WORLD DIGITALIZATION | RESEARCH

Demand-Side Market Research Report on Manufacturing Digitalization in Yangtze River Delta in China

Jointly Released by

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Abbreviations and short forms

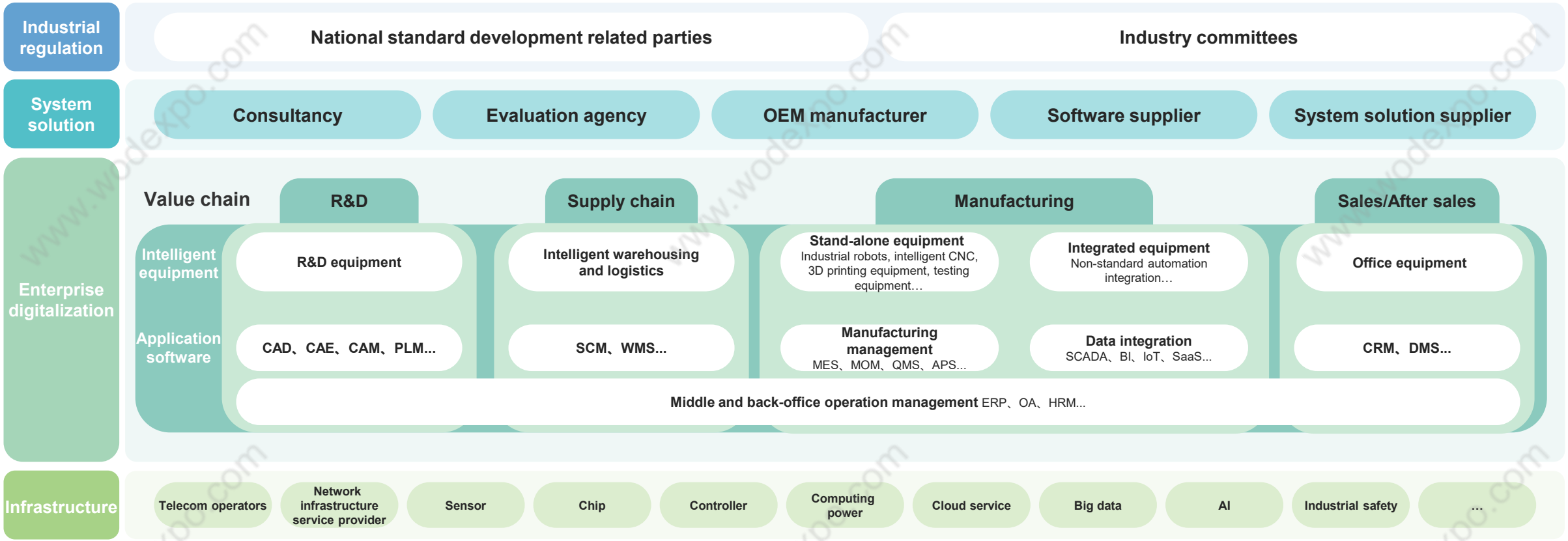
Abbreviations	Full names in English
AGV	Automated Guided Vehicle
APS	Advanced Planning and Scheduling
AI	Artificial Intelligence
BI	Business Intelligence
BOM	Bill of Material
C2M	Customer to Manufactory
CAD	Computer Aided Design
CAE	Computer Aided Engineering
CAGR	Compound Annual Growth Rate
CAM	Computer Aided Manufacturing
CMMM	China Manufacturing Maturity Model
CRM	Customer Relationship Management
DMS	Distributor Management System
EDI	Electronic data interchange

Abbreviations	Full names in English
ERP	Enterprise Resource Planning
HRM	Human Resource Management
IoT	Internet of Things
IPC	Industrial Personal Computer
JIT	Just In Time
MES	Manufacturing Execution System
OA	Office Automation
PDCA	Plan-Do-Check-Act
PLC	Programmable Logic Controller
PLM	Product Lifecycle Management
QMS	Quality Management System
SCADA	Supervisory Control and Data Acquisition
SCM	Supply Chain Management
WMS	Warehouse Management System

Definition of Digitalization in Manufacturing Industry

From perspective of enterprise managers (demand side), manufacturing digitalization covers informatization and digitalization of the entire value chain management of manufacturing enterprises (including R&D, supply chain, production, sales, after-sales and other segments), as well as the informatization and digitalization of the new, renovated or upgraded core production and manufacturing modules in the manufacturing industry.

The purpose is to digitalize and scientifically analyze the upstream and downstream production factors and organizational collaboration relationships of enterprises through the integrated application of intelligent devices, the Internet of Things, and system software, and to promote the optimization of enterprise value chain resources, upgrades enterprise business models, and improves efficiency



Classification for manufacturing industry

The industry classification used in this report is based on the "Classification and Codes of National Economic Industries" (GBT4754-2017), and is classified and summarized according to industry characteristics

Food & Beverage	Agricultural and sideline food processing	Food manufacturing	Tobacco	Alcohol, beverage and refined tea
Textile and clothing	Textile	Clothing and apparel	Leather, fur, feathers and their products and footwear	
Household and daily necessities	Wood processing and wood/bamboo /rattan/brown/grass	Furniture	Papermaking and paper products	Cultural and educational, artistic, sports and entertainment	Printing and Recording, media reproduction
Pharmaceutical	Pharmaceutical			
Automobile	Automobile manufacturing (including complete vehicles and components)			
Electronics	Computer, communication, and other electronic equipment manufacturing	Instrument manufacturing		

Petrochemical	Processing of petroleum, coal and other fuels	Chemical raw materials and chemical product	Chemical fiber manufacturing	Rubber and plastic products
Machinery manufacturing	General equipment manufacturing	Special equipment manufacturing	Electrical machinery and equipment manufacturing	
Aerospace, railway and vessel	Railway, ship, aerospace and other transportation vessel manufacturing			
Others	Other manufacturing industries	Comprehensive utilization of abandoned resources	Metal products, machinery and equipment repair	
Mineral related (Not within the scope of report research)	Non-metallic mineral products	Ferrous metal smelting and rolling processing		
	Nonferrous metal smelting and rolling processing	Fabricated metal products		

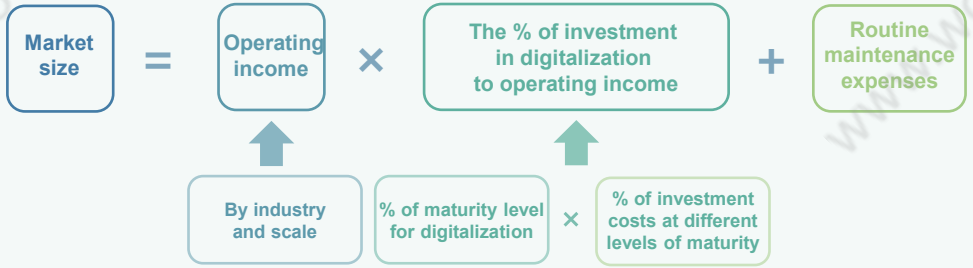
Market sizing methodology for calculation of manufacturing digitalization

Calculation model and data collection

This report mainly **calculates the market size of related industries** from the demand-side of digitalization, to avoid the overlapping problems of the infrastructure layer, equipment software layer, and integration solutions that may be encountered in supply-side research, and is supplemented by **primary/secondary** information and verification

Market size formula

The calculation of market size in this report is based on statistical data on operating income in various industries, the current and future maturity levels of digitalization, as well as the average annual digitalization investment of sample enterprises. It also takes into account of the impact of different sizes of large, medium, and small enterprises in the industry on industry growth rate and digitalization level



Data source

The first-hand information is collected and organized through interviews with digitalization experts in various industries, while the relevant data of the secondary information is collected through the National Bureau of Statistics, annual reports and announcements of listed companies, as well as industry association reports and data. The model also refers to the national standard for the maturity of intelligent manufacturing (GB/T 39116-2020) and the CMMM rating model

Demonstration of calculation model

1. Based on the current industry revenue, the current and future level of digitalization maturity, as well as the cost investment scale of each stage of digitalization, calculate the market size by industry and region

Industry	Industry revenue	Maturity level	Investment required to reach this level (%)	Current maturity (self-assessed website)	Target in 2025	Target in 2030	2023 (actual expense)	Accumulated expense 2025	Accumulated expense 2030
Automotive	1,000	Level 1 and below	0.2%	60%	9%	0%	1.2	0.18	0
Automotive	1,000	Level 2	11%	22%	41%	15%	24.2	45.1	16.5
Automotive	1,000	Level 3	14%	12%	37%	32%	16.8	51.8	44.8
Automotive	1,000	Level 4/5	19%	6%	13%	53%	11.4	24.7	100.7
					Total		53.6	121.8	162.0
					Base size for periods			68.2	40.2

2. Add routine maintenance costs for digitalization systems

	2023 (actual expense)	2025 (accumulated expense)	2030 (accumulated expense)
	53.6	121.8	162.0
Base output		68.2	40.2
Maintenance fee		5.4	12.2
Market size		**73.5**	**52.4**

3. Manufacturing digitalization market size growth adjustment

Market size with maintenance	73.5	52.4
GDP adjustment	7.4	13.1
Final market size	**80.9**	**65.5**

Executive summary

Manufacturing is an important component of the real economy in China. After decades of struggle, China has become the only country in the world with all industrial categories in the United Nations Industrial Classification, and its manufacturing scale ranks first in the world. Policy plans such as "China Manufacturing 2025" and "14th Five Year Plan" for Intelligent Manufacturing Development propose to accelerate the digital transformation of China's manufacturing industry, and use multiple digital technologies such as big data, cloud computing, artificial intelligence, and industrial Internet to upgrade and transform the design, research and development, production, warehousing and logistics, and sales services of the manufacturing industry, so as to enhance the core competitiveness of China's manufacturing industry

