration, data intelligence, and IoT integration.

Take Alibaba Cloud as an example. This operating system centers on DingTalk, data mid-end, business mid-end, and IoT center, and provides solutions to digital-native intelligence construction for each innovative enterprise, bridging the gap between underlying computing power and digital-intelligence innovation. Such

system provides a convenient, fast and intelligent platform for each innovative enterprise, making application development very simple. Even those who do not know how to write code can use low code and application platforms to build their own operating systems, quickly realizing the construction and deployment of digital applications.

Through this digital native operating system, enterprises can directly invoke data, applications and terminals. Such capability helps enterprises eliminate the construction needs of the underlying technology and focus more on business models and innovations.

Alibaba Cloud's Feitian cloud platform and the digital native operating system together form "Alibaba Cloud 2.0", which means that it has evolved from a narrow cloud computing platform to a composite one serving the digital native needs of enterprises. In addition to meeting the needs of computing power, it also packages the capabilities of artificial intelligence, mobile collaboration, IoT, data and business process management, and application development for the direct invocation of such capabilities by upper-layer applications, benefiting every institution at stake. The digital and intelligent innovation of the whole society will be further released, inviting small and medium-sized enterprises to participate in digitalization. Users who could not afford cloud services can access to the ready-to-use cloud.

6   Summary

This chapter mainly introduces infrastructure cloudification, the first step of the pentalogy of Alibaba's business operating system.

- Why companies migrate to the cloud;
- How companies migrate to the cloud;
- Mistakes to avoid when migrating to the cloud;
- Aliyun (Alibaba Cloud), cloud native architecture in China, empowers agile IT architecture and speeds the cloud migration;
- "Cloud Nail Integration" and "Cloud Integration" make application development easier. "Alibaba Cloud 2.0" has evolved from a cloud computing platform in a narrow sense to a composite platform serving the digital native needs of enterprises, which will realize more powerful collaboration between platforms and organizations. It not only changes the way cloud services are used, but also influences how enterprises develop applications, making cloud services as inevitable as resources like water, electricity, and coal for more enterprises, people, and systems.

Therefore, Alibaba Cloud's comprehensive cloud migration is not simply the "full-site cloud migration" or the iteration of IT infrastructure. It will make the future information system the starting point of a new mobile system that is intelligent

and future-oriented. Starting from the comprehensive cloud migration, and combined with the digital native operating system, it will bring fundamental changes to enterprises and the society.

Alibaba Cloud's own development path from scratch is the best example of infrastructure cloudification!

Digitalization of Touchpoints

Wenya Yang

Digitalization of touchpoints is a prerequisite for enterprise digitalization, including digitalization of consumer touchpoints, transaction touchpoints, commodity touchpoints, logistics touchpoints, and production touchpoints. It reflects the digitalization maturity level of touchpoints interacting with all parties in the process of digital intelligent transformation. The digitalization of touchpoints achieves multi-dimensional perceptions of consumers, employees, organizations, commodity status, partners, and ecosystem mainly through the mobility and intelligence of each touch point, enabling enterprises to maintain connectivity and sustain data acquisition capability across the entire link, as shown in Fig. 1. Being consumer demand focused to realize the digitalization of touchpoints can urge the reform and upgrading of the supply party and improve its flexibility, thus better meeting consumers' diverse needs. In the era of digital intelligence, data is one of the essential assets of an enterprise, and the data quality bears a close relationship with the value generated by data. How to collect a large amount of safe and quality data with digitalization has become the core question that enterprises need to think. To keep the light weight and agility of digital touchpoints is the "pioneering work" for enterprises to promote the strategy of "small front office, large mid-end, strong back-end, and rich ecology".

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn
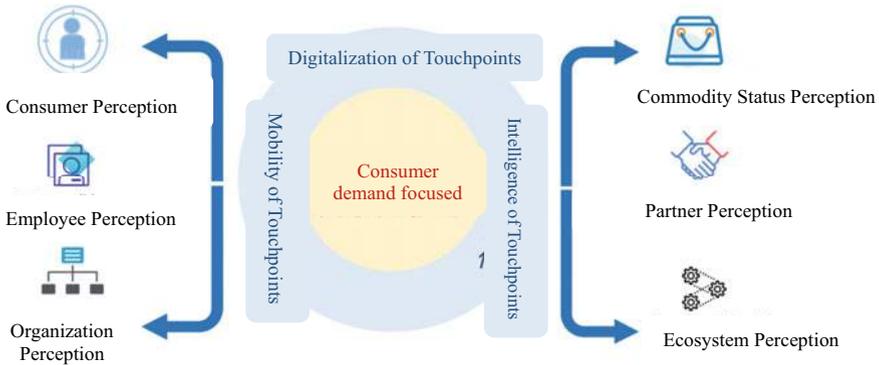
Fig. 1 Contact digitization

1   Full Digitalization of Touchpoints

In the past, companies mainly involved in the one-way promotion of products and services to customers, but now they are engaging in two-way communication or even multi-directional interaction which refers to the instant communication and interaction between enterprises and customers, suppliers, distributors, and manufacturers, etc. Efforts are made to better understand the needs of customers through new technologies such as mobile Internet, Internet of Things, big data, and cloud computing, so as to meet them. Therefore, the initiative to designing a multi-directional interaction mechanism to achieve personalized customer experience is the priority of digital intelligence innovation, as this mechanism can stimulate enthusiasm, encourage creativity and invite participation of all parties.

In terms of retail business, the types of touchpoints involve online touchpoints (Tmall etc.), offline touchpoints (smart stores etc.), commercial touchpoints (advertisements etc.), and social touchpoints (SNS etc.). Many single touchpoints or multiple touchpoints combine to form a multi-faceted and multi-angle network to bridge enterprises and customers. Touchpoints with different forms and dimensions constitute a truly digital intelligent network, with each network node being interconnected and performing digital operations in real time. Changes in customer consumption touchpoints will incur intelligent decision-making adjustments in production, logistics, and online and offline touchpoints of the whole scenario of "people, goods, and fields". The digitalization of touchpoints is a key node connecting the physical and digital worlds, and serves as the data foundation for online business, digitalization of operations, and intelligent decision-making.

2   Key Points of Touchpoint Digitalization

The digitalization of touchpoints is the basis for "upgrading" business competitiveness. The digital transformation of touchpoints covers the following key points.

2.1   Digitalization of Consumer Touchpoints

The early membership card identifies consumers in one single dimension, only keeping the information of name and phone number. Due to lack of digital customer tags, the consumption data generated cannot be analyzed, precipitated, fed back, or reached, which makes it impossible to tap the value of the data at a deeper level. However, the digital membership enables enterprises to access consumption behaviors, each of which makes one touchpoint including potential consumer discovery, consumer analysis, purchase, payment, distribution, and after-sales; enterprises are able to analyze, collect and model the multi-dimensional data covering consumer attributes, regions, habits, and behaviors, etc. Besides, real-time communication with online and offline consumers is available through business communication tools like mobile Taobao App and DingTalk to provide direct access to services. It is conducive to cultivating and distinguishing high-quality consumers, generating value from consumer data, and improving corporate profitability. Please refer to Fig. 3 in "The Driving Force of Consumption Change" chapter.

The digitalization of member information helps enterprises deliver greater rights and interests to the core members, and provide more accurate and desired services, which facilitates the sound growth of offline passenger traffic not incurred by subsidies, thereby improving the sales per unit area and business efficiency.

With the help of membership digitalization, department store companies can also provide value-added services for settled brands and give suggestions on efficient marketing and promotion. In this sense, membership digitalization is the most basic step for merchants to deepen their understanding of consumers and deliver "consumer-focused" services. It is also the basis for department store companies to reach consumers in-depth and make customer diversion ahead.

2.2   Digitalization of Transaction Touchpoints

Limited by the business model before the transformation, department store companies only keep track of large-granularity information on transaction behavior, focusing on income rather than the nature of transaction content, leaving important digital assets in a state of no accumulation, no precipitation, and no analysis.

By digitalizing transaction behavior, the "field" effect of retail department stores can be maximized on the basis of realizing omni-channel operation. At the same
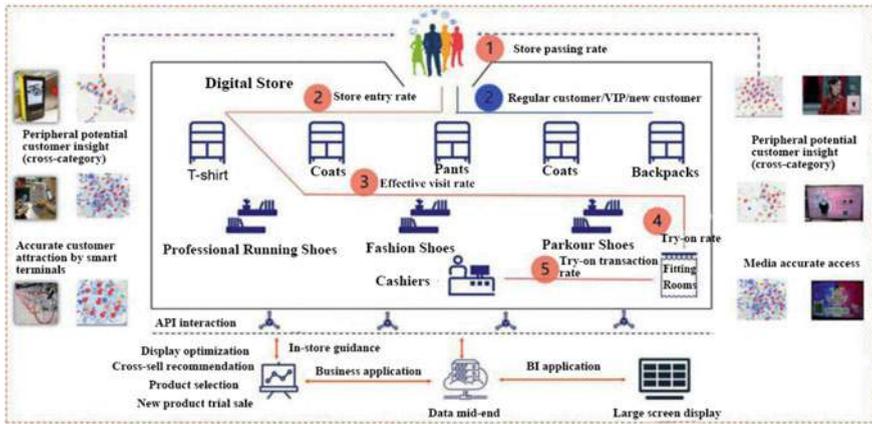
Fig. 2 Transaction contact digitization

time, it can also remove time and space constraints in shopping malls, allowing transactions to be carried out anytime and anywhere.

Through identifying consumers' online and offline shopping categories and preferences, comprehensive digital analysis and prediction can be made based on consumers' habits and behaviors to optimize the varieties and placement of goods in the stores. On the premise that consumption data is connected, transaction digitalization can further enhance the consumer experience. For example, consumption can be automatically linked to the parking discounts of the store, and consumers no longer need to exchange parking coupons at the service desk, which is worry-free and efficient, and greatly improves consumer's shopping experience. Figure 2 shows the digitalization of transaction touchpoints.

2.3   Digitalization of Commodity Touchpoints

Commodity digitalization is the biggest obstacle to be overcome in the transformation process of department store enterprises, as non-standard product management and indirect business models will bring huge challenges to the digitalization. However, the significance of commodity digitalization is to realize online sales, and to provide a solid foundation for the data-driven reconstruction of "people, goods, and fields". The data increment brought by the digitalization of commodities can build a consumer-centric, and scenario-based commodity knowledge map, which can reversely promote the renovation of offline shopping scenarios, thereby better optimizing the supply chain; more complete data dimensions produce more accurate consumer insights. Together with the digital membership system, it will bring consumers a better shopping experience.
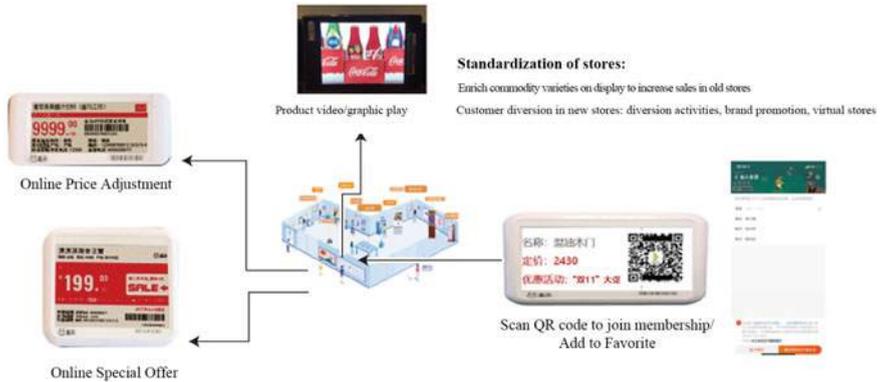
Fig. 3 Commodity contact digitization

In terms of settled brands, the digitalization of commodities can help them automatically realize the unified allocation of inventory within the same city or region by relying on resources of shopping malls, improving store operation efficiency and consumer experience. Moreover, commodity digitalization allows consumers to learn more about the product information by scanning the code, avoiding the loss of customers due to salespersons' inadequate knowledge about the commodity in the past.

There is limited space in bricks and mortar for the product display. However, in the case of commodity digitalization, infinite products can be exhibited for sales, enabling consumers to have more personalized choices in terms of styles and colors. After leaving the store, they can maintain contact with the staff in the store to enjoy better service. Besides, each product has a QR code, which can be traced to the source to understand the entire process of the product from manufacturing, circulation and transportation to sales. In the past, such commodity information could only be known by consumers through a salesperson's introduction. As a result, salespersons' varying capacities, fast upgrading of commodities and diverse categories all added up to the increasing difficulties for them to have a clear understanding of the products. After commodities are digitalized, consumers can access the information efficiently and in real time, including price adjustment and promotion information, without the further notice of the merchants. These are the great benefits brought about by the digitalization of commodities. Figure 3 shows the digitalization of commodity touchpoints.

2.4 Digitalization of Logistics Touchpoints

The digitalization of logistics touchpoints first requires that "everything should be equipped with sensors". Cainiao is the first logistics park in China to use the LoRa IoT protocol. The equipment and facilities in the entire park are connected

together through sensors to realize real-time perception of electricity meter, water meter, temperature, humidity, the stacking height in the warehouse, the flooding of the basement, and even the inclination of the manhole covers in the park. It will trigger the alarm, once something abnormal occurs, which greatly reduces the workload of manual meter reading and inspection in the park, and is more reliable.

Second, the digitization of logistics touchpoints demands that "all cameras automatically conduct calculation". The cameras distributed in the Future Park and those in ordinary logistics parks are fundamentally different, although they seem similar. The ones in the Future Park can make real-time calculation and analysis on the captured images to realize the intelligent scheduling of vehicles, scientific management of stock preparation and early warning of abnormal behavior of employees, which means that people are no longer needed to be on duty in front of the monitor for 24 h.

Although the cloud computing model provides powerful computing power, it sets higher requirements for network bandwidth. However, no park has enough bandwidth to support all the videos of dozens or even hundreds of cameras in each park being uploaded to the cloud. Such problem is solved well by edge computing. The cameras with computing power identify and analyze the events locally, and just upload the results to the cloud, which greatly saves bandwidth. In addition, since the cameras calculate locally without going through the public network, it can provide millisecond-level response speed for abnormal events in the park.

Third, "artificial intelligence makes machines learn to think". The intelligent warehousing and sorting center is an important part of the Future Park, including three intelligent modules of storage, picking and sorting. The use of automated assembly lines, AGV robots and robotic arms has greatly improved the efficiency of warehouse picking and distribution. Besides, the use of the information system independently developed by Cainiao Logistics Park for overall management and scheduling, has effectively solved the problems of low efficiency of storage, picking and sorting in traditional logistics centers. For example, Cainiao's unique robot-run operation scenario is used in the logistics park, where all employees' walking is replaced by AGVs, and the walking distance of employees is reduced by more than 90%; the use of flexible AGV robots breaks the traditional automation dominated by conveyor lines, revolving shelves, and multi-tier racks, superior in replicability, modularity, and flexibility of adjustment. Compared with goods-to-person picking mode of the common AGV robots currently popular in the industry, Cainiao Logistics Park has further developed six functional modules, including AGV grouping function, AGV vehicle-to-person function, AGV goods-to-person function, AGVrebin function, AGV to conveyor function, AGV inventory and merchant functions; complex application scenarios of robot automation rely on powerful system operation control and scheduling algorithms. Cainiao has developed from scratch AGV robot scheduling algorithm, intelligent algorithm for replenishment, algorithm for balancing multi-zone operations, and multi-functional mixed mode algorithm for robots, and its AGV full-process application model and algorithm system are the first of their kind in the industry.

2.5   Digitalization of Production Touchpoints

The digitalization of production touchpoints refers to the digitalization and intelligence of production equipment. In the industrial age, the foundation of the manufacturing industry used to be mechanical equipment and electric parts, which are now replaced by a complex system including hardware such as chips, sensors, and network equipment, as well as databases and production management software. The digitalization and intelligence of equipment has become a reality in more industries and enterprises. Take robots as an example. The process of intelligent devices such as robots entering the factory workshop has already begun, with increasingly wider application of robots.

SOGAL's digital factory is very modern. From order receiving to data processing, production, to delivery and installation, all links are operated with systems, each of which generates various touchpoints data. After the production touchpoints are digitalized, all aspects of production can be controlled. In other words, in the manufacturing process, the business links of order receiving, data processing, production, delivery, and installation are all related, and each business link can be digitalized. SOGAL 4.0 workshop gathers intelligent warehousing, intelligent equipment, intelligent logistics equipment and intelligent quality testing equipment to realize fully intelligent production. Starting from the intelligent three-dimensional raw material warehouse, each board undergoes cutting, edge sealing, punching, sorting, packaging… non-stop and without being handled by manpower. SOGAL 4.0 workshop has successfully connected the separate workshops of the traditional manufacturing into an intelligent production line, which greatly shortens the production cycle of each batch of panels, accelerates the logistics transfer, and reduces the waiting time between processes, as shown in Fig. 4.
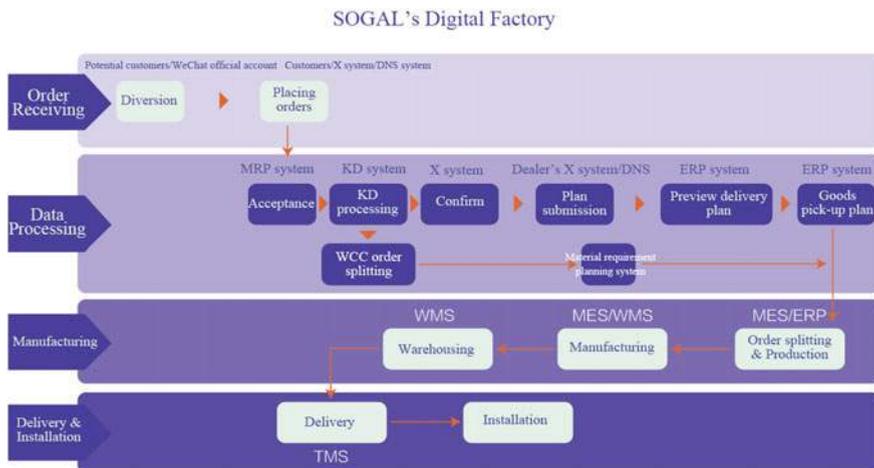
Fig. 4 Sophia's digital factory

In the whole process from production, sales, to logistics, in addition to the commonly seen touchpoint digitalization of consumers, transaction, commodities, logistics, and production, the digitalization can also be achieved in marketing and after-sales, etc. Digitalization of touchpoints is the premise of online business, as the network of touchpoints allows business to exist in the form of data.

3   Practices and Cases of Touchpoint Digitalization

In the era of new retail and big data, traditional retail enterprises have undergone digital intelligent transformation to find new business growth points. Most companies choose to cooperate with commercial platforms such as Alibaba for digital upgrade and transformation of all touchpoints, integrating omni-channel and all-touchpoint data systems, and empowering the application of front-end touchpoints.

As the "pioneer" of traditional retailers, Li-Ning Company Limited was the first to realize that traditional retail stores faced with serious problems like a lack of market perception and overall control, inadequate consumer insight, scattered and fragmented data accumulation, and inability to respond quickly to consumer needs.

To this end, in 2015, Li-Ning Company Ltd. began to cooperate with Alibaba Group to build cloud-based infrastructure and construct omni-channel and all-touchpoint business mid-end and data mid-end; in 2018, Li-Ning launched the digital construction of stores. With the help of technologies including cloud shelf, cloud code, IoT, and facial recognition payment, it accumulates consumer and store data, and harnesses such data to drive the touchpoint layout, thus optimizing all ends of the industry chain, and operation strategies.

Moreover, Li-Ning Company Ltd. cooperates with Yunma to radiate the business district within 3 km of the stores. Consumers are connected with the stores through terminals such as vending machines, rental power banks, Focus Media, and OTT, which take the initiative to accurately match consumers via advertisement placement, promotion notification, and coupon issuance etc. Consumers will then be attracted into the stores by interesting games in interactive shop windows.

When consumers buy products in offline stores, the clerk will advise consumers to follow Li-Ning's public account and register for free membership; after consumers leave the store, Li-Ning can still reach consumers through the membership system. When new products are launched or there is sales promotion, members will receive personalized product recommendations or coupons to interact with Li-Ning.

Besides, Li-Ning proposed the new concept of "China's Li-Ning" via the CBA contest as its sponsor, and launched a series of new products with the iconic image of Li Ning, the athlete, competing in the rings and pommel horse events, attracting more people to queue, drawing lots, and waiting for the latest co-branded limited edition. Such marketing strategy has successfully shaped the brand-new market image and tonality of Li-Ning brand.

In terms of products, "Li-Ning YOUNG" series have innovated in product theme and technical performance, and launched trendy products including parent–child outfits designed for fashion weeks, BADFIVE, and Disney cooperation models, as well as seasonal products featured with technological elements.

As for retail channels, Li-Ning has accelerated the expansion of channel customers and stores, and continued to enhance its store image.

As for marketing, "Li-Ning YOUNG" has gradually established its own digital marketing matrix, and has maintained interaction with consumers and enhanced consumer stickiness with the help of promotional channels such as KOLs in the mother-infant circle, sports talents, and celebrities.

Since 2015, Li-Ning Company Ltd. has carried out the digital transformation of all touchpoints. Its member number has increased to 10 million people, bringing about 5% additional sales growth to online and offline stores. In the first half of 2019, Li-Ning made a profit of 800 million yuan, a year-on-year increase of 123%; the average inventory turnover days dropped to 74 days and its share price increased more than six times compared with four years ago. It first launched the pilot digital stores before the wide application. Now there have already been more than 1,300 digital stores. Figure 5 shows the trend of sales and growth rate of Li-Ning from 2011 to 2019.

The reason why Li-Ning can set off a wave of new domestic products is that it has developed and upgraded the brand's digital touchpoints to keenly capture the subtle changes in consumers and the market, and continued to innovate products efficiently with traditional Chinese culture as its selling point.

In the era of mobile Internet when the needs of consumers are constantly changing, the simple mode of commodity production and sales can no longer meet the rapid development of enterprises. It is a good way to effectively combine the self-owned brand with the current trendy culture to consolidate brand strength. The

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Sales volume (hundred million yuan)	3.86	−19.79	−3.91	−7.81	0.14	3.1	4.46	7.15	14.99
Growth rate		−612.69%	−80.24%	99.74%	−101.79%	2114.29%	43.87%	60.31%	110%

Fig. 5 2011–2019 sales and growth trends of Li-Ning

fashionization and diversification of brand trends is what the transformation of corporate brand value strives for, as it will bring companies closer to consumers and allow them to go further in the future.

In addition to Li-Ning, China Feihe Limited is also a typical case of touchpoint digitalization. In the recent two years, Feihe has cooperated with Alibaba Group to establish a data mid-end and reshape the CRM system. The digitalization and intelligence of its C-end touchpoints has realized the link between consumers and commodities, and achieved multi-dimensional consumer behavior perception.

Feihe builds the shopping guide touchpoint with "people" as the core, and designs a "smart shopping guide" digital tool. The data mid-end applies better shopping guide experience to the business front office by setting detailed customer tags. After customers arrive at the store, the historical behavior data is processed through intelligent algorithms to prompt shopping guides in the dimensions of "communication records", "purchase records", "customer tags" and "recommended words", acquainting the guides with customers more quickly; with the help of the data mid-end, "smart shopping guides" can be set to make recommendations to better serve customers.

The data shows that from 2016 to 2019, Feihe's sales increased year by year at a gradually slower rate compared with the previous period, indicating the losing impetus of the product consumption. Feihe's sales, however, experienced an overall increase after its digital transformation in partnership with Alibaba Group. Figure 6 shows the trend of Feihe's sales and growth rate from 2016 to 2019.

In the digital transformation of touchpoints, Feihe has established a "smart shopping guide" digital tool to empower front-line shopping guides, fully assisting Feihe's in-depth operation of existing customers and full life cycle operation of customers.
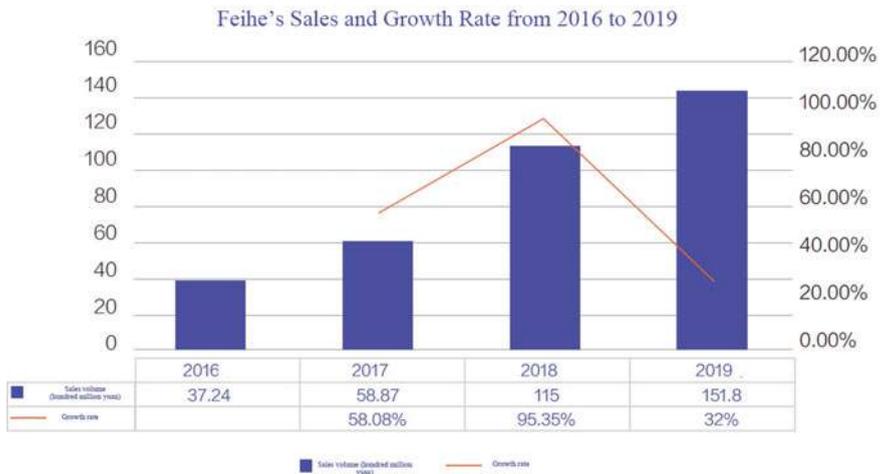
Fig. 6 2016–2019 sales and growth trend of Feihe

The new retail featuring "socializing + e-commerce" makes shopping guides a new traffic portal for brands. Compared with the product detail pages and the unprofessional product introductions by front-line shopping guides, "smart shopping guides" know the pains of shopping guides and can better improve customers' shopping experience. As of June 2019, there were 120 million front-line shopping guides. Therefore, revitalizing and empowering them is the inevitable trend of market development.

Lianhua Supermarket is also a practitioner of touchpoint digitalization. Its Whale Selection App has opened up online and offline channels, enabling consumers to place orders online and the system to dispatch orders offline. That means that consumers place orders on the food delivery platform or Whale Selection App, and a third party (Ele.me, etc.) or Lianhua's own delivery team will provide the door-to-door delivery services within one hour for consumers within 3 km of the surrounding area.

The mode of connecting online orders with offline grid-style distribution effectively improves the shopping experience of consumers. Meanwhile, the online and offline consumption data collected is helpful to accurately portray surrounding consumer groups, and to provide feedback to the offline systems regulating production, replenishment and storage. Lianhua has integrated and intelligentized offline and online touchpoints to connect "people, goods and fields". The method of placing orders online and dispatching them offline can make full use of the resources of offline stores, offering door-to-door service to consumers rather than waiting for them to come. It effectively breaks the barriers of e-commerce, improving the convenience of consumers' shopping, and increasing the continuous interaction with surrounding consumers.

As it becomes harder to differentiate brick-and-mortar shopping, novel experiences play an increasingly important role. Lianhua's Interactive Screen has unveiled a new mode of interaction with highly distinctive and topical themes. As an innovative touchpoint, the interactive screen can not only realize the advertisement monetization in the traditional sense, but also push to consumers the information about supermarket discount, commodities, new store opening, official account App, etc. through games and entertainment interaction, stimulating consumer activity, and creating a pleasant and relaxing shopping environment.

The performance report released by Lianhua Supermarket shows that the turnover in the first half of 2018 was 13.079 billion yuan, and the net profit attributable to its shareholders was about 39.37 million yuan, turning loss into gain.

Chinese enterprises that have achieved success with the help of touchpoint digitization are in a new round of rapid growth, and these enterprises best illustrate that digital intelligence drives the new growth.

4   Summary

The completeness of the touchpoint layout in the whole industry chain can be used to measure the degree of touchpoint digitalization in the enterprise, while managing the large-scale touchpoint equipment through the platform tool will be an important dimension to assess the maturity of the touchpoint digitalization. In this sense, the core capabilities that enterprises need to consider when building digital touchpoints cover the connection method, carrying capacity, connection efficiency, and connection security between enterprises and digital touchpoints, as well as the self-government and self-healing capabilities of touchpoints when the quality of network connections is under test.

(1) The full digitalization of touchpoints means that consumers' needs are understood through new technologies such as mobile Internet, Internet of Things, big data, and cloud computing, and their personalized demands are better catered for. The key to making operational decisions based on data is to fully realize touchpoint digitization in all links from production to sales to distribution.
(2) The key points of touchpoint digitalization cover the digitalization of consumer touchpoints, transaction touchpoints, commodity touchpoints, logistics touchpoints, and production touchpoints. The digitalization of touchpoints in these major links is an important step to forming a data network.
(3) In terms of practices and cases of touchpoint digitalization, companies like Li-Ning, Feihe, Lianhua etc. are all typical cases of harnessing touchpoint digitization to achieve sales growth.

Business Online

Wenya Yang

After the digitalization of touchpoints is completed, various business modules need to be linked by these touchpoints to realize the real-time online business, from which the business mid-end is derived. That means all business data are aggregated and precipitated. Online orders from self-built malls, Tmall, Ele.me, and mini programs, and offline orders from offline specialty stores, convenience stores, department stores, and smart stores, generate separate data, which used to be fragmented and not unified. Things, however, are different now. With the mid-end as the central hub, related businesses of different channels flow between each other. Members can place orders through any channel, online or offline, and the orders are aggregated to the business mid-end where the actual payment amount and credits of the order are calculated according to members' rights and interests, product promotion activities, coupons and credits. The consumption data from being fragmented and not unified to being shared and processed efficiently through the omni-channel and full-link digitalization is a convincing illustration of the business mid-end's functions.

1   Business Fully Online

The business logic in the past suggested that business was often offline. In a shopping mall, if you wanted to check the stock of a certain item in the warehouse, you needed to manually count them. Later, the invention of the ERP system enabled

W. Yang (✉)
Zhuhai, China
e-mail: guowei@phei.com.cn

the inventory query, but only after the account settlement each month, as it relied on the analysis of the current month's sales invoicing report. Compared with the previous manual inventory, the ERP has indeed made a lot of progress, but all the data is still in a semi-online state, not entirely online. Today, the Internet has become an infrastructure, data as a means of production, and computing as a public service. The real impact of the mobile Internet is that people spend most of their time in the online network society.

The mobile Internet is an Internet that involves people more than the traditional Internet. People can solve all the problems concerning clothing, food, housing, and transportation on our mobile phones which are portable and easy to be carried around. With the advent of the Internet of Things era, mobile phones are just one of many online devices. In the future, every device will become the terminal of the Internet, and the era of the Internet of Everything is accelerating towards us. In the electric age, the electricity is available anytime it is plugged in, thus facilitating the development of diverse home appliances. In the era of mobile Internet when everything is interconnected, data has become a new means of production. Every atom and every bit must be attached to the online system. Rules for offline systems no longer apply to online systems. Without data flow, it cannot be an online system. Data is not like oil which lessens as it is used. On the contrary, the more data is used, the more useful it is. To this end, big data and cloud computing give rise to the new form of computing economy. To be truly digital and intelligent, online business is the premise. Business being always online will generate all kinds of data, making the digitalization of business a reality.

All the businesses are digitalized, and all the data serves the businesses. Business and data are like Yin and Yang in Tai Chi Diagram. Their interrelated relationship is that there is Yang in Yin and Yin in Yang. In the Yin-Yang cycle as shown in Fig. 1, business digitalization comes before data assetization, followed by asset servitization, and service businessization, returning to the innovation of data to business.

Business and data jointly support the front office to provide members with closed loop services from marketing promotion, conversion transactions to intelligent services, enhancing the all-round capabilities of the enterprise. Businesses generate various data since it is being always online; assets can be invoked to facilitate the easy use of back-end business resources by the front office, offering better service; finally, through the service capability of data superposition, a business function is formed to better promote business innovation. Let's take a look at the various online businesses that are now very common.

1.1   AI Customer Service

At present, Taobao system has an online product library of more than 2 billion items, and hundreds of millions of users who will make massive requests for the shopping consultation services every day. Consumers' questions are diverse, complex, and individual. For some large stores, the real-time consultation volume
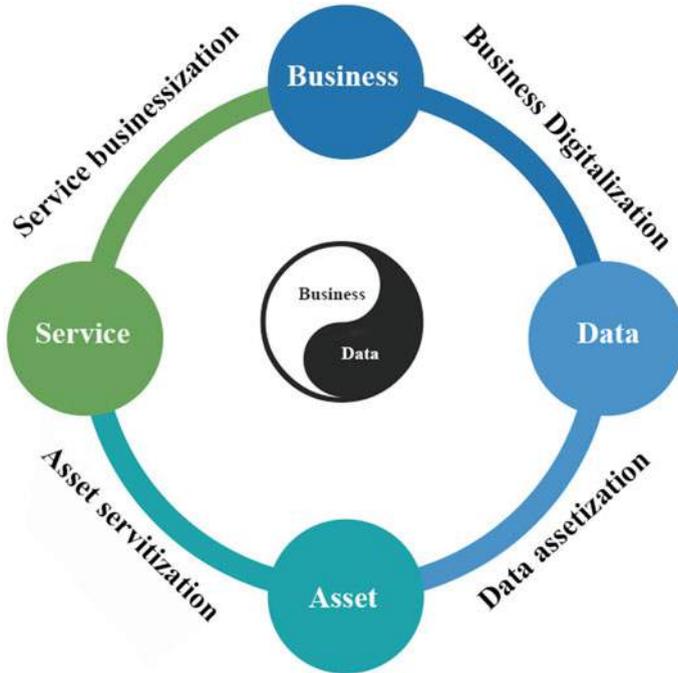
Fig. 1 Business and data

is enormous. Offering quality customer service is particularly important, as the answers directly affect the conversion of product transaction. If the question is not answered timely or not to the customer's satisfaction, it is very likely that a business will be lost. Consequently, the customer service causes huge labor costs to the merchants. In this context, the customer service business needs a solution from the mid-end. "Dian Xiaomi" (store assistant) launched by Alibaba Group is an intelligent customer service chatbot for tens of millions of merchants on the Taobao system. Through the "Dian Xiaomi" official website and Qianniu Workbench, all the merchants of Taobao and Tmall can apply for access to the AI customer service. After authorization and debugging, "Dian Xiaomi" is able to replace the staff for most of the customer service work, thereby reducing the workload of service staff. It is able to respond automatically to questions of inquiries, cross-sell products, and size recommendation in the pre-sale stage as an intelligent shopping guide; reply to the delivery time, confirm the delivery courier and order modification, and prompt payment for unpaid orders, etc. in the in-sale order consultation process; and make automatic reply to the return process, rules on sales return, seven-day no reason return processing, and refund status, etc. in the after-sale stage, as shown in Fig. 2. These tasks used to be addressed one by one by staff customer service, but now they are all done online and in real time. Therefore, "Dian Xiaomi" is a living example of online business.

Fig. 2 AiliXiaomi

1.2   Intelligent Poster Design Platform

When making the product main pictures, posters, or advertisement photos, changing the text, and adjusting the design, the designer needs to communicate with several operators, and keeps making pictures and designs every day. Especially when it comes to Taobao's themed activities such as "Double Eleven" or "Double Twelve" shopping festivals, store anniversary celebrations, or Juhuasuan promotion events, different pictures need to be designed for specific marketing scene. The poster design is, however, complicated and cumbersome, and the effect entirely depends on the competence of the designer. As a common business scenario, the poster design is expected to cater for consumers' demand for product pictures upwards, and the operations downwards. In light of the principle mentioned above that all the businesses are digitalized and all the data serves the businesses, what will it turn out to be if the poster design is combined with data? "Luban" is the example of such online business.

"Luban" is a design product independently developed by Alibaba Artificial Intelligence Lab. Based on the intelligent image generation technology, "Luban" changes the traditional design mode, and manages to complete the design of a large number of banners (web page navigation), posters and venue diagrams in a short time, improving work efficiency. Users only need to input the desired style and size, and "Luban" can undertake the time-consuming and labor-intensive design projects such as material analysis, image matting, and color matching etc., and generate multiple sets of design schemes that meet the requirements in real time. Graphic design was originally a completely offline business scenario, but now it has become a real-time online business scenario through "Luban", as shown in Fig. 3.

Demand matching

		Type	Style	Complexity	Color	Texture	Shape	Position
	Text/ Text group	Main/back-up scheme/main point of plan	Promotion & Lively	Simple				
Content	Product matting/ no matting	Product - matting						
	Logo	LOGO						
	Decoration	Area decoration scattered decoration						
Visual effect	Background	Vector background						
	Color matching							
	Product layout	Multiple product stacking						
Structure	Graphic-text layout	Left-right						
	Decoration Layout	Layout-Dynamic Stacking-Yes Close to edge-Yes						
	Finished graphic		Promotion & Lively	Medieum				

Fig. 3 AliLuban

1.3 Various Forms of Business Online

AI customer service and intelligent poster design platform are typical representatives of business online. Intime Department Store's "Miaojie" moves shopping business online, also known as the popular "cloud shopping" nowadays. Using new technologies such as scene-based live streaming, namely shopping combined with VR and live streaming, can simulate offline business scenarios online and realize an immersive online experience of retail business. The smart shelf solution can make more abundant products available online in real time. With more businesses being online, the underlying logic of different businesses is sorted out, finally bring out the concept of business mid-end.

2 Business Mid-End

From a single business to full businesses being online, what is derived is the business mid-end. Its construction requires abstract modeling of the business to sort out the functional requirements of the enterprise. For example, the functional requirements of apparel retail enterprises for the mid-end are to support the enterprise's management of organization, data, commodities, marketing, membership, orders, logistics and finance, and these are aggregated to form a functional requirement list. The business mid-end emphasizes the sharing and reuse of business capabilities to improve the core productivity of enterprises, and promotes the reform of production relations; it integrates the business operation capabilities and product

technical capabilities of enterprises to support the low-cost and agile innovation of front-end business.

"Business mid-end" is a combination of "business" and "mid-end". The former is easy to understand. There are various businesses in a company, which can be products, technologies or services. The mid-end, on the other hand, may easily remind us of the front-end and the back-end. So, what does the business "mid-end" have to do with the front-end and the back-end?

As you may know, the front-end is an interactive interface that directly provides services to users. This interface often includes various service functions, including homepage, order, product inquiry, personal information, etc., and provides a channel to purchase. If the front-end faces users, the back-end then faces operators and administrative staff who need to manage user information and commodities, and provide configuration support for the front-end. However, many projects involve some repetitive business, which entails ineffective work and reduces efficiency. In order to improve work efficiency, many companies sort out their business, and establish a business mid-end to unify all businesses and to provide public resources. Plainly speaking, the business mid-end is to pick out the common parts of each business to construct a general service platform such as order center, commodity center, inventory center, marketing center, settlement center, and user center etc.

The business mid-end is designed to serve the business. Before its building, it is necessary to sort out the business of the enterprise by summarizing and abstracting the business layer by layer to form a panorama. The business of an enterprise may appear to be very complex on the surface, covering procurement, production, sales, and service etc. in terms of its business functions; engaging in both domestic and overseas markets in terms of geography; and committed to B2B and B2C in terms of business model. Despite this seeming complexity, we need to analyze the essence of them to pinpoint the functions that can be commonly used in the enterprise and support various businesses. It is found that no matter how complicated it appears, some basic businesses are shared, such as products, channels, payments, memberships, and services, etc. They just present a complex business appearance when combined in different sequences.

The construction of the business mid-end should conform to the top-level design of the enterprise, as the different corporate goals may raise distinctive requirements for the business. Besides, the business model of an enterprise is also constantly changing with the competitive environment, thus incurring the synchronous upgrading of the mid-end. As the central system of the enterprise, the business mid-end supports the operation of the core business. All the application systems must establish contact with it to enable all the operations of the enterprise to be digitalized and aggregated in the data mid-end.

Take a basic business of Alibaba Group as an example. The global architecture of business mid-end starts from the head of the business department, and goes through the product manager management view, operator management view, and merchant management view to unify the global business identity. It abstracts and sorts out the businesses in operational control data center and basic data center,
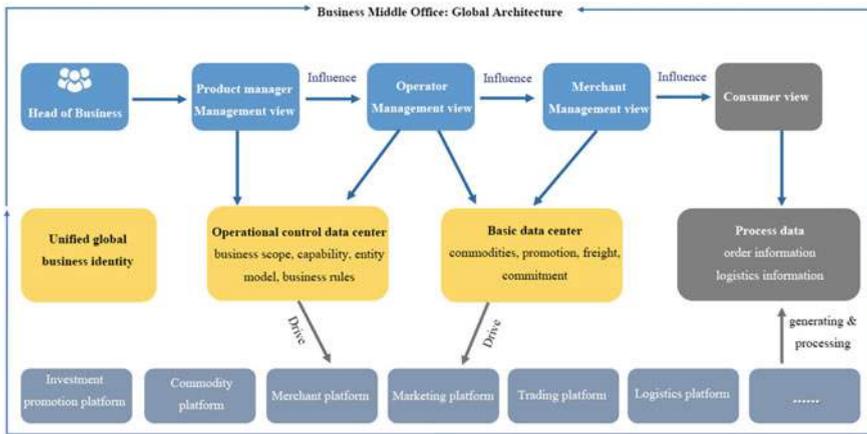
Fig. 4 Central platform-controlled business: global architecture

and combines with the process data generated by the consumer view to drive the efficient operation of platforms responsible for investment promotion, commodities, merchants, marketing, trading, and logistics, as shown in Fig. 4. The business mid-end configures, manages, and executes the systems and deploy operational service teams based on business capability standards, business operation mechanisms, and business analysis methodologies, enabling various business parties to respond quickly and improve their innovation capability at low cost.