This report consists of several parts, including the background and market outlook of digitalization in China's manufacturing industry, analysis of the market size of digitalization in key manufacturing industries, and the digitalization market and policy promotion of manufacturing in key regions across the country and the Yangtze River Delta. The report also provides several digitalization solutions for the manufacturing industry and case studies of digitalization practices in manufacturing enterprises, to help everyone understand the excellent practices and value of digitalization in the manufacturing industry

We expect that the digitalization market of China's manufacturing industry will maintain rapid growth, with a CAGR of about 16% by 2030, and the market size will reach RMB 2.7 trillion by 2030. At the same time, we found that:

- In the process of digitalization, large domestic enterprises have scale advantages. Driven by advanced manufacturing, domestic equipment and software substitution, they lead the digitalization of the overall manufacturing industry by integrating the supply chain system and building an industrial Internet platform
- The number of SMEs is large, and their scale is rapidly growing. Although there are difficulties and pain points in the digitalization of SMEs, with the joint empowerment of the industry chain, digitalization solution providers, and the government, the digitalization of SMEs will be further accelerated
- From a regional perspective, the Yangtze River Delta is economically active, with manufacturing dominated by SMEs and private enterprises. Under the leadership of industry leaders and the endogenous demand for improved management of SMEs, the digitalization market for manufacturing in this region will grow at a rate higher than the national average
- The digitalization in Asia is developing in a stepped manner, with Japan, South Korea, and Singapore maintaining a leading advantage in digitalization. Southeast Asian countries and India are accelerating the digital transformation of their manufacturing industries. At the same time, as Chinese enterprises go global and expand their overseas production base layout, the Asian market will be an important market for excellent domestic manufacturing digital solution providers

This report provides case studies of six enterprises of different scales and stages of digitalization in six major industries, including electronics, machinery, automobile, pharmaceutical, petrochemical, and Food & Beverage. It aims to comprehensively provide the excellent practices of digitalization in each typical manufacturing industry from the demand side and the impact of digitalization on enterprise development

We hope that this report can help solution providers understand the latest trends in digitalization, further focus on product advantages in industries and regions, and combine industry digitalization pain points and trends to create products with industry expertise and technological advantages, establish long-term trust with enterprises, and accompany them on the road of digitalization. We also hope that the demand side of enterprises can grasp the common solutions and latest trends in digitalization through this report, understand the strategic planning and project implementation experience and summary of other enterprises in digitalization, understand the different digitalization paths and backgrounds chosen by different enterprises, and combine with the promotion policies related to digitalization in the manufacturing industry by local governments to assist enterprises in their digitalization planning and implementation

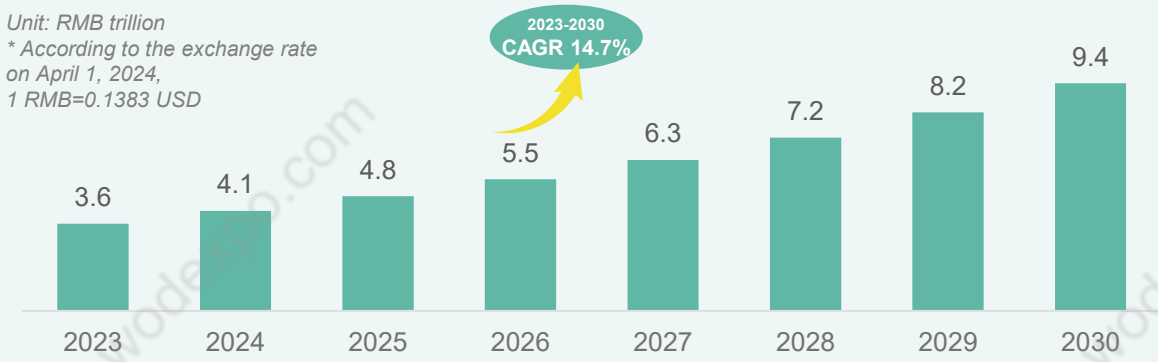
Contents

Part 01

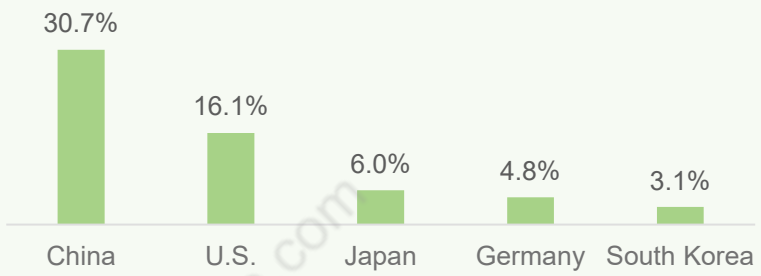
Market Outlook for China's Manufacturing Digitalization

The global manufacturing digitalization market is growing rapidly, with the U.S., Japan, and Germany maintaining the top tier of intelligent manufacturing. China's value-added in manufacturing ranks first in the world and needs to accelerate its catch-up in global competition

Global manufacturing digitalization market size forecast



Global manufacturing value-added ranking



According to the International Yearbook of Industrial Statistics (2023), China is the world's largest manufacturing country, ranking first in the world for 14 consecutive years and building a solid global manufacturing factory position

Global manufacturing competitive landscape

The United States, Japan, and Germany maintain the top tier of intelligent manufacturing

- In 2013, Germany proposed the concept of "Industry 4.0"
- In 2016, the "Digital Strategy 2025" was released
- In 2019, the German Industrial Strategy 2030 was released

- In 2018, the U.S. released the "Advanced Manufacturing America Leadership Strategy"
- In 2022, the National Advanced Manufacturing Strategy was released

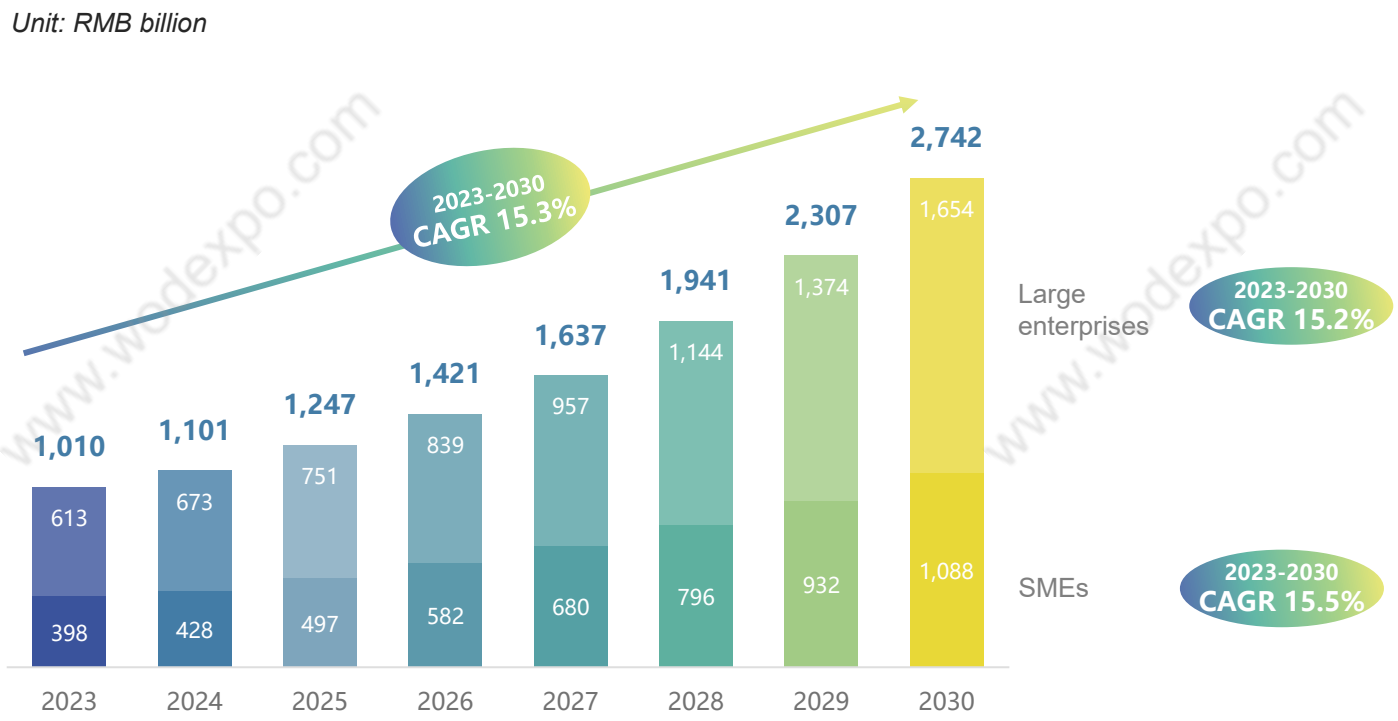
- In 2015, Japan released the "New Robot Strategy"
- In 2017, the concept of "Internet Industry" was proposed
- From 2018 to 2023, Japan release the annual 'Manufacturing White Paper'

The global transformation and upgrading of the manufacturing industry, represented by China, resonates with the policy direction of "revitalizing the manufacturing industry" in developed countries in the United States and Europe, resulting in a dynamic balance of rapid development in the world pattern of intelligent manufacturing. The new generation of information technologies such as big data, the Internet of Things, and cloud computing provide necessary conditions for rapid breakthroughs in the manufacturing industry

Source: IMARC report, public information

Under the active promotion of national policies, the competitive pressure of enterprises themselves, and the overall digital upgrading of the industry chain, the market size of China's manufacturing digitalization industry is expected to continue to grow rapidly

Manufacturing digitalization market size forecast in China



** Note: Large enterprises refer to enterprises with more than 1,000 employees and operating income of more than RMB 400 million, while SME refer to enterprises with less than 1,000 employees or operating income of less than RMB 400 million*