3 Functions of Business Mid-End

Each center of the business mid-end receives data from different ports and provides different services and functions. Like human body's breathing, circulation, or digestion system, each center functions independently, while coordinating to support the operation of the entire system. The division of each center should consider independence and synergy in space, and the sequence of construction in time. The business mid-end is in essence a systematic set of systems, implementing the core business operation mechanism of the enterprise. Therefore, it earns itself the core position of the enterprise operation ecology, and all application systems must establish a connection with it. The content of business capability output is mainly core business data and business processes. From the perspective of the value chain of a single business format, the output of each business link will not only affect the downstream links, but also have a reverse effect on the upstream links. Therefore, each business link needs to share its core business data in real time. The main business involved in the enterprise, from production, commodities, logistics, sales to membership, marketing, order processing, and settlement, etc. must be digitalized and online. The business mid-end then sorts out the common business in each

project, and then builds a general service platform suitable for all. Therefore, the existence of a business mid-end breaks through data barriers and makes business linkage possible.

The business mid-end provides common services in the form of functions, such as product ordering, order management, and payment systems. In addition to services of products, marketing, and payment, it also has the function of process orchestration, which can provide various applications for different usage scenarios as required by users, such as mini programs, App, H5, etc. Having integrated the business, the mid-end can directly provide users with more accurate marketing products and services, and recommend customers to marketing personnel to conduct two-way engagement. Besides, it can coordinate the problems concerning membership, commodities, inventory, and marketing, and make business and data online. The business mid-end can improve the efficiency of development iterations within the enterprise to enable faster delivery, increase innovation efficiency to meet the demands of business agile innovation, and accelerate business transformation. Moreover, it upgrades the Internet architecture to improve the overall performance and to efficiently support the operation decision making of enterprises, making the business smarter. The business mid-end manages to drive the optimization of enterprise processes and organizations, and solve the problems of process redundancy and organizational collaboration barriers under the mid-end sharing system, making organizational collaboration more efficient. Of course, the functions of the business mid-end are beyond what are listed here. More companies are building business mid-ends to improve business flexibility and response speed, enhance precision marketing and service capabilities, and provide strong support for enterprise development. Several common business centers in the business mid-end are featured with distinctive functions to solve different problems of enterprises.

The order center undertakes the information and application of transaction orders, and conducts classification and retrieval, combined analysis, and comparative analysis of orders to visualize and automate the business. For example, from the store order rankings, you can clearly see the information on the sales of national stores and channels, the year-on-year and month-on-month growth, and products with the most sales. When business mid-end was not available, the data of online orders and offline orders was isolated, and the data of different channels was each like a information silo. Order tracking, and return and exchange of goods were separated, as the data was inaccessible. Nevertheless, the order center in the business mid-end manages to assist the operation personnel to integrate online and offline data, link order data from different channels for unified order management, and set an order sharing strategy for better contract fulfilment. It can also better serve consumers and improve consumer experience when they encounter after-sale problems and transaction arbitration.

The commodity center is capable of managing the core data of commodities, and constructing their peripheral data such as commodity brands, attributes, and categories. It is responsible for the centralized data management of product creation, modification, and query, and for the operations on product release, review,

item exhibition and removal. When there was no business mid-end, the product data was not consistent, with the same item labeled as different models and sold at different prices online and offline. That confused the consumers much, and was detrimental to the brand image due to the inconsistency; product data management was chaotic, and items with a lot of inventory were displayed at the sales end that they were out of stock. The commodity center in the business mid-end can assist the operation personnel in managing and reviewing brands, front-end and back-end category management, and commodity management and review to realize commodity data unification, cross-sell commodity sales, intelligent replenishment, and sales forecasting.

The inventory center has the functions of managing warehouse, inventory, goods, parcels, and logistics and transportation. It can systematically manage the location and storage of warehouses, in-warehousing and ex-warehousing, inbound and outbound allocation and its auditing, inventory list making and query, fulfilment inventory inquiry, freight management, and logistics status, etc. Before the business mid-end was available, the inventory information was inaccurate, and data from different warehouses could not be shared, resulting in oversold or overstocked inventory. The inventory center in the business mid-end can assist the operation personnel in available inventory setting, logistics inventory synchronization, channel inventory management, and safety inventory management etc.

The marketing center conducts full-link management of the merchant's activity plan, application, approval, execution, and verification, and is held accountable for the marketing activities covering strategy template, rule configuration, rights and interests, and freight reduction and exemption. Before the business mid-end was developed, the promotion of different channels was inconsistent in terms of types, ways, objects, conditions, and favorable terms, resulting in different consumption experiences of customers. The marketing center of the business mid-end, however, prioritizes customer experience when designing marketing activities, by offering coupons and resorting to multi-channel promotions. For example, on the occasion of grand event like "Double 11" shopping festival, it is the marketing center that enables the simultaneous promotion of merchants both online and offline.

The settlement center provides functions such as settlement, bill generation, bill adjustment, bill inquiry, account reconciliation, and payment. It manages to automatically identify and settle discounts, stored-value cards, balances, and points of customers in consumption activities. However, without the business mid-end, the source of bills could not be traced back to the original data, which was prone to repeated calculations, omissions, and multiple deductions of points. Multiple payment methods were also incompatible. The settlement center in the business mid-end can handle various statement management, adjustment document reviewing, and payment management in a centralized fashion to improve efficiency and accuracy.

Basic information center and user center manage the basic information and user information of businesses, logistics, organizations, user identities, permissions, and roles. It undertakes users' registration information to identify their omni-channel unique ID. For instance, when a customer makes purchase in an offline store and

an online store respectively, it is necessary to be able to identify the same customer and deal with his/her attribution. This is also the premise of connecting the online and offline business.

Figure 5 shows a larger view of the business mid-end's functions.

4   Case Study of Business Online

In 2020, due to the impact of the epidemic, most people traveled cautiously, resulting in few people visiting the brick and mortars. However, there were still many people "cloud shopping". Statistics shows that as of June 18, 2020, more than 30 million people have experienced "cloud shopping", and brand owners have provided more than 10,000 3D model rooms for consumers. During the event, furnishing merchants of Tmall home who opened "Tmall 3D Shopping" had an average store conversion rate 9 times higher than the stores of similar categories, and their transaction volume doubled. "Cloud shopping" is a typical example of making business online. Tangping Designer, a design platform of home improvement and home furnishing under Alibaba Group, is a pioneer for bringing home furnishing business online.

4.1   Re-Evolution of Online Channel Form—Real-Time Online Scene

Tmall Mall used 3D shopping technology on a large scale for the first time during the "618" (June 18th) shopping festival promotion in 2020. The 3,000-square-meter offline store in IKEA Shanghai Baoshan Store was reproduced online with digital 3D real-life technology at a ratio of 1:1, and consumers can "go shopping" online in these virtual exhibition halls.

According to statistics, more than 5 million people experienced the 3D "Cloud Shopping" within 3 days of its launch, and IKEA set a new single-day transaction record in one and a half hours on the day of "618" (June 18th). These data reflect the fact that the online shopping experience based on the application of 3D technology is changing the form of online retail channels for home furnishing.

The home furnishing industry has been invariably constrained by the limited offline "field". Due to its industrial feature, it is completely offline, unable to achieve the efficient linkage of "people, goods and field". What's more, subject to commercial factors such as operating costs and venue size, the offline home retail industry has always suffered from insufficient product display. What is sold is what has been produced, unable to meet the diverse needs of consumers. Meanwhile, online home furnishing stores have obvious defects that they cannot allow consumers to experience in person. To this end, the "semi-integration" of online diversion and offline conversion is what many home furnishing brands adore nowadays. However, the facts show that the conversion rate and per customer transaction of the "semi-integrated" online home furnishing retail store are still low, and

Fig. 5 Big function chart of business central platform

there is a large customer churn rate in the process of online diversion and offline conversion, with the overall operational efficiency being low.

Some products that cannot be displayed due to the limited space of offline venues, such as the integrated effect of model rooms, can be exhibited online now with the 3D technology. Consumers can use the Taobao App on the mobile phones to freely match household items such as TV cabinets, coffee tables, and sofas, etc., and complete the design plan together with the designer. This not only enhances the consumers' sense of participation, but also allows them to preview the real effect of furniture at home in advance. This kind of purchase behavior that consumers make offline on a daily basis can also be online in real time now.

The "field" constructed by digital 3D technology is creating "display aesthetics" that enables consumers to receive more information about the exhibited products, improve the information acceptance rate, and increase the purchase probability and the store's conversion rate. "Tangping Designer" harnessed the digital applications of 3D online scenes during Tmall's mid-year "618" online "cloud shopping" event in 2020 to solve the problem of insufficient online experience in the e-commerce home furnishing category, thereby improving the store's conversion rate. It has waived the "semi-integrated" sales model and constructed a closed loop from "cloud shopping", "3D cloud experience" to "display aesthetics" to promote online home consumption, truly realizing online business.

The statistics of Tmall merchants can also prove the promotion effect of consumer experience on product conversion. During the "618" shopping festival and "Cloud Shopping" events in 2020, the conversion rate of products in the 3D model room was 2–3 times that of ordinary products. Consumers liked shopping in the 3D model room, with the length of stay increasing by 50%. This is the digital reconstruction of "people, goods, and fields" in the home furnishing industry triggered by the technology-driven digital transformation of "fields".

4.2   A Full-Link Closed-Loop Solution—"People, Goods, and Fields" Online

The essence of the retail industry is the linkage between "people, goods, and fields". The 3D technology has digitalized the two elements of "goods" and "fields", realizing the digital remodeling of online products in terms of data and visual dimensions. The simultaneous digitalization in products, crafts and circulation has changed the sales model of the home furnishing industry, which is of great significance.

Digital remodeling enables consumers to opt for more types of products, deeply optimizing their online experience. It, on the other hand, improves the efficiency of merchants as the supply party. In the past, home furnishing was an industry that focused on offline stores, but offline shopping has always been affected by the weather and geographical conditions, and consumers could only access limited amount of information. Today, the application of digital 3D technology allows consumers to obtain more product information without leaving home, truly breaking

the barriers of traditional home retail. The improvement of online scene experience can also prompt consumers to directly purchase online and increase the conversion rate.

In terms of the sales per unit area of the brick and mortars, it has been invariably limited by the carrying capacity of the store. Nevertheless, with the application of 3D digital technology, the online virtual exhibition hall has broken through the limitation of the venue, increasing the variety and quantity of product displays which can be adjusted without restrictions according to the store's own situation. Besides, the 3D technology also solves the problem of poor online experience in the home improvement and home furnishing industry. Now the full link of experience, design, payment, and transaction is digitalized, enabling online transactions of home improvement and home furnishing to form a complete closed loop.

Alibaba Group's "Tangping Designer" uses 3D digital technology to solve the defects of poor and incomplete online experience of the home furnishing industry. Customers can fully participate in home furnishing design, color matching and scene display, which forms a complete closed loop of online diversion, online experience, online decision-making, and online transformation, and greatly improves the efficiency of the supply party in the home furnishing industry, as shown in Fig. 6.

Therefore, "Tangping Designer" harnesses the digital 3D technology to reshape the "field" of the home furnishing industry, connecting the upstream production and downstream consumption in a digital way to better improve the conversion rate of online home furnishing retail.

4.3   Make the Ecology of the Entire Industry Online in Real Time

The digital 3D shopping experience of the home furnishing industry is available because online retail has accumulated a large amount of "goods" data, and the "Tangping Designer" resorts to the SaaS solution based on efficient 3D design tools. The solution "visualizes" the data of virtual "goods", and links production with service on the dimension of data through the in-depth interaction between the virtual and the real world, thus forming a digital full-link closed-loop ecosystem in the home improvement and home furnishing industry.

In the ecosystem of "Tangping Designer", it embodies the digitalization of the home furnishing industry and features with the designer ecology. A large number of offline designers are attracted to settle in to create a perfect designer ecology, allowing them to be online in real time.

At the same time, under the synergistic effect, it has deeply collaborated with platforms such as Taobao.com and Tmall to create a full-link closed-loop ecosystem that can also be online in real time. In order to realize online 3D scenes, "Tangping Designer" uses 3D cloud design tools as technical support, and relies on big data and the 4 K technology to render millions of accurate apartment models
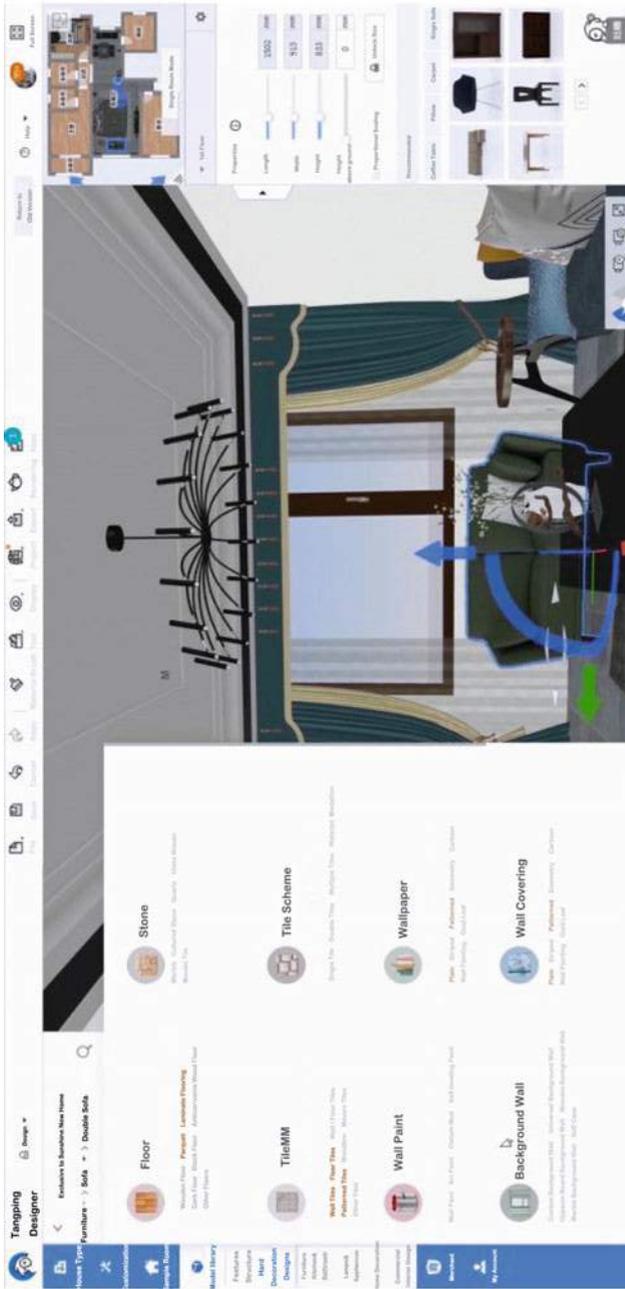
Fig. 6 AliDesigner

Fig. 7 Ecosystem of AliDesigner

at a high speed. Designers can search and retrieve the data anytime and anywhere, improving the product supply efficiency of merchants, as shown in Fig. 7.

"Tangping Designer" cooperates with the algorithm team of Taobao system to precisely match consumer demands through personalized recommendation technology, and push suitable products to consumers who need them, better balancing the supply and demand via the digital means. It encourages consumers to transit from single product consumption to scene consumption to pursue online one-stop shopping, making the entire industry ecology online in real time.

"Tangping Designer" is a typical case of business online. More companies are making their business online via the business mid-end, among which Easyhome, Feihe, BESTORE, Haidilao, and Xtep have all become industry benchmarks. The detailed illustration is presented later.

5 Summary

Businesses exist in various forms online, which brings out the idea of constructing the business mid-end. As the systematic embodiment of business online, the business mid-end enables enterprises to accumulate various capabilities, share business, and make business online in real time. The function of business sharing in the mid-end ensures the business interconnection and the consistent consumption experience, enhancing the brand value and user stickiness.

(1) The artificial intelligence customer service and intelligent poster design platform are typical representatives of the business fully online. With more businesses being moved online, the underlying logic is sorted out to make business transform into data, and data better serve business.
(2) The business mid-end is the result of business online. It emphasizes the sharing and reuse of business capabilities, and integrates the data from the front-end, the mid-end and the back-end, improving the core productivity of the enterprise, and promoting the reform of production relations. Meanwhile, the functions of the mid-end and the back-end support the low-cost agile innovation of the front-end business.
(3) The business mid-end is essentially a systematic set of systems, which realizes the core business operation mechanism of the enterprise. Common business centers in the business mid-end include order center, commodity center, inventory center, marketing center, and settlement center, etc. Each center has its own unique functions, but is closely linked with other business centers.
(4) "Tangping Designer" is a typical case of business online. The real-time scene is displayed online, meaning that "people, goods, and fields" are all online; and the ecology of the entire industry is online in real time. More enterprises choose to make various businesses online via the business mid-end to promote enterprise innovation.

Operation Digitalization

Ye Tian

1 Establish Digital Operational Mindset

Every June, a Baijiu (Chinese liquor) company holds a kick-off meeting to formulate the campaign goals, product strategies, marketing strategies and implementation schedule for the "Double 11" shopping festival. The participants had a heated discussion on whether to use high-end porcelain bottles or low-end glass bottles for the featured products during the "Double 11" period. Through data analysis, the financial manager concluded that the gross profit fell sharply in the first half of the year due to the promotion of low-end products, so it was suggested to market high-end products in the second half of the year; the e-commerce manager, however, based on the previous year's market data and competing product data, disputed that the price of the high-end products was not competitive and the sales target would not be achieved if the high-end products were mainly promoted. Although both the financial manager and the e-commerce manager relied on data, they came to completely opposite conclusions. This dilemma may be encountered by every enterprise. It reflects that the existing data of the enterprise, like isolated islands, are disconnected, and the chimney-like data architecture greatly reduces the value of the data. The data mid-end in this circumstance is the solution. At the same time, as the complexity of business continues to deepen, we need physical data such as sales data and inventory data, and the one that is highly business related, such as risk assessment, sales forecast, and intelligent product selection. These data have to rely on the service provided by the data mid-end.

The data mid-end is like a beacon, illuminating the entire operation process of an enterprise to make marketing, R&D, production, warehousing, and terminal

Y. Tian (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

management transparent and visible. Data is the starting point and the ending point as well. It functions as a key factor to control the results in the operation process, being able to adjust the operation behavior according to the monitored data.

Operation behaviors, regardless of being at the enterprise level or the department level, both need to be centered around data. By analyzing the data can an enterprise's operation deficiency be detected and the causes be traced so as to formulate corresponding strategies and action plans. The new operation behaviors, in return, will generate new data, based on which we discover more problems. In this way, business processes, resource allocation, and management methods are rapidly cyclically iterated, forming the basic operation logic of enterprises in the digital age. This fast iterative digital operation mode requires the support of dual mid-ends, the business mid-end and data mid-end.

So, how do the dual mid-ends support digital operations?

First of all, business digitalization allows most of the enterprise behaviors to be completed online, creating data touchpoints and digital records for each behavior. These data are collected and recorded to formulate data sources. Data assetization manages the collected data, and turns raw data into usable data assets through data cleaning, classification and catalog management. Asset servitization uses API encapsulation to make these data into tools, empowering them with the ability to serve business. Service businessization means retrieving data via the tools anytime as the business required and processing the data to support business development.

To begin with, business digitalization is to facilitate business-related links and processes to run in the form of data. For example, when a customer checks out in a Freshippo supermarket (Hema in Chinese), the store clerk will suggest the customer downloading the Hema mobile app to pay for the bill. This operation seems very troublesome, and may even lose some customers. However, it manages to keep the customer data, especially the transaction behavior data including commodity preference, price preference, time and geographical preference. This app is also an important means of triggering out-of-store sales, and serves as a data link with the next business section.

Another example is a cosmetics brand. The important data related to customers in its store business process include coverage (the total number of effective consumers in the geographically covered area of the store), the number of people entering the mall (the number of potential customers entering the mall), and the number of customers entering the store every day (the number of people who enter the cosmetics store every day), the number of transactions, the attributes of the transaction products (products purchased, cross-sell products, and marketing methods that have worked etc.), and the number of members, etc. For most brands, this data was previously missing. However, through digital transformation, smart devices are adopted to collect and record data such as store entry, moving line, and transaction, so that businesses like payment, inventory, price adjustment, and sales invoicing can be carried out online. At the same time, the data on commodities, production, logistics, and finance is cleaned before being input into the data mid-end to form data assets. When brands launch new products or enter new channels, data assets will come into play, where the historical data will indicate

which products are more popular in certain channels. Besides, the key indicators such as the development cycle of each product, profit contribution rate, and store sell-through rate can be processed through the existing data in the data mid-end, and the data products can be displayed to the business party, transforming the data assets into service capabilities for the business.

The e-commerce department of Samsung China has linked the isolated data across various business departments, and established the Samsung super membership system, upgrading the members of the refrigerator, washing machine, TV, and audio-visual business units to its super members. The data sharing among different business departments has greatly increased the associated purchase rate (an indicator that a customer buys multiple products), meaning that more customers who purchase refrigerators will tend to buy washing machines, microwave ovens, or dishwashers together. In this sense, the data sharing has improved the UV (the transaction amount created by a single customer), greatly increasing the performance without large-scale advertising investment.

As a brand owner, Wyeth shared its own data analysis results with the distributing party, and also established a "corporate university" to empower the distributing party to transform into digital intelligence. Previously in the business world, data could not be processed, or developed into product applications, so brand owners and distributing parties were in a competitive relationship to some extent; but in the era of digital intelligence, data assets are shared and data products are reused at almost no cost. Rather, the data value is increased as the application is continuously validated and optimized.

However, it is impossible for traditional enterprises to overcome the difficulty of data collection overnight. It is a systematic project that needs to be implemented in stages. For example, when customers pay with cash, the shopping guide can suggest customers scanning the code with their mobile phones to become members, so as to collect the transaction data and member data. In this process, some companies may require employees to manually enter customer data. This method may seem simple, but it is extremely difficult to implement. Perhaps in the first few days after the initiation under the impetus of strong assessment, things may go as planned, but no one cares after a few weeks, as the manual data entry is cumbersome and it is not a shopping guide's specialty. Moreover, the authenticity and standardization of the data entirely depends on the awareness and ability of the shopping guide. Therefore, business digitalization requires the support of technology, and it cannot be made into "human digitalization" which reduces rather than increases efficiency.

Data businessization which means using data as an application to empower old business and innovate new business is the other side of business digitalization. The purpose of data collection is to apply it to the business itself. For example, one of the most common forms of data application is data visualization, which forms a visual business dashboard through data analysis, allowing managers to monitor business conditions clearly and efficiently, such as real-time monitoring of sales performance on a large screen.

Data visualization eliminates the original manual work of getting statistics and making data tables, and liberates people from the simple data input and data integration to be involved in the data innovation work of higher value. Managers can directly view the big data screen to understand the business situation without the necessity of listening to the reports of their subordinates.

The multiple use of data algorithms to monitor advertising effects, the estimated industry data for new product development, and the additional purchase data for early warning of inventory as mentioned in the previous chapters, are all examples of data empowering the original business. The data businessization is also capable of empowering innovative businesses. A case in point is the rise of social media such as Tik Tok. How can new media effects be evaluated with minimal trial and error costs? The tags of target customers can be refined, and the content placed on the new media can be based on the sample attributes of effective customers on the old media. After a period of testing and optimization, the comparison data of the new media and the old media can be obtained. The data will reveal the content preferences and behavior preferences of the new media population, so that adjustments can be made quickly to adapt to the new business. If there were no precipitation of old customer data, data effects would not be reflected and whether or not to develop new media business would become a protracted topic discussed within a company.

Data innovation can also be expressed as the export of data capabilities, empowering the upstream and downstream industries and partners in the same industrial ecology. Brand owners can share sales data with the foundry to improve the efficiency of its supply chain management, enabling the foundry to prepare raw materials and production lines more timely. Multiple brands can also share one factory data, which can be aggregated to generate intensive efficiency. For example, if two models of men's shoes of two brands need to use the same outsole (sole), this outsole can be intensively produced. How to split, merge and coordinate multi-brand orders? This has what data businessization copes with.

Business digitalization and data businessization are an incremental closed-loop, where business generates data, and data empowers business, making a virtuous cycle. It should be noted that with the cycle being enhanced, the quantity increases, and that such quantitative changes will lead to qualitative changes as data is continuously processed and optimized: the more data loaded in the same business, the higher the accuracy; the more data entered in the different businesses, the greater the overall value.

The front-end is small and flexible, each of which focuses on a single business, forming high cohesion. The support needed by the front-end is obtained from the mid-end which accumulates the functions of the front-end and the back-end, disassembles them into modules, and makes them a reusable enterprise-level capability to support the front-end. The data mid-end and the business mid-end reinforce each other, harnessing data to continuously optimize business and support business innovation.

2   Alibaba Empowers Digital Operation Products

Alibaba Cloud transforms the methodology, experience and tools implemented in the its data mid-end into products, empowering enterprises to build their own data mid-end. To be specific, Dataphin and Quick series products are used in the merchant domain to build a data mid-end. Dataphin is harnessed for the construction and management of intelligent data, serving as the engine in building the data mid-end; Quick BI is used for real-time online data analysis; Quick Audience is used for consumer operation management, as well as consumer analysis, orientation and expansion; Quick Stock launched in 2020 is a logistics data engine. Figure 1 shows the panorama of Alibaba Cloud's omnichannel data mid-end architecture.

2.1   Dataphin, a Data Mid-End Building Tool

Dataphin is the engine of the entire data mid-end, with functions such as data collection, data management and planning, data modeling, data warehouse planning, and theme-based data services output, as shown in Fig. 2.

Dataphin features the data metric standardization, the automatic data model development, the real-time generation of theme-based data services, and a portal for data asset management. It effectively lowers the threshold for data warehouse construction and truly making data into a value center from a cost center by improving production efficiency and reducing production cost.

Dataphin construction and management of intelligent data is shown in Fig. 3.

2.2   Quick BI Helps Data Analysis of Enterprises on the Cloud

After building and managing big data, we need to use Quick BI, an intelligent data and visualization component, to show the value behind the data to people. Quick BI is an intelligent BI service platform tailored for users on the cloud, which can provide real-time online analysis services on massive data, and support drag-and-drop operations and rich visualization effects. It is capable of quickly performing data analysis, business data exploration, and report making, etc.

For example, decision-makers in the retail industry need to make analysis based on data, the sources of which rely on reports provided by various regions and departments before being aggregated by data analysts. Due to the fact that the localization of data analysis in various places is serious, mistakes or data loss may occur easily. Data analysts are constantly receiving demands to organize, summarize and analyze data in different formats. However, the situation has often changed before the analysis results are released. It is too late to make any decisions, unable to ensure the timeliness of data analysis. The Quick BI real-time data module shown in Fig. 4 (the unit of amount in the figure is "yuan") allows decision makers to observe the sales dynamics in real time, and make adjustment and optimization in time the minute problems are found.
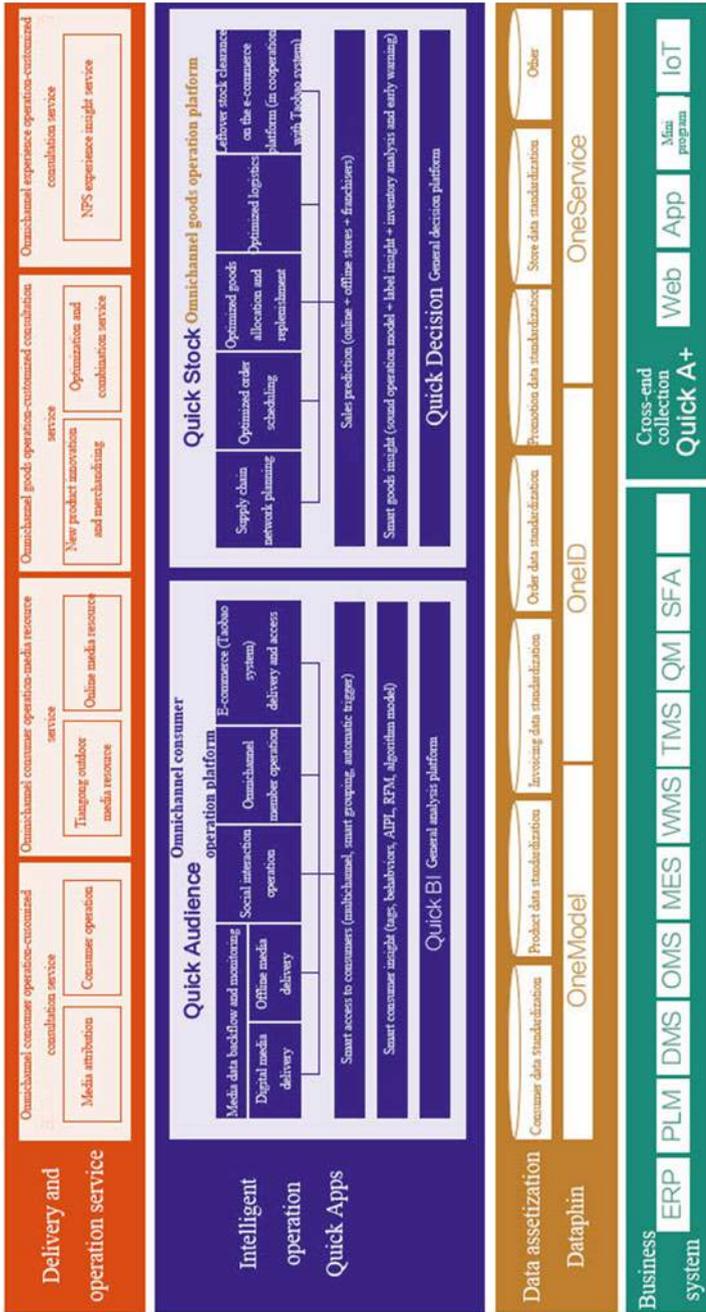
Fig. 1 Panorama of Alibaba cloud global data central platform architecture
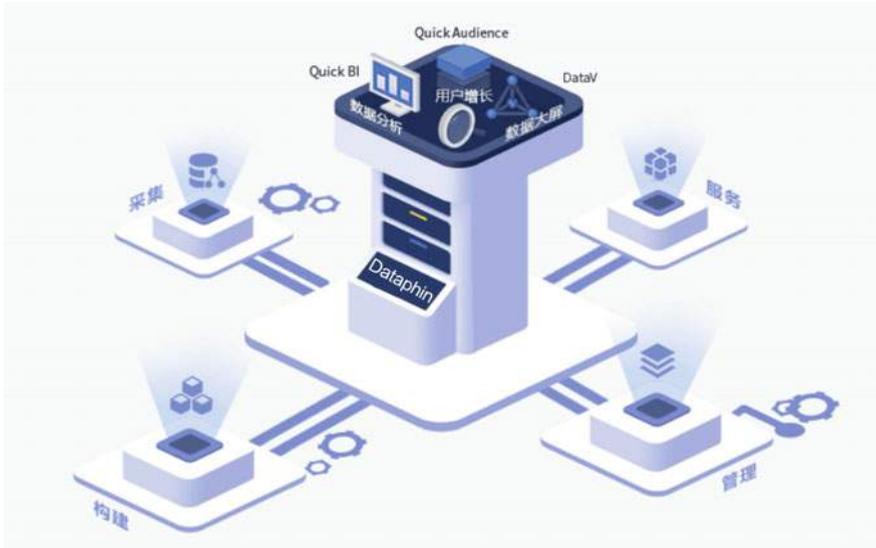
Fig. 2 Functions of Dataphin
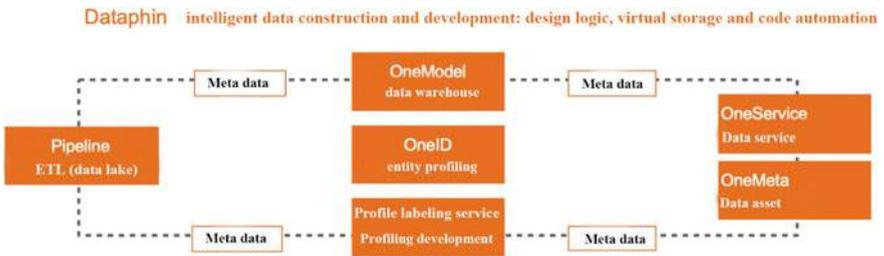
Fig. 3 Dataphin's construction and management of intelligent data

Fig. 4 Quick BI's real time data module

In the past, the data sources were different and the data standards were not uniform, including ERP data, financial data, sales data, and shopping guide data, etc. Consequently, the analysis results were very different, and the correlation analysis between the data was missing, making it difficult to identify real critical business points based on the "fragmented" data. Decision makers could ask data analysts to summarize and correlate data, but front-line business personnel often did not have the authority to mobilize data analysis resources. Quick BI provides intelligent analysis tools for front-line business personnel. With the help of Quick BI's automated forms for self-service query and visual instrument construction, the business personnel can analyze the overall operation and sales of the brand, channel traffic and consumer assets, so as to optimize channel investment, increase sales, and trace the reasons for consumer changes, truly achieving digital operations, and generating value with data.

As shown in Fig. 5 (the unit of amount is "yuan" and the unit of quantity is "Pcs"), through Quick BI, front-line business personnel can view and mark the order volume, predict the trend of future order volume, and stock up at the best time based on the fluctuating transportation costs and price trend.

Fig. 5 Related trend chart from quick BI perspective

2.3   Quick Audience Helps Achieve Intelligent User Growth

With consumers as the core, Quick Audience conducts the multi-dimensional consumer insight analysis through rich user insight models and convenient policy configuration, helping enterprises achieve intelligent user growth. Quick Audience includes the following major functional modules: data source and data set configuration, insight analysis (perspective analysis, AIPL and its circulation analysis, RFM analysis, audience analysis), audience circle selection, and audience management.

Figure 6 shows the Quick Audience omnichannel CDP (Customer Data Platform).

Quick Audience monitors and reflows the brand delivery data of the entire network through media. It collects data from the self-media and self-owned mall through buried points, and synchronously integrates the online and offline sales data of the brand to enable the backflow and precipitation of customer data. By so doing, the digital management of customer information, customer behavior and customer relationship is possible, providing a data foundation for digital marketing.

Figure 7 shows the Quick Audience omnichannel consumer data center.

In the marketing process, the classification and connection of the crowd can be achieved through precise selection. For example, an offline store of a diamond brand can use Quick Audience to select people preparing for weddings, conduct localized delivery based on LBS, and evaluate the delivery results by means of lead forms, and media monitoring and backflow, thus optimizing the delivery plan before its opening.

It is important to use Quick Audience for crowd selection and delivery plan optimization.

Transaction channels such as mini programs and official apps, and data channels like Weibo, WeChat official account, and WeChat community form a traffic-transaction closed loop in the private domain, which can evaluate and optimize the effect of activity plans and the self-media coverage. The advertising of self-owned stores such as Tiangongzhitou and Focus Media, based on LBS, can accurately attract consumers into the store and improve the conversion rate, forming a closed loop of traffic-transaction based on the store. E-commerce platforms such as Taobao.com and Tmall as transaction channels, and Alimama, Tik Tok (Douyin in China), Xiaohongshu, etc. as access channels, constitute a closed loop of traffic-transaction in the e-commerce domain. Quick Audience then integrates omnichannel traffic and the data bank to manage the AIPL cycle of consumers and activate the traffic-conversion capabilities of the three closed loops in these domains.
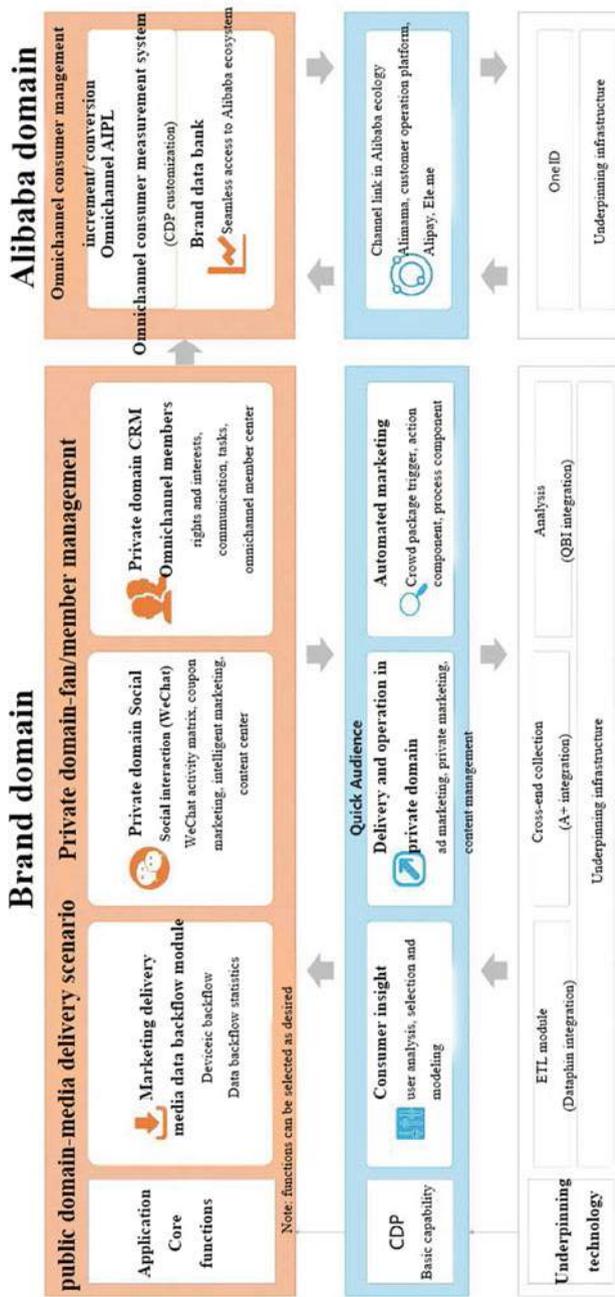
Fig. 6 Quick audience's global CDP
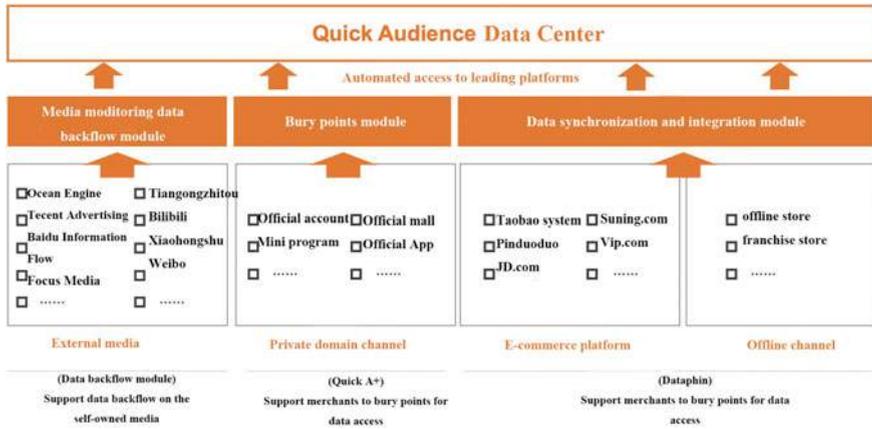
Fig. 7 Quick audience's global C-end data center

2.4 Quick Stock Omnichannel Intelligent Product Operation Platform

Quick Stock is an important intelligent tool of Alibaba Cloud in commodity management. With data and AI algorithm as the core, it resorts to accurate sales forecast, warehousing network optimization and allocation algorithm logic to boost the capacity of sales and operation planning, realizing the efficient digital operation of products in the whole life cycle of planning, production, first shop, trial sale, replenishment and allocation, and stock clearance.

Figure 8 shows the Quick Stock omnichannel intelligent product operation platform.

In the product planning stage, according to market trends and existing products, it gives suggestions on category structure adjustment and new product research and development. In the commodity production stage, it manages to enhance the efficiency of sales and operation planning, and provide material planning and intelligent production scheduling according to sales and procurement plans, making the supply chain more agile and flexible. In the stage of commodity circulation and sales, based on automatic inventory monitoring and early warning, as well as white-box sales forecast, it helps companies manage inventory more effectively and intelligently adjust and allocate the inventory of each warehouse and store by predicting market changes in accordance with the real-time data changes, and making suggestions on omni-channel first store stock, replenishment forecast, and unsalable goods clearance warning.

Figure 9 shows the predicted attribution analysis with Quick Stock.
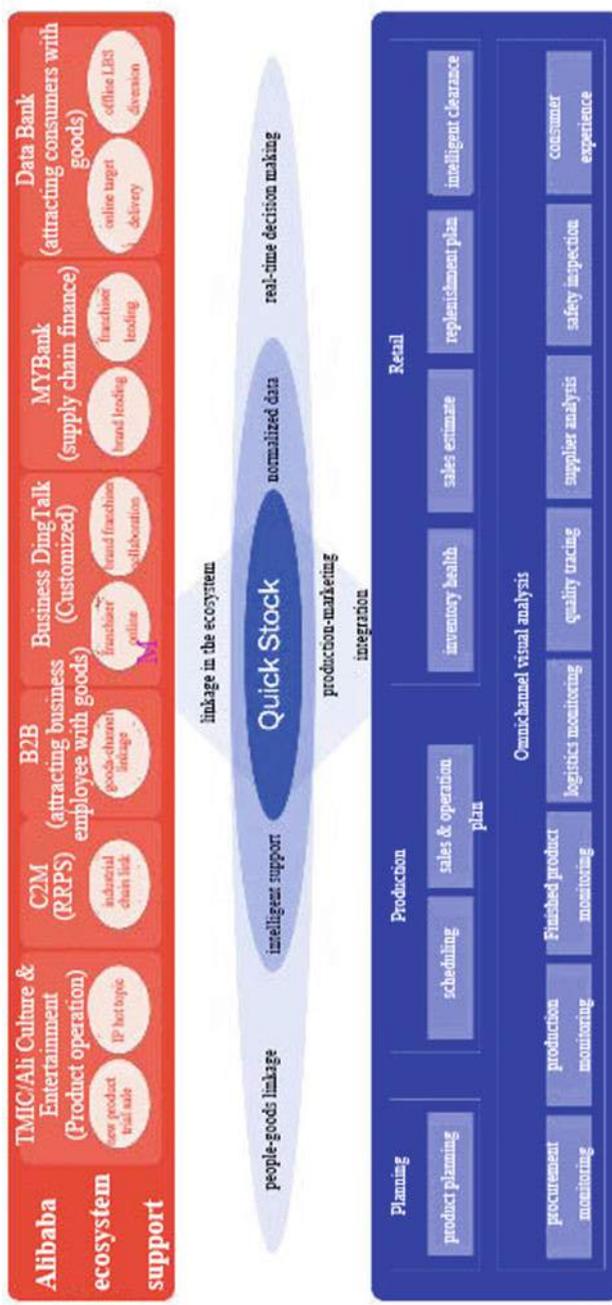
Fig. 8 Quick stock's omni-channel intelligent commodities operation platform
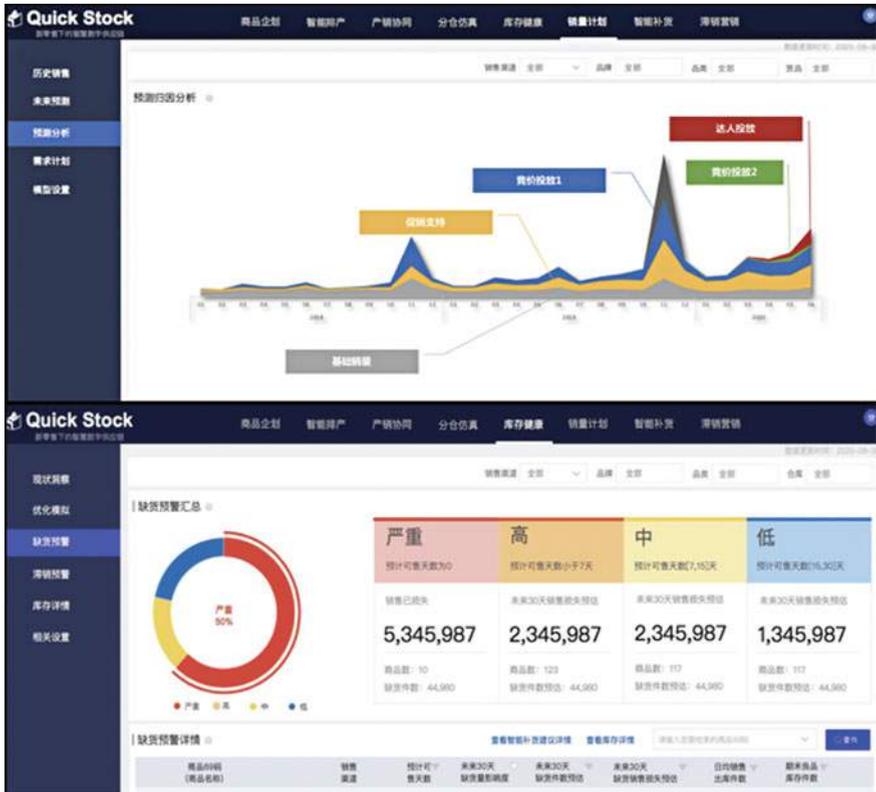
Fig. 9 Predictive attribution analysis of quick stock

3   Alibaba Cloud Helps Enterprises Build Data Mid-End

Alibaba Cloud has a complete set of solutions for helping enterprise build data mid-ends. The whole process is generally divided into 5 steps: ① Digital asset research; ② MRD (Market Requirement Document) blueprint design; ③ PRD (Project Requirement Document) functional design; ④ Data product development; ⑤ Online debugging and optimization. Next, we will introduce the background in which two enterprises build the data mid-end and the implementation points in the due process.

1. **Background and implementation points of JALA Corporation's data mid-end building**

JALA owns 6 beauty brands including CHANDO, MAYSU, Botanical Wisdom, Spring Summer, and COMO, each of which has its own shopping mall channel, KA channel, and e-commerce channel. Since each channel is an independent

operating system, the original system within JALA was chimney-like, resulting in the isolation of data from different brands and channels. It was easy to form data islands and unable to maximize data benefits. For example, the fact that a customer who does not purchase the products of brand A for N days is defined as customer attrition, while it is X days in brand B. Such inconsistent definitions may entail inaccurate overall analysis by business personnel.

Data isolation and fragmentation is the "chronic problems" plaguing many retail companies. How to sort out and organize the data to make it standardized and normalized and to connect the entire link into a closed loop has become the most fundamental appeal of these enterprises in the process of digital intelligent transformation. By sorting out and integrating data that was originally "individually managed", an enterprise's own data mid-end can be built to provide support for its business analysis and insight. This is also an important reason why JALA takes the data middle OOFICE as the starting point of digital intelligent transformation.

In the first phase of JALA data mid-end construction project, Alibaba Cloud conducted screening research, design and analysis on eight domains, namely members, points, consumers, commodities, marketing, stores, BA (shopping guide), and channel sales. According to the research results, the metrics insight dimensions and core indicators are designed, which can provide support for the data of these domains after the mid-end is launched.

The data mid-end can break the original boundaries within the enterprise, and realize the data connection across brands, channels, online and offline, better helping enterprise managers understand and operate data. Therefore, precise marketing strategies can be obtained to carry out consumer group operation and innovative product development.

2. **Background and implementation points of Haidilao data mid-end construction**

Haidilao and Alibaba Cloud have cooperated to develop functions such as online ordering, personalized push, new membership system, omni-channel delivery and offline unified verification, activating the involvement of tens of millions of Haidilao members and increasing the return rate of members. After using Alibaba Cloud's OneData methodology and corresponding products, the IT development cost of Haidilao data mid-end is reduced by more than 30%, as shown in Fig. 10.

It took Haidilao 6 months to complete the migration of CRM data originally on the Siebel, and the reconstruction of core business modules such as marketing, mall, and content center, with more than 20 major functional items launched on the App, increasing the system efficiency by 18–46 times.

Digital intelligence is not exclusive to large enterprises. For small and medium-sized enterprises, only by "embracing" big data can they seize the opportunity to face future competition.
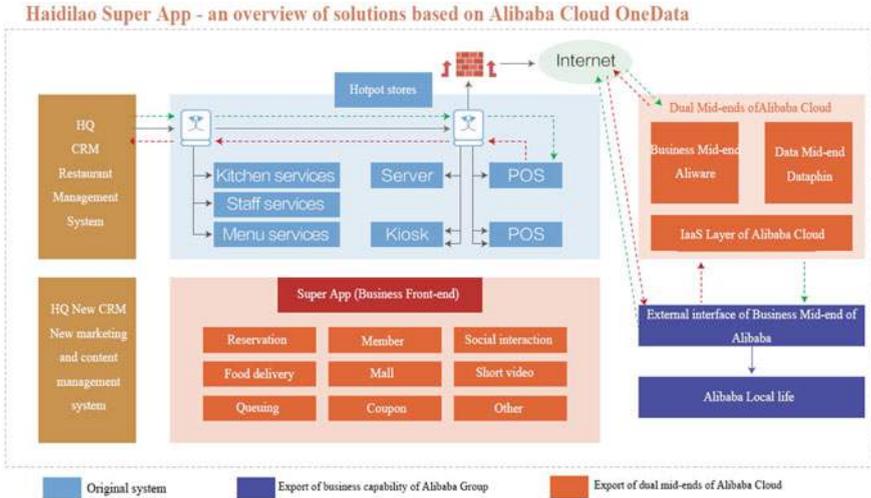
Fig. 10 Haidilao super app—overview of solution based on Alibaba cloud OneData method tool

4 Digital e-Commerce Operations

The annual "Double 11" event is a big test for the operation ability of enterprises. Every year, brand merchants start the plan decomposition and product preparation for the shopping festival in June, "Zhongcao" (recommendation-based marketing strategy) in September, gathering consumers since October 20, and going on sale on November 11. Throughout the entire marketing process, data plays a crucial role.

First, break down the target based on the data. The goals of the "Double 11" campaign can be formulated according to 5 different data dimensions, as shown in Fig. 11. The 5 data results are verified against each other to improve the accuracy of the target.

Fig. 11 Multi-dimensional goal setting
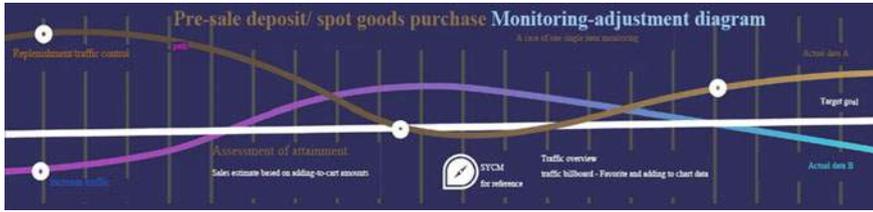
Fig. 12 Chart of monitoring and adjustment of pre-sale deposit/spot purchase

Secondly, select commodities and their pictures for the "Double 11", and make the promotion planning for target consumers according to the data test results. Commodities are analyzed to select those whose analysis results conform to the "Top Item Index" before formulating the stocking plan for "Double 11". At the same time, coordinate the dynamic distribution relationship between commodities and traffic, and make adjustment in real time through data monitoring. According to changes in AIPL data, the buy-to-cart rate, and the consistency between pre-sale figures and plans, it is decided whether to increase the stocking volume and whether to increase traffic exposure, as shown in Fig. 12.

Precision marketing can be conducted by virtue of the digital marketing tool DMP, and omnichannel consumers can be reached through Uni Desk. The authors of this book have drawn a long chart of "Double 11" business operations for readers. For more details, see the folding pages in the book.

5   Omnichannel Digital Operation

The data mid-end is a new infrastructure for the digitalization of enterprises. Alibaba Group believes that it is an intelligent big data system featuring "fast speed", "precision", "omnichannel", "consistency" and "connection", being deemed as the integration of methodology, tools, and organization. Then, how can enterprises improve their digital operation capabilities to achieve growth through the data mid-end? Let's take a look at the omni-channel data operation of enterprises during the "618" event in 2020.

1. **BESTORE**

During the "618" event in 2020, the cumulative sales of BESTORE through all channels exceeded 500 million yuan. The consumer group of the snack food is very large, and more than one billion people in the country can be regarded as potential customers of BESTORE. However, snacks are a category with quite distinct characteristic of random purchases. "Most people usually don't have snacks on their shopping list, but they are more than likely to buy them if there happens to be a snack shelf next to them." This indicates that FMCG brands like BESTORE

must cover as many channels and scenarios as possible in order to drive their performance growth.

At present, BESTORE has more than 1,000 product categories, and its omni-channel membership has exceeded 80 million, covering more than 2,400 offline stores and more than 50 channels such as Tmall flagship store, Ele.me, WeChat mini program, self-operated App etc. "Due to the complex business structure, it is very difficult to run on the original platform architecture". Under this circumstance, it is the BESTORE's priority to connect member information in different channels and finally realize the customer-centered, precise omnichannel marketing.

Therefore, during the "618" event in 2020, BESTORE, with the help of Alibaba Cloud's data mid-end retail industry solution, uploaded its own omni-channel information through Quick Audience, and conducted in-depth analysis of potential customer groups in Guangzhou and Shenzhen. It developed consumers that purchased only from one channel into multi-channel clients who bought both online and offline, which improves consumer stickiness. Besides, it tried to attract new customers via online and offline multi-channels to increases the repurchase rate of products. At the same time, Alibaba Cloud's data mid-end retail industry solution also helped BESTORE to link its physical stores, Light Store (mobile Taobao's mini program) and the store on Ele.me, achieving the goal of attracting its customers on Light Store and Ele.me to physical stores.

2. **Biostime**

During the "618" event in 2020, through the omnichannel in-depth marketing, Biostime achieved a sales increase of 83% over the same period in 2019, setting a record of 10 million yuan in sales and becoming a leader in the industry. Biostime abandoned the traditional marketing methods in the past, and echoed the topic of the variety show "Summer of the Band" by marketing "baby's summer" featured with the elements of "summer" and "music". Such marketing strategy was taken as being warm, novel, and creative, binding its brand reputation with sales during the "618" event. In the early stage of the event, Biostime continued to attract people's attention by placing star advertisements and "planting grass" (marketing) on products. Throughout the whole event, it resorted to the app open ads on Tik Tok (Chinese Douyin), Baby Tree, Weibo, Amap, UC, and Youku etc. to reach the fans, covering multiple scenes of mother groups and entertainment life. It was worth noting that its exposure on Douyin exceeded 74 million times, with the topic of "baby's summer" being continued to be "hyped". By virtue of perfect brand exposure and conversion links, efficient communication with consumers has created a large pool of potential customers for the warm-up of "618" activities.

It is often difficult to attribute the sales to the brand's market behavior, as brand and sales are separated, forming a dilemma of isolation between "brand reputation" and "sales effect". Biostime, however, turned to the digital precision marketing to effectively utilize the influx of people from other channels and convert the potential brand audience to its consumers.

Fig. 13 New Haoxuan doors and windows' new retail live in Taobao during "618"

In terms of the operation of old customers, Biostime paid more attention to the presentation of optimization mechanisms and the exposure of promotion mechanisms in addition to formulating product mechanisms and gameplay for old customers during the "618" promotion. Through continuous adjustment and optimization, the exposure rate of old customers of the store hit as high as 87%, and the repurchase rate of old customers reached 6.4% during the "618" period in 2020.

3. **SUNHOHI**

In 2020, SUNHOHI Smart Home Technology won the first place among the home improvement custom window brands the first time it participated in the Tmall "618" event. From June 1st to June 20th, 2020, the total sales of doors and windows of SUNHOHI in the Tmall exceeded 30 million yuan.

During the "618" event, SUNHOHI adopted the most advanced green screen technology in the new retail live broadcast on Taobao.com (as shown in Fig. 13) to realize the 3D presentation of the home scene, making consumers feel as if they were in the scene. The application of green screen technology was the first time in the live broadcast of the door and window industry.

At the beginning of May 2020, SUNHOHI had begun to carry out new retail training in 16 provinces, with more than 2,000 store staff participating in it. Among more than 1,800 stores nationwide, more than 600 stores had joined Tmall New Retail, and completed store training for Tmall events and new retail workbenches. Online and offline digital operations covered the entire process, and there were 5 conversion links for the digital monitoring: exposure click rate, online deposit purchase rate, store reception conversion rate, fire phoenix (Tmall home improvement new retail product) sales verification rate and user's positive review rate and sharing rate.

The digital touchpoints recorded the store's assessment of the reception conversion rate and verification rate, and the BI system displayed the store's performance

and conversion rankings in real time. Online and offline shopping guides cooperated to complete the order and shared the bonus pool. Alibaba's new retail system was used to manage the operation process and control the sales results in real time.

The digital practice of merchants in the "618" event reveals that digital operation is the core, centering on which the setting of sales targets, marketing promotion, and conversion monitoring are carried out. Digital operations control the entire process, with each operation link being able to be adjusted and optimized. If the process is manageable, the result is controllable. Compared with businesses without data support, businesses with digital operations are more like guided missiles, dynamically adjusting targets and modifying paths in real time, which can accurately capture market variables and conduct precise marketing to target groups.

6 Summary

This chapter mainly introduces the following points.

(1) Digital operations can more effectively coordinate various resources of the enterprise, make predictions through data, and judge the role of operational behaviors and elements, so as to achieve rapid iteration and adjustment. The construction of a digital operation mode requires the support of dual mid-ends, namely business mid-end and data mid-end.

(2) Alibaba Group provides Dataphin, Quick Audience, QuickBI, Quick Stock and other products to allow enterprises to build their own data mid-end, realizing intelligent growth of users and intelligent operation of goods through all channels, and visualizing the real-time data in the business process.

(3) In the cases of e-commerce digital operation and omnichannel digital operation, JALA, Haidilao, BESTORE, Biostime, and SUNHOHI are taken as examples to illustrate how digital intelligence influences the operational mindset of the enterprise from partial to the whole, and makes the company more competitive.

Decision-Making Intelligence

Dongying Hong

Decision-making intelligence is the last step in the pentalogy of an enterprise's digital-intelligence transformation, and it is also the necessary process undertaken by the enterprise to change its development strategy from "business-driven" to "data-driven". With the expanding application of big data analysis technology, the intelligent scenarios in the enterprises are also constantly enriched. Through continuous training and learning of big data, decision-making intelligence is capable of making more reasonable decisions, and forming a virtuous closed loop of learning feedback, which will ultimately help enterprises achieve efficient decision-making across the full link.

1 What is Decision-Making Intelligence

In 1978, Herbert Alexander Simon, the American Nobel Laureate in Economics, proposed that the essence of management is "decision-making", and the two prerequisites for the establishment of optimal decision-making principle are "rationality" and "efficiency". The essence of decision-making, plainly speaking, is to enable the right people to make decisions in the right way at the right time. Data-driven decision making is a whole process in which decision-makers analyze the data related to the decision-making objects, dig out the information about the preference relationship between the decision-making objects implicit in the data, and

D. Hong (✉)
Taiwan, China
e-mail: guowei@phei.com.cn

then classify, grade or rank the decision-making objects according to the obtained information before making decisions.

Decision-making intelligence refers to the ability to build big data analysis based on automation and equipment intelligence, enabling "data" to be transformed into "insights", and then generate actions from insights. It enhances the insight analysis ability technically, as well as from the perspective of organization, control and capability, truly ensuring the smooth operation of the "perception—insight—assessment—response" closed loop and its cyclical improvement. In short, decision-making intelligence is resorting to the algorithm design of deep learning, optimization technology, and forecasting technology in the scenarios of human scheduling, cargo allocation, and resource optimization, etc., to enable intelligent decisions on precise marketing, computing resources, revenue management, risk control, smart logistics, delivery scheduling, industrial manufacturing scheduling, aviation, and power market, etc.

Statistics show that if the intelligence of enterprise data is increased by 10%, the quality of its products and services can be improved by about 15%. The new trend of our time is, therefore, the construction of intelligent decision support system. According to Gartner's estimates, by 2030, intelligent decision making will surpass all other types of AI activity, accounting for 44% of the global AI-derived business value.

2   Essential Steps to Decision-Making Intelligence

The decision-making process is the most complex function in the human brain, and decision-making intelligence is a world-class problem. It is difficult to realize decision-making intelligence mainly for the following reasons.

- Decision making is a process that integrates subjectivity and objectivity, reason and emotion. Currently, computers are only good at dealing with rational computable parts, and better modeling and approximation paths are needed.
- There is a slew of factors that affect decision making. It is necessary to have the ability to identify and extract effective information from the pools of data permeated in the decision-making environment, and to reason and make assumptions about the unknown information as well.
- Scenarios that use decision-making intelligence in various industries often require real-time decision making, and even high-concurrency decision making. The recommendation results that need to be returned to users in the Internet are usually in milliseconds, which poses great challenge to the system architecture.

No matter how difficult it is, new infrastructure technology is making continuous progress, and decision-making intelligence technology is surging. With various expert platforms contending with each other, traditional enterprises do not need to recruit a group of intelligent professionals to develop decision-making intelligence

tools, as there is no need to "reinvent the wheels". Nevertheless, due recognition is necessary, just as proper preparation. God helps those who help themselves.

2.1 Two Important Steps for Decision-Making Intelligence in Traditional Enterprises

First of all, it is necessary to ensure the core business online, to wit, all business processes being dealt via software, ensuring traceability of all procedures and business. In fact, for the vast majority of enterprises, the first step in realizing enterprise intelligence is to make core business online, migrating traditional services online through digitization and software.

Secondly, it is necessary to complete the automation of business links and the operation digitalization, which means using data mid-end technology to build a customer operation system. After this condition is met, the core business of the enterprise can be built on the "cloud", and driven by software, making it possible to evolve into intelligence. After that, the intelligence of enterprises can be truly realized through artificial intelligence technology. Enterprise intelligence is a "decision-making machine with learning competence", which can not only realize automatic decision making, but also continuously optimize and improve the efficiency and effect of decision making through the closed loop of learning. As mentioned in the case of "Rt-Mart" in Part IV of this book, after nearly a year of adjustment and learning, RT-Mart has begun to fully use the intelligent system to predict online orders, to be specific, the orders of each store every day. The accuracy rate has exceeded that of manual prediction, reaching more than 90%.

2.2 Building Intelligent Brain Via Cloud Business, Data Integration, and Application Innovation

In view of the practical experience of Alibaba Group in realizing intelligence, enterprises can start building the intelligent brain of enterprises from the following three aspects.

1. Break Down Information Silos

Information silos occur when data within an enterprise is incompatible, which is usually caused by the unbalanced business development and the sequential relationship of technological development. When describing the same business concept, the business system and the technical system use different data models, resulting in the inability of the data to be connected. In addition, a large amount of data also exists offline, such as in the form of paper documents, legal documents, and reimbursement bills, etc.

2. Deep Integration into the Application

Integrate AI into applications in an "industry + AI" fashion. Although the internal organizational functioning in traditional industries is relatively mature, there are still a large number of manual operations, which are inefficient and prone to errors. The intervention of AI can enhance operational efficiency.

3. C2B Migration

Successful AI experiences in C-type applications can be applied to B-type applications. Despite the differences between C-type and B-type applications, some good experience and technical practices in C-type application can be used in B-type application scenarios, effectively shortening the construction path of the enterprise's intelligent brain.

When the "big wave" of digital-intelligence transformation is coming, there is not much time left for people. For traditional enterprises, especially non-digital aboriginal enterprises, the easiest way to achieve multiplier effect is precisely the decision-making intelligence of business "scenarios" under the original knowledge structure of the industry, and in-depth exploration of how to deepen the online business and operation digitalization. Do more with less!

3   Application Scenarios of Decision-Making Intelligence in Various Industries

At present, the management of most enterprises in China is still in the stage of sorting out or building business rules, with only a few having entered the automatic prescriptive analytic phase. Of course, this is mainly due to the fact that the important premise to achieve intelligence mentioned in Sect. 2 is not ready. We, however, can "make it a big deal". Just like technical experts writing code, we can adopt the "divide and conquer" manner to select important, urgent and appropriate "scenarios" for their own enterprises to begin under the inspiration of some intelligent decision-making cases. Therefore, this section will introduce some representative application scenarios of decision-making intelligence in the industry.

3.1   Smart Shopping Center

There is a large shopping mall in Shenzhen that has introduced the business intelligence system very early in China. Its managers fully explore and utilize existing massive data to extract meaningful information to assist their decision making. Empowered by consistent and accurate data, more timely response speed, more flexible and powerful analysis tools, and richer business analysis support, managers

are capable of discovering business opportunities and risks hidden underneath in a timely manner. Some application scenarios are listed below.

(1) Decisions on the monthly sales assessment system and the marketing plan of the shopping mall are made based on the multi-level analysis of sales data, the operation of each store and counter, the year-on-year and month-on-month measurement of historical data and current data, and the gap between actual sales and planned sales. For example, by making month-on-month, year-on-year and horizontal comparisons of the actual sales of counters in the day, week, month, and year, it provides data support for evaluating the performance of branches, floors, and counter groups, as well as sales ratios, differences, and growth rates of other branches. Therefore, shopping malls can analyze the growth trend of counter operating performance, and have a clear idea of the performance and the advantages and disadvantages of counter sales in each branch.

(2) Mine various information hidden in the price. By analyzing commodity prices, the mall can better understand the price of the target commodity category to design the display based on the price distribution, and to determine the commodity price in the shopping mall or the most appropriate selling point, all of which serves as the basis for the decision makers to position the commodity category, and introduce or discard certain commodities. For example, the price elasticity of commodities is often analyzed, and the sensitivity of demand to price change is also measured by calculating the elasticity of the commodity's week-on-week sales and price within a week before and after the price adjustment takes effect. Changes in the price of goods and demands can be used to grasp the price elasticity of the commodities, improve the sales volume and the investment income of promotion, and can also be used as data support for pricing when in cooperation with suppliers.

(3) Use promotional data to evaluate benefits. Each promotion is analyzed to discuss whether the promotion can really help the salesperson, how it actually works, and how to improve it later. For example, in terms of the sales volume of the promotional commodities, the sales growth driven by the promotional price changes, and the sensitivity of the relevant promotional items to the price are analyzed by comparing the sales amid the promotion with those before and after the promotion.

The relevant basic business data is centralized in the data mid-end, and after a series of data processing, front-end tools and technologies are used to enable the analysis and query of various businesses. Meanwhile, on the basis of the data mid-end, a reasonable business analysis application platform is established to provide a comprehensive and efficient data analysis for the company's managers and functional departments of operation, investment attraction, procurement, finance, and customer service, thereby offering better intelligent decision-making support for the operation and management.
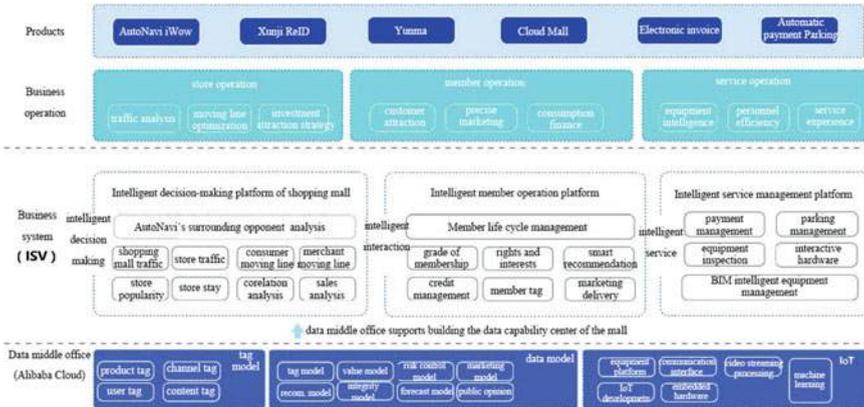
Fig. 1 Solution for product architecture of intelligent shopping center

Fig. 2 Big chart of solution for intelligent shopping center

Figure 1 shows the product architecture of the smart shopping center solution and Fig. 2 shows the big picture of the smart shopping center solution.

3.2 Intelligent Infrastructure in New Energy Industry

Alibaba Energy Cloud is a rich set of professional cloud business and technical solutions for the new energy industry, helping energy operators and service providers to quickly build standardized or customized business platforms, so as to

realize flexible development and implementation of business applications, and to be able to build a new ecology of energy interconnection.

Alibaba Energy Cloud reduces energy consumption and optimizes energy strategies through real-time energy monitoring and analysis.

The applicable scenarios of Alibaba Energy Cloud include the rapid construction of digital photovoltaic power plants, new energy power plant planning and investment income forecasting, rapid construction of electric vehicle time-sharing rental systems, lean construction of electric vehicle networking according to scale, the use of big data for precise energy efficiency management, and construction of lightweight large screen of operational data.

The above solutions have the following advantages.

- Comprehensive perception: Use Alibaba Cloud IoT solutions to comprehensively perceive massive and heterogeneous energy-consuming device data, reducing data access costs and performing high-compression storage.
- Panoramic insight: By using DataV component technology rather than the complex configuration software, professional large screen can display the dynamic information of the integrated energy platform, enabling customers to intuitively perceive the data.
- Innovation incubation: Adopt enterprise-level Internet architecture microservice products to enhance the comprehensive energy service capabilities against the fierce competition.
- Data decision making: Use Alibaba Cloud's one-stop data development platform, Dataworks, to support decision making on comprehensive energy services with data, such as ROI, marketing effects, and customer selection.

Figure 3 shows the smart energy service platform.
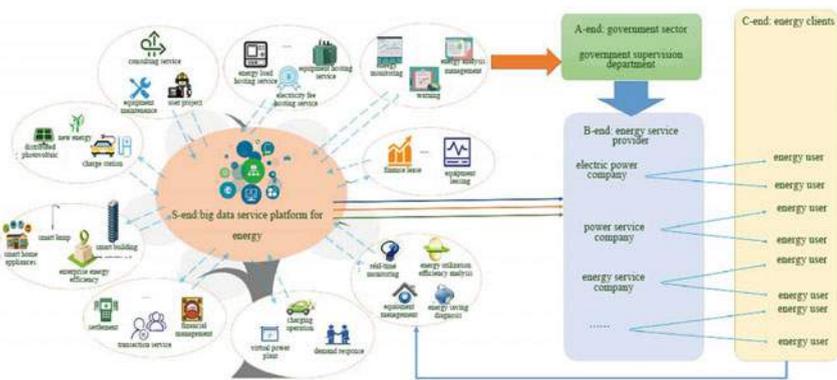
Fig. 3 Smart energy service platform

3.3 Smart Agriculture Brain

Alibaba Cloud combines artificial intelligence with various industries ranging from urban management, industrial manufacturing to agriculture. ET Agricultural Brain is an end-to-end closed-loop "data + analysis + decision-making" product system of Alibaba Group's self-developed key agricultural core technologies. Having been verified by the example of in-depth industry integration, this product is committed to major agricultural industries to nurture 16 industry engines, and has passed the best practice test of customers in many fields.

ET Agricultural Brain has an optimal product architecture and convenient access. It is deployed on Alibaba Cloud's public cloud, featuring low cost, modular on-demand services, convenient upgrades, and fast service response. Like other Alibaba products, ET Agricultural Brain is also a platform co-created by Alibaba's ecological partners. It connects Alibaba Group's new retail, new finance, and logistics through data, and links to Alibaba's global markets, customers and warehousing in real time. At present, the project is applied to the fields of pig farming, apple planting and melon planting, and is capable of digital file generation, full life cycle management, intelligent agricultural analysis, and full-link traceability, etc.

4 Scenarios and Value Creation of Decision-Making Intelligence in ABOS 11 Elements

The scenarios in which decision-making intelligence has been achieved via Alibaba Cloud in different industries such as retail, logistics, agriculture, and energy have been introduced previously. This section mainly discusses the scenarios and value creation of decision-making intelligence in ABOS 11 elements.

1. Brand

In terms of the business element of "brand", decision-making intelligence has been applied in the analysis of market positioning, competitive advantages and disadvantages, market opportunities, accurate spokesperson/KOL (Key Opinion Leader), and accurate media.

In 2020, Tmall's "Double 11" event opened a special session for new brands for the first time. According to incomplete statistics, on November 1, the turnover of more than 1,800 new brands exceeded that of all the new brands in the whole day of "Double 11" in 2019, with the turnover of 94 new brands increased by more than 1000%. The growth rate of new brands on Tmall from 0 to 1 was getting faster, and presented a "phenomenal explosion" in particular in 2020, which was completely different from the single-point growth in previous years. How can a large number of new and cutting-edge brands grow quickly and even surpass traditional big names within just a few years after their establishment? It can be attributed to consumers' recognition with the new brand, especially the lifestyle that the new

brand represents. Enterprises develop brand positioning based on consumer data analysis and interactive feedback on Tmall and Alibaba platforms, providing value innovation for different customer groups, and achieving brand development.

The inherent reason for the above phenomenon is that enterprises realize the data-driven brand operation by accumulating multiple data such as brand marketing, public opinion, and behavior preference. They build intelligent algorithms to empower brand operation and decision-making scenarios, which enables the accurate matching of brand strategy and tonality with target groups, real-time grasp of trends of brand public opinion, and the conversion and continuous operation of brand loyalty groups.

2. Commodity

In terms of the business element of "commodity", decision-making intelligence has been used in accurate mining of new opportunities in incremental markets, fashion trend prediction, smart pricing, intelligent product selection, and intelligent commodity combinations.

Take Li-Ning Company as an example. It used to be confronted with the problem of brand aging for a long time, estranging itself from the new consumer group. Since 2019, Li-Ning Company has cooperated with Alibaba Cloud to jointly build digital stores by using technologies like cloud shelves, Yunma, and IoT; they have also jointly built a data mid-end and developed high-end applications such as selling point analysis and intelligent commodity combinations based on the mid-end. Today, Li-Ning can quickly and accurately analyze the popularity of different product categories through in-depth data mining on categories, commodities, competing products, and consumer demand. At the same time, by virtue of the connection of touchpoints, its awareness of consumers is strengthened, being able to better serve consumers. Li-Ning brand, which is now in its thirties after the establishment, is getting younger and younger, with its revenue from merchandise sales continuing to rise.

Here is an example of smart replenishment. In Bosideng's "Retail Cloud" project, dealer warehouses were cancelled in the pilot area, and the supply chain system would automatically replenish dealer stores and directly-operated stores, saving inventory costs. Using online big data to monitor supply chain inventory nodes is quick and efficient, enabling appropriate inventory allocation at the right time and at the right node. In addition to reducing the structural shortage of retail outlets through inventory integration, collaborative production resources, and rapid replenishment, it also applied the systems of store passenger flow and store inspection, store dashboard analysis, and card-free payment; by virtue of the big data analysis, it transformed the operation and management model of traditional stores to improve the operation efficiency; and it reduced the out-of-stock rate of stores through big data analysis, which has led to a double-digit increase in store performance year-on-year.

3. Manufacturing

In terms of the business element of "manufacturing", decision-making intelligence has been applied in intelligent manufacturing, production capacity prediction, and production defect monitoring, etc.

The decision-making intelligence in the manufacturing process is a leap from manufacturing to "intelligent manufacturing".

By organically integrating digital touchpoints such as sensors, smart machines, industrial robots, smart workshops and employees, the data on equipment, production, and interactive behaviors collected by the touchpoints can be guaranteed to be accurate. At the same time, core businesses such as procurement and production scheduling are available online and open to collaborate with the ecosystem, truly achieving efficient integration and collaboration from demand to production. Besides, data mining can facilitate more accurate demand forecasting, more efficient manufacturing modeling and simulation, thereby ensuring high-quality, efficient, clean and agile production with low consumption.

For example, in the production process of photovoltaic slices, there are thousands of production parameters that affect the yield of slices, such as mortar temperature, and mortar density. Slight changes in any variable will directly affect the final product. Through Alibaba Cloud's big data analysis algorithm, all variables collected during the production process of Suzhou GCL Photovoltaic Technology Co., Ltd. can be analyzed to find out the key variables most related to the yield. "Based on these key variables, a production parameter monitoring model is built for the company, and these variables are analyzed during the production process. Once the variables exceed the model range, the monitoring system will give an early warning." After the first-phase implementation of the project, the company saved tens of millions of yuan every year. In this case, the "small" goal is not hard to reach.

4. Channel

In terms of the business element of "channel", decision-making intelligence is applied to integrate the omnichannel customers, commodities, inventory, and order data, and enrich the intelligent applications in channel positioning, intelligent location selection, and customer insight, thus empowering stores, dealers and other partners. It not only improves the overall channel management level, but also guarantees consistent experience across all channels.

Take intelligent site selection as an example. In order to attract surrounding customers into the store, Chongqing Shin Kong Place adopts AutoNavi's intelligent location selection solution. By taking the location of the shopping mall as the center point to quickly analyze the characteristics of surrounding consumer groups, their consumption habits, and job and housing distribution, it can accurately reach potential consumers and existing members via the Alipay mini program and then attract target consumers to the store for consumption with coupons.

5. Marketing

In terms of the business element of "marketing", decision-making intelligence is applied to emerging digital touchpoints such as live broadcasts, Internet celebrities, short videos and social media. Buried points are harnessed to collect the omnichannel data, creating portraits for precise customer group and members. Then, relying on technology and data to allocate marketing resources to realize full-link online automation of marketing activities including planning, execution, and optimization, it can accumulate the data on customers and events, and third-party data to form data insights and optimize marketing input and output, thus achieving accurate marketing access to consumers and consumer asset operation in the full marketing life cycle.

The complete advertising delivery process of Alibaba Group's one-stop smart advertising network is as follows: from real-time budget allocation optimization, omni-media delivery strategy coordination, crowd insight and crowd recommendation, to creative synthesis and creative optimization, brands can obtain a complete intelligent marketing strategy, if marketing demands are given, thus realizing an all-round one-stop marketing. For merchants, accurate marketing delivery based on the real-time demands of consumers can greatly improve the delivery efficiency. AI can analyze consumers' shopping habits and browsing habits. For example, if a consumer likes a certain dress, AI can guess whether the consumer prefers the color or the tailoring style of the dress, and then draw on the consumer's behavior to achieve high-quality matching between consumers and merchants.

6. Retail

In terms of the business element of "retail", decision-making intelligence is applied to digital touchpoints such as adding smart shelves, electronic price tags, passenger flow identification and interactive screens. Consumer experience data is collected to give full play to the advantages of omnichannel touchpoints and integration scenarios, enabling the delivery of a rich consumer experience. Data on consumers, commodities, orders, inventory, and interaction behavior is integrated to form business insights, supporting the decision making on intelligent product selection, passenger flow analysis, and operation analysis. Meanwhile, it empowers the front line sales by boosting its performance, improving consumer experience, and promoting consumption conversion.

"Visualized Analytics Dashboard of Business Operation" is a set of overall solutions. By establishing a unified data and computing platform, it can analyze and display spatiotemporal big data with operation data as the core in the operation management and decision-making scenarios featured with multi-business types and multiple projects. Besides, it is able to collect and process core data such as revenue and contracts, store sales and customer flow, membership and services in the process of business operations, and conducting visual management of the entire business process based on spatiotemporal data. It is subdivided at the application layer as follows.

Under the theme of investment promotion, rental management application can visualize the rental situation of shops, providing data support for rental decisions, and enabling the shop rental issues to be dealt with quickly.

Under the theme of operation, the application of customer flow statistics can carry out high-precision analysis and statistics on the consumer distribution for effective marketing and promotion; provide rich and accurate passenger flow information for the settled merchants; and assist shopping malls to conduct lease negotiations with merchants and suggest operations based on actual data, with the aim of achieving refined operations, improving management efficiency, and reducing operating costs.

This system has been put into use in several large business groups. Through the analysis and display of spatiotemporal big data, it can effectively solve the needs of macro and micro data, information reporting and decision making in the process of business management, while the innovative visual interaction method has truly created a workflow featuring problem finding, cause analysis, work order push, problem-solving feedback and record tracing. Besides, the practical operational management "cockpit" it builds helps major commercial organizations get rid of the management efficiency crisis, reduce labor operation costs, and finally enable shopping malls to carry out intelligent management, seizing industry opportunities. Figure 4 shows the management analysis dashboard of the shopping mall.

7. Service

In terms of the business element of "service", decision-making intelligence has been applied to intelligent customer service and public opinion analysis. It improves service efficiency through interaction, linking, and experience to ensure experience effect and satisfaction. Through the link between IoT devices and digital commodities in the full scenarios, intelligent resource scheduling and knowledge base iteration capabilities are built to improve service accuracy.

In recent years, more and more brands have begun to provide online services. Different from traditional brick and mortars, online services largely determine the first impression of new customers on the brand, and also affect the loyalty of old customers to the brand. It is, therefore, the general trend to improve service intelligence. Digital upgrades at all touchpoints have been carried out and the data of traditional offline service centers on consultation, complaints, returns, on-site maintenance and inspections have been collected to provide business services such as online training and learning, and work order management. On the basis of technological, digital, and product capabilities, combined with Alibaba Group's 20 years of service experience and human resource scheduling system, a complete set of service solutions has been formulated, with intelligent functions such as self-service and refund available, which not only helps merchants reduce service costs and improve service efficiency, but also creates reverse value-added income for them.
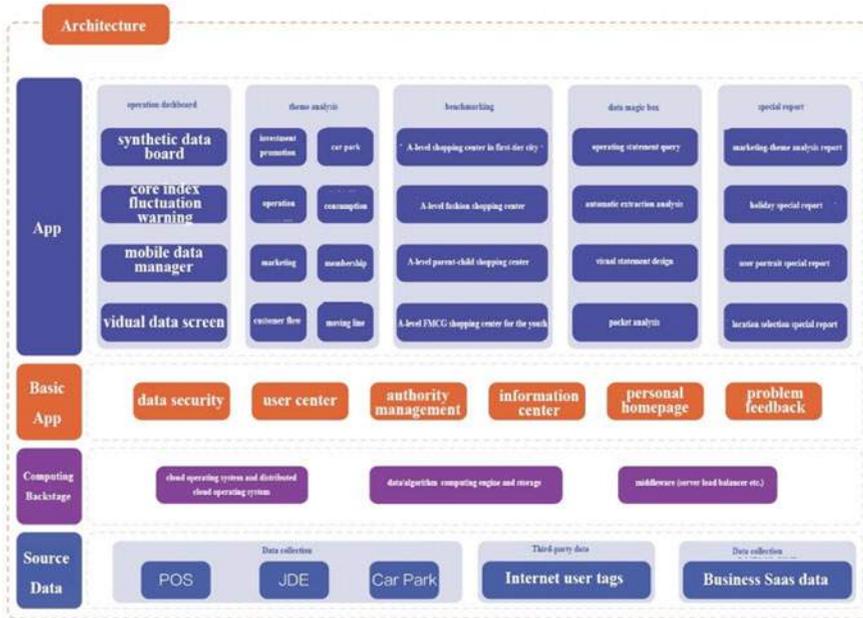
Fig. 4 Kanban of shopping mall management analysis

8. Logistics

In terms of the business element of "logistics", decision-making intelligence has been applied to digital touchpoints such as automatic sorting, unmanned forklifts, automated vehicles, UAVs, and smart containers, and it is available in the logistics warehouses, trunk lines, "last kilometer" delivery and terminals. Data and business online functions are applied in scenarios such as route optimization, safe transportation, product traceability, and cold chain control. Through the extraction and modeling of core data such as warehousing, routes, inventory, and human–computer interaction, it analyzes and optimizes warehousing layout, inventory quantity, logistics routes, and collaborative delivery to achieve eco-platform-based smart logistics of high-efficiency.