Source: National Statistics, Expert interview, Ipsos analysis

Drivers of China's manufacturing digitalization

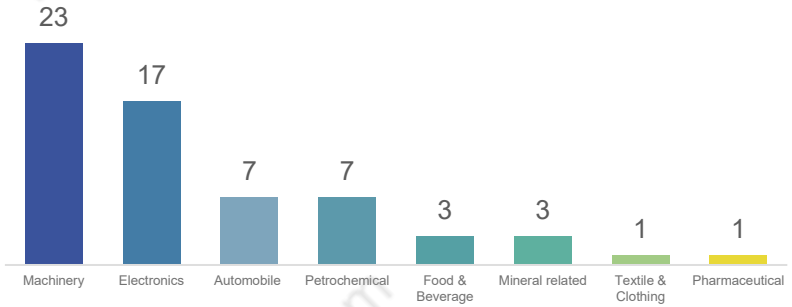
- In 2015, China proposed "China Manufacturing 2025" to address the challenges of Industry 4.0 in Germany. The 2021 "14th Five Year Plan for the Development of Intelligent Manufacturing" and other policy plans propose to accelerate the digital transformation of the manufacturing industry and enhance the core competitiveness of China's manufacturing industry
- Chinese advanced manufacturing enterprises are facing global market competition and urgently need to accelerate digitalization from the perspectives of product quality, delivery efficiency, and cost. SMEs need to integrate into the upstream and downstream enterprises of the industry chain for more efficient collaboration while promoting their requirements for cost reduction, quality improvement, and efficiency enhancement. They will also actively engage in digitalization
- The digitalization of manufacturing enterprises is also a process of ecosystem construction. In addition to the digital industry itself, it also needs to develop synchronously, including digital infrastructure, intelligent devices and software, and related consulting services. The localization of core software and equipment will drive a new round of growth after 2027

Large enterprises with scale advantages lead the overall manufacturing digitalization. Through the supply chain system, industrial internet platform and external consulting agencies, they jointly create mature solutions to empower the entire industry

Global distribution of lighthouse factories by country

On December 14, 2023, the World Economic Forum (WEF) announced the latest batch of "lighthouse factories" list, adding a total of 21 "lighthouse factories" and 4 "sustainable lighthouse" factories. Among the 21 newly established lighthouse factories, 12 are located in China

Industry distribution of Chinese lighthouse factories (62 locations)



As of December 2023, there are a to tal of 153 "lighthouse factories" world wide, including 62 in China

Characteristics of digitalization in large enterprises

- Large enterprises, who compete with international advanced enterprises, started earlier in digitalization, especially information construction, and moving towards automation and Intelligentization
- Large enterprises usually promote digital strategies from top to bottom through group management; they have scale advantages, good financial and resource guarantees, relatively low trial and error costs, and the ability to iterate to establish advantages continuously
- The digitalization of large enterprises is widely present in various industries, and there are successful benchmark cases in many industries, which have a guiding role in various manufacturing industries

Large enterprises drive the digitalization of the entire industry

Large enterprises have become an important driving force for the overall digitalization of the manufacturing industry through their impact on the industrial ecosystem:

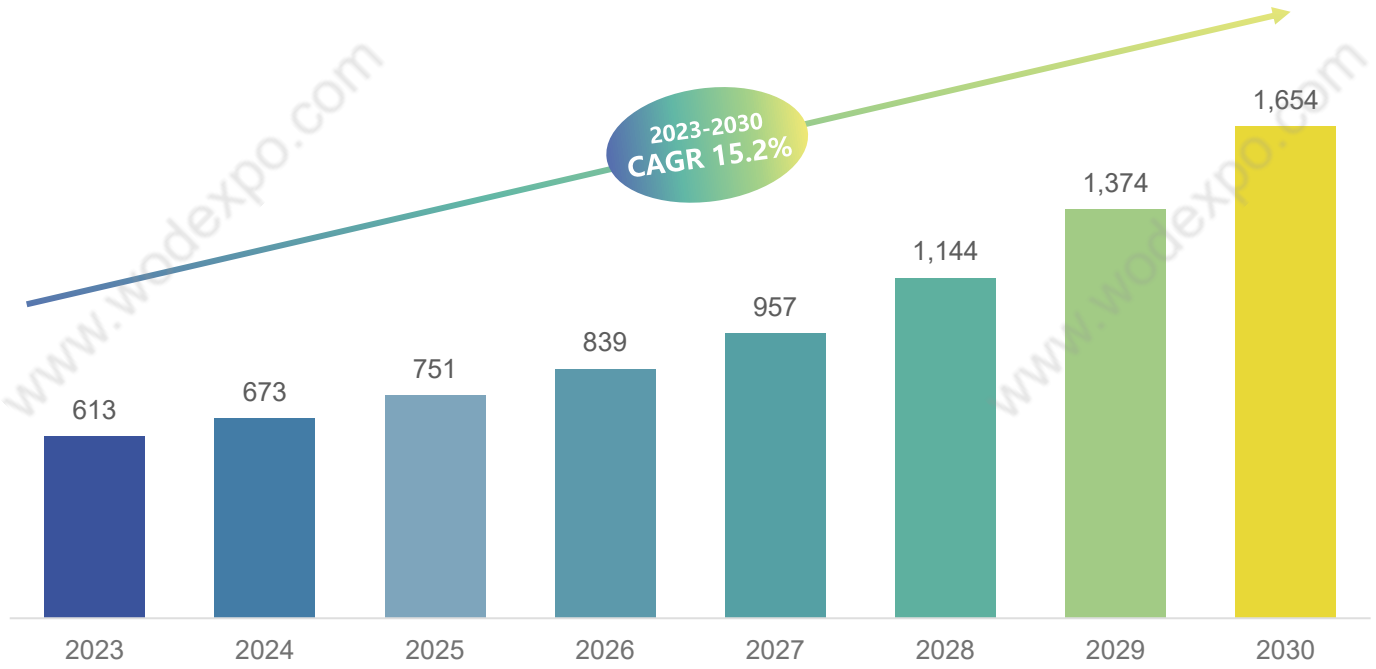
- By creating a closed-loop business with suppliers, large enterprises can drive the digitalization of upstream and downstream enterprises in the supply chain
- Professional industrial Internet platform has been formed through the accumulated experience in digitalization, such as Root Cloud from Sany Group, to empower the upstream and downstream of the industry chain
- By collaborating with external consulting firms, big enterprises create mature solutions suitable for various industry application scenarios

Source: WEF reports, Ipsos analysis

The mid-term growth of large enterprises is driven by both market competition and national industrial policies; Technological development will also reduce the cost of digitalization

Manufacturing digitalization market size forecast in China - Large enterprises

Unit: RMB billion



** Note: Large enterprises refer to enterprises with more than 1,000 employees and operating income of more than RMB 400 million*

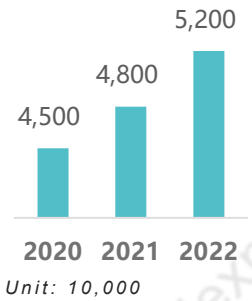
Source: National Statistics, Expert interview, Ipsos analysis

The growth trend of digitalization in large enterprises in China

- Affected by the economic cycle, the competition between domestic and foreign industries has further intensified. Large enterprises need to continue digitalization, reduce costs, increase efficiency and improve quality, and enhance market service levels in order to compete with advanced enterprises
- The national policy of encouraging key advanced manufacturing industries and promoting the replacement of domestic equipment will have a significant impact on the digitalization of large enterprises in 2-3 years, driving the related market to grow at a rate of about 20% per year from 2027 to 2030
- The emerging big data and AI large model technologies are likely to make substantial breakthroughs and applications in recent years, further reducing the threshold and cost of level 4 and above digital-related technologies, such as in the fields of predictable maintenance and intelligent decision-making. And these new technologies will be applied first in large enterprises

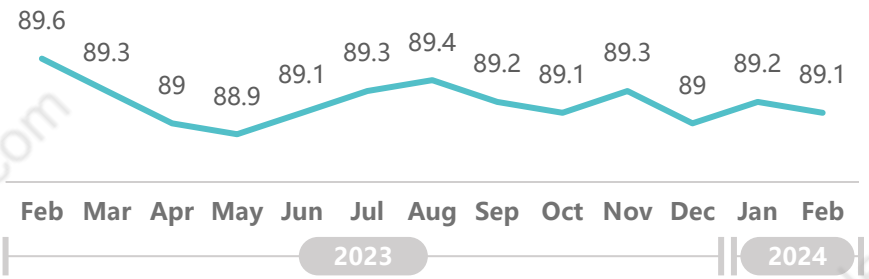
SMEs, with large number and growing scale, have challenges in digitalization, but will be driven and empowered by industry chain, digitalization solution suppliers and the government

SME quantity



Unit: 10,000

China SMEs development index



Status quo of SMEs in China

- The scale of SMEs is rapidly growing. As of the end of 2022, the number of SMEs in China has exceeded 52 million, an increase of 51% from the end of 2018
- The development index of SMEs has slightly decreased compared to the previous period. As of February 2024, the development index of SMEs was 89.1, which is lower than the same period in 2023 and still below the critical value of prosperity of 100
- Production and operation are greatly influenced by external policies and industry environment
- Small-scale enterprises with continuously rising production costs
- The penetration of business management software (ERP, OA, BI, etc.) and core business process digitalization (MES) is low

Difficulties in digitalization of SMEs in China

Cost concerns

- SMEs have weak profitability and face rigid investments in capital, technology, and human resources
- The trial and error cost of transformation is high, and whether enterprises can achieve the expected benefits of digital investment has great uncertainty

Strategic determination

- Digitalization will involve business model innovation and business ecosystem reconstruction. Management needs to have a clear understanding of the new model
- SMEs usually face more pressures, giving the low starting point, making it difficult to allocate sufficient resources for digitalization