A logistics system used machine learning technology to predict the sales volume of goods, the workload of each link, and the timeliness of operations, and established an optimization model at the planning layer according to the predicted results. By creating an operation optimization algorithm, it obtained the optimal storage area and shelf type combination scheme of the warehouse. Therefore, a series of layout optimizations have been carried out on product listing suggestions, inventory suggestions, replenishment plans, and tally plans, which have increased the utilization rate of warehouse capacity by 42% and the overall operation efficiency by 35%.

Smart Supply Chain's Digital Brain

Cainiao's Digital Supply Chain Brain, through the combination of digital warehouse division, digital prediction, and digital decision making, helps merchants drive the supply chain upgrades via the digital intelligent technology to be more efficient and intelligent.

At the same time, intelligent warehousing and distribution, supply chain's intelligent full services, and business flow linkage services are available. The digital supply chain brain launches the following three products.

- Warehouse Distribution Tool: Help merchants divide warehouses more scientifically, so that products are closer to consumers, enabling them to have a better time-sensitive experience.
- Prediction Tool: Utilize the CPFR tool featuring sales forecast, production and sales planning, and replenishment to make merchants turn around faster and release more funds. It is worth noting that the sales forecast function which remains at the top level can predict the SKUs and the sales of sub-warehouses in the next 4–13 weeks.
- Data Tool: Drive digital operations and make decision-making more scientific through visual data dashboards.

Many Tmall merchants have yielded good results from the excellent supply chain with the help of the digital brain. For example, the turnover days of P&G Tmall flagship store's merchandise decreased from 73 days in 2018 to 29 days in 2019.

In fact, with the in-depth development of digital commerce, there are more digital marketing methods available on e-commerce platforms like Tmall, and the digital coordination of supply and demand is becoming more urgent, thus setting higher requirements on digitalization and intelligence.

For example, in the big promotion activities, preparing the goods in advance to ensure the same-day delivery or hour-delivery of pre-sale goods could only be possible with the digital and intelligent logistics supply chain. Cainiao's supply chain brain connects the front-end sales and the back-end of the supply chain, thus enjoying unique advantages in business big data, computing power and algorithms.

9. Finance

In terms of the business element of "finance", decision-making intelligence is applied to corporate/individual credit investigation, supply chain finance, and online mortgage-free credit loans for e-commerce merchants.

For merchants, the annual "Double 11" event is a "big test" for its supply chain finance. On the one hand, a large amount of fund is needed for stocking. On the other hand, the procedures for small and medium-sized merchants to borrow from traditional financial institutions are cumbersome and the approval takes long time. What's more, as the turnaround time of merchants is getting faster, it is even more difficult to match the efficiency of loans with sales. All of these will lead

to rising operating costs and increasing business risks. Now, however, merchants no longer have to worry about it. The business history of merchants on Tmall will accumulate into a credit record, which will become an important reference for financial institutions to lend. In addition to precision financing, Alibaba Group also uses a complete set of visualization systems to help merchants accurately control marketing and operation to improve the efficiency of fund collection and payment, accelerating the operation of the entire supply chain logistics and the high-speed capital flow. This will reduce the overall cost of the supply chain and improve the overall service level.

10. Organization

In terms of the business element of "organization", decision-making intelligence is mainly used in RPA (Robotic Process Automation), intelligent matching of human resources for candidate selection, employment, and assignment (intelligent promotion assistance system reduces subjective bias) and other scenarios.

When it comes to personnel promotion, a team of a certain size usually encounters the following two questions: which candidates have promotion potential? And among these candidates, who meets promotion standards better?

In the past, it was the supervisor who decided on the promotion, which inevitably brought about bias. It is no longer the case now. Assisted with the AI, the subjective bias caused by human operation in the decision-making process can be minimized.

At present, the AI decision-making of the intelligent promotion assistance system is mainly used in the nomination and review stages. For entry-level and mid-level positions, the intelligent promotion assistance system has achieved 98% prediction accuracy, and can cover 40% of the potential promotion crowd. For a large group like Alibaba, this figure is of great help in improving corporate efficiency.

In addition, Alibaba Group has created an interviewer evaluation model for employee promotion work.

The interviewer's skills and maturity directly determine the efficiency and effectiveness of the recruitment. Unlike the intelligent promotion assistance system, the interviewer evaluation model lacks objective historical data. In this regard, when building an interviewer's evaluation model, it is necessary to choose an active learning method, which combines manual modeling with machine modeling. In the manual modeling stage, expert experience is deeply introduced to generate directional indicators, and then through the manual annotation results of the samples, the data is adjusted until the final interviewer evaluation model is generated.

After obtaining the manually labeled data, the machine modeling stage will start. In this stage, an automatic model will be obtained and features can also be mined from the data, such as which characteristics the interviewer conforms to and which tendencies the interviewer has. These data features can be used to assist manual modeling and labeling.

Through Active Learning, this interviewer evaluation model can achieve more than 90% accuracy in evaluating interviewers and cover 20% of interviewers. Although the percentage of 20% itself is not large, it is sufficient enough to support the recruiting team to conduct interview skill training, follow-up review and other corresponding operational adjustments for interviewers.

11. Technology

In terms of the business element of "technology", decision-making intelligence is applied to cloud-native (defined in Chap. 16 "Infrastructure Cloudification" in Part III) architecture definition and design principles (process automation principles). On the basis of software delivery standardization, automation is achieved. By configuring data self-description and final-state delivery process, automation tools can coordinate delivery goals and environmental differences to automate software delivery and operation and maintenance. This is also the continuous optimization and value creation presented by artificial intelligence after it integrates digital new infrastructure such as cloud computing, big data, Internet of Things, mobile Internet, and blockchain.

It is precisely because of the value that cloud native technology brings that STO Express decided to use the public cloud as the main computing resource. After many technical exchanges with Alibaba Cloud, STO Express finally determined Alibaba Cloud as the sole partner to provide it with a stable computing and data processing platform. At present, STO Express handles tens of millions of orders per day with hundred millions of logistics trajectories, generating 1 TB of data every day, which requires more than 1,300 computing nodes to process services in real time.

The head of STO Express's cloud platform mentioned that with the growing business of STO Express, the adoption of cloud-native architecture solutions can solve the problems such as the slow upgrade of traditional applications, bloated architecture, and inability to iterate quickly. Through the comprehensive transformation to a cloud-native architecture system via Alibaba Cloud, remarkable results have been achieved in the four dimensions of cost, stability, efficiency, and business empowerment. The value brought by these cloud-native technologies is the core driving force for STO Express to use public cloud as its main computing resources.

5   Summary

Decision-making intelligence is what enterprises yearn for, which will help them transform from "business-driven" to "data-driven". This chapter mainly elaborates on the following aspects.

(1) Decision-making intelligence means that the enterprise resorts to the algorithm design of deep learning, optimization technology, and prediction technology based on big data to make decisions intelligently on various business activities in the scenarios of manpower scheduling, goods allocation, and resource optimization, etc.

(2) Enterprises realize decision-making intelligence through "business online, data integration, and application innovation".

(3) Decision-making intelligence realizes the data value for customers of different industries, including intelligent location selection and intelligent marketing.

(4) The presenting scenarios and value creation of decision-making intelligence in ABOS 11 elements.

To enable the transformation from empirical decision-making to "data + algorithm" decision-making, enterprises need to continuously mine, aggregate, and analyze consumer data, and the data on R&D, production, and supply chain, and then build a new decision-making mechanism based on "data + algorithm" to replace the traditional empirical decision-making mode.

Pioneers of Digital Intelligent Transformation

RT-Mart: A Digital and Intelligent Leader in the Retail Industry

Fuming Chen

In 1998, RT-Mart opened its first hypermarket in Shanghai. In the following ten years, RT-Mart's turnover had achieved explosive growth by virtue of its strategy of opening stores in second and third-tier cities, an extremely refined store operation plan, and a mixed management model of centralized headquarters and decentralized stores.

As of 2009, RT-Mart had opened 143 stores in 21 provinces, municipalities and autonomous regions across the country, with its annual turnover reaching 40.4 billion yuan, and the single-store sales exceeding 300 million yuan. As an independent retail brand, RT-Mart had surpassed Carrefour and Wal-Mart to become the largest and most efficient retailer in China. In fact, RT-Mart has been the leader in Chinese retailing ever since.

Nevertheless, just as RT-Mart ascended to the throne of the retail industry, a fundamental change was going to take place in China's consumer market.

In 2010, e-commerce boomed in China. Euromonitor statistics showed that from 2012 to 2017, the compound annual growth rate (CAGR) of China's standard supermarket retail sales and hypermarket retail sales were 2.31 and 1.39% respectively. In contrast, the CAGR of e-commerce-driven online retail sales reached 45.7%. As of the end of 2017, the retail sales of standard supermarkets and hypermarkets accounted for 17.1 and 5.2% of all retail formats respectively, while online retail sales constituted 23.8%, exceeding standard supermarkets to become the largest retail format.

F. Chen (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

The rise of e-commerce has brought not only new retail formats, but also changes in consumer shopping habits. Almost all the goods and services people need can be purchased through the Internet. Consumers, especially young people, are beginning to opt for shopping online instead of visiting offline physical stores. This can be seen from the portraits of consumers in hypermarkets. Nine out of ten people who shop in hypermarkets are the seniors, with only few young people, which is in obvious contradiction to the fact that young people are the mainstream consumer groups in society.

These changes soon spread to RT-Mart. Since 2011, although RT-Mart's total turnover continued to grow, the growth of the same-store sales indicator, the most important operating indicator in the supermarket industry, has slowed down and even experienced negative growth in 2014. According to the 2014 annual report of Sun Art Retail, the parent company of RT-Mart, the decrease in same-store sales growth was mainly due to the slowdown in the growth of the overall consumer market and the more diversified consumer channels.

Facing the continuous loss of young consumers, where should traditional hypermarkets go?

Huang Mingduan, then chairman of RT-Mart, was very clear that hypermarkets must be transformed and upgraded in order to survive. The core issue is to establish links with young consumers. Since young consumers have gone online to shop, hypermarkets must be accessible online, too.

Therefore, at the end of 2013, RT-Mart launched its self-operated B2C e-commerce company Feiniu.com, and began its exploration of Internet and digital intelligence. However, it was not easy. High warehousing costs, high performance costs, high traffic costs, and low distribution efficiency put Feiniu.com in a dilemma of sustained losses.

Three years later, Feiniu.com was transformed again to use the model of store and warehouse integration, exploring the synergy of online and offline stores. On the one hand, efforts were made to develop RT-Mart Youxian App, which provides B2C fresh food one-hour home delivery service for consumers within 5 km around the store, meeting the shopping needs of young consumers; on the other hand, RT-Mart e-Lufa app was available to offer B2B purchase services for small and medium supermarkets, restaurants, entertainment venues, enterprises and institutions around the RT-Mart store.

At the end of 2017, RT-Mart's digital-intelligence transformation entered a fast track when Alibaba invested in Sun Art Retail. As of today, 414 hypermarkets opened by RT-Mart in Chinese mainland have all completed digital transformation. In addition to RT-Mart Youxian App, it has also provided services through Alibaba's Taoxianda, Ele.me, Tmall Supermarket and other ports. Consumers within 5 km are provided with one-hour home delivery service, and consumers within 5 to 20 km around the store are provided with half-day delivery service.

Up to now, RT-Mart has more than 10 million online members, of which 20–30% are also offline store members. The number of daily online orders is close to 400,000, and online sales account for 20% of the total sales which is hoped to reach more than 50% in the future. In 2019, RT-Mart fresh produce e-commerce

achieved full profitability, and the same-store sales growth indicator began to turn positive after five consecutive years of negative values.

The core of digital intelligence lies in data. Using data to drive business operations, improve operational efficiency, and realize intelligent decision-making is the ultimate goal of digital intelligence. To obtain data, it is necessary to use Internet technology and hardware equipment to digitize all processes and touchpoints of business operations and make them online. In order to improve the efficiency of business operations, higher requirements on organizational capabilities are set, desiring smoother and more efficient collaboration within the organization and between the organization and the outer system. Meanwhile, with the integration of online and offline omni-channel business, more flexible, safer and more reliable cloud services are required to ensure operational efficiency and stability.

In terms of RT-Mart's digital-intelligence transformation, it has carried out active explorations in cloud migration, touchpoint digitalization, organizational collaboration, data-driven business, and intelligent decision-making, and has, therefore, yielded remarkable results.

1 Infrastructure Cloudification

As of January 2020, RT-Mart had opened 414 hypermarkets in Chinese mainland, covering 29 provinces and autonomous regions in East China, North China, Northeast China, Central China, and South China. More than 10,000 employees and over 10,000 shopping guides provided services to more than 4 million consumers every day. In order to facilitate management and to avoid possible network disconnection from affecting store business, RT-Mart's infrastructure system adopts a distributed architecture. The regional headquarters system, store system, and POS system are relatively independent, and basically, each store has its own server. The headquarters system and the store system are not online in real time, and the information exchange between them is uploaded or released in batches on a daily basis. The daily transaction data is collected by each store independently, and then uploaded to the headquarters system at regular intervals; when the headquarters launches various activities or adds new products, the information is also released to the system of each store in batches on a daily basis. After the store processes the information, it is pushed to POS machine system. Therefore, the disconnection of any link will not affect the normal operation of the store's business. "Such a system architecture is necessary for traditional retail chain enterprises, without which it is difficult to do business," said Chen Yu'an, CTO of RT-Mart.

After more than 20 years of optimization, RT-Mart's system has been running very smoothly, and has integrated many mature management mechanisms. These advantages have jointly helped RT-Mart become the largest retailer in China. However, no matter how good the system is, it only serves traditional offline retail. When the new era comes, traditional retail enterprises are required to transform and upgrade themselves to do business online and integrate their online and offline

businesses. A hurdle is, in this circumstance, placed in front of RT-Mart - the distributed architecture cannot support online business, let alone adapt to online and offline integration.

Chen Yu'an explained that retail companies have to deal with consumers and inventories across the country, if they want to do online e-commerce. In this case, the distributed architecture with independent systems cannot function well and only the centralized architecture can connect with consumers in a unified way and provide accurate inventory information. If a retail enterprise wants to adopt the store-warehouse integration model based on LBS to provide home delivery services to consumers around the store, it not only needs a centralized architecture to undertake all consumers' apps or third-party platforms, but also requires the data interaction between the business system deployed in the centralized architecture and each store system. A hybrid architecture is thus formed, with part of the business system in the centralized architecture, and another part in the offline distributed architecture. Therefore, "how to transform from a distributed architecture to being able to do online business, or even to integrate online and offline business, is a hurdle that traditional retail companies need to overcome. If they fail it, they cannot do the business."

When RT-Mart started Feiniu.com in 2013, its online business was separate from its offline hypermarket business. The Feiniu.com team had built its own online mall and warehouses across the country, and also constructed a local Internet Data Center (IDC), on which Feiniu.com's systems were centrally deployed. There were various promotional activities being launched on Feiniu.com, and each time the campaign was on, the traffic on the platform would skyrocket. In order to avoid overrunning the local IDC, Feiniu.com also used third-party cloud services to form a hybrid cloud configuration of local IDC and cloud services. "Whenever there was a big promotion, we would rent cloud servers for elastic expansion. After the event, we would stop the cloud server," Chen Yu'an said.

For RT-Mart, Feiniu.com's self-operated e-commerce model faced many challenges. Wu Chunxiang, general manager of RT-Mart's new retail business department, said frankly: First, RT-Mart deals in fast-moving consumer goods, which are often low in unit price and large in size, so warehouse costs are high; secondly, the delivery cost is also very high, as the commodities have to be transferred multiple times en route by the third-party logistics; thirdly, the cost of developing new members in the mall is beyond imagination, and the member retention rate is extremely low; and finally, fast-moving consumer goods are urgently needed by consumers, but Feiniu.com could only offer next-day delivery service which is low in delivery. Therefore, in the first few years, although Feiniu.com's turnover had increased, the margin of loss had not been narrowed.

"Actually, we have been discussing internally how to proceed with this model, but we just couldn't find how to improve it," Chen Yu'an said. In 2016, Freshippo appeared. This new retail model being store-centered and featured with online and offline integration allowed RT-Mart to discover opportunities, because this model matched exactly with RT-Mart's core advantages - supply chain and store network.

To this end, RT-Mart decided to transform, and developed RT-Mart Youxian App and "e-Lufa" App to provide home-delivery services for consumers and purchase services for corporate customers around the store respectively. Since online orders need to be delivered by offline stores, the online retail business system centrally deployed on the hybrid cloud architecture needs to interact the data with the business system of each store for membership, payment, inventory, marketing, and logistics. A hybrid system architecture has been naturally formed, which includes both the distributed architecture of the original store and a cloud-based centralized architecture that can integrate online and offline businesses.

At the end of 2017, after receiving investment from Alibaba, RT-Mart started to migrate the systems and devices deployed on third-party clouds to Alibaba Cloud, and used the elastic computing and scalable network bandwidth provided by Alibaba Cloud's ECS, RDS, ARMS and other products to ensure the safer, more reliable and more stable operation of online and offline integrated businesses. RT-Mart's original cloud architecture has thus become a hybrid cloud of local IDC and Alibaba Cloud.

In terms of the benefits of migrating to the cloud, Chen Yu'an gave an example. During the epidemic in 2020, RT-Mart conducted an online and offline pre-sale event for a very hot-selling product, which was almost a SecKill item in any channel. In this event, consumers first needed to place an order on the RT-Mart Youxian App before they picked up the goods at the store, which could reduce the time consumers spent in the store. RT-Mart deployed the pre-sale system on the local IDC and the first two pre-sale events went smoothly as there was not much publicity for the event. However, in the third pre-sale, the surging traffic suddenly overwhelmed the server, resulting in other consumers on the RT-Mart Youxian app being unable to place orders. Therefore, RT-Mart migrated the entire pre-sale system to Alibaba Cloud, and scaled out 36 cloud servers for this pre-sale to cope with peak traffic.

"It only took one week to migrate to and deploy these 36 servers. If the local IDC were used, we would have spent one to two months to wait for the 36 servers to arrive after placing an order with the manufacturer. Now, we will scale out the resources on Alibaba Cloud whenever we find the traffic is high for any promotional campaign, which means that the flexibility of enterprises to respond to external changes has become greater," Chen Yuan added.

Of course, neither the hybrid system architecture nor the hybrid cloud is the ultimate goal of RT-Mart. Chen Yu'an revealed that RT-Mart's hybrid architecture is quite complex, and data flow needs to go all the way from headquarters to stores, to cloud mid-office, and then to Alibaba mid-office. The whole system will break down if one link goes wrong. Therefore, RT-Mart hopes to simplify the data flow path, and to achieve this, all systems should be migrated to the cloud for the direct online operations. To this end, RT-Mart plans to "move" the original offline systems to Alibaba Cloud in two or three years, upgrading the current hybrid of distributed and centralized system architecture to a completely centralized architecture deployed in the cloud.

At the same time, the current IDC will not continue to be purchased after the server expires, and the business system deployed in the IDC will be migrated to Alibaba Cloud. By then, the hybrid cloud configuration of IDC and Alibaba Cloud will become pure Alibaba Cloud.

2   Digitalization of Touchpoints

A core operation of digital-intelligence transformation is to obtain data. In other words, all business processes and touchpoints must be online and digital.

At its inception, RT-Mart imported the ERP system. "To be large-scale chain stores, an information system is needed at the bottom layer to support them. Only by doing so can you manage stores of South China in Shanghai," Chen Yu'an said. With the ERP system and years of functional development and optimization, the business process of RT-Mart's offline stores has basically been informatized, and data on supply chain, commodities, transactions, and members are all deposited in the system.

In 2013, in the face of the fierce impact of e-commerce, RT-Mart began to explore online retail and launched Feiniu.com, its self-operated e-commerce, in order to reach the growing online consumer group. However, the model of Feiniu.com was too challenging. After several years of losses, RT-Mart gave up the idea of self-operated e-commerce after discovering the opportunity of new retail, and transformed Feiniu.com into a store delivery mode featuring online and offline integration. Consumers can enjoy the one-hour home delivery service from the nearest store through the RT-Mart Youxian App, while merchants can obtain the next-day delivery service from the nearest store through the RT-Mart "e-Lufa" App.

However, both RT-Mart Youxian App and "e-Lufa" App have limited ability to attract new users, with most of their users being the original ones of offline stores. Alibaba Group's investment, however, has opened up a vast online market for RT-Mart. In March 2018, RT-Mart began to access Taobao.com's Taoxianda project. Like RT-Mart Youxian App, the Taoxianda project is also a one-hour home delivery service for fresh food. Therefore, for RT-Mart, it means an additional port is available to reach online consumers aside from RT-Mart Youxian App. More importantly, this port is located on the mobile Taobao App whose huge traffic not only brings considerable online sales to RT-Mart stores, but also allows it to quickly acquire a large number of new users.

Since then, RT-Mart has entered the Ele.me platform, and has also reached a "shared inventory" cooperation with Tmall Supermarket, providing one-hour delivery service for consumers within 5 km of the store, and half-day delivery service for consumers within 5–20 km, which further expands RT-Mart's online traffic and user numbers.

So far, RT-Mart's new retail business has had 4 ports online, and consumers can choose any port to place an order. After stores receive orders from different ports, they will be delivered through the same fulfillment system. "Our front end

is different, but our back end is exactly the same. We combine orders from neighboring communities into a batch and hand them over to a delivery man. The more orders there are, the higher efficiency it is," Chen Yu'an explained.

Up to now, all the 414 RT-Mart stores have provided the one-hour home delivery service, and more than 200 stores have launched the half-day delivery service of Tmall Supermarket. The number of its online users has exceeded 33 million, with over 10 million active users; the number of "e-Lufa" merchants has surpassed 530,000, with nearly 240,000 active merchants. According to Wu Chunxiang, although the user groups of the four online ports overlap with each other to some extent, the overall difference is obvious: RT-Mart Youxian App users are mainly home users, most of which are loyal users of RT-Mart; users of Taoxianda and Tmall Supermarket are mainly white-collar workers; and RT-Mart users on Ele.me platform are a younger group who mainly buys snacks and fruits.

For these online users, each RT-Mart store has arranged for specific personnel to create groups, and to maintain and operate them. They have established Xiaoyou group (for Youxian App users and with 250,000 members), Xiaotao group (for Taoxianda users and with nearly 400,000 members) and Xiao'e group (for Ele.com port users). On the occasion of new product promotions or festival activities, the user operation department in each regional headquarters of RT-Mart will design operation plans, produce content, and then send it to the stores whose staff will push it to the groups. If users have questions, they can have them solved in the groups. "The shopping frequency of members in these groups is much higher than that of overall online users," Wu Chunxiang said.

In addition to the online digital ports, RT-Mart is also trying to use the community group buying model to reach more users. On the one hand, RT-Mart cooperates with Cainiao Station, and the latter develops its station managers into group leaders, allowing them to establish and operate a community buying group. When customers of these groups place an order through a mini program, it will be uniformly distributed by RT-Mart stores to the community. On the other hand, RT-Mart itself has set up a special team to be the head of the group, and the business representatives of "e-Lufa" app can also be the group leaders.

While expanding online sales ports, RT-Mart has implemented new retail transformation in all stores to enable them to operate online. The stores use Alibaba Cloud POS machines and self-service cash registers, which not only connects the product and inventory data with Alibaba, but also turns the store payment link into a digital touchpoint for consumers, as shown in Fig. 1.

In order to improve the picking efficiency to complete the on-site picking within 20 min, the stores have installed a suspension system and deployed a quick picking warehouse, as shown in Fig. 2. Chen Yu'an explained: "Store inventory, especially fresh products and fast-moving consumer goods, are basically shared online and offline. For goods with relatively fast turnover, it may happen that they are bought by the offline customers before the store picks them for the online orders placed beforehand; or the goods have been put into the shopping cart by the store customers, but the online inventory still shows that they are in stock. In order to avoid

Fig. 1 Alibaba cloud POS and self-service cash register in RT Mart store

Fig. 2 Suspension system and quick warehouse picking of RT Mart stores

similar out-of-stock circumstance, we set up a quick-picking warehouse for physical separation of goods with fast turnover, but do not separate goods with slow turnover. At present, the out-of-stock rate of our delivery is about 0.6%."

Most of the quick-picking warehouses cover an area of about 300 m^2 and can accommodate more than 3,000 items, which are mainly fresh products, dairy products, beverages, as well as hot-selling daily necessities and specials, accounting for 80–90% of the deliveries. The commodity types, placement and inventory in the quick-picking warehouse are based on the big data, and the picking line in the

warehouse has been designed in a way to reduce the frequency of goods picking back and forth.

3 Online Business

In order to ensure the efficient and smooth operation of omni-channel business both online and offline, RT-Mart needs an intermediate system to link multiple online retail ports with the distributed offline stores.

In 2017 when RT-Mart launched the Youxian App and the "e-Lufa" App to start the new retail, such an intermediate system was established, which was called RT-Mart Mid-end. This business mid-end was deployed on a hybrid cloud of RT-Mart's IDC and a third-party cloud. In the future, it will be fully concentrated in the cloud when RT-Mart's hybrid cloud completely becomes Alibaba Cloud.

Now, the business mid-end is able to interact with RT-Mart Youxian App, Ele.me platform, and Alibaba mid-end in real time at the speed of seconds on one end, and the business systems of all stores on the other, so as to obtain data on inventory, price, commodity, and logistics. Besides, RT-Mart has deployed a set of local systems in each store as a transfer station between the business mid-end and the store system, as its ERP system is a stand-alone system with no service capability.

By virtue of the cloud-based business mid-end, RT-Mart has enabled the simultaneous launch of business on multi-channels, and can carry out unified management of resources, data, operation, and business, effectively promoting the stable growth of the overall business. By the end of 2019, RT-Mart's online retail business had returned to profit, and the same-store sales growth of its stores had begun to turn positive.

While the omni-channel new retail business yields fruitful results, RT-Mart is also using digital and mobile means to enhance the underlying efficiency of stores. In the past when the ERP system was adopted, there were few chances for the mobile management of the store. Basically every day, a large number of report forms were printed early in the morning and distributed to the corresponding personnel in the store who took the report forms to complete the tasks listed above. When all the tasks were done, they would hand over the report forms. Now, RT-Mart uses PDA devices for the store mobile management of goods receipt, tallying, shelving, picking, packaging, distribution, and inventory. "A lot of work can be assigned to the PDA of the corresponding personnel through the system. After receiving the task, they can complete it and report it directly on the device (as shown in Figs. 3 and 4)," Chen Yu'an explained. RT-Mart has also developed a "Store Advisor" App, which allows store staff to check the store's sales and contract performance at any time on their mobile phones.

RT-Mart has a total of 414 stores, covering 29 provinces, cities and autonomous regions across the country, with more than 100,000 employees and over 100,000 shopping guides. Its large yet scattered organizational structure poses great threat

Fig. 3 Received task

Fig. 4 Equipment submitting

to the internal communication, which, fortunately, is solved with the introduction of DingTalk, as shown in Fig. 5.

"For me, the greatest benefit of DingTalk is that it is easy to find people, as our organizational structure is too complicated, and the personnel are scattered all over the country. Now, I can easily locate the general manager of a certain store through the organizational structure on DingTalk, and he can also know who I am. During the epidemic in 2020, we could immediately contact everyone for national

Fig. 5 Introduction of Dingtalk

video conference by pressing a button on DingTalk, which makes our work more efficient," Wu Chunxiang said.

Hu Qingfen, Deputy General Manager of the New Retail Department, said that RT-Mart's routine work, such as internal communication, attendance, notification, and report and official document signing, was basically performed on DingTalk, realizing mobile office. Many trainings used to be conducted offline, incurring great travel expense and time cost, which now has been significantly reduced with the help of DingTalk's cloud classroom. Moreover, with trainings online, it is clear to collect the data on how many people have participated in the training, whether they have finished the course, and whether they have taken the exam. "During the epidemic, it was inconvenient to travel on business, so we moved all trainings to DingTalk. It turned out that the number of online trainings in the first quarter was more than that of the four quarters last year, yielding good results."

4   Operational Digitalization

The ERP system has basically enabled the informatization of RT-Mart stores, and by using the sales invoicing data accumulated in the system, RT-Mart has established a very strong product management capability. "The competitive edge of our chain hypermarket is that we know which commodities should be purchased, which commodities sell well or bad, and how to manage the commodities," Chen Yu'an remarked.

However, aside from sales invoicing data, other data, such as membership information, are more often just numbers. As Wu Chunxiang said, RT-Mart only knows the quantity of its customers, not the quality; it keeps track of the customer numbers in this area and the frequency they visit the store in a week, but it has no clue as to their identity, gender, age, or preferences. In this sense, the data is only output to make the statistical reports for the decision-making reference of managers, far from the real data processing, mining and application.

In 2014, RT-Mart launched Feiniu.com and started its online business. "We know that people and transactions are related online, in particular, the single person and his/her transaction. Therefore, we need to extract all the transaction data," Chen Yu'an said. It just so happened that the big data technology was already mature at that time, and RT-Mart used a big data development framework to establish a data mid-end on its own hybrid cloud. It's just that this development framework was an open-source system, which was posed to certain security risks.

Currently, RT-Mart is cooperating with Alibaba Cloud to rebuild the data mid-end on Alibaba Cloud with its development platform DataWorks and the big data computing service MaxCompute. It was expected that RT-Mart would import relevant data on membership, transactions, and contract performance into the new data mid-end within 2020.

The fulfillment and delivery of online orders is completed by RT-Mart and Fengniao Logistics, and the whole process is entirely driven by data. When the RT-Mart store system receives orders from multiple online ports, it will automatically dispatch the orders to the pickers who will pick the goods by partition according to the information displayed on the PDA. After picking and packing, the picker clicks the "Finish" button on the PDA, and the order information will be automatically transferred to Fengniao's intelligent dispatching system, which will automatically notify the rider to deliver the order.

Fengniao Logistics has customized the in-store delivery model for RT-Mart to improve delivery efficiency and service quality, with the current on-time delivery rate being 99%. At the same time, the Fengniao system will collect multiple orders in the same area according to the coverage area and distribution route, and hand them over to one rider for distribution, which not only greatly improves the distribution efficiency, but also increases the rider's income.

5   Decision-Making Intelligence

In Chen Yu'an's view, IT technology development in the next 10 years will be pursuing intelligence. Artificial intelligence was around more than 20 years ago when its application was not mature. It was in recent years that artificial intelligence technology has evolved to be quite mature with successful cases in application, but it is not so popular. To this end, Chen Yuan believed that in the next 10 years, enterprises that can build digital intelligence capabilities will continue to survive.

He also said that once the digital intelligence ability is developed in the company, it can help many things to be done. Despite a complete ERP system in

RT-Mart that can produce many reports, these reports are only a collection of data and information. It is mainly up to people who read these data reports to make an appropriate decision. Of course, there are different types of decision making, including routine decisions, business decisions, and strategic decisions. After the realization of digital intelligence, routine decisions and business decisions can be replaced, enhancing the operation efficiency.

For example, when RT-Mart undertakes the one-hour home delivery business, two things are very crucial: First, the inventory must be accurate, because the order must be delivered within one hour after the customer places it; second, there must be enough manpower to deliver the order. To meet these two requirements, it is necessary to reserve inventory and manpower in advance. But how much is adequate? To answer this question, RT-Mart must forecast orders as accurately as possible.

At first, RT-Mart forecasted online orders by people one week in advance and the forecast was made from store to store, with the accuracy rate being about 90%. In early 2019, RT-Mart began to try to use Alibaba Cloud's intelligent system for prediction. "At the beginning, the accuracy of intelligent prediction was 70–80%, but sometimes only more than 60%. With so many decision-making factors to be considered, the system needs to be trained with data to improve the accuracy," Wu Chunxiang said.

After nearly a year of adjustment and training, RT-Mart has started to fully use the intelligent system to predict the daily orders of each store since April 1, 2020. The accuracy rate has exceeded that of manual prediction, reaching more than 90%. "With accurate order forecasting, we can prepare inventory and manpower in advance, thus optimizing the operational efficiency. Later, we will continue to adjust the intelligent system to make it learn new things, and we hope that the hourly forecasts can be possible in the future," Wu Chunxiang added.

6 Summary

Chen Yu'an believes that intelligence brings about an increase in efficiency. RT-Mart is a distributor, connecting consumers on one end and suppliers on the other end. The linking channel is like a pipeline, and there are often places where they may be clogged. How to use a more efficient system to allow smooth circulation without any congestion between the two ends is what RT-Mart should do. For example, the exchange between the store and the headquarters is now on a daily basis. It may take two or three days for the headquarters to collect information and report it to the manufacturer, and a week for the manufacturer to deliver the goods again. The information flow in this supply chain is actually slow. In the future, under the Internet and intelligent architecture, if the information flows in seconds, it is worth exploring what impact it will have on the whole supply chain and the operation and management of enterprises.

Therefore, in terms of digital intelligent transformation, what RT-Mart needs is to build a more active and intelligent IT/DT system based on cloud architecture. At the same time, it will harness the resources and capabilities of Alibaba Group to build RT-Mart's intelligent capabilities. "When we have such capabilities, our decision making will be faster than other retail companies, thus sharpening our competitive edge over time," Chen Yu'an remarked.

Easyhome: Reconstructing "People, Goods, and Fields" with Digital Intelligence

Beihong Wu

In 1999, Easyhome opened its first store on the North Fourth Ring Road in Beijing. As of November 2020, it had spread nationwide, with a total of 409 stores covering 220 cities in 30 provinces, municipalities and autonomous regions and boasting annual sales of over 85 billion yuan. It has become a leading home furnishing enterprise in China, and listed in Shenzhen.

Now, Easyhome has evolved from a building materials market to a super-large retailer with home furnishing as its main business and functions as a large consumption platform for interior design and decoration, furniture and building materials sales, smart logistics, financial services, modern department stores, cinema restaurants, physical fitness, digital intelligence, and home care.

Wang Ning, President of Easyhome Group, said that Easyhome focused on the development strategy of "one core and three integrations" in 2019, to wit the chain development of large home furnishing stores as the core, and the integration of large home furnishing and large consumption, the integration of online and offline business, and the coordinated integration of upstream and downstream of the industrial chain. That year witnessed that Easyhome's revenue hit 9.085 billion yuan with a net profit of 3.126 billion yuan, a year-on-year increase of 7.94% and 60.08% respectively.

B. Wu (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

It took 15 years from the opening of the first store in 1999 to the opening of the 100th store, but only three years from 100 to 200 stores. By 2028, Easyhome plans to open 1,200 stores. Wang Ning said: "In 2020 and beyond, we will continue to speed up the opening of stores."

In the process of the "rocketing" style growth, Easyhome has also encountered "growing pains". Before 2013, boosted by the domestic real estate boom, the home building materials were generally in short supply, and the "life" of home furnishing stores generally lived well.

However, since 2013, the real estate industry has undergone a significant change. The rise of integrated home furnishing has cut off household consumption, as upstream real estate developers mainly feature hardcover rooms and ready-to-move-in accommodation. Coupled with the impact of major e-commerce platforms on offline stores, consumers now have more diversified choices, and their demand for experience is continuously reshaped. Moreover, with the "post-80 s" and "post-90 s" becoming the mainstream of the entire retail consumer market, major home furnishing brands have been "shocked" one after another by the emerging Internet home furnishing brands that claim to "sweep" offline brick-and-mortar stores. Under the increasingly severe situation, traditional home furnishing stores such as Easyhome have begun to worry.

In 2013, Easyhome moved its offline store online and created the Juran.cn (the online mall of Easyhome). However, due to the misunderstanding of the relationship between online and offline businesses, this attempt has instead caused a split between the online and offline markets. The emergence of Didi Taxi made Easyhome start thinking about the platform model. It noticed that home improvement design was becoming the Internet traffic entrance of the home building materials industry, which propelled Easyhome to build the "Juran.cn" mall into a platform featured with home improvement design.

The "Homestyler" platform released in 2016 has gradually become one of the online traffic portals of Easyhome, but its anxiety of the operation had not been eased, with a new challenge confronting the home furnishing retail industry. As the "last mile" problem of e-commerce have been gradually resolved, the barriers between online and offline shopping have been basically eliminated. Professional home logistics service providers, and logistics services on giant shopping platforms can basically meet the needs of consumers for online furniture shopping, making them less dependent on offline shopping.

In the past, people usually went to home furnishing stores or building materials and furniture markets to buy furniture, but now they can make the purchase in any place with home consumption scenes due to the gradual blurring of the boundaries between furniture and home furnishing. They may even turn to furniture renting rather than buying. Therefore, when consumers' time becomes more fragmented, and they prioritize more on a convenient and comfortable shopping experience, will traditional stores with huge volumes and maze-like layouts far away from the city center be gradually abandoned?

Emerging technologies are making changes possible in the home furnishing retail industry. Due to the limited products that can be displayed in traditional furniture stores, it is difficult to meet the experience needs of consumers, hard to acquire customers, and prone to low sales per square meter, which is increasingly forming a vicious circle. The popularity of software such as cloud design, however, has enabled stores to remotely design ideal homes for consumers and match a variety of products online. Especially with the advent of the 5G era, data transmission and virtual display greatly extend stores' space and achieve immersive experience and interaction through large screens. In the future, stores may become an integrated multi-functional space of "design + experience", and no longer need luxurious decoration of hundreds or thousands of square meters.

Fortunately, Easyhome encountered an enterprise that highly recognized the business model and business mindset of Easyhome—Alibaba Group. In February 2018, the two parties signed a strategic cooperation agreement, which unveiled the new retail of Easyhome: Reconstructing "people, goods, and fields" and accelerating the transformation of digital intelligence.

The digital intelligent transformation of Easyhome is a reorganization of the relationship between "people, goods, and fields". In traditional scenarios, there are no detailed arrangements for the positioning of the "field", how to serve the surrounding people based on the "field", and how to position and deploy goods based on services. These are problems brought about by traditional retail fields, and business decisions are often based on experience.

In such a "field", the category layout is not determined by platform providers like Easyhome, but by category distributors. The home furnishing store platform mainly functions with property operation, providing all-round guarantee services, such as advance compensation, green environmental protection, no reason to return, and zero delay in delivery and installation, etc. Easyhome is one of the earliest companies in the industry to establish the business philosophy of "being inclined towards consumers" and to build industry service benchmarks.

"But now the operation mindset has changed," said Li Xuanxuan, Director of Operation Management Center of Easyhome. "The entire market has undergone major changes, and the entire retail system has gradually matured. The advance compensation service originally provided intends to deal with poor business operations and runaway businesses or the inability of merchants to undertake after-sales service responsibilities. Now the gradually enhanced operation capacity of merchants is weakening the necessity of all-round guarantee services provided by the platform."

A collaboration that fully empowers Easyhome is underway. Easyhome has been fully empowered by Alibaba Group, from infrastructure cloudification, digital upgrade of home building materials sales, empowerment of cooperative brands, integration of various new retail formats to create a life service complex, to the improvement of its own operation management and decision-making capabilities. Now, the new retail transformation of Easyhome has become the vane of traditional home furnishing stores, which has reference significance for the entire industry.

Figure 1 shows the performance trend of Easyhome (2016–2019).

Fig. 1 Performance trend chart of easy home (2016–2019)

1   Infrastructure Cloudification

Since its cooperation with Alibaba Group, Easyhome has established a development strategy to be driven by big data. The digital-intelligence transformation is an important milestone in the strategic transformation of Easyhome. It is considered to be a long-term, sustainable and phased construction process, and infrastructure cloudification is the first step in its digital-intelligence transformation. Li Xuanxuan said that the fundamental starting point based on this strategic positioning is to improve its informatization level and enhance its informatization production and service capabilities through full cloudification.

In June 2020, the acceptance of the first-phase cloud projects of Easyhome was completed. It had implemented the infrastructure cloudification of the original system in stages, consolidating the IaaS facility featured with the high flexibility, strong scalability, and excellent compatibility for the new retail. By so doing, it enabled the development of business systems and a large number of applications no longer to be restricted by the pressure of infrastructure or operation and maintenance.