Organizational capability

- The level of importance attached by the top leader and whether scientific management is emphasized in the corporate culture
- The shortage of digital talents in SMEs, whether the CTO/CIO investment is economic, coupled with the investment of the IT team, the internal talent training system is time-consuming and labor-intensive

Source: National Statistics, China Association of SMEs, Public information

Opportunities in digitalization of SMEs in China

The driving effect of industrial supply chain integration

Industrial Internet platform, digital transformation service providers, large enterprises and other parties promote business collaboration, resource integration and data sharing of upstream and downstream enterprises in the industry chain, and drive SMEs in the upstream of the industry chain to achieve "chain" transformation

Digitalization solution supply market

Digitalization suppliers are starting to promote mature technologies and solutions to SMEs, focusing on the pain points and difficulties of their transformation, and providing "small, fast, light, and accurate" products and solutions, such as general business management software Kingdee Cloud ERP. In industrial software, Siemens provides a compact and lightweight industrial software suite for growing enterprises on its Xcelector platform

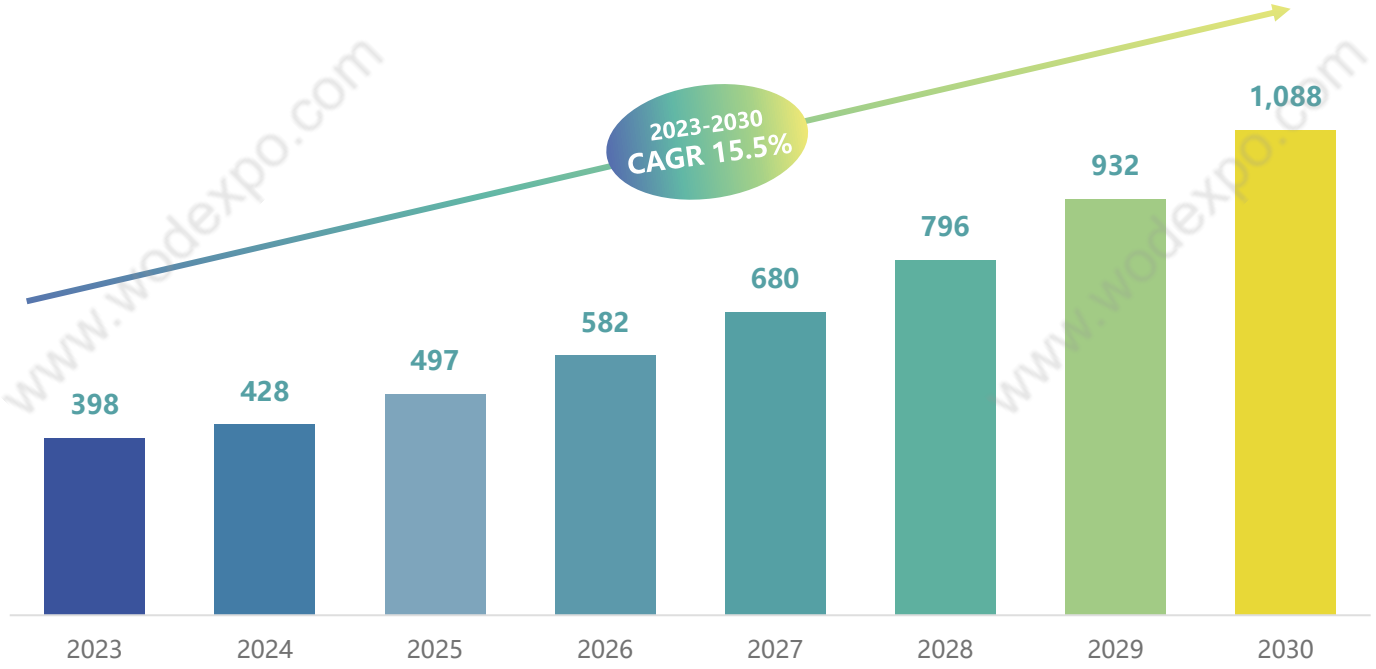
Government policy support

The "Guidelines for Digital Transformation of SMEs" was issued by the General Office of the Ministry of Industry and Information Technology in November 2022 aiming at local supervisory departments at all levels, proposing requirements to support the digitalization of SMEs and promote their high-quality development

SMEs are facing dual pressures of market competition and supply chain integration in medium term. With help of general industry solutions and favorable policies, they are accelerating in digitalization

Manufacturing digitalization market size forecast in China - SMEs

Unit: RMB billion



** Note: SME refer to enterprises with less than 1,000 employees or operating income of less than RMB 400 million.*

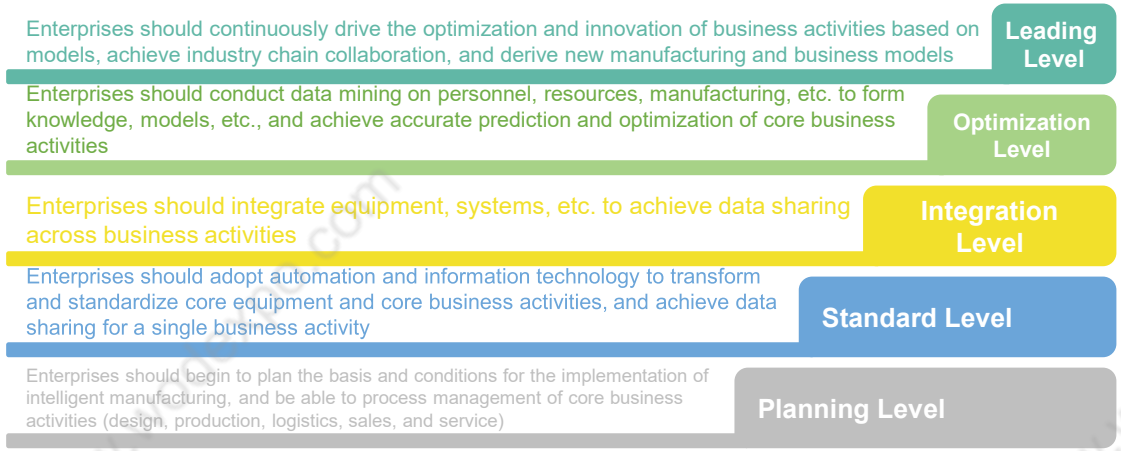
Source: National Statistics, Expert interview, Ipsos analysis

The growth trend of digitalization in SMEs

With the combination of the following factors, the digital demand of SMEs will steadily increase, growing at an annual rate of 15-18% over the next five years:

- The increasing impact of market competition on SMEs, as well as the integration pressure of industry supply chains, require SMEs to increase the pace of digitalization and improve their competitiveness
- The maturity and popularization of general digital technologies and application scenarios in the industry effectively reduce the threshold of digitalization and improve the confidence of SMEs in digitalization
- The new generation of young inheritors and management of some private enterprises have a stronger concept and determination to promote digitalization

The national standard of intelligent manufacturing maturity has become an indicator to measure the process of manufacturing digitalization nationwide, and the maturity of SMEs is mostly at the first level. Most of the certified enterprises are medium and large enterprises, mainly at the second level



National standard for maturity level of intelligent manufacturing

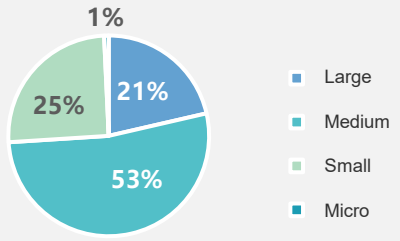
In 2020, the national standard "Intelligent Manufacturing Capability Maturity Model" (GB/T 39116-2020) was officially released, which specified the composition, maturity levels, capability elements, and maturity requirements of the intelligent manufacturing capability maturity model

Intelligent manufacturing maturity model (CMMM model)

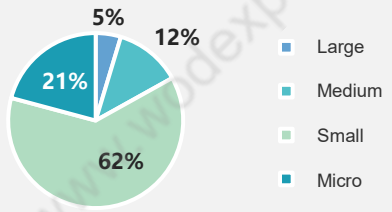
Based on this national standard, China Electronics Technology Standardization Institute under the Ministry of Industry and Information Technology has developed and released the Intelligent Manufacturing Capability Maturity Model (CMMM model), which has become the standard model for the national evaluation of the digital maturity of enterprises, and is also the basis for enterprises to conduct self-assessment of digital maturity

The standards and assessment models are being promoted as digitalization is developed in various industries and encouraged by government policies. By the end of 2023, the number of companies conducting self-assessment has increased from 60,000 in 2022 to 90,000, and the number of companies conducting grade certification has reached over 500. In particular, SMEs show great enthusiasm for self-assessment, accounting for 95% of the number of self-assessment enterprises

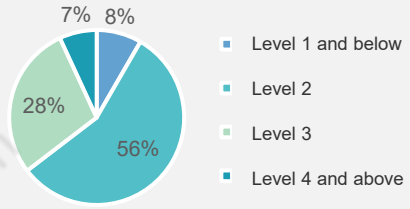
Certified enterprises by scale



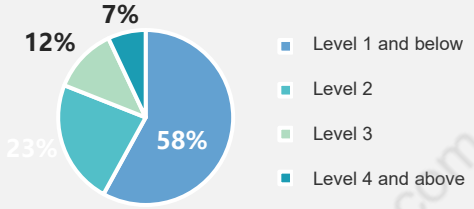
Self-assessment enterprises by scale



Certified enterprises by maturity level

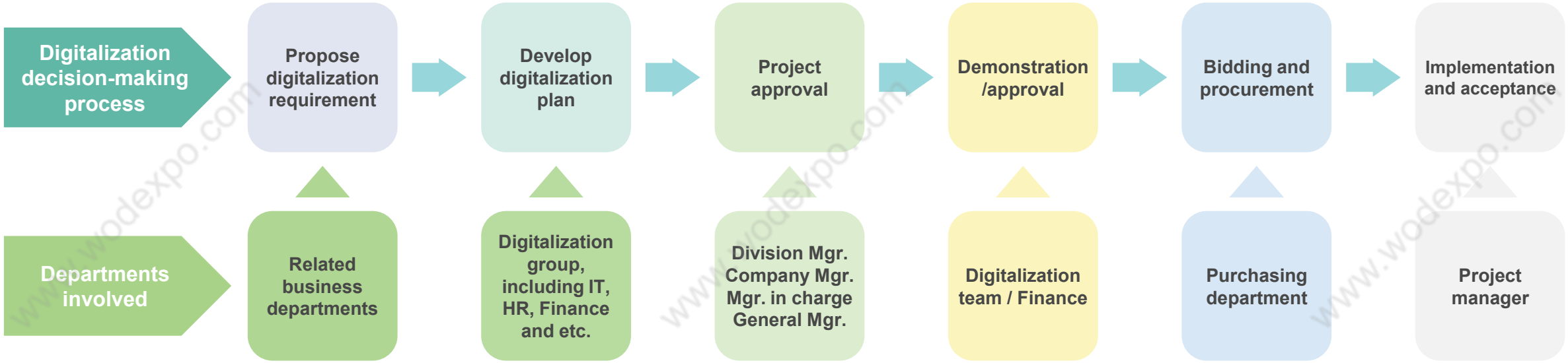


Self-assessment enterprises by maturity level



Source: Intelligent Manufacturing Evaluation Service Platform, public information

Digitalization is a "top leader" project. Companies usually establish a digitalization team, in which project manager is responsible for managing project progress, cost, and execution status, regularly reporting to CEO to ensure overall smooth progress



- The digitalization is generally led and promoted by the "top leader" of the company, who defines the top-level architecture design, vision and blueprint design of the digital project, and provides resource support at the strategic level of the enterprise
- The important factor determining the success of digitalization is the“two-wheel drive" of business and IT departments. Technologically advanced solutions need to be integrated into the industry's know how and solve business pain points and difficulties to avoid detours in digitalization
- The success of digitalization requires the planning and support of corporate resources such as funds and manpower, as well as long-term planning in financial budgeting and personnel recruitment reserves

Source: Expert interview, public information, Ipsos analysis

Enterprises digitalization is a process of continuous investment in stages. The difficulty and cost reduction effect vary at different stages. But digital empowerment and quality improvement is the only way for enterprises to achieve sustainable development

Process standardization

- Digital gap analysis, business development planning, and digital path coupling
- Optimal solution recommendation and evaluation
- Standardized management of main business processes

Automation, informatization and digitalization

- Automation and informatization of core business processes to reduce production and operational costs
- Build basic information system to meet business needs (financial, regulatory compliance)
- Digitize the entire lifecycle of business processes to enhance efficiency and core competitiveness
- Digital decision-making and management enhance business transparency and the scientific and timely nature of decision-making
- Advanced layout for intelligentization stage

Intelligentization

- Collect and analyze data from various business processes, to achieve prediction and optimization, and drive new value creation
- Applying breakthrough technologies to achieve intelligent products and services, as well as innovative new business models

Optimize innovation Industrial synergy

- Continuous innovation, promoting industry chain synergy, creating new production, manufacturing, and business models

Intelligent Manufacturing Maturity Model (CMMM Model)	Level One	Level Two	Level Three	Level Four	Level Five
Digitalization practical difficulty		Higher difficulty		Higher difficulty Need breakthrough	Only suitable for Industry leader
Digitalization practical effect			Significant ROI, significant cost reduction and efficiency improvement effect	Low ROI Unclear investment direction	

Due to different industry characteristics and scale, the main motivation, implementation path selection and implementation degree of digitalization are different. Enterprises need top-level design and early planning, and maintain agility and continuous adjustment during implementation process

The **main drivers** for **enterprise digitalization** are affected by factors such as the development stage of the industry, regulatory level, and supply chain

Traditional manufacturing enterprises in the mature stage, such as industrial machinery, textile industry, and etc.	Reduce cost and increase efficiency
Industries with strong regulatory or quality requirements, such as pharmaceutical, food processing, automotives, etc.	Compliant production; Quality traceability
In the downstream of supply chain, direct contact with the market, such as consumer goods, home appliances, electrical products, and etc.	Flexible production; Reduce costs and increase efficiency

The path selection of specific implementation is affected by factors such as production type, industry core value chain and industry supply chain integration degree

Production type	**Process-oriented manufacturing enterprises**, continuous processes and high degree of automation - enterprises will quickly enter the digital stage, such as chemical enterprises **Discrete manufacturing enterprises**, production process is relatively complex - enterprises need to start from implementing single point automation, such as machinery manufacturing
Internal value chain	**Enterprises will choose to implement from their core value chain** in order to quickly achieve results, such as digitalization of R&D in pharmaceutical and digitalization of marketing in consumer goods
Industry supply chain integration	In industries with strong **supply chain integration**, some enterprises will start digitalization from the integration of downstream demand side and upstream supply side, such as the digitalization of logistics warehousing in automotive parts factories

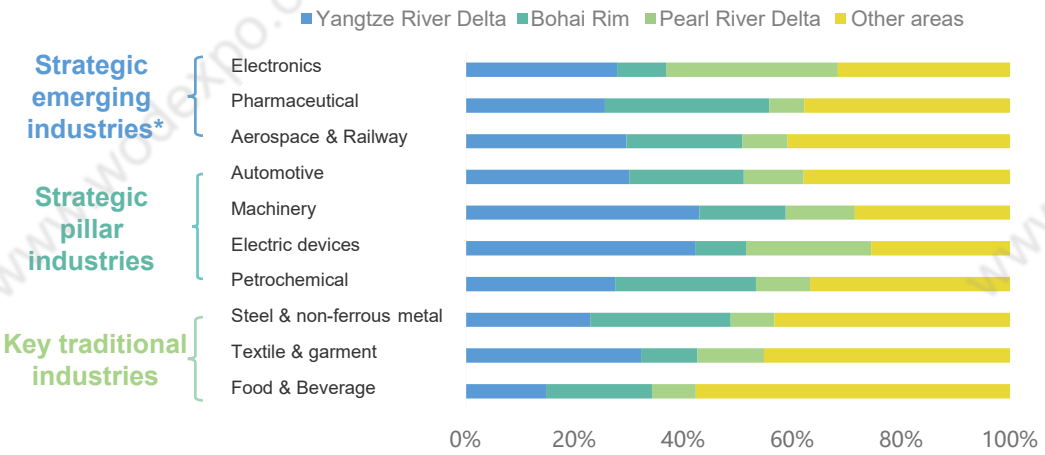
The implementation method and degree of the plan mainly consider the maturity of the existing industry general digital technology, input-output ratio, talent reserve and other factors

Digital technology maturity	Generally, enterprises are willing to choose **mature technologies that have been validated by the market**, such as MES and APS applied in CMMM Levels 2 and 3; However, digital twin and edge computing in CMMM Level 4 applications are usually only implemented in leading enterprises
Talent reserve	Leading enterprises with strong digital talent reserve will **adopt self-developed methods to promote digitalization**. Generally, enterprises mainly **rely on external suppliers** to choose the industry general scheme, whose implementation degree will be **limited by the ability of the supplier**
Return on investment (ROI)	Companies will **choose to stay at the appropriate level of digitalization** based on input costs and their own characteristics. Some interviewed machinery companies expressed that investment of CMMM Level 4 is too high and will remain at Level 3; At present, the promotion of Lighthouse Factory to the entire group is also constrained by cost factors

The high degree of agglomeration of key industries in China's manufacturing industry facilitates the driving force of digitalization industry clusters. The country not only attaches great importance to the construction of digital infrastructure, but also introduces various fiscal and financial policies

The concentration of key industries in China is high. The total revenue of strategic emerging industries and strategic pillar industries in the Yangtze River Delta, Bohai Rim, and Pearl River Delta economic zones accounts for about 67% of the country. In the 14th Five-Year Plan, local governments actively layout and promote strategic advantage industries and advanced manufacturing industries

Percentage of key industries in each region to the national total in China



The industrial support policies in major regions across the country, have an impact on the clustering of manufacturing industries. Leading enterprises have a strong radiating effect on driving the manufacturing digitalization of the entire industry chain

**Note: The classification of strategic emerging industries, strategic pillar industries and key traditional industries refer to the classification of industrial clusters in Shandong, Shanghai, Guangdong, Jiangsu and other places. Some industry classifications overlap due to the availability of data*

Main path of digitalization	Bohai Rim		Yangtze River Delta				Pearl River Delta
	Beijing	Shandong	Jiangsu	Shanghai	Zhejiang	Anhui	Guangdong
Digitalization of leading enterprises	●	●	●	●	●	●	●
Digitalization of industrial agglomeration zones in industrial parks	●	●		●	●	●	●
Coordination by industry chain & chain owner	●	●	●	●	●	●	●
Digitalization of SMEs		●	●	●	●	●	●

Government support for digital infrastructure

- Domestic industrial software development and promotion
- Domestic hardware and intelligent equipment
- 5G+ Industrial Internet construction
- Promote solutions and application scenarios
- Digital ecological construction (such as service provider pool)
- Data security and network security systems

Government's safeguard measures

- **Fiscal support**
  - Lighthouse factory, smart factory and other awards
  - Equipment, production lines, software subsidies
  - The first set of independent equipment, the first edition of independent software award
- **Government purchase**
  - Digital diagnostic planning
  - Network security evaluation
- **Financial support**
  - Digital-related loans and interest subsidies
  - Government industry fund guidance

Source: National Statistics and local statistics

Both large enterprises and SMEs have reached a new growth stage in digitalization. Large enterprises are gradually shifting to paradigm in terms of concepts, implementation methods, and infrastructure, while SMEs are facing with new development opportunities