In fact, "Juran.cn" of Easyhome once made a cloudification attempt as early as 2015. "Homestyler", the current intelligent design and home improvement management platform upgraded from "Juran.cn", consists of six major parts, including design cloud platform, home furnishing material procurement platform, commodity sales platform, construction management platform, logistics distribution platform and smart home service platform. The original "Juran.cn" has become a part of it, which is the home furnishing material procurement platform now. The Meijiadaren 3D design software acquired in 2016 supports the design cloud platform.

A clear demand to move to the cloud soon naturally emerges. With the continuous increase in the number of users, especially the surge of overseas users, this design platform that provides free design tools and rendering services for designers and merchants is struggling to cope with the daily traffic spikes even if the server

scale rapidly expands to thousands. Especially when interior design is displayed, the rendering technology requires a lot of calculations, which demands very high CPU resources. With the number of tasks during the daily peak hours fluctuating wildly, it often occurs that the task of rendering a picture needs to wait for dozens of minutes or even hours which the designers could not afford to wait. What is even worse is that once the computing resources exceed the design value, it will cause all the tasks in execution to crash. When the Internet traffic is low, however, a large number of servers are idling, leaving resources not being properly utilized.

The R&D team of "Homestyler" excels in R&D of 3D graphics and image processing, but has to invest a lot of energy and money in non-core businesses, such as infrastructure operation and maintenance. Some of these costs are getting higher and higher due to its ever-expanding scale, resulting in the cost of software R&D becoming out of control, and diluting the resources that should have been invested in core products, which makes the R&D team very distressed.

High stability, high system flexibility and high performance have become the inevitable choices for "Homestyler" to transform to the cloud. In 2016, "Homestyler" began to use third-party cloud services and used cloud-native technology for development and transformation. In 2018, after the investment of Alibaba Group, it migrated to Alibaba Cloud as a whole. In 2019, it was upgraded to "Tangping Designer", becoming an important part of Alibaba's e-commerce ecosystem.

At the beginning of 2020, the IT department, new retail department, and marketing department of Easyhome Group were merged into the operation management department, which became part of the new retail system, and carried out digital-intelligence transformation of the overall business. Before using cloud services, it was difficult to use its own data center to meet the requirements of urgent product launch in the short term. Traditional informatization construction was more about solving internal application problems, which was controllable from the perspective of resource requirements. For example, the number of servers needed and how to deploy them were predictable.

With the transformation of Easyhome to new retail and digital intelligence, requirements for the computing power of data and systems have greatly increased, despite the business scale not changing much. Now it is necessary to mine the accumulated data value, for which the basic computing power of the whole system cannot meet the requirements.

"Development has also entered a high-yield stage. Unlike the original traditional informatization construction, the deployment of data mid-end and business mid-end requires flexible cloud to realize informatization and product development. For example, it only took a week from negotiation to the final launch of the mini program recently, which was impossible before," Li Xuanxuan remarked.

2   Digitalization of Touchpoints

Digital-intelligence transformation is a powerful tool for Easyhome to build a mutually beneficial relationship with brand owners, so accelerating the digital transformation of new retail stores is the second step that Easyhome has taken for its accelerating transformation and upgrading.

Consumers who have experienced home decoration know that home furnishing stores are so large that it is quite time-consuming to visit. Moreover, their awareness of home furnishing brands is not as high as that of fast-moving consumer brands. They often confuse their requirements and cannot remember the brand names.

Easyhome Jinyuan Store located on the West Fourth Ring Road in Beijing is the first smart store of Easyhome, as shown in Fig. 2. As soon as consumers enter the store, they can use the digital product—smart big screen to retrieve detailed product information according to their own preferences and habits, and find the location of a brand in the store that they have searched online before, as shown in Fig. 3. The store also incorporates the apartment types of more than 100 surrounding communities into the system, and nearby consumers can directly match the decoration style according to their own apartment types.

Building materials merchants in home furnishing hypermarkets have also initiated smart store renovations. In the store, consumers can not only touch ceramic tile products, but also see 3D model rooms with different decoration styles on the display screen of the store. The tiles used in the model rooms are exactly the ones displayed in the store. This service, called "decoration fitting room", can intuitively present the actual 3D effect of the products after decoration, urging consumers to make an on-site purchase decision.

Fig. 2 The first smart store of easy home

Fig. 3 Smart big screen

When using "decoration fitting room", consumers can first search for their own community and unit number on the touch screen to find their own apartment type from the apartment library, and then select their favorite style from the decoration case library, such as Nordic, Chinese style, modern, and pastoral, etc. The system will automatically match the selected style with the apartment, and successfully generate the 3D decoration renderings within 30 s. Consumers can scan the code to save the decoration renderings to their mobile phones, or they can ask designers to make some adjustments to the renderings. In addition, all home furnishing and building materials products that appear in the design drawings can be bought in Easyhome store or its online store, truly achieving "what you see is what you get".

When making payment, consumers do not have to go to the cashier to queue up, but can directly scan the QR code on the PAD in the shopping guide's hand. Next, they just need to wait at home for the products to be delivered to their door. The logistics system of Easyhome has been connected with manufacturers, which allows consumers to query the information of the products purchased from Easyhome through their mobile phones from being off the production line to the delivery, just like shopping on Tmall and Taobao.

This kind of convenience is accessed not only by consumers, but also by businesses as well: in the display space equipped with screens for the decoration effect, the interaction time between shopping guides and consumers can be extended by $25 \sim 30$ min, making the conversion rate and transaction rate increase exponentially compared with the past when consumers were only willing to stay in the store for 5 min.

As a model of smart stores, Jinyuan Store is implemented in Easyhome throughout the country. In the "618" promotion in 2018, eight Easyhome stores in Beijing enabled the payment pass and membership pass with Alibaba Group, and attract

Fig. 4 Smart recommendation of easy home shopping mall

consumers through the online privilege deposit. In the 3-day event, the eight stores achieved a total sales of 1.068 billion yuan, which tripled year-on-year.

In 2019, Easyhome had upgraded 110 smart stores and it was expected to complete the digital transformation of all stores by the end of 2020 when it would be connected with the Alibaba system in terms of commodities, orders, marketing, payment, consumer finance, etc., to form the foundation for online and offline integration of Easyhome.

Figure 4 shows the smart recommendation of Easyhome hypermarket.

3   Business Online

On the basis of the digital transformation of physical stores, Easyhome has vigorously developed its online business and jointly built a localized e-commerce platform, the intra-city station. Launched in May 2019, it aimed to link the online and offline business operations.

The localized consumption spurred by the intra-city station is the future trend. Initially, the intra-city station of Easyhome was only launched in five cities, Beijing, Zhengzhou, Wuhan, Chongqing and Tianjin. Wang Ning introduced that after the outbreak of the COVID-19 in early 2020, the number of intra-city stations had reached 126 by mid-May, where the number of goods exceeded 800,000 compared with the small quantity in the original five intra-city stations at the end of 2019. The number of visitors surged from an average of 3,500 a day last year to an average of more than 300,000, with even higher figures for holidays such as "May 1st". The users who visit the Easyhome intra-city station have clear requirements for home furnishing or home improvement products rather than window shopping.

In the online and offline sales scenarios of home furnishing, there is a conflict of interest between regional agents and factories, which invites the split of online and offline business. The intra-city stations take the distributors or agents as the operation center and link the 700 million users of Taobao system on the city dimension. They build a localized incremental platform for offline branches and merchants and assists the settled brand merchants to operate the private domain traffic in the station through the commodity operation and online marketing, facilitating the sales increase brought by the conversion.

Wang Ning said: "In the beginning, many dealers resisted the idea of the intra-city station, but they all actively get involved after seeing traffic brought by it. At present, there are more than 20,000 dealers in the intra-city station, with more than one third of the total number of national distributors, and this number is still increasing."

Another portal for online traffic derives from home improvement and home furnishing design. However, Easyhome has taken a detour in figuring out the online portal. At the end of 2013, Easyhome moved its offline store online and built it into "Juran.cn" mall. At that time, it falsely believed that online and offline stores were two separate markets. It positioned offline consumers as mid-to-high-end groups, and believed that online consumers valued cost-effectiveness. Therefore, in terms of business model, "Juran.cn" mall chose to directly cooperate with brand manufacturers to get goods at the ex-factory price.

However, they soon discovered that this "road" was not easy to walk. The home building materials industry is inseparable from after-sales service, including delivery, construction, and installation, and these services are usually provided by distributors in various cities. To a certain extent, "Juran.cn" took goods from manufacturers, but dispatched after-sales services to offline distributors, treating them as cheap labor.

What is even more unexpected is that "Juran.cn" diverted consumers from offline stores, posing a direct threat to distributors, which irritated them. Besides, "Juran.cn" also confronted with passenger traffic and bargaining problems. As a vertical platform that set foot in the online market late, there was no chance to vie for traffic with the existing "Big Mac" platform. Meanwhile, offline store consumers could bargain with sellers, but online consumers could not.

The emergence of Didi Taxi made Easyhome start thinking about building a platform model. It noticed that home improvement design was becoming the Internet traffic entrance of the home building materials industry, which propelled Easyhome to build the "Juran.cn" mall into a platform featured with home improvement design. In 2015, "Juran.cn" took the three major home improvement business of design, material and construction as the entry point, and built an online and offline integrated platform of intelligent design and home improvement management—-"Homestyler".

On the "Homestyler" platform, designers can obtain free 3D home improvement design tools that integrate the functions of renderings, construction drawings and budgets, which enables them to be freelance designers and start their own businesses; consumers can post their needs to find the satisfactory decoration

design schemes and favorite designers, or design on their own; home furnishing material manufacturers can seamlessly connect the digital product library with the home furnishing material procurement platform to expand the sales network; home building materials distributors can access free online sales platform to realize the integration of online and offline marketing; the construction teams can get dispatched orders by virtue of reputation and word of mouth, achieving the automatic management and monitoring of the home improvement process; the logistics and distribution service of home improvement can reduce the number of deliveries and facilitate the intelligent management of post home improvement services. This online home improvement platform realizes the convergence of interests of six parties, to wit designers, factories, distributors, stores, construction teams and consumers.

In September 2019, after receiving investment from Alibaba Group, Easyhome upgraded the "Homestyler" to "Tangping Designer". As the official home improvement and home furnishing design platform of Alibaba e-commerce ecology, it has realized the digitalization of the whole process of home design, and explored new business models such as sales sharing and monetization for home designers, as shown in Fig. 5.

With the business being gradually online, a unified platform is required to support the business management of multiple systems, making the need for building a business mid-end even keener. In fact, as early as 2016, Easyhome had developed the concept of business sharing, and all businesses such as markets, home improvement, supermarkets, catering, and cinemas shared the membership system and marketing system. At that time, there was already a prototype of the business mid-end, but it was relatively unmature. Therefore, during the construction process, Easyhome adopted the strategy of simultaneous construction of the data

Fig. 5 AliDesigner

mid-end and the business mid-end. When the data mid-end was able to call the data of all business departments, the business mid-end could function well.

The online and offline integration has changed the entire business model of Easyhome. The sales rankings and customer flow statistics of Easyhome stores and settled brands, and the consumption data analysis of residents in surrounding communities were converged to transform Easyhome from being property management type to a big data-driven one.

In order to support the rapid business development, Easyhome has been building an IT system. On the one hand, it has invested heavily to build an internal large ERP system, establishing a "Zhihuijia" (intelligence integration) system with the architecture of front-end, mid-end, and back-end; on the other hand, it has introduced Alibaba Group's concept and technology to build a new retail platform.

However, compared with the continuous innovation and improvement of the business system, the construction of the internal collaborative system of Easyhome was relatively lagging behind. The huge organizational structure gave rise to problems such as inconvenient communication within the enterprise and long links of information transmission. For the purpose of a flatter management structure and more efficient organizational collaboration, Easyhome had started to use DingTalk since the end of 2017, unveiling its digital intelligent transformation from the organization being online.

DingTalk's product functions have well solved the problems of online organization and online communication. However, in terms of enterprise process collaboration, application construction and business integration, more professional products are needed to support the requirements of form process construction at low cost and in complex scenarios of group enterprises.

DingTalk is a mobile office portal with a unified entrance. If traditional OA is used, additional resources are needed to match the products with the staff's permissions of DingTalk. Therefore, it is necessary to select highly configurable forms and processes, which can access DingTalk's staff data, adapt to the dual development platforms of PCs and mobiles, and feature with powerful interface functions and configurable service calls. The "YiDA" software of Alibaba's SaaS meets the requirements of Easyhome. Now, Easyhome deals with its administration, human resource and finance work via DingTalk, thus realizing online office.

The sudden outbreak of epidemic is not a "critical situation" that threatens the development of Easyhome, but a test of its digital-intelligence transformation in recent years. It urges the company to further devote to digital intelligence in the future. Wang Ning said that during the special period, Easyhome enabled its ten-thousand-people team to communicate freely and cooperate with each other by virtue of the mature application of the online office system "DingTalk"; and meanwhile, the "Taobao Live Broadcasting" of Easyhome launched as early as 2019 demonstrated its cutting edge as a front-end marketing tool.

Today, there are two types of companies, one with digital capabilities and the other without. The ones with digital capabilities will hold more potential for development in the future, and those without digital capabilities will inevitably be eliminated in the end. "In the past, we considered everyone a ground force. We

often wondered whether we needed to reorganize a group of people to become the air force, if we wanted to battle in the sky in the future. Later, we found that we needed to combine the two in terms of marketing and the underlying structure. The high integration of online and offline should not just be a slogan. Organizations must also adapt to the digital capability structure, and set different requirements for different positions and KPI of the staff. I believe that many enterprises that have undergone digital capability transformation will feel the same way," Wang Ning said.

4   Operation Digitalization

Big data is one of the important "engines" powering Easyhome's transformation to new retail. Easyhome's big data platform project is called "1321 Big Data Platform Construction Plan": to create "one ecological integration system" that supports Easyhome's multi-role and full-touchpoint digital collaboration capabilities, integration of large home furnishing and large consumption, and upstream and downstream integration; to empower "three businesses"—data-driven refined marketing, data-driven investment promotion operations, and data-driven chain expansion; to optimize and improve "two types of management" - data-driven internal operation management and data-driven service management; and to finally build "one big data platform" to form a complete data ecology of Easyhome.

The Big Data Platform Construction Plan is in the process of being gradually implemented, during which some practical problems have been encountered. Li Xuanxuan said that the first thing to change was the usage habits when Easyhome transformed from a property management platform to a data-driven one. For example, the management of investment promotion operation used to rely on personal experience, the accumulated influence of managers in the industry, and the connection between the city and the industrial system. Even without the help of products and digital systems, business could still be done well. However, amid the digital intelligent transformation, processes, standards, nodes, and data must form a complete closed loop, which requires various standard processes. Cases like unsuccessful negotiations also need to be recorded in terms of the implementation details and data reference issues, all of which require front-line business personnel to adapt to.

In this case, only the top executives can fully promote the transformation in an orderly manner. In addition, it is necessary to intensify trainings to realize the value of tools through operation, supervision and assessment.

After the investment in internal corporate management has yielded results, Easyhome, as a platform, is also thinking about exporting its own information management capabilities to the brand partners settled in the Easyhome. At the end of 2019, Easyhome released the "Retail Advisor", a data product for brand owners, which can help brands carry out digital transformation. This means that more than 130 VIP brand factories, more than 300 strategic cooperative brands, and more

than 60,000 distributors across the country that have established cooperation with Easyhome will become the beneficiaries of this data product.

Li Xuanxuan said: "We'll consider providing informatization services to brand owners and partners in the next stage. However, these businesses will grow exponentially, followed by a substantial increase in costs and operating expenses. Therefore, it is necessary to consider whether we should make it a digital business and whether it can generate business value. This is similar to Alibaba Group's own platform transformation. The difference between the platform that initially provided goods selling and the one that offered better goods selling is what the platform can provide, including capabilities, data tools, marketing and promotion tools, etc. These capabilities and tools will become the platform's business, and the platform, therefore, needs to possess operational capabilities."

The data mid-end and the business mid-end have become the foundation of the ability to construct a large platform. In Easyhome, the data mid-end and the business mid-end will be constructed simultaneously, because the data mid-end will integrate the data previously scattered in various business departments.

In the process of building the two mid-ends, Easyhome discovered many problems in the previous informatization construction, which needed to be reorganized and reconstructed. For example, there were multiple commodity centers before, but there was no data and business sharing between them, which now needs to be reconstructed. There were also some businesses whose capabilities need to be enhanced. For example, although the membership information of Easyhome could be accessed in multiple business formats, the service capacity of the membership system was still insufficient. As a matter of fact, the membership system originally built based on the store business must now be optimized and improved on the mid-end.

Li Xuanxuan said, "At the current stage, the construction of dual-mid-ends is to see which parts need to be optimized, rebuilt, reset, and merged with similar items from the perspective of the large system."

5   Decision-Making Intelligence

An important aim of digital-intelligence transformation is to enable enterprises to have a "digital-intelligent brain". Relying on the recommendation, prediction, and decision-making made based on complex intelligent algorithms, enterprises can directly take corresponding actions, and make continuous adjustment and supplement according to the real-time data feedback, forming benign closed loop of learning and feedback, and ultimately facilitating the efficient decision making of enterprises through the full link.

According to Li Xuanxuan, it would take 3 to 5 years to realize decision-making intelligence. By the end of 2020, the internal digitalization of the enterprise would have been completed first, cleaning and sorting out all the internal data related to operational decision making. The current data mid-end project is also solving

this problem, and on this basis, it outputs data products and applications to serve different roles and groups.

In fact, many data dimensions and data required for decision-making do exist, but they are scattered in various business systems. Therefore, the data must be processed and calculated in each business system, and the original manual data need to be digitalized. At the same time, the inventory of data assets should be made, such as connecting data between human resources and business systems, so as to realize the value of data in performance evaluation and KPI assessment, etc.

After the completion of the first stage, the digital service capabilities of investment operation management, chain management, property management, and marketing management will become the focus of output. Property management is a relatively cumbersome business, but due to the use of intelligent building systems, data collection and management of infrastructure such as water and electricity are relatively complete. "Being clear in business and low in complexity, it is the part that first realized decision-making intelligence," Li Xuanxuan said.

6   Summary

In the Internet era, the original way of communication between merchants and consumers based on the traditional store and operation model has changed, and word of mouth has become a testament to the merchant's service capabilities. The rise of online channels and the emergence of Internet home improvement companies have diversified consumers' choices. What consumers need is a supply system with product-service capabilities and insight capabilities.

This, therefore, urges the fundamental transformation of Easyhome. It explores the business model of tripartite cooperation among stores, distributors and factories, aiming to help businesses operate. Marketing will be used to connect products with consumers, involving the refined operation of various issues such as product category, product structure and brand differences.

In essence, the transformation of new retail and the reconstruction of "people, goods, and fields" are indispensable from the capability support of the mid-end and the back-end. Digital intelligence is a systematic construction for Easyhome, and the transformation of digital intelligence needs to be based on the enhanced capabilities of mid-end and back-end in terms of operation, decision-making and management. It is difficult to improve the efficiency of decision-making and operation by relying on traditional informatization construction and empiricism. Li Xuanxuan said, "Under the concept of new retail, managing goods is a complex system, and there must be a complete operating system, which requires re-evaluation and promotion of the digital intelligent transformation." Therefore, in this process, the adjustment of front-office business forms and the corresponding capability reconstruction of middle and back-ends will be a continuous deepening process.

Feihe Dairy: Winged with Digintelligence

Fuming Chen

In recent years, a "dark horse" has emerged in the domestic infant formula industry—Feihe Dairy. Since the second start-up in 2001, Feihe, starting from a county in Northeast China, has grown into the first domestic infant milk powder brand with revenue of over 10 billion yuan in less than 20 years, dominating the infant milk powder market in China.

Feihe survived the industry "vortex" in 2008, not because of luck. During the rapid development of the industry, when all its peers were vying to occupy the markets, it was busy "planting grass and raising cattle", fully devoted to the construction of its own industrial clusters.

After more than a decade, Feihe managed to build the first exclusive industrial cluster of infant milk powder in China. From pasture planting, dairy cow breeding, fresh milk collection, to production and processing, and channel control, all links are fully controllable. At the same time, by virtue of exclusive industrial clusters, Feihe has also formed a 2 h industrial ecosystem. The fresh milk collected from the milking parlor of the original ecological pasture is transported to the world-class factory within 2 h through a fully enclosed low-temperature safe transportation vehicle, and then directly spray-dried to produce milk powder, which ensures the nutritional freshness of the product.

From 2016 to 2019, Feihe's revenue rocketed from 3.724 billion yuan to 13.722 billion yuan, with a compound annual growth rate of 54.5%, displaying a stable performance. In terms of market share, according to AC Nielsen's data for the

F. Chen (✉)
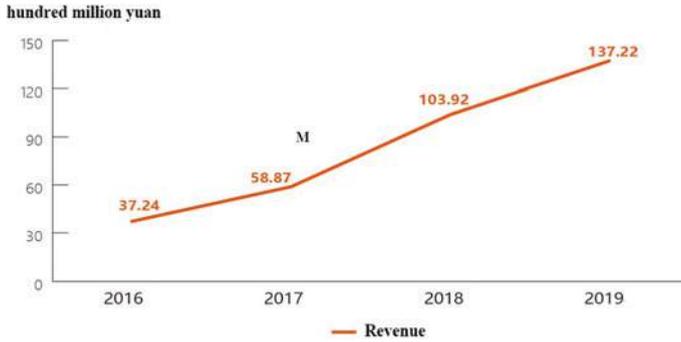Shanghai, China
e-mail: guowei@phei.com.cn

hundred million yuan

Fig. 1 Performance trend chart of Feihe Dairy (2016–2019)

Fig. 2 Feihe Dairy's stock price trend chart (as of January 29, 2021)

third quarter of 2020, Feihe's overall market share was 17.2%, far exceeding that of the second brand.

Figure 1 shows the performance trend of Feihe (2016–2019).

In November 2019, Feihe was successfully listed on the Hong Kong Stock Exchange. As of January 28, 2021, Feihe had been listed for 14 months. Its share price had risen from HK$7.44 to HK$23.05, and its total market value had exceeded over 200 billion Hong Kong dollars, ranking second in China's dairy industry. Figure 2 shows Feihe's stock price chart (as of January 29, 2021).

Although Feihe has become a market leader, a fact that cannot be ignored is that the number of births in China has continued to decline since 2017, with 5.23 million born in 2018 and 4.65 million born in 2019, hitting the lowest birth rate record since 1961. The sustained decline in the total number of births means that the overall capacity of the domestic infant milk powder market will gradually shrink.

As a result, Feihe established a strategy to strengthen its dominant position in 2018. To this end, Feihe and Alibaba Group reached a cooperation, embarking on
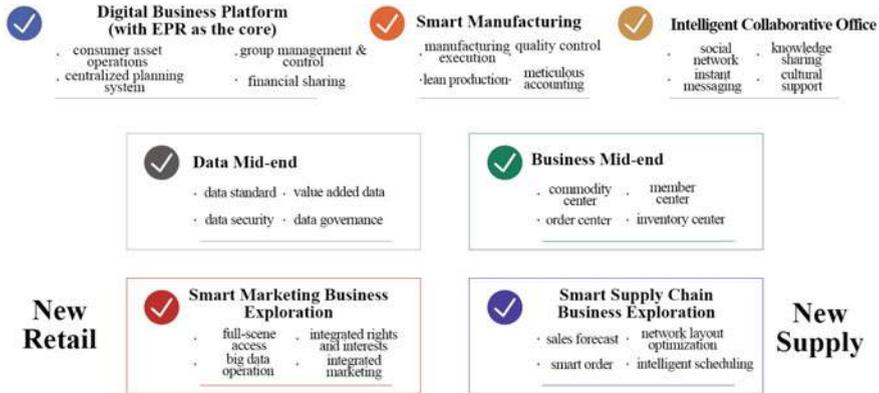
Fig. 3 Strategic planning of digital intelligence of Feihe Dairy

the road of the digital intelligent transformation. Figure 3 shows Feihe's digital intelligence strategic plan.

The digital-intelligence transformation of Feihe mainly started from the construction of a data mid-end. So far, the first phase of the project with new retail as the core has been completed; the second phase focusing on building a smart supply chain is being actively promoted; and the third phase prioritizing the smart application of algorithms has also been initiated.

Regarding the digital-intelligence transformation that has been implemented so far, Feng Hailong, the head of Feihe Information Center, believed that the construction of a data mid-end had enabled Feihe to acquire digital intelligence capabilities such as homology, agility, prediction, backward push, and two-way facilitation, thus truly realizing refined operations and data feeding the business.

1   Infrastructure Cloudification

Compared with the traditional offline IDC (Internet Data Center) model, the biggest advantage of moving servers and databases to the cloud is that they can obtain great scalability and flexibility. Once the business volume surges in a short period of time, such as during the "618" and "Double 11" promotions, the cloud server and database can be immediately expanded to acquire computing and storage capabilities at high concurrency. Once business volume falls back to normal, the expanded capacities can be returned to reduce costs.

At the same time, the cloudification of infrastructure can also reduce operation and maintenance costs and improve system stability and security. After the cooperation project with Alibaba Group was launched, Feihe gradually migrated the business system originally running on the third-party cloud to Alibaba Cloud. Feihe did this mainly because of an incident it had encountered.

At that time, Feihe's business system database running on a third-party cloud failed, affecting its production, but the cloud service provider offered insufficient technical support. In a moment of desperation, Feihe turned to the project manager of Alibaba Cloud to coordinate its technical experts to help solve the problem, who managed to quickly resolve the database failure. After this encounter, Feihe made up his mind to migrate the business system to Alibaba Cloud, thus opening a new stage of being fully in the cloud.

2   Digitalization of Touchpoints

Feihe's products are sold nationwide through a huge sales and distribution network, but Feihe does not directly manage and operate its sales outlets across the country. Instead, with the help of various digital means, it has established links with consumers. Feihe has printed a QR code on the bottom of each can of milk powder. After purchasing, consumers can scan the code to trace the source and get credit points. In return, Feihe can identify consumers and establish direct links with them.

In addition to the digitalization of sales scenarios, IoT (Internet of Things) digital transformation on the production side is also imperative for the milk powder industry, which sets a higher requirement for sales and operation planning. Once the production end is digitalized, it can be connected with the front-end sales data and sales forecast data, so that the entire industry chain will be more efficient.

For example, what type of products should the fresh milk collected from the ranch be used for? Which factory should it be sent to? If the equipment in the factory happens to fail and production cannot continue before the delivery, which other factory should the fresh milk be sent to next? Provided that the digitalization is realized at the production end and data access is available with the front end, these questions can be well answered, which will greatly optimize the efficiency.

To this end, Feihe has started the exploration of smart factories. It has launched the MES system (manufacturing execution system) on a pilot basis. After the MES system is connected to the production equipment, the production execution data and equipment information can be presented in the data mid-end. It has also introduced the LIMS system (laboratory information management system), which is connected with more than 60 kinds of inspection equipment in the factory. Inspectors can make inspection plans on this system, and the system will issue instructions to the equipment and upload data, which used to be done manually.

3   Business Online

An interesting thing is that when Feihe and Alibaba Group first negotiated the cooperation, what the two parties discussed was to build a business mid-end rather than the data mid-end that was implemented later. However, the two parties discovered via the communication that many companies had established their

own business systems, large or small, after years of informatization construction, and these business systems boasted remarkable operational efficiency after years' adjustment and optimization. It would be quite difficult to introduce a totally different business mid-end to completely change the original business system architecture. This explains why many companies directly move the online and offline integrated omni-channel business to the newly introduced business mid-end, while for the company's original offline business system, they choose to migrate it to the mid-end step-by-step in stages.

Since Feihe's current online business is not extensive, and it does not directly participate in the management and operation of offline sales outlets, the demand for a business mid-end to deal with its online and offline integrated omni-channel business is not so urgent. Despite no appropriate opportunity for cooperation in the business mid-end, the two parties have reached a consensus on the value of the data mid-end during the communication, which brings the subsequent construction of a data mid-end.

However, the story is not over. As Feihe's brand power grew stronger and its partner system became more complete, the business middle-office technology architecture was transformed to an Internet distributed and micro-service architecture, which could better meet the needs of business innovation and changes. At the same time, Feihe's empowering partners could provide comprehensive digital support in terms of "people, goods, and fields": focus on full touchpoints and all customer groups, and integrate advantageous resources from all channels to enable inventory sharing, achieving national unified management.

To this end, Feihe changed its mind, and was determined to cooperate with Alibaba Group in the business mid-end to achieve efficient data connectivity and data empowerment between the business mid-end and the data mid-end. At present, the investigation work of Feihe's business middle-office project has been basically completed, and it is about to enter the construction and delivery stage.

Figure 4 shows Feihe's IT system architecture planning.

4   Operation Digitalization

With the overall decline in the domestic infant milk powder market, the competition among milk powder companies will inevitably shift from vying for incremental users to the retention and operation of existing users. If Feihe wants to maintain its leading position in the industry, it must prioritize the existing users in terms of user operations.

To operate users well, you must first know who these users are. Questions are very crucial as to how many existing users Feihe has, who they are, how sticky they are, what the repurchase rate is… To answer these questions, one thing is required—data.

"In-depth operations on existing consumers need the support of data. When you are empowered by the data, you'll have the opportunity to adjust and optimize the previous business model and operation," Feng Hailong said.
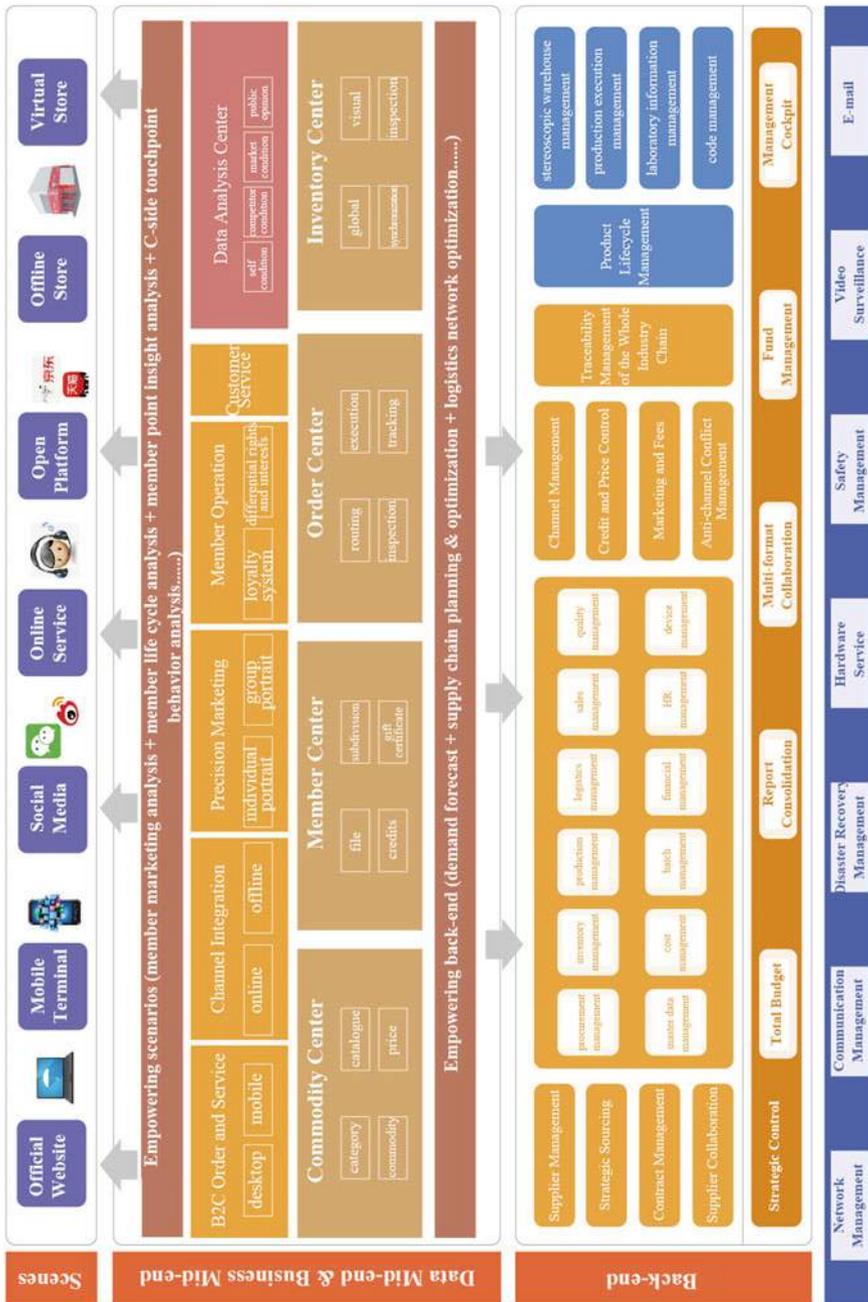
Fig. 4 Feihe Dairy's IT system architecture planning

However, like most traditional enterprises, Feihe's business data are scattered in different systems, disconnected and not defined or stored according to a unified standard, which makes it difficult to merge these data together, let alone processing, analyzing or even applying it.

The good news is that owing to the complete and exclusive industrial cluster Feihe has established, "core data can all be accessed", whether it is the data on production, raw materials, quality, and production scheduling in the production process, the data on purchase order, inventory, logistics, and planning in the supply chain link, or even the data on marketing activity, channel, B-side order, C-side sales, and expense in the sales link.

For example, due to the product characteristics of infant milk powder, strict traceability management is required, and meanwhile, in order to monitor the stability of market prices, Feihe has deployed a system basically incorporating all distributors. In this way, it manages to master more than 90% of the distributors' data, which is difficult to achieve in some FMCG industries.

The problem is how to aggregate the data existing in different systems, and process and output them according to unified standards, to empower various front-end business operations, such as existing customer operations. Alibaba Group's data middle-office solution can just meet Feihe's needs.

Figure 5 shows the top-level architecture of Feihe's big data.

In August 2018, Feihe's data mid-end project was officially launched. Feihe and Alibaba Group reached a consensus to fully realize Feihe's data standardization, data assetization, data value and data service with the help of Dataphin products, technologies and OneData methodology of Alibaba Cloud's data mid-end; to achieve in-depth consumer insights, support precision marketing, and realize closed-loop management of marketing effect analysis; to build a unified labeling system for consumers, and provide data support services for Feihe omnichannel digital marketing, refined operation of terminal stores and customer experience improvement.

At the same time, the entire data mid-end will be built on Alibaba Cloud, with one end connected with Feihe's original systems to collect all the accumulated data of these systems to the data mid-end, and the other end linked with the front-end business operation system to empower various business operations with data, as shown in Fig. 6.

Alibaba's project team is responsible for planning and building the entire middle-office architecture. It develops and launches nine business analysis scenarios, including consumer care, marketing business activities, offline activities, store orders, and online sales interaction. The intelligent analysis results of these scenarios are used to display the business status in real time and guide the front-end business operations, as shown in Fig. 7.

Feng Hailong believed that Feihe was able to explore new business models with the aid of data mid-end. Therefore, before the official construction of the data mid-end, Feihe had proposed to explore a new retail model, and made four corresponding core goals for its new retail: effectively retain incremental consumers;

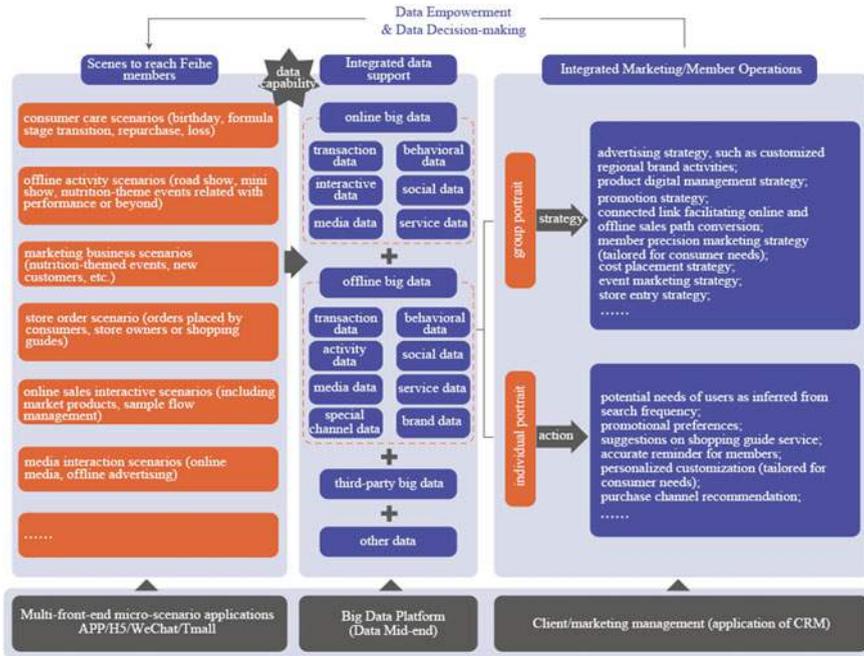**Fig. 5** Feihe Dairy's Big Data top-level architecture

Fig. 6 Data empowerment, data decision-making

operate existing customers in depth; fully empower shopping guides; and realize full product domain operations.

As shown in Fig. 8, Feihe establishes global online links with consumers.

On the front-end business system empowered by the data mid-end, Feihe mainly built two systems on its own, one being a business operation platform called "Smart Shopping Guide", and the other a consumer operation platform called "Feihe Star Mom Club", both of which were run in the form of apps. "Smart Shopping Guide", used by front-line shopping guides and business personnel, integrated multiple front-end businesses such as marketing, store inspection, regional management, event management, and membership management. "Feihe Star Mom Club" was a platform for consumers, providing them with various services, such as obstetric examination reminders, parenting tips, baby feeding, expert consultation, and Star Mom classes.

In September 2019, the first phase of the data mid-end project centered on Feihe's new retail was completed. Through data standardization and data service, dozens of business front-ends have been connected to collecte core data assets of tens of millions of members, tens of thousands of stores and shopping guides.

According to Feng Hailong, the first-phase construction of the data mid-end project is of great value to Feihe in five aspects.
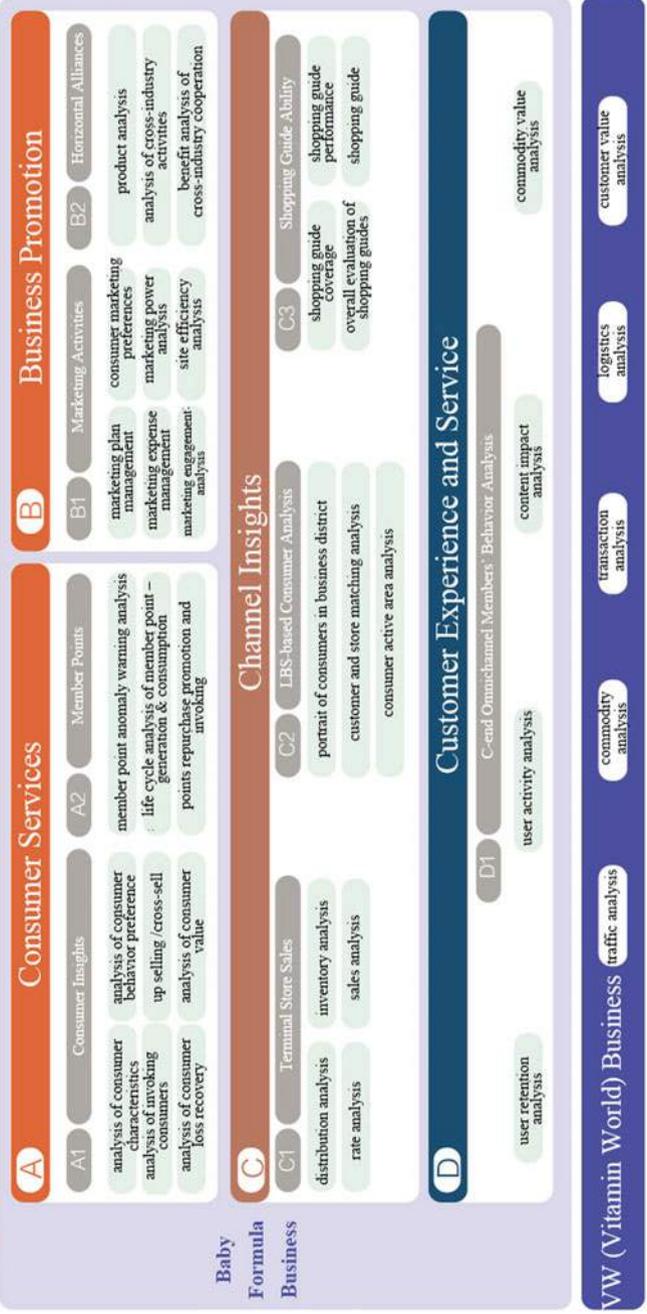
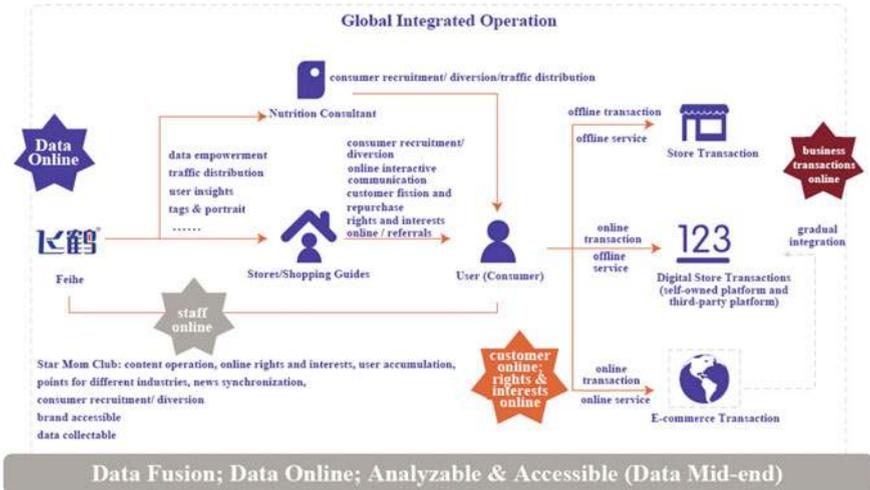Fig. 7 Marketing and consumer scene design

Fig. 8 Global online link between Feihe Dairy and consumers

First, it provides a unified data source to allow a consistent understanding of the business throughout the company. In many other similar consumer goods companies, what the boss sees is the "blooming business"; what the middle-level manager sees are "menacing crises"; and what the front-line personnel sees are "faults everywhere". By virtue of the data mid-end, everyone is seeing the same business landscape and talking about the same business world.