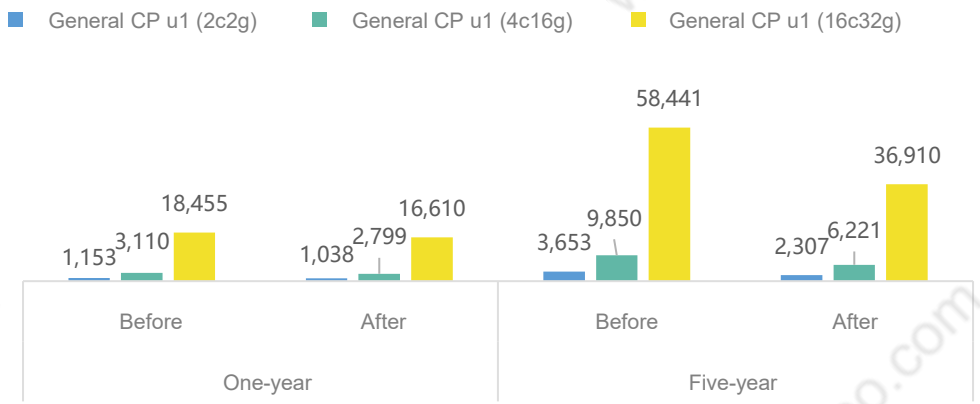
Large enterprises are the leading force in digitalization, and with the summary and achievements of digitalization in recent years, the methods of digitalization are gradually changing

Digital concept	Digitalization is an IT project that focuses on improving production processes and equipment	• Digitalization is a top-down change management approach that utilizes digitalization as a means throughout the entire group • Emphasize top-level planning and design
Implementation method	Purchase international corporate solutions and highly customized R&D, and maintain a large internal IT team	• Seeking domestic alternatives and adopting domestically produced equipment in core industries • Adopting mature industry standard solutions with necessary customization
Infrastructure	Localized deployment of software preferences	Based on cloud computing, build industrial cloud platforms, industrial big data, industrial Internet, etc., and accelerate the development towards cloud computing
Implementation focus and pain points	How to achieve the transition from "0" to "1"; the large initial fixed-cost investment needed	• The next maturity enhancement (such as CMMM Level 3 to 4) will have a high technical threshold and a significant decrease in ROI • The technology of big data applications (such as data modeling and predictable operations) is not mature, and the application scenarios are not clear

With the promotion of digitalization by large enterprises in related industries, the strategic determination, benefits, costs, and capabilities faced by SMEs in digitalization are also changing

- Digital solution supply market: domestic alternative solutions with decreasing cost
- The promotion of "fast, light and accurate" products and solutions enhances the secondary development and demand response capabilities of SMEs
- SaaS subscription-based software services reduce the upfront fixed costs
- Improved delivery efficiency and cost reduction enhance the determination of SMEs
- SMEs have more diverse and flexible methods of implementing digitalization, such as using existing MES platforms for technological upgrades rather than replacements

Aliyun service pricing for SMEs (excluding Ulanqab / Heyuan region) in China, effective on February 9, 2024

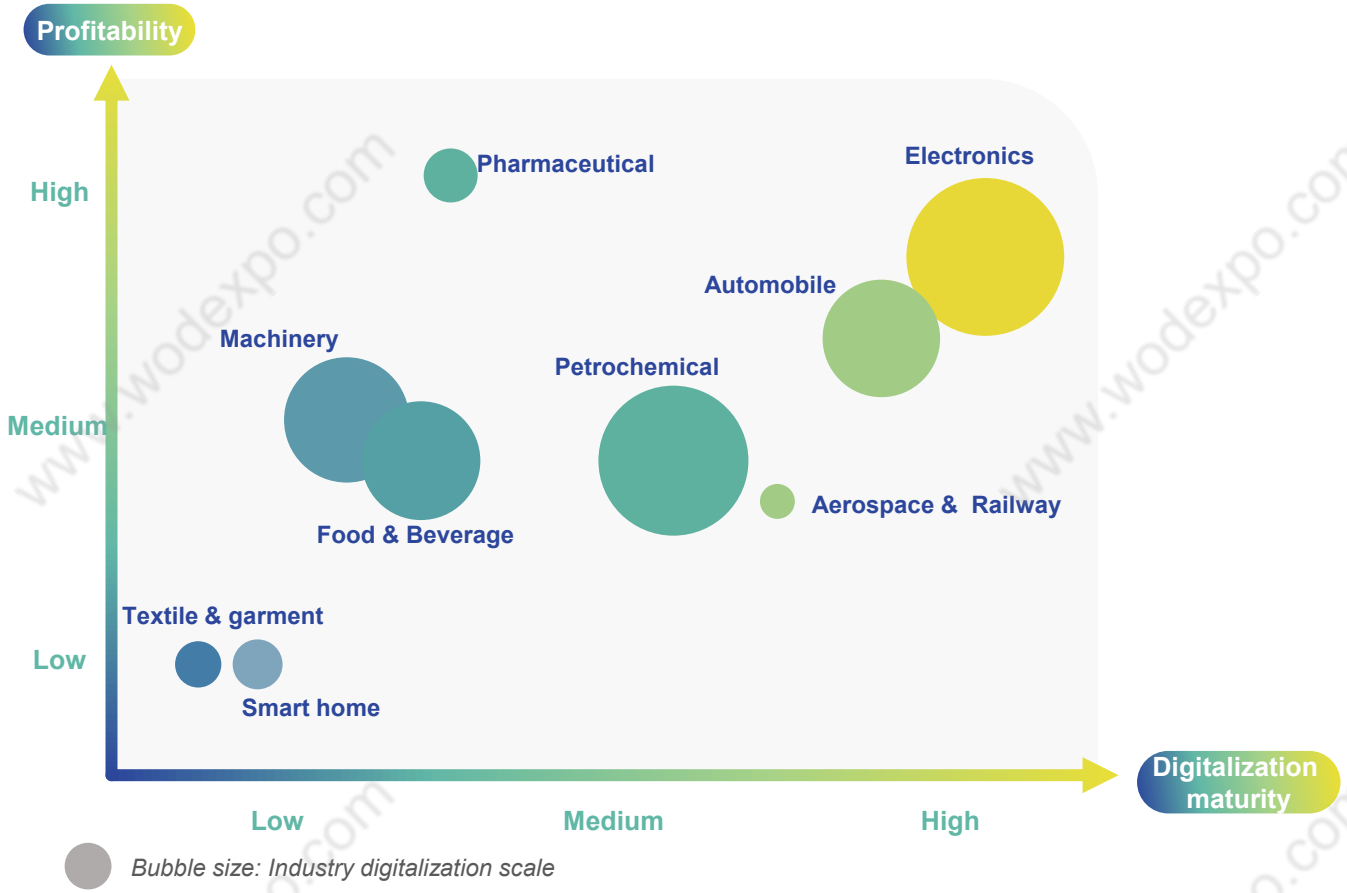


Source: Public information, Ipsos analysis

Part 02

Market Outlook for Digitalization in Key Manufacturing Industries in China

The digitalization level in different manufacturing industries is affected by industrial scale, profitability, and competition. The market size future growth depends on the improvement of the maturity level of relevant industries



Source: National Statistics, Expert interview, Ipsos analysis

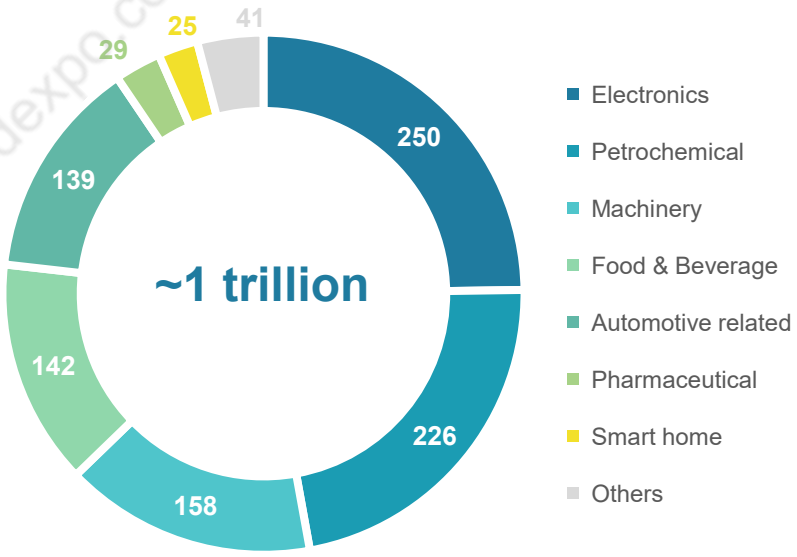
The main influencing factors of the digitalization market size in different industries in China

- **Industry scale:** The larger the industry scale, the greater the willingness to digitalize, because it can achieve greater scale effects in digitalization, such as petrochemical, electronics, etc.
- **Profitability:** Industries with high profitability have high willingness to invest in digitalization and relatively large capital and talent resources to allocate (such as automotive, semiconductors, petrochemicals, etc.). On the contrary, industries with low profitability are restricted by profitability and capital (such as textile and apparel)
- **Market competition:** Influenced by the market competition environment, especially in many industries that compete with global manufacturing and technological levels: the closer the industry is to the market, the higher the willingness and degree of digitalization, such as automotives, computers, food, etc.
- **Manufacturing type (discrete or process type):** It has a significant impact on the choice of digital implementation path and process, and the overall investment scale of digitalization is relatively similar. Discrete type has a high demand for customized flexible production, while process type focuses on process standardization and production visualization
- **Future scale growth trend:** depends on the maturity of the industry's existing digitalization level and the continuous improvement of the digitalization level of SMEs

Electronics, petrochemical, machinery, Food & Beverage, automotive related, and pharmaceutical are key industries for manufacturing digitalization industry, ranking among the top six and maintaining steady growth

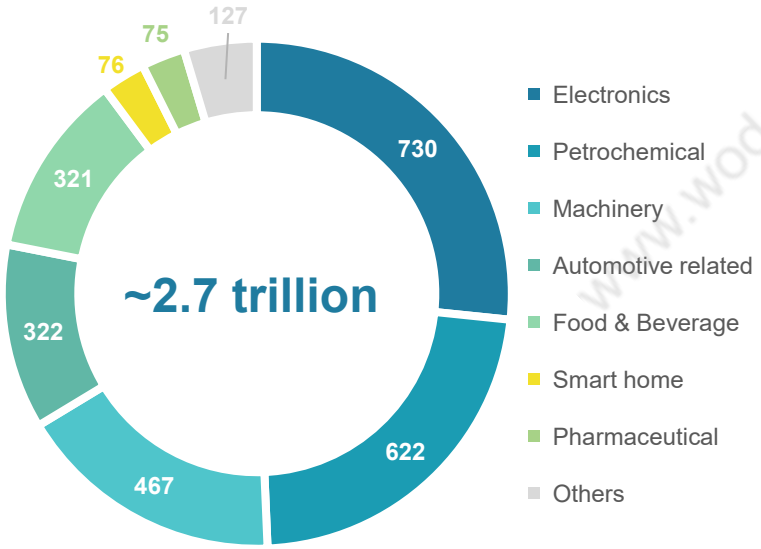
Market size of digitalization in manufacturing industry in China in 2023

Unit: RMB billion



Market size of digitalization in manufacturing industry in China in 2030

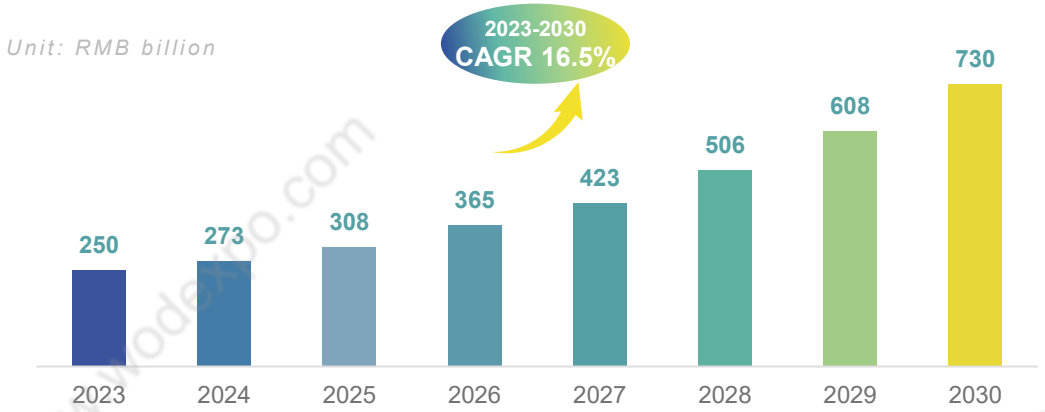
Unit: RMB billion



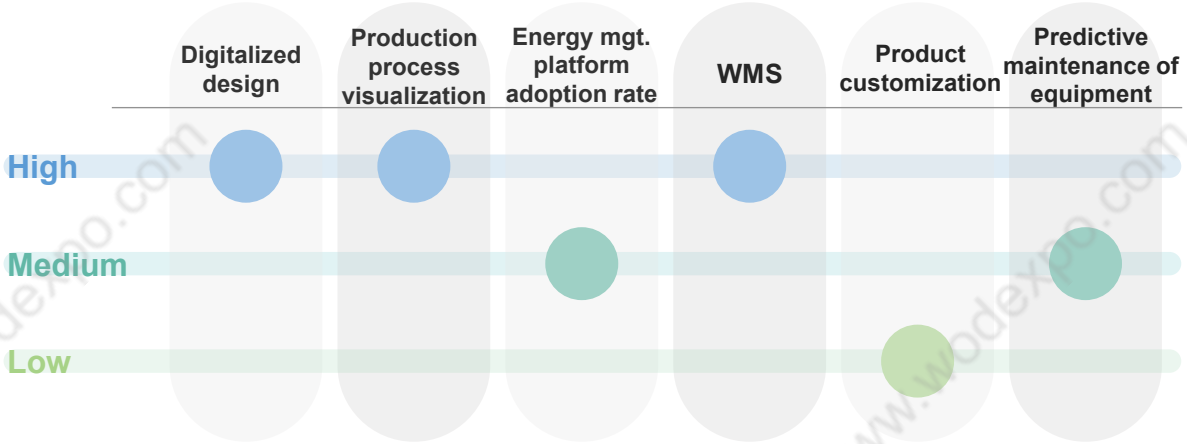
Source: National Statistics, Expert interview, Ipsos analysis

Electronics: Relatively high level of digitalization but facing intensified competition from international manufacturers. The replacement of domestic equipment, upgrading of high-end intelligent manufacturing, and sustainable production will drive the continuous growth of digitalization

Electronics industry digitalization market size forecast in China



Industry key digital detail indicators



Industry characteristics: discrete type. Core value chain for design and development, scale production. As the national high-end manufacturing core industry, some sub-sectors (such as semiconductors, integrated circuits, communication equipment, etc.) maintain rapid development

Current digitalization status:

- The average level of digitalization in the electronics industry is high, especially in R&D and production parts
- By 2022, the penetration rate of digital R&D design tools will reach over 80%, and industrial software such as CAD and CAE will be widely used. The CNC rate of key production processes, digitalization rate of production equipment, and networking rate are among the top in various industries
- The industry has large investments and significant economies of scale. Digitalization is mostly concentrated in top enterprises, while upstream SMEs are relatively lagging behind

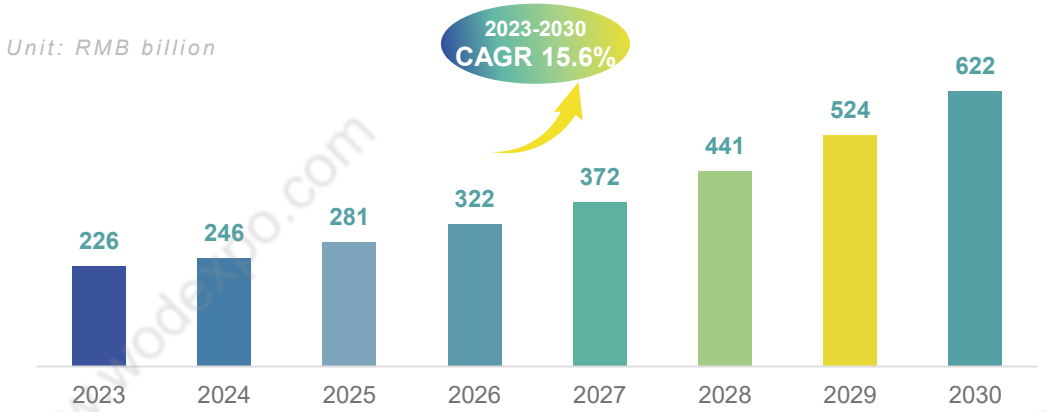
Future growth direction of digitalization

- Jumping to the high value-added supply chain, and the competition with international manufacturers is intensifying. By solving the bottleneck technology, industry investment will maintain rapid growth
- The country promotes high-end manufacturing of domestic intelligent equipment to replace imported equipment, which will promote the rapid development of digitalization in related industries, and the demand for domestic equipment and software is huge
- Sustainable production is becoming a focus for the future of the electronics industry, with intelligent management and predictive maintenance of power and water resources becoming a key focus of digitalization
- Electronics is the fundamental industry of national digitalization. Digital industrialization, mature technology solutions and application scenarios to further spread to upstream SMEs to become the focus of development

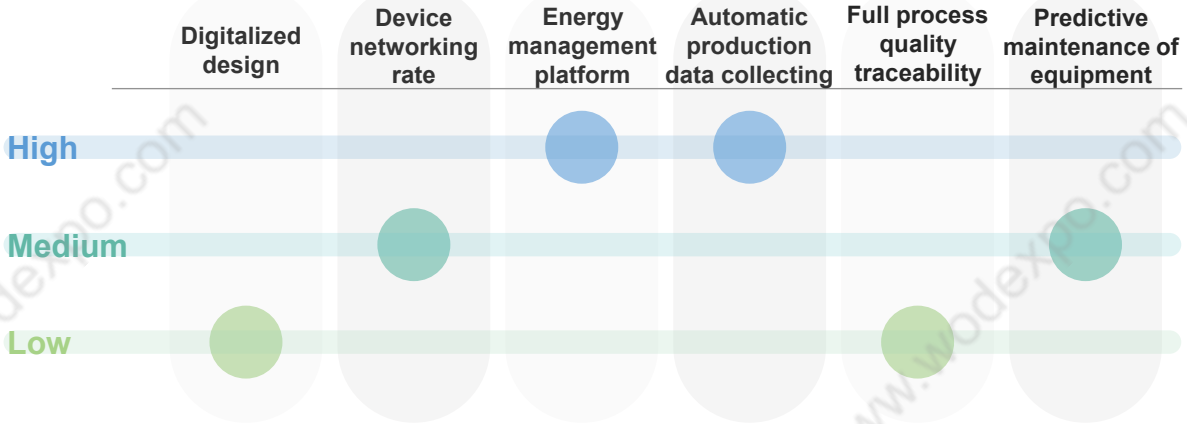
Source: National Statistics, Expert interview, Ipsos analysis

Petrochemical: Relatively good foundation in industrial automation control. In the future, the intelligent production process, the replacement of humans with machines, and the resolution of safety issues in the hazardous chemical industry will drive the continuous growth of digitalization