Second, it can make Feihe react more agilely. With real-time data presentation, changes can be observed soon to respond with decisions in no time.

Third, it enables Feihe to quickly and accurately identify problems and opportunities. In fact, during the first-phase construction of the data mid-end, the team discovered a lot of problems which reminded business personnel to enhance the control and urged them to optimize the mechanism.

In addition to existing problems, opportunities, of course, can also be identified. For example, Feihe would rank the online and offline sales growth rates of various provinces and cities. Through the ranking, it was found that a city ranked 16th offline, but first online. What does it reflect? Consumers may only search for 1.6 brands on average before buying milk powder online, and online purchases will not be affected by whether there are stores around them. To this end, online sales growth can represent the brand recognition in the region. That is to say that Feihe enjoys a strong brand recognition in the local area, if the growth rate of online sales in that city is high. This presents a good opportunity for Feihe, which should invest more resources in that city to drive the growth of offline sales there.

Fourth, it can urge the business department to improve. When the data was not so transparent, some front-end business departments would operate more casually. The establishment of data mid-end, however, enables all operations and data

to become transparent, which can help the company re-examine the business to gradually improve.

Fifth, the data mid-end is bidirectional. The most significant difference between the data mid-end and BI (business intelligence) is that the latter is one-way. It only presents the aggregated data of the past business with a lag, and cannot empower the front-end business. The data mid-end, by contrast, collects data from the front-end business system, and then processes and analyzes the data before empowering the front-end business with the capabilities generated after data aggregation. Such data capabilities are exactly the basis for exploring business transformation models.

For example, according to the real-time POS data provided by the mother and baby chain stores that have been connected to the system, the data mid-end has concluded that there are two peak sales periods for infant milk powder: from 8:00 a.m. to 10:00 a.m., and 8 p.m. to 10 p.m. Referring to this data analysis result, Feihe's sales managers can control the behaviors of shopping guides in the future, instructing them on what to do at different time periods.

It is also because of the empowerment of the data mid-end that Feihe transferred many of its previous offline activities to online during the COVID-19 epidemic. From February to March 2020, Feihe held nearly 90,000 online interactive activities, with more than 2,000 events a day at most, reaching more than 2.1 million consumers. Its e-commerce business has yielded 200% year-on-year growth and driven more than 100,000 offline retail outlets for sales.

Although the first-phase construction of the data mid-end completed in September 2019, in Feng Hailong's view, it was just the beginning, far from playing its due role and unleashing its capability. Feihe hoped to transfer the data capabilities of the data mid-end to the back-end supply chain and production, creating an intelligent factory with smart supply chain.

Therefore, after the Spring Festival in 2020, Feihe and Alibaba Group launched the second phase of the data mid-end project. At present, the priority of both parties is to standardize and normalize the data of Feihe's supply chain and production, and then import all of them into the data mid-end to achieve full-link data connectivity, as shown in Fig. 9.

At the same time, Feihe has also started the implementation of the third-phase project, aiming to fully promote the intelligent application of data algorithms and data business, optimize and expand the application scenarios, and finally realize intelligent decision-making.

5 Decision-Making Intelligence

For a long time, although most enterprises have resorted to market data and internal operation data for making management and business decisions, more often they rely on human insight and experience. The rationality and effectiveness of such decisions are often, however, greatly affected, and mistakes are even made, thus impeding the operating efficiency and development of the enterprise. Therefore, avoiding decision-making mistakes and improving decision-making effectiveness
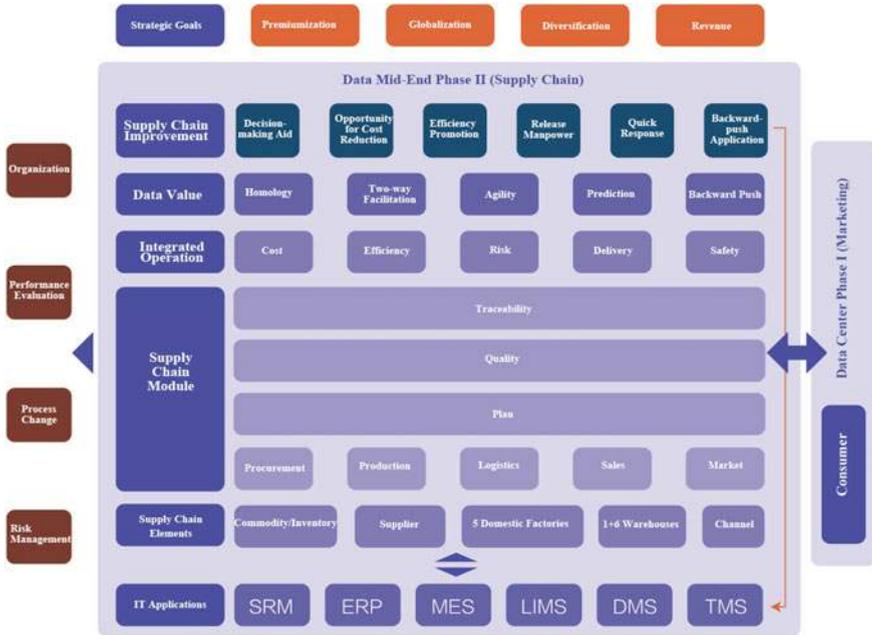
Fig. 9 Phase II project of data central platform

with the aid of technical means has been the common desire of all enterprises for a long time.

The emergence and maturity of technologies such as the Internet, big data, cloud computing, Internet of Things, artificial intelligence, and intelligent algorithms are making the desire of enterprises a reality. An essential aim of digital-intelligence transformation is to enable enterprises to have a "digital-intelligent brain". Relying on the recommendation, prediction, and decision-making made based on complex intelligent algorithms, enterprises can directly take corresponding actions, and make continuous adjustment and supplement according to the real-time data feedback, forming benign closed loop of learning and feedback, and ultimately facilitating the efficient decision making of enterprises through the full link.

For the smart supply chain, Feihe hopes to accurately obtain the data of front-end demand to forecast future demand, manage inventory and formulate distribution plan, thus supporting the market with the most economical and reasonable investment, as is shown in Fig. 10.

Despite the second-phase project still being in progress and the third-phase project being just started, Feihe has already tried to refer to historical data to arrange logistics for each area, and calculate the most efficient and economical logistics solution according to cost, transport capacity, freight, etc. They are also considering accessing the retailers' data with their own supply chains to enable smart replenishment.

Fig. 10 About smart supply chain

6   Summary

When we tried to understand the business in the past, it was like viewing a 360-pixel low-resolution photo, blurry and unable to see the details nor the full view. Now, the data mid-end has made the business transparent and visual, just like a 3D high-definition model, which can withstand the examination and inspection from all angles. It is so appealing that it invites our full involvement," Feng Hailong commented on the first-phase construction of the data mid-end.

Besides, through the establishment of a data mid-end, Feihe is trying to absorb the "nutrition" generated by massive data, thereby powering the industrial chain upgrading, business sustainable development and new business exploration.

Feng Hailong also remarked that the construction of the data mid-end had no end, as the business model is always changing and the data is being updated. Every time there is a change, it is necessary to make corresponding adjustments to the data mid-end, such as developing new interfaces, adjusting data labels, or adding the dimension of data analysis. In this sense, Feihe's digital intelligent transformation will continue to advance in deeper and wider fields, leading the upgrading and transformation of the entire industry.

Haidilao: Thoughtful and "Smart" Service

Beihong Wu

In the early 1990s, Zhang Yong, founder of Haidilao, worked in a tractor factory in Sichuan after graduating from a technical school. He only earned 90 yuan a month at that time, but his neighbor, Granny Zhan, had already become a local nouveau riche with her ancestral technique of cooking smoked geese. Inspired by his neighbor, Zhang Yong quit the job and started his own business—a hot pot restaurant.

Years later, Granny Zhan was still selling smoked geese in street shops, while Haidilao, which Zhang Yong ran, had become a national chain enterprise, and even opened stores overseas. It was listed in Hong Kong, China in September 2018, becoming the first catering brand in China with a revenue of over 10 billion yuan and a market value of over 100 billion yuan. By the end of 2019, Haidilao had 768 global stores, with 54.98 million members and 100,000 employees. In just two years after its listing, Haidilao's market value had doubled, from more than 90 billion yuan to more than 200 billion yuan in October 2019.

The most significant difference between a street store and a chain store is the ability to replicate—to migrate the success of one store to more stores. Digitalization is one of the essential means of such capability replication. According to Dr. Shao Zhidong, Chief Information Officer of Haidilao, digitization is an inevitable trend of business development.

What comes first is the digitization of ordering and cash register system, which is the "rigid demand". More than 20 years ago, when there were only one or two stores, a table was often used to record the order and settle the bill, which was

B. Wu (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

prone to mistakes. Therefore, the POS system was used to solve the problem at that time.

Next is the digitization of membership. When there was only one store, waiters could remember all the customers, making them feel at home. However, when there are 100 or even 1,000 chain stores, the staff are mobile, and sometimes they need to work in the newly opened stores. In this process, the information of customers must be digitized in order to be collected.

In its subsequent development, in addition to order information and member information, the data on personnel, finance, and suppliers have also been incorporated into the system, which is also a digital process. There is no way to develop or even survive without doing so. Therefore, Shao Zhidong believes that digitization is an issue concerning both Haidilao's development and survival. Moreover, the development of business and technology will naturally drive the digitization process of enterprises.

Nevertheless, the digital system is the most basic, and does not indicate the level of digitization. Data should be automatically collected and integrated rather than manually entered; the systems should be interconnected and then a data-driven business system is formed through the integration and analysis of the data, enabling data-driven intelligent decision-making. Only at this time does digitization enter a higher stage of cloudification and intelligence—"digintelligence" as we call it.

When talking about the degree of digitization of his own business, Shao Zhidong emphasized the differences among industries: some companies are "born" online, such as e-commerce, whose digitization degree is almost 100%, while the catering industry is barely digital, thus being confronted with daunting challenge of digital upgrading. Indeed, "China Catering Report 2019" showed that the digital level of catering in China in 2018 was only about 10%. There is another notable data in this report that the chain rate of Chinese restaurants in 2018 was 5%, compared to 30% chain rate of the American restaurants announced by the American Restaurant Association, which was 6 times more than that of China.

In May 2016, Zhang Yong, CEO of Haidilao, sighed at the China Catering Industry Member Consumption Index Conference, "I can hardly imagine which catering (enterprise) can occupy a 10% market share, but the proportion in many other industries can be much greater than 10%." At the conference, Zhang Yong proposed the idea of using the new technology that incorporated IT technology, artificial intelligence and automation technology to change the cost structure of the entire catering industry. Since then, Haidilao has begun its own race of store expansion, and the digital upgrade.

Between 2016 and 2019, Haidilao opened 30, 97, 193 and 302 new stores each year, respectively. Compared with the five to eight newly added stores in 2015 and the years before, the expansion rate was obviously accelerated. The surge in the number of stores and members overwhelmed the original system, with frequent failures and slow speeds. A rapid growth as such required the corresponding digital infrastructure as its underlying support. To this end, since 2016, Haidilao has begun to gradually migrate its core business systems to the cloud; in 2018,

Fig. 1 Haidilao performance trend chart (2015–2019)

Haidilao and Alibaba Cloud cooperated to build the infrastructure of the data mid-end, business mid-end and mobile mid-end. On this basis, they upgraded Haidilao Super App and reconstructed the membership system to strengthen the close relationship with customers. In the same year, its first "smart restaurant" was opened in Beijing, using automatic condiment-making machines, intelligent food delivery robots and intelligent kitchen management systems to offer "thousands of hot pot flavors" to consumers with different needs, which reduced cost, boosted efficiency and ensured food safety; it planned to complete the cloudification of all core business systems in 2020, and apply automatic condiment-making machines and intelligent food delivery robots to hundreds of stores nationwide. In terms of digital intelligence in the catering industry, Haidilao is already leading the way. Figure 1 shows the performance trend of Haidilao (2015–2019).

1   Infrastructure Cloudification

According to Shao Zhidong, CIO of Haidilao, the development of the enterprise is inseparable from going to the cloud. When the number of chain stores expands to 100, and cloud computing technology has matured, migrating to the cloud will undoubtedly be an inevitable choice. Otherwise, it will be impossible to survive the market.

After more than 20 years of development, Haidilao has established a variety of systems, including the ordering and cash register system, unified reservation and queuing system, and CRM membership system for customers; IKMS (Intelligent Kitchen Management System), CKMS (Central Kitchen Management System), supplier management system, store inventory management system, and product management platform for the production and supply; intelligent personnel system, and ERP system for internal operation; new store construction system, intelligent site selection platform, BI (business intelligence) system for business development;

and an innovation system that encourages employees to come up with ideas. Shao Zhidong is quite familiar with these systems, "We have all kinds of systems you can think of, with a total of 136 systems."

These systems were deployed in traditional IDC (Internet Data Center) computer rooms, not on the cloud before 2016. According to Cheng Qiwu, Minister of Haidilao's Information Department, the traditional IDC had several drawbacks. First, it was difficult to extend it, as the purchase of cabinets and servers required a cumbersome and complicated approval process; second, the failure rate was high, with the equipment being often overhauled; third, it was vulnerable to DoS (Denial of Service) attacks, resulting in network congestion and breakdown. The backwardness of infrastructure had severely constrained Haidilao's business development.

Therefore, in 2016, Haidilao decided to move the system to the cloud, as the cloud environment ensures better scalability of the system, lower failure rate, and stronger stability and security. The first business that went to the cloud was the ordering and cash register system, which was not a simple migration, however. The original system needed to be reconstructed to solve the compatibility problem; the interfaces between the systems needed to be re-debugged or deployed; and the rules of the application firewall needed to be adjusted. It took two years to complete the reconstruction and migration to the cloud, for the staff had to modify and debug the system store by store, just like ants moving house. Nevertheless, after going to Alibaba Cloud, there will be no problems with the system, even when the number of stores expands to 2,000 or 5,000.

The second business that moved to the cloud was the membership system. In May 2018, Haidilao cooperated with Alibaba Cloud to implement the Haidilao Super App project, which was officially launched on October 16 of the same year. There were actually two key things underpinning the super app project. One was the construction of the mid-end, that is, to establish the infrastructure of the mobile mid-end, business mid-end and data mid-end on Alibaba Cloud, which was equivalent to digging the foundation to provide the underlying support for the "building" of the business department in the future; the second was to reconstruct the entire membership system and move it to the cloud to cope with the high concurrent traffic.

Before going to the cloud, Haidilao's original membership system did not support any e-commerce promotions such as Seckill. As a matter of fact, almost no activities could be launched at that time, for the system would easily collapse, once the concurrent traffic was high. It is no longer the case after Haidilao moved to the cloud. Promotional activities commonly held by the e-commerce are available on the App now, and the new system manages to assist hundreds of millions of members and support marketing campaigns with tens of millions of participants.

When talking about the benefits brought by the super app project to Haidilao, Shao Zhidong said, "Through this project, Alibaba Group helps us with the architecture to support the e-commerce system, provides a complete set of tools for us to iterate on this version in the future, and even teaches us how to use these tools, which is the biggest reward."

"Now we have sorted out the entire architecture, with the clear layout of mobile mid-end, business mid-end, and data mid-end. The developed tools and concurrent architecture are ready for use, which means that the foundation has been dug. As to what kind of house is to be built on the foundation, it is not determined by the technical department, but by the business department," Shao Zhidong explained. At present, business departments are constantly adjusting and iterating their respective applications according to business needs. Since the business mid-end built on Alibaba Cloud can fully support the adjustment of various applications in the front-end, the business department can try out their ideas and innovate without worrying about the downtime. A stable and flexible architecture system is indeed the basic guarantee for business innovation. Figure 2 shows the architecture of the Haidilao system.

Haidilao moved its reservation and queuing system to the cloud in 2019, the personnel system PeopleSoft and the logistics system SAP's ERP to the cloud in 2020. With all the core business systems from front-end to back-end being on the cloud, Haidilao has become "Haidilao on the cloud", with its network service capability being enhanced several times and infrastructure failures basically having disappeared. The efficiency has been greatly improved, despite the number of personnel in the information department remains basically the same. This means that Haidilao has been endowed with digital core capability and an intelligent computing environment that is agile, stable, cost-optimized, safe and risk-controllable, laying a strong foundation for future business datamation and data businessization.

2   Digitalization of Touchpoints

Haidilao has always been known for its excellent service. In a series of touchpoints such as customers arriving at the store, queuing, seating, ordering, dining, and paying, waiters' hospitality allows customers to have a good experience and get surprises beyond their expectations. For example, when customers wait in line, Haidilao provides free manicure, shoe shine, and massage services; its waiters can remember the dining preferences of regular customers, and offer ginger Coke in time when seeing customers cough.

For traditional restaurants, waiters cannot interact with customers until they come to the store for consumption, and this interaction usually ends when they leave. Modern restaurants, by contrast, can reach customers online and have more interaction with them, in addition to providing offline services.

For example, Haidilao Super App is an entry to "mobile online services". During peak dining hours, Haidilao's stores are often full, and customers have to queue for a long time. For this reason, Haidilao has put a lot of thought into queuing services, such as providing snacks, offering manicures, and folding origami cranes for vouchers. In some stores, customers, while waiting for a table, can play table tennis or billiards, or play interactive games with other customers on the super-large screen to win coupons. The purpose of various services is to prevent customer loss caused by long queue time. Now, the queuing problem can be better solved
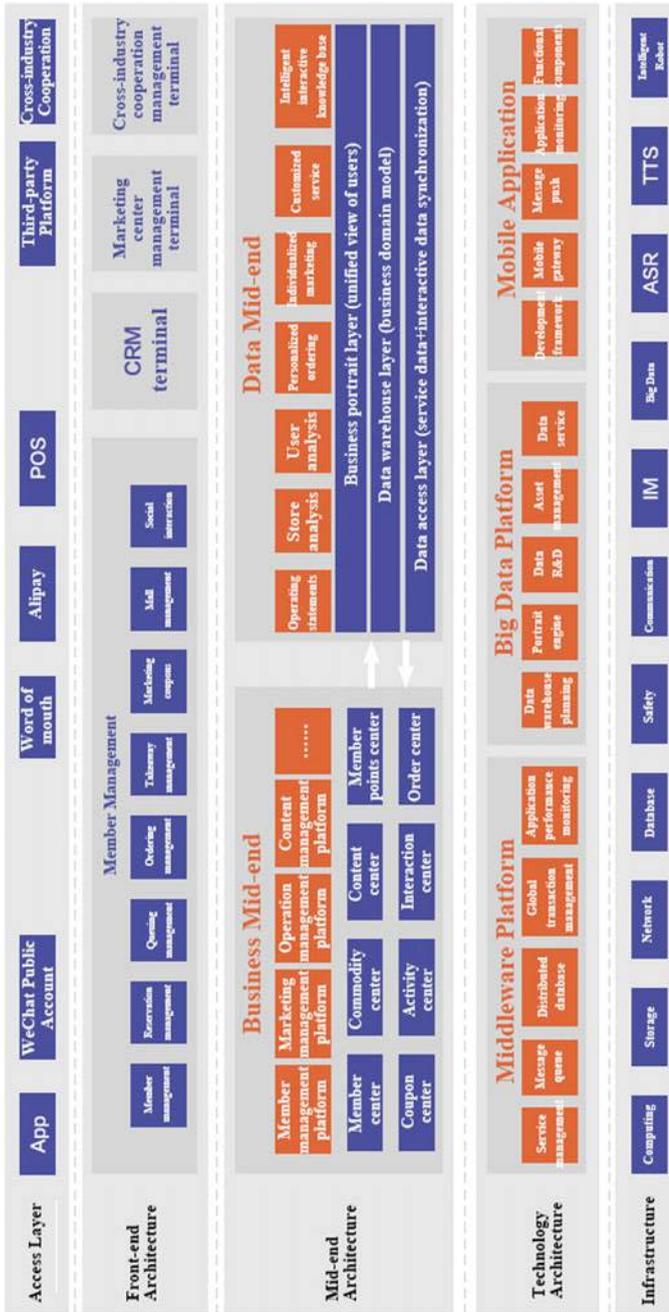
Fig. 2 Framework diagram of Haidilao system

Fig. 3 Haidilao smart restaurant

on the Super App, where customers can book a table in advance or participate in the same-day queue. If the current Haidilao store is fully booked or there are too many people waiting in line, they can check the queuing situation of other nearby Haidilao stores, or opt for delivery or takeaway. Customers have more choices now.

Figure 3 shows Haidilao Smart Restaurant.

In order to save meal time, customers can order dishes in advance on the Haidilao Super App. Haidilao extends its thoughtful service from offline to online: considering the individual needs of customers, it provides seating options such as "by the window", "by the amusement park" and "relatively quiet table", as well as scene options such as birthday parties or classmate reunions; any special needs can be remarked by voice or text, such as baby chairs, children's tableware, etc., so that personalized needs can be met when you arrive at the store, as shown in Fig. 4; after ordering, customers can share the ordered menu with their peers or others; when customers make a reservation, the Super App will also display the location map of the store, such as the specific floor of the mall where the store is located, so that new customers can quickly find it.

In the past, waiters in the store could remember what dishes the regulars liked to eat and which seats they preferred, and helped them arrange in advance. However, once there is a flow of waiters, or customers go to other branch stores to dine, how to ensure that customers still receive attentive service?

This can be solved when membership information is digitalized. No matter the customer logs in to order food through the Pad terminal, the Super App terminal or other ports, the consumption information each time will be collected in the data mid-end system, and some personalized tags such as spicy food, or vegetarian food will be generated for the member. Moreover, if the waiter observes some

Fig. 4 Haidilao super app

details, such as the customer's preference for a certain dessert, he/she can also add such a personalized label to the customer in the system. In this way, whichever Haidilao restaurant the customer goes to dine next time, the waiter can log in to the system to immediately know the customer's characteristics and preferences, and provide desired attentive services, such as delivering customers' favorite ice water, preparing fish soup or cushions for pregnant women, recommending some dishes that customers like, or sending for free a plate of snacks that customers once praised. Only in this way can customers always feel at home and being cared about—such digitalization is hailed as "digitalization with warmth".

When discussing member tags, Shao Zhidong expressed his envy to digital native companies, "Our digitalization is not at the same order of magnitude with that of e-commerce. Taobao user, for example, can be added with more than 6,000 tags at once, and often with two genders, one being actual gender and the other the shopping gender."

Haidilao's member tags will be more diverse in the future. At the end of March 2020, Haidilao joined Tmall's "Membership Pass". For members who agree to log in to Haidilao on the Tmall platform, Haidilao can learn more about their

consumption preferences and thus generate tags of more dimensions. "This is of great meaning for the reverse customization of C2M in the future," said Wang Meng, Director of Member Operation and Maintenance of Haidilao.

3   Business Online

Haidilao has established a total of 136 digital systems from the front end to the back end, which have played a crucial role in developing its business. However, due to the fact that the early cloud computing technology was immature and there was no concept of data mid-end and business mid-end, these systems were all isolated like chimneys, disconnected to each other, but with too much overlap and redundancy in functions.

For example, Haidilao's app has its own front-end and back-end, so do Alipay and Haidilao's official website. In the past, they were devoted to building chimney-like systems one by one, reinventing the wheels. Actually, there were many functions that could be shared, such as payment functions. However, each system used to have its own set of payment system, which caused a lot of trouble and prevented quick and uniform settlement. In addition, each system would involve all stores. Every time a store was newly opened, its information needed to be filled in each and every system. "In the past, the more stores we had, the more worried I became. What should be done if we open another 100 stores?" Shao Zhidong, CIO of Haidilao said frankly. If data cannot be updated in a timely manner, business cannot be coordinated in real time, making it impossible for executives at the headquarters to keep abreast of the situations in all stores.

In 2018, Haidilao did a very important thing when cooperating with Alibaba Cloud on the Super App project, which was to build an architecture of business mid-end and data mid-end. To be specific, the business mid-end is to integrate common functions in various businesses. For example, many business terminals use the payment function, and then a shared platform of the payment center will be built in the business mid-end, ready to be called by each front-end, which is quite convenient. In the future, if the front-end develops new business, it can also be easily extended.

At present, in Haidilao's business mid-end, some customer-related service functions have been established, such as marketing center, order center, payment center. In the future, the mid-end functions related to internal operations and supply chain will also be provided to form "large mid-end, small front-end", making the business more agile and efficient. Figure 5 shows the data mid-end of Haidilao.

In order to enable the technical department to better meet the needs of the business department, Haidilao has created a new position called ITBP (IT Business Partner), which is dedicated to converting the needs of the business department into something (IT requirements) that developers can understand.

On the dual mid-ends and a mobile mid-end dedicated to mobile applications, the brand new Haidilao App came into being. With such an infrastructure, Haidilao
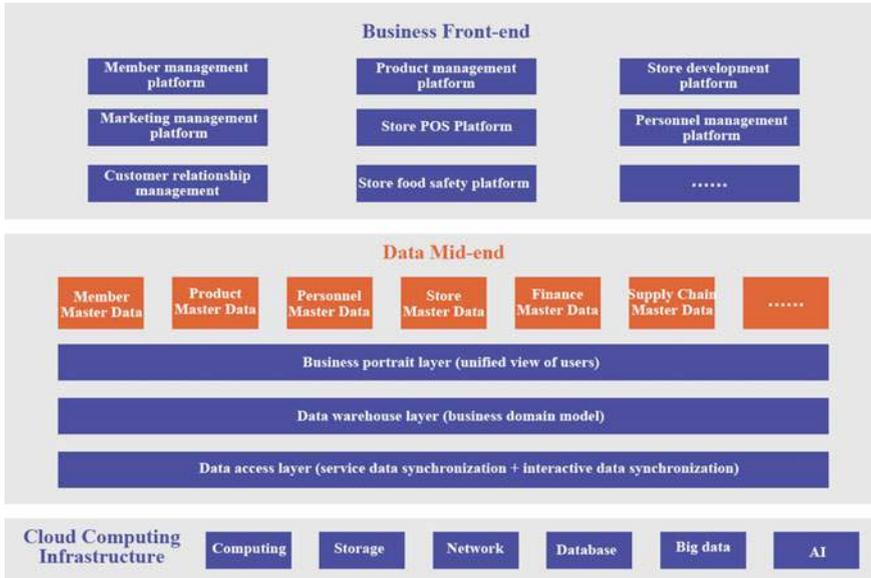
Fig. 5 Haidilao's data central platform

can quickly iterate various functions on the App as required, from basic functions at the beginning, including queuing, reserving, ordering, and takeaway, to diverse functions such as shopping malls, popular activities, games, communities, and short video sharing. Besides, intelligent customer service is online around the clock. Every month, Haidilao will adjust the functions and layout of the App according to customers' changing needs, which could not be possible without the establishment of the mid-end.

During the COVID-19 epidemic in 2020, considering the safety of its 100,000 employees and customers, Haidilao closed its domestic stores from January 26, and offered takeaway services in some stores from February 15. Dining-in service was not available until March 12. During the closure period, Haidilao's management and some employees did not stop working. Every day they held DingTalk video or voice conference between 9:00 am and 6:00 pm to communicate the work of the day; live stream in multiple groups was used to convey messages, ensuring the coordination of all employees of the company; some departments also used DingTalk's "online text collaboration" application to jointly edit documents while discussing in a voice conference, avoiding the inconvenience of editing documents back and forth.

Meanwhile, some online membership activities did not stop, either. Wang Meng, Director of Member Operation and Maintenance of Haidilao, said that they created several topics then in the Super App community, and the participation of members was very high. Customers left messages asking when Haidilao would resume work, saying that they missed the waiters of Haidilao. To this end, Haidilao

organized an online live broadcast on the app, for which employees enthusiastically signed up to perform their talents, including singing, dancing, performing acrobatics and conjuring. It even video connected with a Haidilao store open for business in Singapore. The audience watching the live broadcast in China couldn't help shouting "too tempting" when they saw the food in the store. Through such online interaction, Haidilao had maintained an emotional connection with customers during the epidemic.

In addition to content marketing, during the epidemic, Haidilao also embedded the Taobao live broadcast function in the Super App to divert traffic into the Haidilao's Tmall flagship store, promoting sales of various products. It also provided fresh food delivery and hot pot takeaway to meet the needs of customers.

Over the years, Haidilao has won many loyal "fans" with its excellent offline services. However, even the best relationship needs to be managed. Owing to the limited visits of customers to the store, Haidilao has tried to maintain close interaction with customers through the operation of online communities. As for the customers, they themselves also have strong social needs. They dine in Haidilao not just for the food, but more for social interaction. Customers walk into the same "field" on the Super App because of their common preference for Haidilao, where they post new ways to eat hot pot ingredients, a handsome waiter performing noodle stretching dance, or their game level and event prizes etc., which exerts a positive influence on each other.

4   Operation Digitalization

In addition to building various applications on the business mid-end, Haidilao has undertaken a very important job in recent years, which is to collect data scattered in various systems and import it into the data mid-end.

According to Cheng Qiwu, Minister of Information Department of Haidilao, the primary role of the data mid-end is unified storage, which means to standardize the data generated by various business systems, to collect it into a variety of master data (basic data with shared nature), such as the master data of dishes and stores, and then to provide the master data to various business parties via the terminal API (application program interface) function so as to realize data sharing across departments and systems.

This is a project requiring a great amount of work. Over the years, Haidilao has accumulated massive data, which cannot be simply moved to the mid-end. Rather, it needs to be cleaned, deleting the duplicate and redundant ones, completing the missing one, and correcting or deleting the wrong one, before the data is migrated to the data mid-end. Moreover, Haidilao has many suppliers of ingredients and dishes, whose ingredient numbers are not consistent with those of Haidilao. Sometimes there are multiple codes for one item. For example, the same potato supplier may have two codes, and is even labeled with inconsistent codes inside Haidilao's system, resulting in repeated data entry. Therefore, it is necessary to sort out the master data, and reorganize the code for unified data management.

Despite the large amount of work, after data standardization, Haidilao can provide its own unified API to access any system to achieve centralized data management. Under that circumstance, there will be no need to log in to each system separately to query all the data of a store.

Moreover, the data mid-end features with timeliness. In the past, the data extracted by Haidilao from various business systems every day might be a model of T + 1 (plus one day), and the calculation speed in the traditional data warehouse was very slow. By virtue of Alibaba Cloud's Dataphin intelligent data construction and management platform, coupled with the MaxCompute big data computing service, the computing speed has been significantly increased.

In addition, since the data mid-end can feed back unified data to the business system in a timely manner, it is possible to make some attempted improvements in the business based on these data, such as the recommendation of dishes—"guess you like it" and so on.

At present, Haidilao has imported all the customer-side master data into the data mid-end, and the unified identity authentication of members has also been completed. Whether the customer logs in to the store through Pad, App, WeChat or Alipay, the system can identify the customer's unique ID and remember the customer's preferences, accumulating data for subsequent personalized services.

Haidilao had received about 200 million customers in 2019, and the number of its members hit 54.98 million at the end of 2019. How to maintain such a huge group of members and encourage them play a greater value, instead of being just a symbol in the company's database? Haidilao began to use the data and business dual mid-ends to carry out more refined operations for members.

The data mid-end aggregates and analyzes member data from various ports to generates member tags. Next, the member operation department of Haidilao checks these tags in the marketing center of the business mid-end to delineate the member groups that they want to reach, and conduct precise automatic marketing on them through the system, such as pushing content of related topics in the app or send SMS notifications. This means that each member who opens the Haidilao Super App may see different content, similar to the "thousands of versions for thousands of consumers" (content tailored for consumers' needs) on the mobile Taobao app.

For example, for some customers who often go to Haidilao late at night for food, Haidilao will push the information of crayfish tasting events to them, when crayfish, food suitable for late-night snack, is offered. Others who consumed beers in Haidilao will receive the information push when Haidilao launches new beers.

Through such tag selection, Haidilao can capture the member data it wants so as to gain deeper insight into member preferences in subdivided scenarios. It can also enhance members' engagement and brand loyalty through follow-up targeted member activities. Meanwhile, the needs of members can be conveyed to the new product R&D department and production department of the company.

Recently, Haidilao plans to promote some products on the online store. Before the products are officially on sale, the Member Operations Department will organize members to participate in tasting events and vote on more than 20 products, whose final score is lower than a certain percentage will be eliminated after the

reasons are figured out. Therefore, the launch of a new product is not solely determined by internal personnel, but based on the opinions of customers. On the Super App, "Member Experience Officers" will also be recruited to deliver some products that Haidilao plans to launch in the near future to solicit their feedback. In addition, topics will be initiated in the app's community to learn about what games members like to play on the Haidilao App, and what kind of cultural and creative peripheral products they hope Haidilao will develop, etc., so that Haidilao can customize it as customers desire. According to Wang Meng, Director of Member Operation and Maintenance, many members have deep feelings for Haidilao and they are more than happy to participate in such member activities. For example, Haidilao once held cultural and creative design activities, to which members enthusiastically contributed, and some of the design works seemed to be professional-level, a true testament to the saying that "there are always masters hidden among folks."

The Membership Operations Department will analyze the consumption data of members on online malls and offline stores every month, and take corresponding measures to increase the number of members' coin exchange and store visits, stimulating the consumption of "sleeping" members.

5   Decision-Making Intelligence

As one of the important paths to the strategic goal of "changing the cost structure of catering enterprises with new technologies", Haidilao launched its first smart restaurant in 2018, exploring the digital and intelligent means to improve customer experience, reduce costs and increase efficiency, and ensure food safety. The smart restaurant has made useful attempts to improve the intelligence of the entire chain from the production supply to the consumption.

Shao Zhidong said that the essence of hot pot is the condiment and dipping sauce ingredients. Despite the same dishes to be plopped into the pot, different flavors of condiment will make different tastes. Since customers have different acceptance level for tongue-numbing and spicy flavors, some may require "mild spicy" to the waiter for the condiment when ordering. Even though the waiter will make a note in the ordering and cashier register system, the flavor tends to be easily affected by the chef's mood and cooking technique, sometimes with more spicy seasonings, and other times fewer seasonings. The flavor taken by the chef as "mild" spicy may be too hot for customers. To this end, Haidilao has launched the "Thousand Flavors for Thousand People" service, which means that waiters save the customers' requirements on the flavors of being tongue-numbing, spicy, fragrant, salty and sweet, as well as the ratio of oil and water in the CRM system. The automatic cooking machine can prepare a customized condiment through the mixture of main ingredients, food accessories and seasonings (for elevating the delicate taste) with the precision of up to 0.5 g. Customers can give a name to the customized flavor, share it with others through a QR code, and even PK with others in the Haidilao Super App community.

Fig. 6 Haidilao data big screen

According to Yang Li, head of Haidilao supply chain, 70–80% of customers who self-made condiment for the first time will opt for their "customized condiment" that has been saved in the CRM system, when they revisit Haidilao for consumption. Figure 6 shows the big screen of Haidilao data.

In order to ensure food safety, the kitchen of the smart restaurant is unmanned, with a constant temperature of 0–4 °C, in which the robotic arm automatically picks and delivers food, as shown in Fig. 7. Each dish has an RFID tag, and it will trigger the automatic alarm and be removed from the shelves, after it exceeds 48 h. After the dishes are made, several intelligent food delivery robots will take turns to deliver the dishes to the customers.

In order to reduce costs and increase efficiency, the smart restaurant has cooperated with Alibaba Group on inventory management to predict sales through the algorithm of "smart demand forecasting" and track inventory in real time. By calculating the amount of ingredients and dishes consumed every day, the quantity of replenishment to be needed can be determined to keep inventory at a reasonable level, thus reducing waste while maintaining sufficient supply. This kind of algorithm requires a deep learning process. As more stores apply the "smart demand forecasting" algorithm, more high-quality data will be accumulated over a long period of time, and more influencing factors will be taken into consideration, which will significantly improve the prediction effect. Besides, reasonable control of inventory is the lifeline of a company. Many companies lose money because of the backlog of inventory. Therefore, it is of great significance to improve the accuracy of sales forecast and purchase management.

For catering companies, location selection is another crucial link. If the location of the store is not well chosen, it is difficult to attract sufficient customers no matter how well everything else is done. Therefore, Haidilao cooperated with Alibaba

Fig. 7 Unmanned kitchen

Cloud and Amap to employ intelligent algorithms and big data to select the store location. In the past, it was business developers who ran around to select locations based on their own experience by following two rigid standards—"200,000 population within a radius of 3 km" and "in one-or-two-km proximity to a large-scale business and shopping center". In 2019 when Haidilao opened a new store every 1.2 days on average, if business developers were visiting the new locations for selection in person, they would have ended up in extreme exhaustion. Now they just need to sit in the office and turn on the data analysis screen, with the intelligent algorithm evaluating the location in view of multiple factors such as population density, consumption level, store distribution, surrounding catering and shopping facilities, transportation convenience, and competitors, which has greatly improved the probability of successful site selection.

6   Summary

The digitalization of catering enterprises is challenging. As Shao Zhidong remarks, intelligence is based on digitization, and the so-called artificial intelligence is only possible on the basis of big data. For catering companies, one consistent code for one product is necessary not only within the system of the catering company, but also for the suppliers when delivering ingredients, though it is quite difficult to make it. Yang Li, head of the Haidilao supply chain, also believes that it is difficult to standardize the food supply data of catering companies. For example, beef and mutton are often put back after being partially cut, and the yield rate of spinach is fluctuating (a pound of spinach can yield 85% as product served in cool

weather, but only 50% in hot weather); all of which have caused a lot of trouble for digitalization.

Despite the great challenges, Haidilao is resolute in digital intelligence. When there were only a few chain restaurants, Haidilao excelled in its thoughtful service; and when the number expands to hundreds or even thousands, only by resorting to digital intelligence can Haidilao form a scale effect and develop soundly, eliminating the problems of large enterprises—bloated systems, waste of resources, and inefficient processes. Now, Haidilao already has a good underlying infrastructure— a data mid-end and a business mid-end built in the cloud, which can support the rapid development of the business in the future and accurately grasp the consumption trend and the competitive environment. With the development of technology and the advancement of digital intelligence in the whole industry, challenges in the digital intelligence of supply chain confronted by Haidilao will eventually be resolved, upgrading its thoughtful services to smart thoughtful services.

BESTORE: Following Through the Digintelligent Transformation

Beihong Wu

At 9 a.m. on February 24, 2020, the world's first live broadcasting of company listing was unveiled on the official website of the Shanghai Stock Exchange. Yang Hongchun, founder and chairman of BESTORE, a Wuhan enterprise, solemnly announced in the live broadcasting that BESTORE officially landed on the A-share market. This special listing ceremony undoubtedly gave a boost to the market under the shadow of the COVID-19, as shown in Fig. 1.

The minute the news was released, some media people wrote to analyze what BESTORE had done to manage to be listed in the harsh environment. One of the conclusions was to continue to promote digital intelligent transformation.

Figure 2 shows the performance trend of BESTORE (2015–2019).

The first quarter report of 2020 released by BESTORE also confirmed this view. It showed that BESTORE's revenue in the first quarter increased by 4% year on year, of which the online channel revenue grew by 25% year on year, with the proportion of online sales expanding from 45% in the first quarter of 2019 to 55%. At the same time, BESTORE has actively promoted "store+" businesses including takeaway, group buying, and community group buying, with the proportion of takeaway sales increasing by 118% compared with the same period last year. This performance is fairly outstanding for BESTORE, an enterprise headquartered in Wuhan. Figure 3 shows the stock price trend of BESTORE (as of July 13, 2020).

The digital intelligent transformation of BESTORE can be traced back to 2008. At that time, BESTORE was still in its first year after the establishment, and had just opened 100 stores. Yang Hongchun lump-sum invested all the profits of

B. Wu (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

353
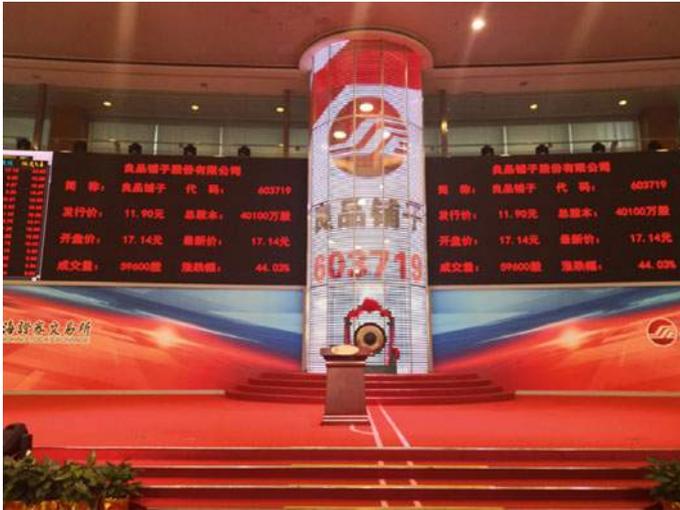
Fig. 1 Best store's cloud listing live
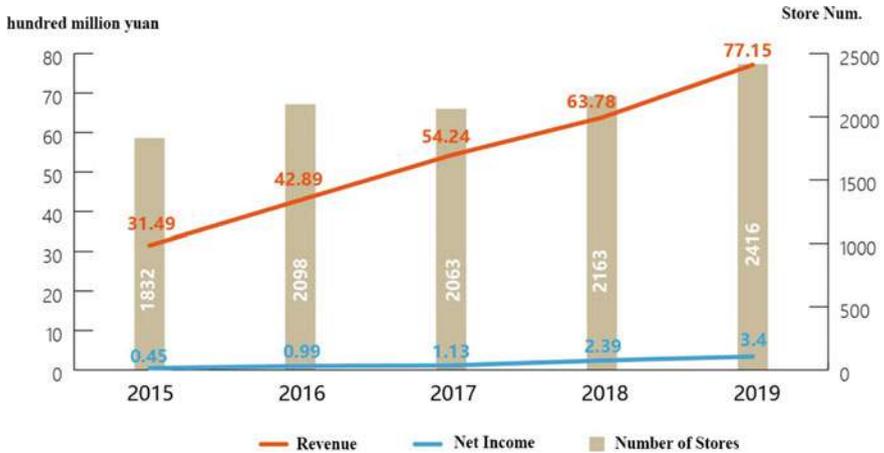
Fig. 2 Performance trend chart of best store (2015–2019)

10 million yuan to launch the store information management system. Zhu Shuxiang, head of the information technology center, who joined BESTORE that year, experienced the whole process of informatization construction.

"When I first came, the conditions of BESTORE stores were not as good as those of small street shops now." Even though it was more than ten years ago, Zhu Shuxiang still recalled it vividly, "All the purchases and sales had to be weighed manually. So did the account settlement and money collection." At that

77.92 元 ↑ +2.44 (+3.23%)
2020/07/13 15:00:00 已收盘 (北京时间)

上证:3443.29(+1.77%)
深成:14149.14(+3.50%)

今开	75.40
昨收	75.48
最高	78.02
最低	74.34
换手率	11.92%
成交量	4.89万手
市盈率	97.91
总市值	312.46亿

分时　　5日　　1月　　1年

Fig. 3 Stock price trend chart of best store (as of July 13, 2020)

time, BESTORE had already developed hundreds of single products, and it was not hard to imagine how extremely challenging it was to manage business completely manually from purchase and sales to inventory.

For the most original and basic purpose—to manage money and goods clearly, BESTORE started the information system construction. In June 2008, the store information management system was launched, realizing the unified management of products, prices and orders in all stores; in 2009, when the number of stores increased to 300, the warehouse information management system was la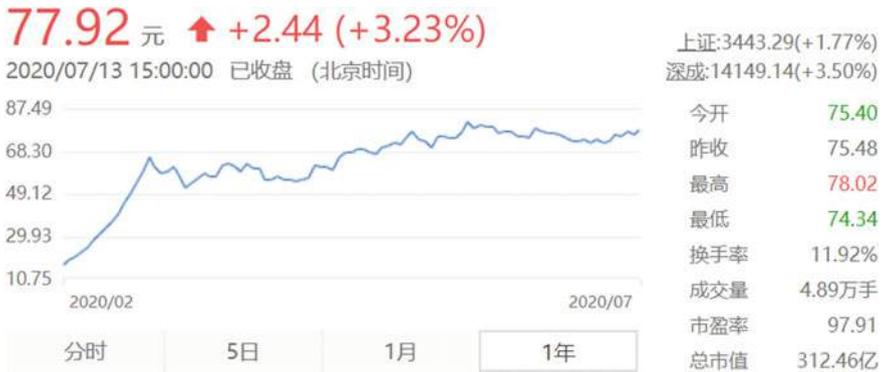unched to ensure that store replenishment orders were processed in the warehouse in less than 4 h; and in 2011, in order to improve internal operational efficiency and achieve refined management, BESTORE built the entire supply chain information system and upgraded the ERP system.

In 2014, BESTORE invested 50 million yuan to cooperate with SAP, IBM and other companies to start the overall informatization construction. In less than 2 years since then, BESTORE's omnichannel platform has basically been built, connecting the front-end, middle-end and back-end, and integrating all online and offline transaction data and customer data. As a result, all channels that used to be separated from each other, have become an organic entire whole with information exchanges.

"In the past, many decisions were made by people based on their personal experience, as to what new products to launch, whether the store to be opened, and whether it will make a loss or profit after opening, etc.," Zhou Shixiong, Vice President of BESTORE, said, "There are hundreds of sales channels, and 2,400 stores in BESTORE with more than 80 million members and thousands of SKUs (stock keeping units) in inventory. New products are introduced very quickly, and relying on people to make decisions brings us great challenges." Fig. 4 shows how BESTORE conceives the trend of retail reform.

Based on the layout and practice of digitalization in the early stage, BESTORE has naturally transitioned from digitization to the stage of digital intelligent transformation, further deepening the cooperation with Alibaba Group.
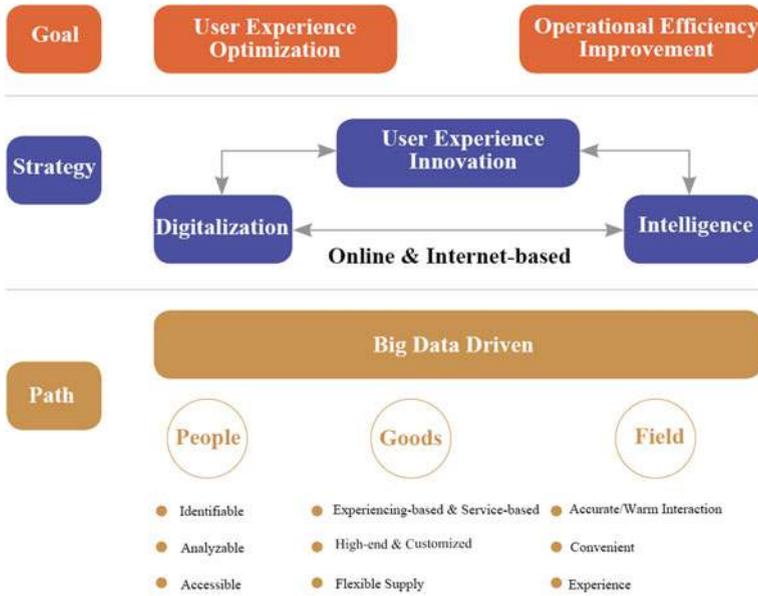
Fig. 4 Best store's understanding of retail change trend

1   Infrastructure Cloudification

Since its cooperation with IBM in 2014, BESTORE has built and rented a computer room. Although the system had been launched, the cost input was relatively high, and the operation and maintenance was very difficult. A dedicated technical team was required to be responsible for server installation, network, and security, virtualization, and disaster recovery, etc.

At that time, BESTORE was on its fast track of development with more business events to hold and more frequent marketing promotions, which posed a great challenge to IT. As Zhou Shixiong recollected, in order to cope with the big promotion events such as "Double 11", BESTORE usually rented or purchased high-performance servers three months in advance, "because it involves issues such as delivery cycle, installation and commissioning, and networking. These hardware costs are actually a waste for us after the event ends."

On top of that, BESTORE must always be on guard against hacker attacks and some physical crisis events. We had once encountered such situations as the construction around the computer room cutting off cables, the overheating in the computer room causing business shutdown for half a day, and the company's official website being hacked during a major public relations event and the page unable to be opened. These incidents have all exerted quite a negative impact on us.

Since 2015, BESTORE has been gradually migrating its business to Alibaba Cloud in a planned fashion. "The marketing applications that are inclined towards

C-end consumers, in particular, such as the food delivery mall, the self-built BESTORE app, etc., have already been moved to Alibaba Cloud," Zhou Shixiong said, "The entire business system of BESTORE, especially the front-end and mid-end has already been encompassed in the overall cloud migration plan, which will be implemented step by step."

From the vantage point of BESTORE, "cloud" is featured with elastic computing power, which can be freely matched with the demand during traffic peaks or troughs. It provides flexible space for the operation of retail enterprises, especially during the big promotion festivals such as "618" and "Double 11". Besides, it is more secure, eliminating the possibility of emergencies such as hacker attacks.

In addition, after the business system has been gradually migrated to the cloud, the productivity of BESTORE's existing IT team has also been greatly increased. "Basic tasks such as system operation and maintenance are solved through public resources to the most extent, freeing up manpower of the team to devote to work that empowers business departments with digital intelligence," Zhou Shixiong remarked.

2   Digitalization of Touchpoints

BESTORE has attached great importance to data since its establishment, and has stipulated a principle that it will resolutely not enter channels that cannot form a data loop.

What is "forming a data loop"? According to Zhou Shixiong's explanation, it refers to the fact that BESTORE reaches consumers in the whole domain, and the feedback of these consumers and effects it reaches must be able to return to the system, which helps BESTORE conduct data analysis and evaluation to make decisions accordingly and continuous with the iterative optimization.

In both online channels such as self-built apps and WeChat mini programs and offline stores, BESTORE has laid out many buried points to obtain data information such as consumers' online browsing paths, user engagement on the webpage, and length of stay. However, these are all limited to the private domain traffic pool, providing limited data.

In 2017, BESTORE cooperated with Alibaba Group to launch a smart store system. In 2018, the smart shopping guide system was rolled out, making 6,300 shop assistants in more than 2,000 stores online shopping guides.

As of September 2018, BESTORE had established a full range of interactive sales channels such as smart stores, e-commerce platform, O2O takeaway, and self-operated apps, with nearly 50 million members and 8 million monthly active users. As shown in Fig. 5, it is a QR code payment for a BESTORE store.

According to Luo Yiqun, head of BESTORE's E-commerce Technology Center, after cooperating with Alibaba Group, BESTORE has more channels (touchpoints) for obtaining data, "This is of great help to us."

Fig. 5 Scan code payment of best store

3 Online Business

In the fast-changing retail market, retail companies need to quickly respond to changes in various touchpoints, reshape and optimize business processes, so as to improve the efficiency of organizational communication and collaboration. At the same time, it is also necessary to upgrade the full-link digital intelligent business system to promote the openness and collaboration between ecology. Figure 6 shows the "dual mid-ends" structure of BESTORE.
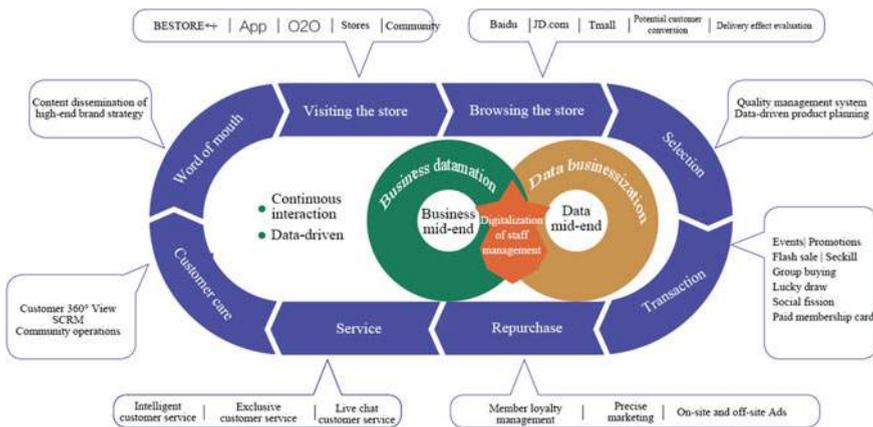

Fig. 6 "Double-Central Platform" architecture of best store

4   Organization and Communication Online

"The premise of business online is that the organization and communication are online," Zhou Shixiong said.

In the past, BESTORE did not have a unified platform to realize the online organization. Everyone communicated mainly through emails until DingTalk was introduced as a unified tool for internal communication. "More than 10,000 employees are now on DingTalk, enabling the organization and everyone's communication online."

According to Zhou Shixiong, there are a total of 43 business systems in the supporting infrastructure of BESTORE, involving suppliers, franchisees, logistics, membership, marketing, stores, orders, customer service, and finance etc. "We have presented these systems on DingTalk." For example, employees can quickly perform operations such as approval, asking for a leave, and check-in through clicking corresponding buttons on the DingTalk interface to access BESTORE's own OA and HR systems. In terms of the store inventory, employees can click the "Inventory" button on DingTalk to receive tasks online, scan codes for products using mobile phones, and make an inventory in groups, which greatly improves the efficiency. "DingTalk is the mobile portal of BESTORE and an accelerator for business online." Zhou Shixiong commented on the role of DingTalk in this way.

As for the business online, the construction of the business mid-end is the top priority.

Based on its own business characteristics, BESTORE divides its business mid-end into seven major sections—membership, marketing, merchandise, inventory, order, channel, and logistics. In view of the importance and urgency of these businesses, as well as the maturity of related business systems, BESTORE has formulated a step-by-step implementation plan. At present, the construction of the member mid-end has been completed, and the construction of the omnichannel order mid-end is in progress.

Why did BESTORE build a member mid-end and an omnichannel order mid-end first? Zhou Shixiong explained, "Members are the core asset of BESTORE. Our previous membership system did not support business development very well. It's therefore of high urgency to construct a membership mid-end and we completed the construction in 2019."

Prior to it, BESTORE's membership was separated from each other in different channels. After the member mid-end is built, the omnichannel membership has been available. Members of all channels can be identified through one ID, sharing the information of the membership level and member rights. BESTORE attaches great importance to the consistency of members' rights and interests. "For consumers, they should enjoy the same rights and interests no matter in which channel they consume, as it is the BESTORE brand that they recognize. This is of great significance for us to improve user experience and establish a high-end brand image."

As for the order mid-end, it is determined by the omnichannel business model of BESTORE. "We will have more channels, and the fusion of various channels will

be an inevitable trend of future development. For example, when consumers order food at home, the delivery may be responsible by a store, or 'Taobao Light Store'. Sometimes, it may even be delivered from the sub-warehouse or directly from the factory, and the products involved are more diverse. Different modes of distribution such as regular delivery or cold chain delivery are available," Zhou Shixiong said, "The order distribution of each channel based on our system architecture in the past was independent of each other, but now it is required to be able to respond to the diverse needs of the front-end business flexibly and quickly. The order mid-end can label each order to match different channels, which is a huge upgrade to the system that used to be channel based."

In Zhou Shixiong's view, as long as the mid-end is well built, it can adapt to various flexible changes in the front-end. "Since the core of the retail industry is membership and orders, what change most in the front end are also these two factors. For other elements such as inventory and commodities, BESTORE has always built them in a unified manner, which did not pose great challenges to us. To be specific, we support the back end through one set of supply chain, no matter which channel the products are in."

5   Supplier Management

Most of BESTORE's products are manufactured by suppliers. Although BESTORE has its own repackaging factories, "It mainly relies on suppliers," Zhou Shixiong said.

For the purpose of more efficient business collaboration with suppliers, BESTORE has built an SRM platform with B/S system architecture to connect all suppliers, enabling online communication of the following businesses.

- Scheduled delivery. The procurement department of BESTORE posts demand online, and the supplier, after receiving it, arranges the delivery plan which will be reviewed by the planner of BESTORE before being presented to the warehouse.
- Financial reconciliation. Settlement information is released online, and suppliers can upload the invoice after confirming the receipt of payment.
- License management. Suppliers can upload three certificates and factory inspection report of products in real time so that BESTORE can manage license data online.
- Collaborative planning. The purchase, sales and inventory of suppliers' key raw materials and packaging materials are managed, enabling BESTORE planners to keep record of the inventory of core raw materials in real time and arrange procurement plans.
- Collaboration in R&D of new products. BESTORE's new product proposal, R&D needs and progress are published to speed up the successful launch of products.

Liu Ling, Vice President of Supply Chain of BESTORE, introduced the specific procedures of supplier management. Take quality control as an example. BESTORE has a complete factory quality management system. Before production, "We will agree with each factory on the quality index system and specific index values of all products, which will be incorporated into BESTORE's internal quality system upon agreement," Liu Ling said.

Through the SRM platform on which BESTORE and suppliers collaborate, the factory will first conduct a round of self-inspection on the corresponding indicators after each batch of product is produced, and then upload the data to the platform before initiating a supply appointment. After BESTORE approves it, the delivery time and quantity can be determined, and BESTORE will conduct another round of quality inspections after receiving the products. Only when the inspection results are consistent with the standards can the batch of products be accepted.

BESTORE has also established the first nationally recognized laboratory in the snack food industry. In 2018, BESTORE's quality control laboratory introduced internationally advanced electronic tongue, which can quantify the taste of products such as sourness, sweetness, spicy level, and saltiness, thereby replacing the human tongue for standardized test on the taste indicators. "For example, the electronic tongue can quantify and accurately measure the indicators of various dimensions of the taste of dried mangoes from the Philippines and Vietnam," Zhou Shixiong said. In the same year, the quality control laboratory of BESTORE imported quality inspection equipment from the United States to test the indicators of hardness, crispness, and freshness of the products.

6   Logistics System

BESTORE was the first to put forward the concept of "freshness" in the industry in 2017, and in 2019, it proposed another product concept, "extreme freshness". This inevitably puts higher demands on the logistics system.

In December 2017, BESTORE's No. 1 Storage Base, invested with 450 million yuan, was officially put into use. Since then, BESTORE has established a three-level storage system, namely central warehouses, regional warehouses, and stores. The central warehousing system includes three warehouses, offline warehouses, which support the supply of offline stores nationwide, as well as delivery to regional warehouses; online warehouses (B2C), which support the delivery of e-commerce individual orders; and online warehouses (B2B), which support the supply of e-commerce regional warehouses.

By virtue of informatization and digital intelligence, the central warehouse has successfully merged the three warehouses by resorting to the three-dimensional warehouse and the automatic sorting system. On this basis, a fast-response logistics network has been established, ensuring the daily shipment of 150,000 to 200,000 orders during the peak time.
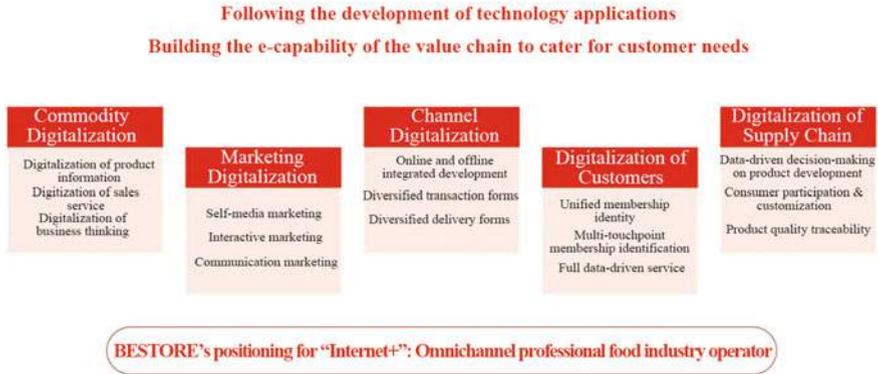
Fig. 7 Application scenarios of WAN data

In 2019, BESTORE implemented the self-service analysis of business reports in the invoicing system through BI, improving business analysis efficiency, and reducing errors in manual reports. More importantly, commodity inventory turnover time was controlled within 12 days, out-of-stock rate below 2%.

7 Operation Digitalization

According to Zhou Shixiong, operational digitalization can be interpreted from two levels. One level is the digitalization of the company's own operations. "BESTORE has continued to invest in and build digital intelligence for so many years, and the entire system is relatively complete and sound." What is more abundant are the application scenarios for wide-area data, as shown in Fig. 7.

8 Commodity Planning

"When developing new products, we need to gain insights into the entire market and industry trends, understand our competing products, and grasp unstructured data such as customer reviews, which requires the use of many tools," Zhou Shixiong said, "From product planning to the finalization of new products, they are all the results of big data interaction and analysis, and the entire R&D process of BESTORE is to do testing iterations while developing."

During the 2018 Russian Football World Cup, BESTORE captured the "buzz word" of "rattan pepper" through the public opinion data of the whole network. Its Information Department then aggregated sales data from its own platform and the third-party platform in order to select the target customers, analyze their preferences and needs, and make sales forecast. It finally determined to develop "Cold Spicy Cup" with the "Sichuan Cold Pot Skewers" as the prototype, targeting

markets in Sichuan and Hunan provinces, and designated the Commodity Department for product development. Similar examples included "Cat's Claw Shaped Abalones", "Spoiled Little Wild Cat" snack packs, and cat-shape lollipops, whose development was inspired by the cat persons.

In 2020, in view of its brand positioning as high-end snacks, BESTORE delineated the children group between 6 and 12 years old, and decided to enter the children's snack market.

When it came to specific products to be made, BESTORE conducted data analysis and research on product categories through Tmall. According to Liu Ling, at the beginning, BESTORE "chose mostly snacks similar to adults" in terms of product categories. Later, by analyzing the data provided by Tmall, it was found that children's snacks must be more clearly focused, so the product range was reduced. "Through the data, we found that mothers were most concerned about health and safety when buying snacks for their children, followed by nutrition and deliciousness," Liu Ling said, "Finally, our snacks for children narrow down to categories of fish sausages, fruit juice candy, and probiotic yogurt beans."

Take jelly as an example. At first, BESTORE incorporated jelly into children's snacks. Later, it was found through data analysis that many mothers were reluctant to allow their children to eat jelly, "because they felt that some additives in jelly were not conducive to the health of children." Therefore, BESTORE removed the category of jelly from children's snacks, and tried to develop two foods made of natural fruit ingredients. One was a fruit juice bar with a jelly taste, which was made into a cheese-like shape by pureeing the fruit; the other was a fruit puree called "suction jelly".

Compared with the previous product planning and R&D without big data support, Liu Ling said, "It is indeed a world of difference. In the past, it was basically based on experience and feeling. Although it had its own channels and had accumulated a lot of product data, the amount of data on members in the private domain cannot be compared with that in Alibaba's public domain."

After the new products of BESTORE are launched, the company will carry out product testing iterations based on market feedback. For example, after BESTORE launched children's snacks, it unveiled a "Linjianpuzi" gift box product. However, after tracking the sales data, it found that mothers usually did not choose gift box packaging when buying snacks for their children unless it was a gift. Therefore, BESTORE adjusted its strategy and prioritized products with higher daily purchase frequency.

BESTORE has previously cooperated with celebrities to host two live broadcasts of children's snacks on its Tmall flagship store. "We analyzed the data of the live broadcasts in Alibaba's backstage, and found that in many cases mothers tended to buy children's snacks only when they bought some for themselves." This challenged Liu Ling's previous perception. "We used to separate children's snacks from adult ones, and specially set up the BESTORE Xiaoshixian (little foodie) flagship store to sell children's snacks," Liu Ling said, "It turns out that about 30% to 40% of mothers share the same snacks with their children, and another 30%~40% of mothers buy snacks for their children only when buying some for

themselves. On the contrary, the proportion of mothers who buy snacks solely for their children is not very high. That's why we connected the purchase links for adult snacks and children's snacks."

9   Precision Marketing

In 2018, BESTORE began to promote precision marketing. "The so-called precision marketing is to match the right products to the right users in the right way at the right time," Zhou Shixiong said, "There are many categories for the snacks, perhaps with more subdivisions in the future. In addition, they have various tastes such as sourness, sweetness, bitterness, pungency, and saltiness, for which different consumers will have different preferences."

Dealing in such complex products, user insights must be made more precise. "Designing and supplementing user tags is what we will continue to optimize later", as user traffic will become more expensive in the future. Only precise marketing can bring the highest efficiency, as shown in Fig. 8.

After a period of exploration, the precision marketing of BESTORE has yielded preliminary results.

In March 2020, BESTORE's Store Business Department formulated a precise marketing strategy in East China and South China, namely focusing on expanding the penetration rate of new products, supplemented by attracting online consumption of old products. Marketing was aimed at consumers who had purchased new product series within half a year, and women aged 25 to 35 who had a preference for new products. The product's own selling points, flavors and tastes were pushed to consumers as the main content of the information, trying to weaken their perception of product promotion. In the end, by means of targeting consumers with goods, 51,000 coupons were redeemed, and the average unit price of customers using coupons was 119.8 yuan, an increase of 26% compared with the average unit price of customers.

On the occasion of the super brand day of the "Ele.me" marketing campaign in May 2020, BESTORE tried to wake up by SMS the consumers who had purchased snacks via food delivery channels in the past six months with unit price more than 69 yuan, especially during the previous hot events. Single products with high penetration and high gross profit were displayed at the top, and those with low unit price but high gross profit were set up in the on-site promotion position for the one yuan sec-kill activity to attract online consumers. In the end, a total of 210,000 orders were placed in two days, creating the peak sales of the takeaway channel in the first half of 2020. Compared with the popular event in January, the number of visitors increased by 108%, and the number of orders were up by 90%, with the sales reaching 12 million yuan.
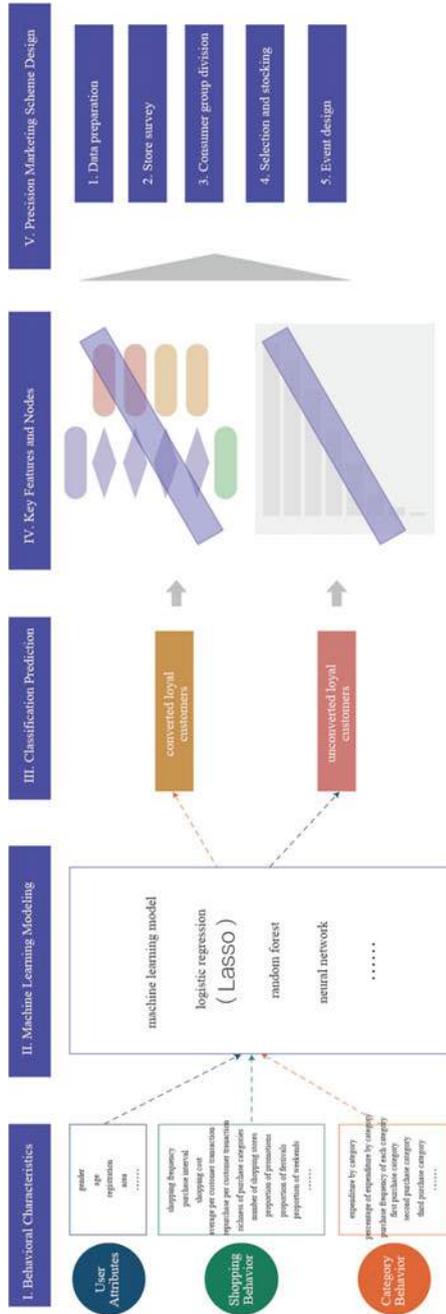
Fig. 8 Precision marketing

10   Data Mid-End

According to Zhou Shixiong, BESTORE started to build a data warehouse as early as 2015, the predecessor of the data mid-end, and built the entire data warehouse system around 2018. In 2019, BESTORE cooperated with Alibaba Group to reconstruct and upgrade its own data mid-end based on Alibaba Group's complete solution.

As mentioned above, BESTORE has a total of 43 business systems, each of which was developed by different suppliers. Some are packaged software, while others are self-developed. Therefore, the structure and logic of each system are different. The establishment of data mid-end managed to organize the data of these business systems according to different themes. "For example, data related to commodities is included in the subject database of commodity, and data related to transactions in the subject database of transaction," Zhou Shixiong said, "All the subjects will be further divided by different indicators, such as sales into sales of new products, old products and single products. These indicators can be further stratified into different levels."

Sorting the data in this fashion is equivalent to conducting the data abstraction and organization for the front-end application. For example, when making supply chain planning, you only need to find data related to commodities, marketing, and supply chain from the data mid-end without having to worry about where the data comes from, or about the complex logic and structure inside the system. "It's equivalent to making a hub between the front and back ends. The person in charge of the front-end application just needs to check the mid-end, and doesn't need to worry about the complexity of the back-end system. It yields higher work efficiency, and constitutes an essential and critical link in the process of transformation from traditional digitalization to digital intelligence.

11   Decision-Making Intelligence

For retail businesses, efficiency is key. It is very difficult to rely on people to achieve the best match between many production factors and management factors. Big data and digital intelligence must be used to ensure the best match and optimal efficiency of all factors as a whole.

12   Store's Diagnostic Model

BESTORE's digital intelligent management of stores is reflected in the models of diagnosis and analysis, commodity combination, replenishment, sales forecast, and store location evaluation of a single store.

Take the management of a single store as an example. "The single-store operation diagnosis model can automatically help the managers of each store to make decisions based on data. Each of our stores replenishes goods every day, and what
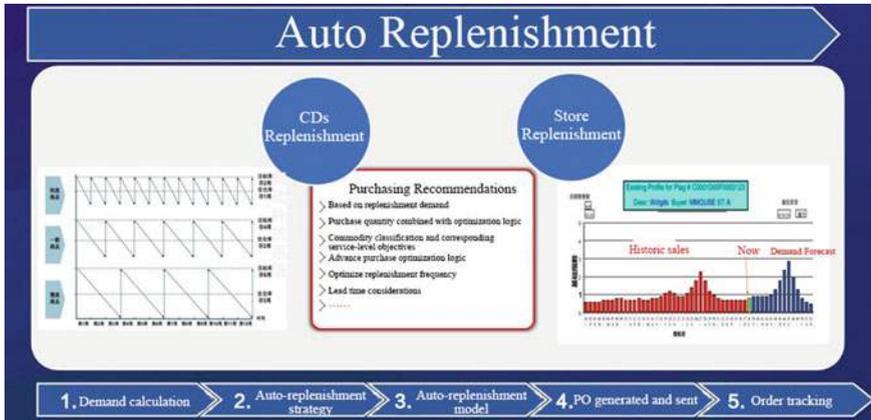
Fig. 9 Automatic replenishment system of best store

to replenish and how much to replenish are automatically calculated through system data," Zhou Shixiong said, "In addition, we embed some tools related to store management in DingTalk, such as the differences or deficiencies of each product category in the store compared with similar stores of the same region, so as to recommend products, display, and marketing strategies for a single store." Fig. 9 shows the automatic replenishment system of BESTORE.

Take the "store location evaluation model" as an example. Before opening a new offline store, BESTORE must base on the data of consumer traffic in the business district, the traffic on weekends and holidays, the preferences and purchasing power of the people in the business district, and the rent etc. to fully evaluate various indicators such as whether the average daily sales of a single store can support costs like rent and labor after its opening. "This analysis and evaluation process requires an intelligent data decision-making model," Zhou Shixiong said.

13 Sales Forecast

In the past, BESTORE always made sales forecasts when planning marketing activities. "The forecast was mainly made by people based on their experience," Liu Ling said, "Nowadays, with intelligent sales forecast as the engine, it can power the production and sales coordination system of the entire supply chain." Fig. 10 shows BESTORE's intelligent prediction platform model.

After the rapid development in the early stage and the exploration and practice of digital intelligence, "These intelligent decision-making models and digital intelligence capabilities have been 'embedded' in the process of our business operations," Zhou Shixiong said, "Take sales forecasting as an example. From sales forecasting to production-sales coordination, the entire marketing plan and supply chain assurance plan are exported, with the prediction accuracy rate being greatly
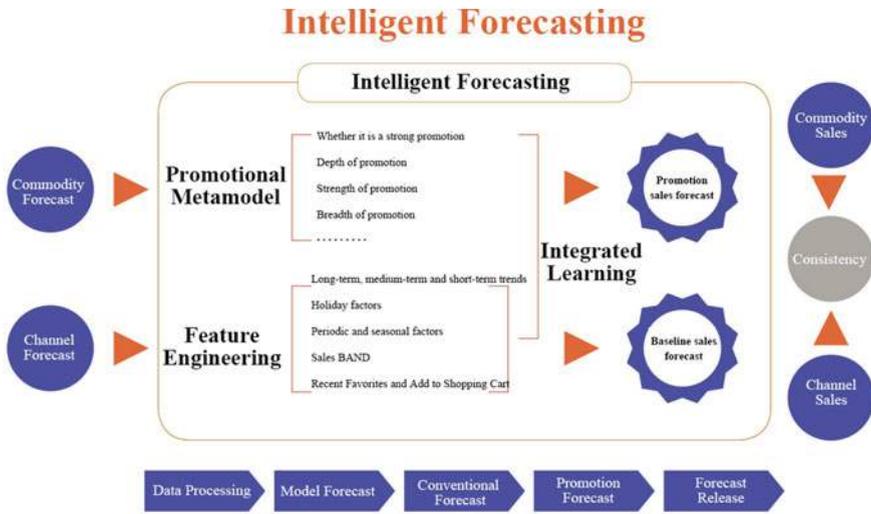
Fig. 10 Intelligent prediction platform model of best store

improved." It is reported that the accuracy rate of manual sales forecasting in the past was about 30%~40% per SKU, and now using the sales forecasting model, the accuracy rate can reach over 70%.

14 Smart Routing for Order Delivery

Faced with a large number of online orders from users across the country, it is necessary to deliver them efficiently and with high quality at a controllable cost. Therefore, BESTORE continuously optimizes the intelligent routing rules for order delivery by adding various strategies and models and allocating optimal warehouses and carriers to achieve the best experience for users.

For example, during the COVID-19 epidemic in 2020, the system automatically optimized the sourcing logic of the warehouse network based on the fulfillment rate and logistics cost of each warehouse. "This is a relatively intelligent logic, which takes orders into consideration. In principle, it is best not to split the order, because once it is split, the logistics cost will increase," Zhou Shixiong said, "It is also necessary to consider how to match the warehouse. In view of where the order was placed, for example in Wuhan or Harbin, the best way to match the optimal warehouse is through sourcing."

BESTORE currently has more than a dozen sub-warehouses across the country. In addition to matching the warehouse, it also needs to consider which express to use. During the COVID-19 epidemic, some express companies could deliver normally, while others were closed. At the same time, some products even needed cold chain transportation. "In short, all kinds of complicated situations must be

considered, concerning factors such as goods, direct delivery, inventory, shortest route, and express delivery."

15   Summary

In view of different consumption scenarios, including online, offline, and home delivery, with the help of various digital intelligent tools of Alibaba, BESTORE has already built the omnichannel service capability.

- Online: It mainly relies on the customer operation tools of Alibaba and other third-party platforms, such as customer operation platform, and Dharma disk, combined with the self-developed member mid-end, to link the online and offline member data, rights and interests, and operations. At the same time, with the "Internet+" online operation mode of the stores, it resorts to the front-end touchpoints such as Apps, mini programs, and community operation, and harnesses the member mid-end supplemented by functions of member recruitment, member loyalty management, member marketing, and promotion, so as to support its operation with the thorough system of front-end, mid-end and back-end.
- In stores: By means of in-store and self-operated online social fission activities, live broadcasting, and brand promotion and delivery tools, BESTORE attracts consumers to its stores; and then it helps consumers complete the consumption in the store through store POS, member mid-end, electronic payment, Alibaba smart stores, DingTalk employee mobile platforms, and a variety of digital intelligent terminals. Meanwhile, the additional purchases and transaction data of consumers in the store will flow back to the member mid-end to improve its $360°$consumer profiling, thus forming a closed loop of precise marketing.
- On the road: In addition to member precision marketing activities, social fission activities such as group buying, lucky draws, member privilege cards, and stamp collection are shared through live broadcast platforms, brand advertising tools, BESTORE App, mini programs and community operations, so as to enhance the brand exposure and consumer traffic conversion.
- Home delivery: BESTORE's home delivery service is divided into three parts. First, connect with mainstream third-party food delivery platforms such as Ele.me to complete the traffic import and sales transformation of the third-party platforms. Second, build a takeaway and self-pickup platform with apps and mini programs as the main touchpoints. Third, incubate innovative home delivery services with the help of Alibaba's light store scheduled delivery and front-end warehouses that cooperate with the distribution system, so as to offer home delivery services of products for different customer groups in different scenarios with different performance timeliness requirements.

For BESTORE, digintelligent transformation is a process of continuous development and optimization from the macro to the micro, and will be followed through, as improving the efficiency is an eternal topic in the retail industry.

Xtep: Leader of Digital Intelligent Transformation

Fuming Chen

In 1987, 17-year-old Ding Shuibo founded Sanxing Company in Jinjiang, Quanzhou, Fujian Province, mainly producing, selling sneakers. In just 6 years, Sanxing has become the shoe company with the largest foreign trade sales volume in China, with its branches in more than 40 countries, regions including America, Chile, Spain

After 2000, Ding Shuibo was keenly aware that the business of foreign trade OEM began to decline, while the demand in the domestic market was gradually heating up. Therefore, in 2001, Ding Shuibo founded the Xtep brand, which emerged with the differentiated marketing strategy of "fashion + sports" in the increasingly competitive sporting goods market. By 2007, Xtep's operating revenue exceeded 1.3 billion yuan.

In 2008, Xtep was listed on the Hong Kong Stock Exchange, and had sustained its rapid growth in the following years until 2012 when Xtep's revenue growth stagnated and even experienced a cliff-like decline, plummeting from 5.55 billion yuan in 2012 to 4.34 billion yuan in 2013. Thousands of offline stores were closed one after another. Of course, Xtep was not alone in this dilemma. In fact, at that time, there was an "upsurge in store shutdowns" in the clothing industry, sports shoes and clothing included.

The reason behind the phenomenon of store closing is that the vast majority of clothing companies were engaged in wholesale business. After the products were produced, they were sent directly to the general agent by the order quantity

F. Chen (✉)
Shanghai, China
e-mail: guowei@phei.com.cn

signed half a year ago, and then the deal was over. In this model, brands and con-sumers were isolated. On the one hand, brand owners could not quickly introduce new products to the market and deliver them to consumers; on the other hand, they could not get consumer feedback on products, with no way of knowing market changes and consumer needs. At the same time, with the domestic economy growing and people's consumption increasing, the needs of consumers are further refined and changeable, which amplifies the negative impact of the disconnection between products and consumer needs. All of these eventually led to an "inventory crisis" in the apparel industry.

Confronted with the drawbacks of the traditional model and the pressure from international fast fashion brands, Xtep decided to make a strategic transformation in 2015, from an extensive wholesale model to a consumer-centric retail model. To this end, Ding Shuibo proposed a "3+" strategy, namely "product+" to upgrade products, "sports+" to integrate products and services, and "Internet+" to enable online and offline digital intelligence empowerment.

In 2017, the "omnichannel retail platform" in the business mid-end jointly created by Xtep and Alibaba Group was officially launched, and Xtep became the first enterprise in the sporting goods industry to truly establish a business mid-end. Besides, the launch of the omni-channel retail platform also marks the successful conclusion of Xtep's three-year strategic transformation from the wholesale model to the retail model.

The model transformation urged Xtep to examine its retail business from the point of traffic and members. Just at that time, Alibaba Group put forward the concept of new retail. As a result, Xtep immediately launched a new retail project, and cooperated with Alibaba Group to introduce new retail tools and solutions such as smart shopping guides, smart stores, cloud stores, and DingTalk, making the "six businesses online", namely organization online, shop assistant online, service online, payment online, store online, and product online.

2018 was a proud year for Xtep. It achieved a revenue of 6.383 billion yuan, surpassing the highest level in history in 2012, with its annual net profit growth rate as high as 61%. The year 2019 witnessed that Xtep's annual revenue hit 8.183 billion yuan, up by 28%, and its net profit amounted to 728 million yuan, an increase of 11% year-on-year, ranking among the top three in the sporting goods industry. It is more than evident that empowered by the digital intelligence, Xtep's three-year retail transformation has yielded remarkable results.

Figure 1 shows the trend chart of Xtep's performance (2015–2019).

At the same time, with its main brand constantly thriving, Xtep embarked on a new journey again. In 2019, it launched a new development strategy of multi-brand internationalization, and successively acquired international brands, Paladin, K-Swiss, Saucony, and Mele, committed to becoming the world's first brand of sports fashion.

So, how does digital intelligence empower Xtep step by step? What profound impact has it brought to Xtep's retail operations and organizational capabilities? In the future, which "deep water areas" will Xtep's digital intelligence experience?
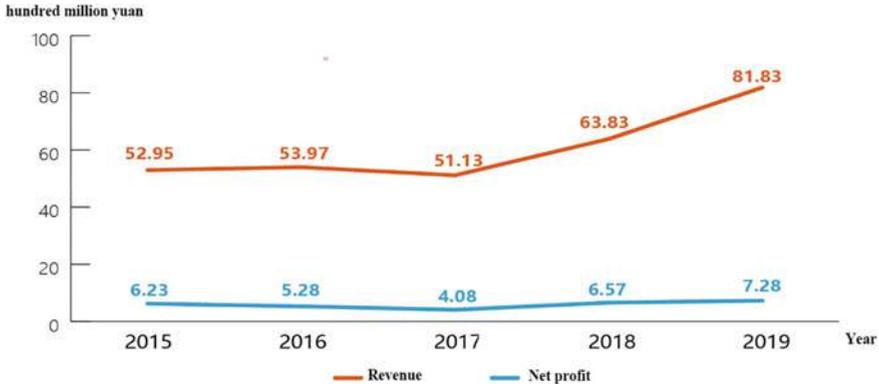
Fig. 1 Trend chart of Xtep's performance (2015–2019)

1 Infrastructure Cloudification

When building an omnichannel retail platform, Xtep adopted Alibaba's mid-end system, which is planned based on a distributed cloud architecture to ensure system stability and fast computing. Therefore, going to the cloud has become inevitable for Xtep to build an omnichannel retail platform.

However, Xtep used the private cloud model at the beginning, which means that Xtep's mid-end system was not placed on Alibaba's public cloud, but deployed on Xtep's own IDC (Internet Data Center). According to Tang Kunjun, CIO of Xtep, the reason for using a private cloud was mainly because of fear of data leakage. As a matter of fact, "We later realized that this was unnecessary worry, because the security technology provided by Alibaba's public cloud is actually more complete," Tang Kunjun added.

Actually, there's a big problem with adopting a private cloud. Alibaba Group will continuously upgrade the middleware technology on the public cloud, and if Xtep deploys all middleware on the private cloud, it cannot upgrade simultaneously with Alibaba, which makes it impossible for Xtep to enjoy many of the latest products of Alibaba Group.

In addition, the operation and maintenance of the cloud architecture of the mid-end sets high requirements for IT personnel, and enterprises often lack such talents and cannot afford the cost of these talents. Therefore, once something goes wrong with the mid-end system, Xtep has to turn to Alibaba's for technical support.

Therefore, Xtep moved the entire mid-end system, including all middleware, application servers, and databases, etc., to Alibaba's public cloud in 2019. "In the future, our mid-end system will become more functionally powerful and stable. At the same time, it will become more reliable in terms of operation and maintenance. There will be no need to worry about the system failure at the crucial marketing period like "Double 11", "618" mid-year shopping day, and National Day holidays," Tang Kunjun said.
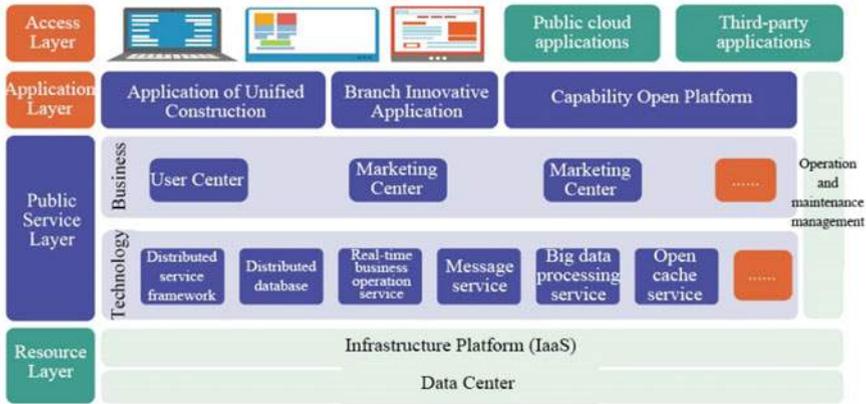
Fig. 2 New generation system architecture based on enterprise-level internet architecture

Figure 2 shows the new-generation system architecture based on the enterprise-level Internet architecture.

At present, Xtep's systems covering order, commodity, logistics, payment, and membership have been centralized on the cloud omnichannel retail platform. As Wu Lianyin, Vice President of Xtep, remarked, "The more open the system is, such as being consumer-oriented, channel-oriented, or even global business-oriented, the easier it is to move to the cloud. In the long run, systems of ERP, supply chains and warehousing are bound to migrate to the cloud." Fig. 3 illustrates the overall cloud architecture of Xtep.

2   Digitalization of Touchpoints

To achieve success in digital intelligence empowerment, the key lies in data acquisition. Therefore, the business operations of enterprises and the touchpoints with consumers should be online and digital as much as possible.

When Xtep wanted to transform from a wholesale model to a retail model, it did not mean completely changing the agency distribution model that had been practiced over the years, nor directly managing and operating the existing more than 4,000 stores. "To grasp the terminal, we don't have to directly manage and operate it. By introducing the system, we can be very 'close' to the store and 'see' the store operation and the status of the staff in real time," Li Bo, General Manager of Xtep's Overseas Business Department (who was in charge of Offline Retail Management back then), explained.

Therefore, Xtep has introduced a unified POS system to all stores, which integrates functional modules such as membership, cash register, and inventory. With this system, Xtep is able to master the store's operational data and reporting system. In this way, "All stores will be transparent. Aside from knowing the operating

Fig. 3 Xtep cloud's overall architecture
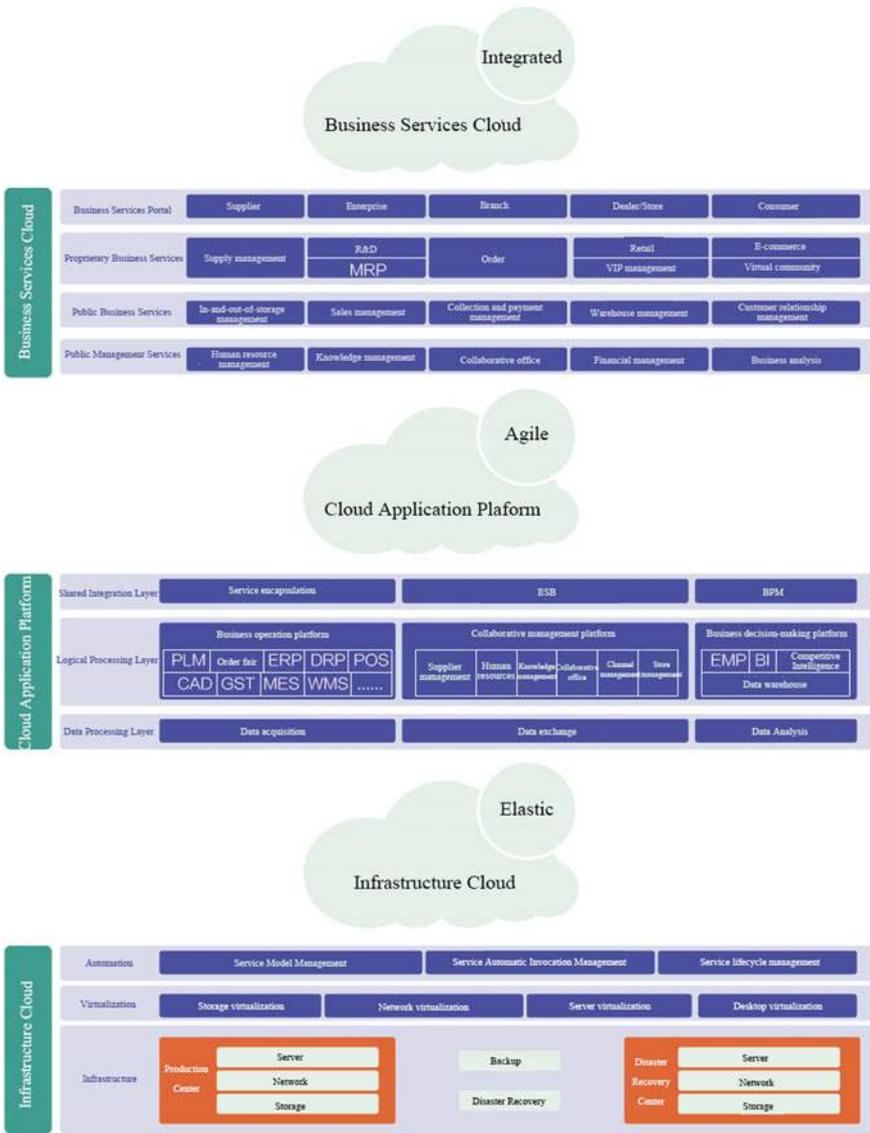
status of the store, we will be attracted by sales, not just how much money was sold today, but how the money was sold and what products were sold; were they new products or old ones being sold; were they shoes, clothing or accessories; were they selling at a high price or a low price, at an old store or a new one; and which products are selling fast and which are not, etc."

In 2017, Xtep successfully completed the retail transformation, closely followed by the exploration of new retail. To this end, Xtep has established a new retail operation center which has focused on member operations at the very first start. However, in spite of having a variety of customer touchpoints, there is no good way to accumulate members and engage in subsequent interactions with members, especially in stores, the most important consumer touchpoints of Xtep.

Therefore, Xtep adopted the method of scanning the code to join the club. When a customer enters the store, the shop assistant will invite the customer to scan the code with the mobile phone to join the membership. After scanning the QR code, customers can become members of Xtep and have their own exclusive shopping guide at the same time. In other words, the shop assistant has established a one-to-one exclusive relationship with the member.

In addition to establishing interactive relationships with members through digital means such as QR codes, Xtep has also carried out intelligent transformation of its stores with the help of Alibaba Group, making the shop assistant management, services, payments, stores and products online. Some core stores are also equipped with intelligent hardware devices, such as passenger flow counting, interactive large screens, 3D fittings, cloud shelves, cloud POS, etc. At present, among Xtep's more than 6,000 stores, over 4,300 stores have completed intelligent transformation. It is reported that Xtep has the largest number of new retail smart stores among all the brands that cooperate with Alibaba Group to engage in new retail.

3   Business Online

When Xtep transformed into a retail model, it grasped the terminals to know the operation of the stores, and at the same time, integrated the online retail with offline stores to enable omnichannel retail.

However, Xtep's original business system was "chimney-like", with each corresponding to a specific business respectively, and there are altogether more than 80 systems. "These systems and business are exclusive to one another and locked together, and they are like old broken tractors, which can no longer run," Tang Kunjun said.

Figure 4 shows the system structure diagram of traditional IT construction.

Moreover, the original system could not provide real-time data. What everyone saw was the data from a day or two days ago, which could not support the timely business analysis at all. At the same time, the vertical and independent systems could not meet the requirements of Xtep's omnichannel marketing for connecting the online and offline orders, commodities, inventory, logistics, and membership, etc.

At that time, in order to solve these problems, Tang Kunjun and his team consulted all the well-known software vendors at home and abroad, but found that most of their IT architectures were developed and designed based on the wholesale model, which could not well respond to the future retail business needs.
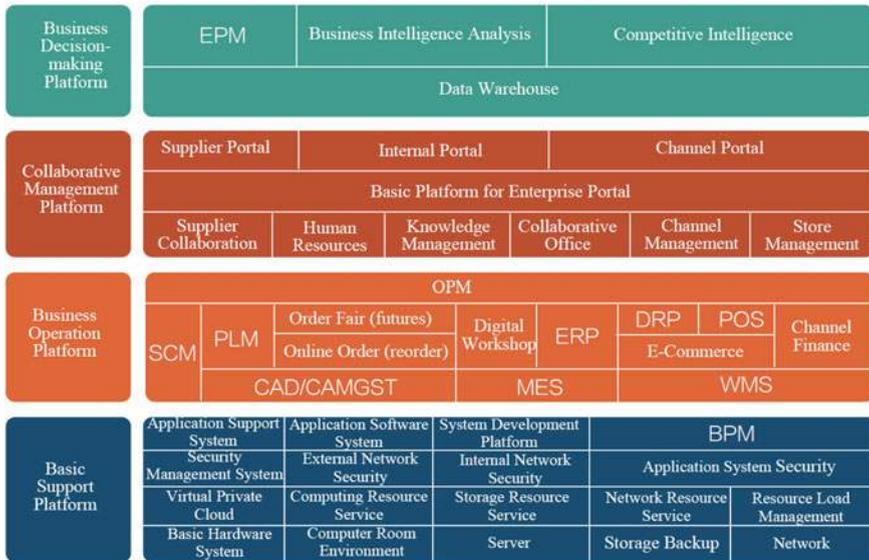
Fig. 4 System structure diagram of traditional IT construction

Until one day, Tang Kunjun heard about the "mid-end" developed by Alibaba, so he led the team to visit Alibaba headquarters for a day. After returning, he resolutely decided to build the mid-end. His thinking was simple. The middle-end technology that could support Alibaba's huge heterogeneous business would definitely function well in supporting Xtep. He told this idea to Dr. Xiao Lihua, then Vice President of Xtep Group and General Manager of E-commerce, who staunchly supported him and personally participated in the construction and delivery of the entire mid-end.

Then, Xtep separated its stable business processes with the same attributes, and established centers for commodities, channels, inventory, membership, and payment, etc., based on Alibaba's middle-end middleware technology. These centers served as public resources for different front-ends of the business to call, truly achieving "one-fits-all approach".

"The separated business process, accounting for almost 70 to 80% of the original business process, remains unchanged. We just need to develop SaaS application to deal with the residual 20 to 30% of the business process that will change. These application software form small front-ends which will call the required resources and services from the shared service center in the mid-end," Tang Kunjun explained.

In 2017, Xtep's business mid-end for omnichannel retail was launched. "It took us more than a year to develop, launch, and promote the entire mid-end, which is unique in the industry," Tang Kunjun said, "Moreover, we used shock therapy
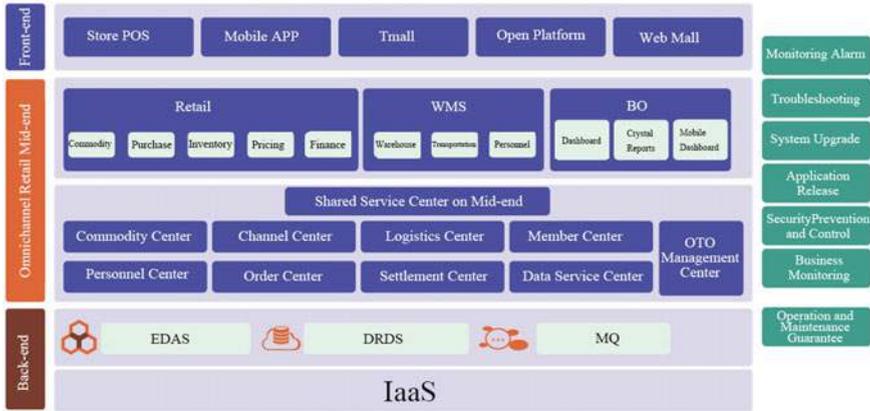
Fig. 5 Overall architecture of aliware-based omni-channel retail platform

at that time and completely overthrew the original system, leaving no way out for ourselves."

Figure 5 shows the overall architecture of the Aliware-based omni-channel retail platform.

After the launch of the business mid-end, whenever Xtep receives orders from different online retail channels such as Tmall, Taobao, official mall, and official app, the system will automatically assign the order to the nearest store that is integrated with warehouses, based on the intelligent algorithm of "full product range first, then the nearest", and automatically notify the logistics company for delivery. During the "Double 11" period that year, almost all Xtep's more than 200,000 online orders were automatically delivered in this way. It not only greatly improved the delivery efficiency, but also significantly reduced the logistics cost and the inventory. As of now, more than 6,000 Xtep stores have all been connected to the omnichannel retail platform. In 2019, its online retail sales increased by more than 20%, accounting for more than 20% of the company's overall revenue. Figure 6 shows the online and offline integrated mid-end.

In order to realize the retail model, Xtep needed to dig deep into the terminals. In addition to mastering the operation of the store, it also needed to help all the shop assistants improve their work experience, business ability and execution efficiency.

Xtep's more than 6,000 stores belong to over 40 branches. In the past, every time there was any policy, promotional event or instruction from the headquarters, it was passed down from the headquarters to the branch and the head of the district (person in charge of all the stores in the area) and then to the store. Many times, due to different understandings of the people involved in the process of message conveyance, the flow of information often ended up in nowhere, unable to reach the shop assistants. There was no one to be held accountable for the execution, and it often ended up with nothing.

Fig. 6 Central platform after online/offline integration

Li Bo analyzed a set of data. An ordinary shop assistant, under normal circumstances, can sell 1.3 pieces of items per single transaction after he/she works in the store for three months, 1.8 pieces after 6 months, and 2.2 pieces after a year. Each shop assistant, however, tend to stay in the store for about 8 months. If the store manages to keep the shop assistant for more than a year and accelerate his/her growth, the business of the store will be greatly improved.

Moreover, the frequent turnover of shop assistants will also affect the daily operation of stores and customer experience. A store manager reported that if there was less turnover of colleagues in the store, they would understand each other better and fewer mistakes would be made out of misunderstanding. If there were always new comers joining in, many problems would arise during training, such as finding the wrong shoes or wrong clothes, misinterpreting the goods, or disagreeing with customers. Such incidents could have a considerable negative impact on business.

That is why Xtep hoped to bring more than 20,000 shop assistants together and realize the instant communication to solve problems concerning message conveyance, shop assistants training and retention, and market feedback. Therefore, Xtep introduced the "Super Shopping Guide" app, which connects the company with all shop assistants through the mobile terminal, and also builds a community for all shop assistants.

> "Super Shopping Guide" covers almost all the relevant links and issues of store operation, such as training, member activation, sales skills, display props, image, promotion, and defective goods refund. In addition, there are interactive messages from shop assistants on it, such as "Small Potatoes' Show" and "Let's Dance Together".

Li Guanyi, CEO of Xtep Global Business Group, has a positive opinion about the "Super Shopping Guide" app, "Through this app, all the resources related to store operations and shop assistants can be directly accessed by the store. This system has been in operation for more than 4 years, which has effectively empowered offline stores."

In addition, DingTalk has become a unified office platform for all Xtep employees. They have established various work groups on it, where they can communicate and collaborate online at any time. The company's OA system has also been connected to DingTalk, enabling matters to be processed online including work approval, attendance check-in, leave, knowledge management, and remote meetings.

4   Digitalization of Operations

Xtep started early in data application. It introduced SAP's BO (Business Object) system in 2008, and deployed the then state-of-the-art basic data platform in 2012.

Different from the data pools accumulated by traditional IT systems that could only be applied independently, this basic data platform classifies and integrates Xtep's data, enabling it to be used independently or integrated. That means Xtep can query all the data and conduct meta-analysis through the platform.

However, Wu Lianyin, Vice President of Xtep, said frankly that this data platform did not connect the data of more than 60 systems at that time. It only extracted data from various systems for analysis, and the analysis results were presented in the form of reports, mainly to meet the needs of management and decision-making. What's more, the data platform was offline from business operations, so data extraction and analysis could not be performed amid business operations, let alone data empowerment for business operations.

Therefore, when Xtep developed its business mid-end for the omnichannel retail platform, it simultaneously built its own data mid-end. All the data generated by the business platform is deposited on the data mid-end, and the front-end applications on the business mid-end can call the data resources on the data platform at any time, thus forming a closed loop of "dual mid-ends", namely the business mid-end and the data mid-end.

Now, the operational data of all Xtep stores is updated every 10 min, unlike the past when the data was only available a day or two days later. "Without real-time data, it may be no impact on general business. However, at important marketing events such as the National Day when it is necessary to focus on whether the promotion activities are effective and whether the sales target is achieved, it is impossible to make immediate guidance without real-time data. Now that we can see the data in real time now, we can adjust our strategy at any time," Tang Kunjun said.

In the past, when inspecting a store, the person might not know who the store owner was or how the products were selling. Now, through the dashboard on the mobile phone, the store's operational data can be monitored in real time, such as traction analysis, product analysis, and sales status. This dashboard application is now used 40,000 to 80,000 times a month.

With the store operational data, it can also guide the branch to make goods allocation or promotion in a timely manner. Now, it is possible to track the sales rate of each item to know how many items are sold per unit time. If the sales

rate of a certain product is found to be high, it can promptly remind the branch to replenish the stock, and even notify the back-end to reorder quickly; if the sales rate is low, it is recommended to transfer goods between regions or stores, and offer discounts when necessary. Of course, it doesn't actually track every item, but the top 20 items which account for about 40 to 50 percent of sales.

Suggestions or instructions on allocation and promotion will be issued from the headquarters and sent to the corresponding branches. For example, if several shoes show signs of being unsalable, the Commodity Department at the headquarters will formulate a promotion plan; the Retail Department will determine the display and POP design plan for these shoes; and the Training Department will design a promotional message and conduct online training for shop assistants through the "Super Shopping Guide" app. When all the plans and materials are in place, they will be distributed to each branch for implementation. During the implementation process, stores need to take pictures of the promotion and send them back. Thus, a complete and mature link has been formed.

With real-time data, the inventory of all stores becomes visible and transparent. When there is a short of size for the products that the customer wants, the shop assistant will query the store system to check whether the products of this size are available in other stores in the same business district. If the customer is in urgent need of the products, the shop assistant will apply for a transfer in the system, and fetch the items from another store for the customer to try on; if the customer is not in urgent need of them, the shop assistant will apply for a goods transfer and make an appointment with the customer at another time for the try-on, or ask another store to express the goods to customers directly.

In addition, by interacting with members one-on-one, the shop assistant can master the member data to know customers better than themselves. For example, as the retail sales person knows, the middle sizes of shoes are always sold out first, leaving the goods at both ends, such as size 42 and size 35, sold at a discount. That is because once there is a short of certain sizes, the rest sizes have to be discounted, rarely sold at the regular price. As a result, these products may be placed on the promotion table, waiting for its dim change of being bought. However, if the shop assistant knows one of his members wearing a size 42 and the color he likes, the assistant can send him a message to recommend the shoes, telling him that he can get a 15% discount plus a small gift for being a veteran member. It is quite possible that the customer will buy them. Although the shoes are sold at a 15% discount, it is perhaps the best outcome. Otherwise, they could only be sold at a 50% or 30% discount at a time in the distant future, if being left on the promotion table.

Xtep also connects its own membership data with the third-party data to extract the consumption characteristics and behavior features of target consumers and fish out the corresponding tags, before developing suitable products and marketing methods to conduct integrated marketing on target consumers.

For example, in the second quarter of 2018, Xtep sponsored a program "This is Street Dance". Since this program was broadcast on the Youku platform (a subsidiary of Alibaba Group), Xtep used Alibaba's big data to gain insights

into consumers, audiences, and even street culture consumers, and then develop marketing plans based on these insights.

For another example, Xtep sponsors dozens of marathons every year. In terms of brand marketing, Xtep has given full play to the advantages of online and offline integration. In addition to sponsoring offline events like the marathon, Xtep also holds the Marathon Expo before the game. Marathon runners go to the Expo to receive their competition equipment, and those who are interested in running can also visit the Marathon Expo to learn about the latest running information and participate in on-site interactions. Many interactive activities will be set up by Xtep, such as scanning codes in its booth, which intends to attract consumers to its online stores for consumption, and at the same time acquire consumers' data for subsequent interaction with them.

In terms of the consumers reached by marketing, Xtep mainly targets three types of people. The first category is Xtep's members, who are the core audience of marketing activities. Xtep will communicate with its members through special accounts, such as Xtep Member Club Official Account and Xtep Official Member Mall.

Aside from members, Xtep also pays attention to a "Lookalike Member" group. Xtep first tags different members in its own member library, and then cooperates with third-party big data platforms to pinpoint people with the same tags from the large data pool, so as to make targeted marketing on these people via their commonly used touchpoints.

And the most peripheral audience is Xtep's long-term target consumers. For Xtep, it is necessary to maintain a long-term relationship with members, and it is also hoped that more target consumers will become its members. Therefore, on the one hand, Xtep starts from inside, finding members who have already developed a liking towards the brand, and doing marketing on them; on the other hand, it starts from the outside and works inwards, aiming at the ideal target consumers of Xtep, that is, 18~24 years old to win their recognition and trying to bring them into Xtep's "big family" through different marketing means.

5   Decision-Making Intelligence

Most enterprises have been making management and business decisions based on market data and internal operation data, but more often than not, they rely on human insight and experience. Such decisions are often less scientific, reasonable and effective, and even make mistakes, thus affecting the business efficiency and development process. Therefore, it is the common desire of all enterprises to reduce decision-making errors and improve decision effectiveness with the help of technology.

The emergence and maturity of technologies such as the Internet, big data, cloud computing, Internet of Things, artificial intelligence, and intelligent algorithms are making the desire a reality. A vital target of digital intelligence transformation is to enable enterprises to have "digital intelligence brains". Relying on the

recommendation, prediction, and decision-making made based on complex intelligent algorithms, enterprises can directly take corresponding actions, and make continuous adjustment and supplement according to the real-time data feedback, forming benign closed loop of learning and feedback, and ultimately facilitating the efficient decision making of enterprises through the full link.

From store location selection, membership management, to commodity management, Xtep is trying to replace traditional human decision-making with digital intelligence capabilities. For example, Xtep has established an intelligent allocation system, where stores can predict sales for the coming week based on their own sales history, combined with data such as weather and regional preferences, and it can be accurate down to the number of SKUs. At present, the accuracy of sales forecast can reach 80%. The production side can adjust the SKU in time according to the front-end sales forecast, changing the original mode of "production and delivery after receiving the order" into "preparation based on forecast". As a result, the delivery time has been shortened from 45 to 20 days on average, which greatly reduced out-of-stock situations and increased store revenue.

6 Summary

According to Wu Lianyin, Xtep's digital intelligence is relatively ahead of its time in the industry. First of all, Xtep's basic information system is relatively complete, with a long period of data accumulation. Secondly, it focused on data application early, and established a data platform to integrate and analyze data, thereby enhancing its strong data application capability. Thirdly, Xtep is willing to try new technologies and tools. It is the first in the industry to introduce mid-end technology to build a closed loop of dual mid-ends, and explore new retail models on a large scale.

For the transformation of digital intelligence, Wu Lianyin proposed a framework of "Three Ends and One Capability" from the perspective of Xtep. The "Three Ends" are the consumption end, the supply end, and the production end, and the "One Capability" refers to the digital intelligence capability. "The consumer end, also known as the consumer ecosystem, mainly focuses on consumers to meet their needs and increase their stickiness. The supply end, namely the Industry Internet, centers around the products and how to better design and develop the products with partners. The production end, also called the Industrial Internet, tackles how to quickly respond to market demand and realize small-lot, flexible production. All of these require digital intelligence capabilities," Wu Lianyin explained.

Xtep's current digital intelligence transformation is mainly focused on the creation of the consumer ecosystem, so as to build and improve its own digital intelligence capability. Once the capability is mature, it can be exported to the supply and production ends to amplify the effect of intelligent decision-making, eventually forming the synergy of the whole industry chain. In fact, Xtep has already begun to try to deploy the Industrial Internet.

Postscript

At the end, I would like to especially thank all readers for your willingness to spend time and energy to read this book, practicing and exploring the ideas together.

We have helped hundreds of companies carry out the transformation of digital intelligence. I would like to make a brief summary of it and address matters that merit our attention, hoping that whoever wants to engage in digital intelligence will take less detours and avoid the pitfalls in practice. The most important principle is that digital intelligence transformation requires four major upgrades, upgrade in concept, system, capability, and organization.

First, the concept must be upgraded.

The transformation of digital intelligence is not simply an IT system construction, not just another higher level in the old hierarchy in the new era in the new era. Instead of building more "chimney-like" or "isolate islands" systems, it requires a holistic design and construction in terms of strategy, business, organization, technology, and operation, so as to drive the technology of digital intelligence, reconstruct the business model and reshape the core competitiveness of the enterprise.

The transformation of digital intelligence refers to the system upgrading, and the use of new technologies such as artificial intelligence, big data, and cloud computing, but more importantly, it is the process of creating and satisfying consumer demand through big data insight to force the enterprise to continuously optimize the internal process and reconfigure resources, thus improving efficiency and effectiveness, and leading new business with technology.

Transformation is not just a matter of IT, technology or e-commerce departments. Rather, it is a top leadership project, and the importance attached to it by the boss is its primary productive force. It is an online and offline integrated transformation with the full involvement of various departments, which requires the personal participation and promotion of the core senior management of the enterprise.

It is not just a partial adjustment of the organization, process, system, etc.; it is an all-round transformation of the enterprise in terms of thinking, strategy, process, organization, talent, and incentives. Thirty percent of the transformation depends on technology, while seventy percent relies on operations.

It is not about just creating a tool and system to connect everything, but about an efficient big data-driven end-to-end business connection that features all process, total element, whole network, omnichannel, full touch points and full life cycle.

It is better not to wait and see, or to be a spectator and critic. The early the company starts the transformation to be a practitioner, the more benefit it will yield by taking the user traffic dividend. Companies need to enhance its basic skills, and prioritize the continuous building and improvement of the entire ecosystem.

The transformation of digital intelligence is a process of overall planning, step-by-step implementation, model demonstration, review and summary, and replication and amplification, which cannot be hasted.

It is not a process of an individual company making efforts to meet its own needs, but a process of breaking through their own boundaries, opening up to win–win cooperation.

It is not an overnight process, but a process of iteration, evolution, upgrading, and continuous improvement in line with technological upgrades, and changes in consumers and the competitive environment.

In the past, business operations were more concerned with the balance sheets, cash flow statements, and profit and loss statements! In the future, more attention must be paid to digital intelligence assets, especially digital intelligence user assets, and end-to-end digital intelligence industry chain assets!

Tools can solve local problems, while systems can address systemic problems.

The input into digital intelligence transformation is not the cost, but the investment in building future-oriented capabilities, like constructing the foundation for the high-rise buildings. Companies need to make full and necessary preparations for the economy era of digital intelligence transformation, like protagonists in Chinese Wuxia novels connecting the Ren (Conception Vessel) and Du (Governing Vessel) channels to become unbeatable. Otherwise, companies will be deprived of the qualifications for market competition.

The key to the difference in the effect of digital intelligence transformation lies in training system + incentive system! All companies that do well have strong training systems, with repeated co-creation and publicity to strengthen change management; and they adjust the supporting incentive systems in a timely manner.

Secondly, as for system upgrades and capability upgrades, it is very important to find the right partners.

System upgrades and capability upgrades need to be supported by relatively mature partners who have sufficient understanding and practice of business and full-link digital intelligence transformation and upgrading. Alibaba Cloud Intelligence first invests a lot of human, material and financial resources in its own system, such as Intime Department Store, Freshippo (Hema), RT-Mart, Easyhome, Red Star Macalline and many other commercial entities, to repeatedly practice and optimize them, and then extract the effective tools and solutions to empower representative enterprises from various industries. It underwent rounds of optimization before the widespread application in various industries. Hence, Alibaba Cloud Intelligence is the preferred partner for the transformation and upgrading of digital intelligence in various industries.

Organizational guarantee is the key to digital transformation! Organizations also need to upgrade.

30% technology and 70% operations is the success formula.

Talents of digital intelligence operation, analysis and innovation need to be continuously replenished! What is the most challenging and important is organizational upgrading. How to realize the organization of personal knowledge, the manifestation of tacit knowledge, the standardization of explicit knowledge, the systematization of standard knowledge, and the intellectualization of system knowledge? The enterprises with successful transformation of digital intelligence must be communication online, organization online, business online, collaboration online and ecology online.

And a good incentive policy can stimulate the creativity of each individual to the maximum. The greatest but often overlooked law of management is that most people may not necessarily do what you expect, but they will definitely do what you have set up for appraisal, and reward and punishment.

Operations in different business periods require different assessment indicators (see the figure below).

All industries must be upgraded in the era of digital intelligence economy, being changed or taking the initiative to change. This urges us to think: can we redefine ourselves, and what are the more appropriate directions, means, and methods?

Theory needs to be summarized, refined, and optimized.

Practice yields success when it is focused rather than encompassing. What is important is to grasp the key elements of success, and the main contradiction, just like seizing the "bull's nose"!

Peter Drucker, Management Guru, once remarked that management is a kind of practice, whose essence is not in "knowledge" but in "action"; its verification lies not in logic, but in results; and its sole authority is achievement.

However, practice without theoretical guidance is reckless, and theory without supporting practice is fantasy!

Theory and practice are, therefore, unified in a spiral fashion, mutually enhancing each other.

The higher realm lies in the unity of knowing and doing, constantly surpassing oneself.

Why do so many people who have learned countless great truths still cannot live his life?

Because they fail to pursue the unity of knowing and doing!

Many people and things in this world are either "easier said than done", or "easier done than said", leaving very few people the practitioner of "unity of knowing and doing", but it is indeed a goal worth pursuing forever!

1 Channel Customers	2 Stores		3 Consumers
	Retail	Digital	
• Sell in	• Sell out	• Sell out	Based on big data, subdivision of user groups
• Sell through	• Consumer flow	• UV	• Duration of live broadcast • Number of interactive users
• Sell out	• Effective display	• PV	• Live staff • Activity feedback rate
• Grid marketing	• Bag lifting rate	• Conversion rate	• Number of new users • User status
• Length: Distribution rate	• Per Customer Transaction	• Per Customer Transaction	• Number of regular customers • User value
• Width: SKU Num.	• Number of stores	• Page resource efficiency	• Conversion rate • Churn rate/Retention rate
• Height: Single product sales	• Single store revenue / Area effectiveness	• Input and output of marketing	• Repurchase rate • Input and output of precision marketing for customer groups
• Terminal display	• Input and output of marketing	• Inventory turnover	• Per Customer Transaction
• Activity participation			• Customer age
• Cash collection / Receivable			• Purchase frequency
			• Number of connected users

Brand Owners — Products/Services/Marketing

Regional Agency / Regional DC

Dealers

Secondary Dealers

KA/Department store/Boutique

Tmall / Taobao

Terminal Stores

Franchise Chain Stores

Directly operated chain stores

Self-operated store/other stores

Consumers (Users) — User grouping, interaction and insight

1   2   3

Learning without using is just like entering a treasure house without taking anything.

For those companies that have yielded phase success in the transformation of digital intelligence, we should not only marvel at the apparent achievement of fast and flexible response, but also pay due attention to the long-term accumulation and technical support that are invisible underneath. In the wave of digital reform that has come, we cannot just be bystanders or critics. Only by taking action can we become the participants, leaders and even creators.

Looking back on the creation process of this book, I found that it was indeed a hard-won work and came by chance. There have been at least three major attempts.

The first time I wanted to write the book was from 2004 to 2006, when I was a doctoral student at the Chinese Academy of Sciences. At that time, my doctoral dissertation was on "Creating a brand-centered, fast and flexible supply chain", and the core conclusion was to build an efficient closed-loop system that is being consumer-centered, led by intelligent brands and supported by fast and flexible supply chain. Originally, I intended to break the one-way B2C chain definition of the supply chain theoretical system and build a complex, multi-way data-driven network system and dynamic model of business flow, logistics, capital flow, information flow, and human flow, $C2B2C^n$. However, I did not know how to express it mathematically, and the simulation model could not be made. Only some qualitative descriptions could be given, so I had to lay it aside.

The second time was from 2012 to 2014. I found a team of doctoral supervisors and professors in a university, and prepared a lot of PPT slides to communicate many times on the content and framework. Together we sorted out related literature and wrote hundreds of pages. Nevertheless, what we had written was somewhat too theoretical and specialized to be popular. So, I had to give up.

The third time was from 2015 to 2017. I found a partner in a consulting firm to start it over again, but after writing hundreds of pages, I found the style not right, and a bit dull. There was too much irrelevant information, so I gave up again.

Then comes this time, which was also a coincidence. At the beginning of March 2020, Mr. Zhengxiong from Taobao Education and his team visited me and we discussed writing a book titled "Data Reconstructs Business". After that talk, I thought it was finally time to write a book on "Full-link Digital Intelligence Transformation and Upgrading", in order to help more enterprises to accelerate digital intelligence transformation, taking less detours and avoiding the pitfalls in practice. Finally, after rounds of discussions, it was named "Digintelligence Drives New Growth". During the composition, I repeatedly discussed the framework with several other authors (the changing background of the times, the methodology of digital intelligence transformation: the pentalogy, 5-layer architecture, and 11 elements, etc.), and sorted out benchmark cases, various PPT materials, and customer cases of digital intelligence transformation and upgrading. In line with the principle of "Alibaba only creates quality products", we discussed back and forth numerous times via video conferences, and face-to-face communication during the process to "PK", "focus on" and "iterate" the drafts with dozens of modified and revised versions, and our satisfaction rate also rose from 10 points, 20 points, 30 points…

finally to 90 points, and even 95 points. Nevertheless, since the latest practices of various industries iterate too rapidly, our supporting products and solutions are also upgraded so fast, it is just safe to say that the new things are still happening the moment you are reading this book.

Finally, I would like to thank Tian Ye, Hong Dongying, Yang Wenya and others who wrote the book, as well as Yan Jiehua, Chen Fuming, Ge Weiwei, Wu Beihong, and Zheng Yue for their on-site interviews and content refinements of the case studies, and Liu Guofeng, He Bingquan, Shao Beisi, Ya Yu, Lou Jue and Qi Lili from Taobao Education for their great support.

My special thanks go to Daniel Zhang Yong (nicknamed Xiao Yao Zi, meaning free and unfettered man), Chairman of the Board and CEO of Alibaba Group, for his inspiration and support, who gave me the opportunity to personally participate in the work related to the group's new retail and the cloud intelligent new retail business, and to get in touch with companies in different industries at different stages of development, and to explore the path of digital intelligence transformation and upgrading. I have benefited a lot from his deep understanding and insight into Alibaba's business operating system, his understanding of first-line businesses and the needs of employees at all levels, and his initiative to drive various changes.

I would also like to thank Jeff Zhang Jianfeng (nicknamed Xing Dian), President of Alibaba Cloud Intelligent and Head of Alibaba DAMO Academy, for his understanding and support. I have benefited a lot from his forward-looking understanding and insight of cloud-related technologies, his focus on products, his wisdom on data intelligence applications, and his deep understanding of Alibaba's culture of innovation and breakthroughs all the way through.

Thanks to Li Jin, Chen Lijuan, Guo Jijun, Liu Xiangwen, Xu Shijun, Liu Weiguang, Yuan Qian, Ren Geng, Peng Xinyu, Jiang Jiangwei, Ku Wei, Jin Rong, Qi Xiaoning, Shi Yaoyun, Yao Gang, Wang Gang, Zhou Ming, Jiang Yanxiang, Li Feifei, Jia Yangqing, Ye Jun, Zhu Hong, Fang Xiaomin, Si Wei, Gong He, Zhang Qi, Wang Xiaoxia, Liu Song, An Xiaopeng, Su Chen, Lie Wen, Li Duoquan, Liu Dan, Zhou Rui, Li Shuanghong, Xiao Jian, Zhang Liang, etc. for their understanding and support.

Thanks to Dai Tao, Zhou Binbin, Cui Jiahui, Yan Hao, Liu Xinming, Wang Haigang, Bao Peng, Wu Xuejun, Wang Yang, Sun Lingzhi, Liu Xin, Chen Jie, Yuan Haocheng, Zhou Shu, Li Xiaoqiang, Zhu Na, Wang Fuzhuang, Yang Bo, Li Linlin, Lou Ying, Xu Chaochao, Hou Fang, Liu Xiaoyan, Lin Lin, Li Xing, Zhou Yun, Gao Shifang, Wang Ruixue and all the team members. We fight together and win together. We are so proud of you for being our new intelligent retail members.

We deeply appreciate the thousands of pioneers and explorers from various industries for your devotion to the transformation of digital intelligence, including Youngor (Chairman Li Rucheng, Li Hanqiong, Xu Peng, and Zhang Kaidong), Xtep (Chairman Ding Shuibo), Bosideng (Chairman Gao Dekang, Mei Dong, and Rui Jinsong), Red Dragonfly (Chairman Qian Jinbo, and Qian Fan), Feihe (Chairman Leng Youbin, and Feng Hailong), Mengniu (President Lu Minfang, Gao Fei, and Zhang Jue), Hengan (Chairman Xu Lianjie, and Xu Qingchi), JALA (Chairman Zheng Chunying), Liby (Chairman President Chen Zebin), Easyhome

(Chairman Wang Linpeng, Wang Ning, and Li Xuanxuan), Bestseller, Li Ning, Anta, Belle, Semir, Haidilao, Xibei, New Hope, Yum, Home Original Chicken, BESTORE, Three Squirrels, Swire Coca-Cola, Shuanghui, Pearl River Beer, TAETEA, Xiao Guan Cha, TCL, Robam, Joyoung, Elion, Nu Skin, Yashili, Junlebao, L'Oreal, Estee Lauder, Chanel, Red Star Macalline, Oppein, Shangpin Home Collection, RT-Mart, Jiajiayue, Lianhua, MINISO, Watsons, Xinhua Bookstore, SINOBO, Liangzhu, and Xixi National Wetland Park.

There are so many other colleagues, customers, and partners to thank, and I am so deeply grateful for all of you who cannot be listed here due to the limited space. Our shared experience of exploring and practicing is truly unforgettable.

Being a workaholic, I am particularly grateful for the understanding, tolerance and unconditional support from my parents, parents-in-law, siblings, my wife and children. It is you who have allowed me to focus on my work without distractions, to pursue my goals while enjoying the journey!

<div style="text-align: right">

Xiao Lihua

April 2021

</div>