Petrochemical industry digitalization market size forecast in China



Industry key digital detail indicators



Industry characteristics: process type; The core value chain is continuous production and equipment operating condition detection. Long industry chain, large-scale equipment. The industry has a high degree of globalization, and there is still a gap with the world's advanced level

Current digitalization status:

- The foundation of industrial automation control is good, and the overall level of digitalization is at the forefront of process industries
- In the production process, the digitalization rate of equipment and the degree of automatic collection of physical parameter data are relatively high. However, there is a phenomenon of incomplete data collection, limited data analysis capabilities, and inability to convert productivity effectively
- Due to the long industry chain and wide coverage, the level of supply chain collaboration is not high

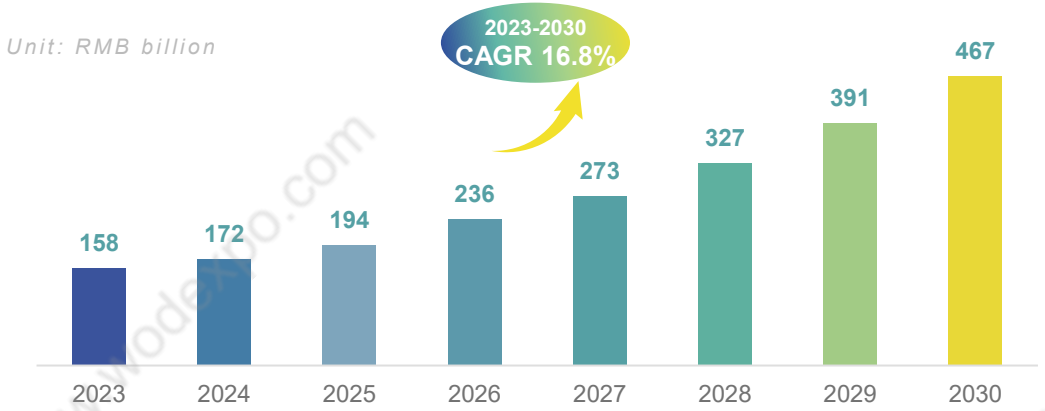
Future growth direction of digitalization

- Production process intelligence, including improving the equipment connection rate, perfecting data collection, enhancing data analysis and modeling capabilities, and providing services for process design and quality traceability, is the focus of digitalization in the petrochemical industry
- The domestic self-sufficiency rate of industry R&D design and production control software is low, and the demand for domestic solutions will increase in the next few years
- For labor-intensive sections, further conversion is carried out through "machine replacement", "intelligence substituting" and "intelligence improving efficiency"
- There is a high incidence of data security risk events, and many industries involve key regulated hazardous chemical processes, hazardous chemicals, and major hazard sources. The improvement of network and data security governance is urgent

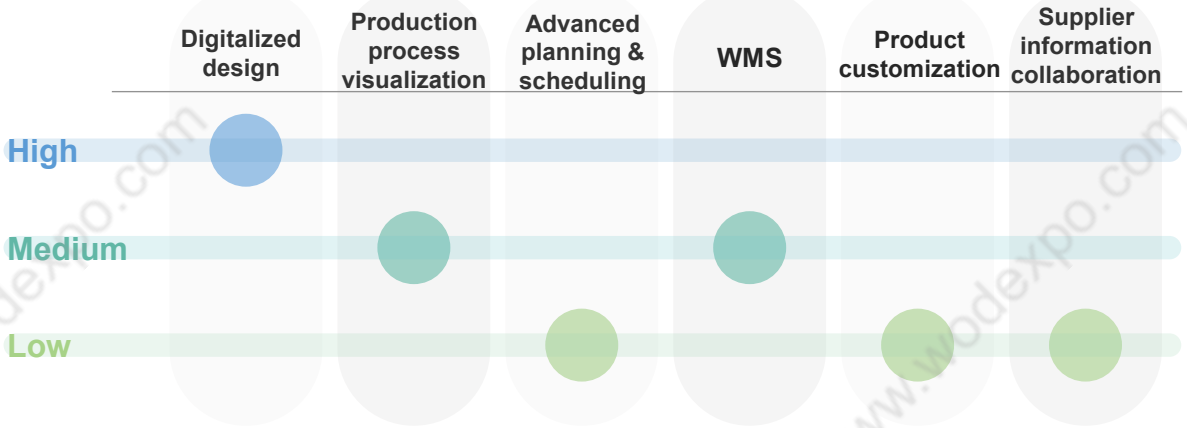
Source: National Statistics, Expert interview, Ipsos analysis

Machinery: The current level of digitalization is uneven. In the future, leading enterprises will continue to deepen digital transformation, and enterprises in the early stage will focus on automated information technology, which will promote the continuous growth of digitalization

Machinery industry digitalization market size forecast in China



Industry key digital detail indicators



Industry characteristics: discrete type. The core value chain is flexible manufacturing. Long industry chain, obvious enterprise scale differentiation. The product homogeneity of the industry is high, and the cost pressure is large. The acceleration of domestic equipment substitution, the rapid development of downstream innovative industries (semiconductors, new energy), and the rapid growth of power equipment demand for new power grids

Current digitalization status:

- The overall informatization and digitalization level of the machinery industry is relatively low. More enterprises are still in the stage of automation to informatization
- Leading companies have networked their equipment, but they also face the challenge of how to further leverage production data modeling to achieve predictable and intelligent management

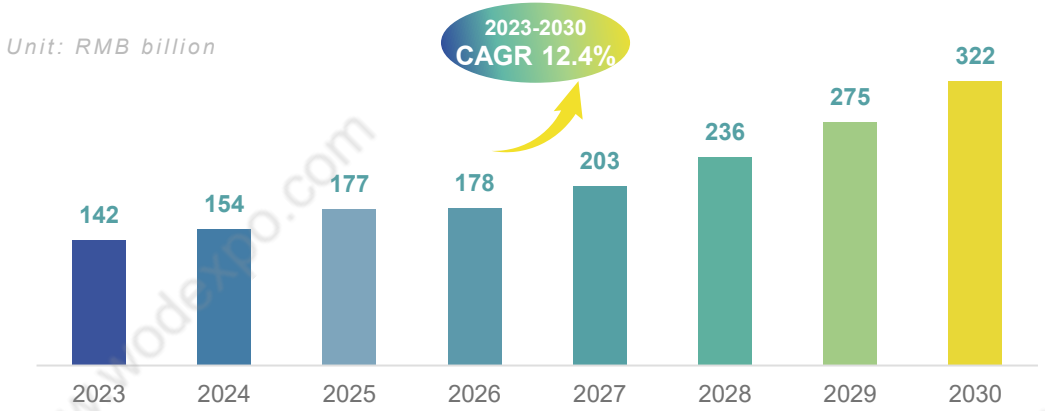
Future growth direction of digitalization

- Capacity upgrading and digitalization are generally carried out simultaneously, and the replacement of domestic equipment will continue to generate demand
- Leading companies gradually deepen the key aspects of digital transformation, enabling data to transform productivity, such as data modeling for predictable production
- The focus of enterprises still in the initial stage of digitalization is still automation and information technology, to quickly achieve cost reduction and efficiency, and solve the problem of "labor shortage" in some enterprises
- The demand for personalized products and flexible production will promote the penetration of R&D and production control industrial software in the machinery industry

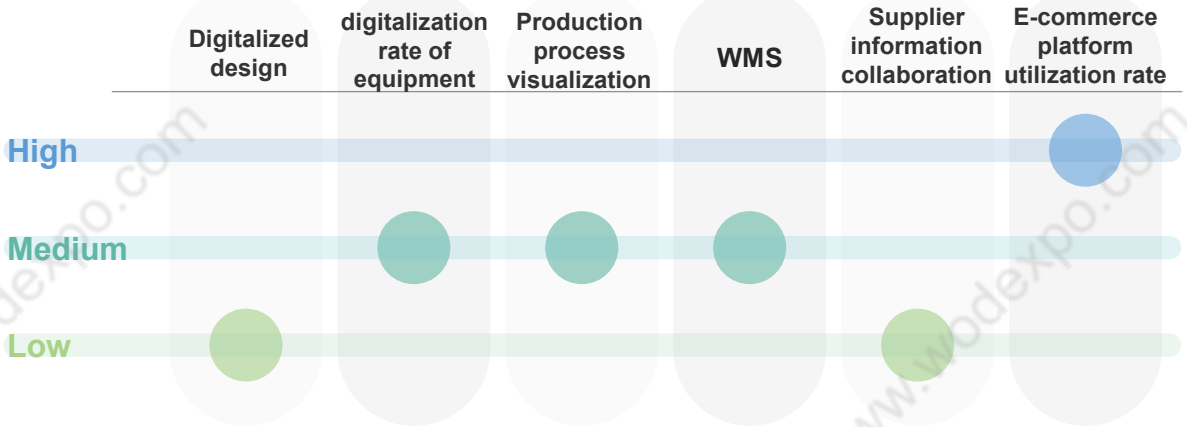
Source: National Statistics, Expert interview, Ipsos analysis

Food & Beverage: The overall degree of digitalization is relatively low (except marketing). In the future, the direction of R & D design, production processes, quality traceability, marketing upgrading, and intelligent warehousing and logistics will drive the continuous growth of digitalization

Food & Beverage industry digitalization market size forecast in China



Industry key digital detail indicators



Industry characteristics: mostly process type. The core value chain is marketing and quality traceability. The overall demand is stable and continues to grow, but the demand for individual categories is flexible and changeable. Due to low unit price, large consumption and changing consumer preferences, the marketing side of supply chain is highly competitive. Strict requirements for quality and safety, high public attention, and demand for health and safety drive industrial digital transformation

Current digitalization status:

- The digital maturity of the industry is not high compared with other industries. However, the investment and level of digitalization in marketing is at the forefront of the industry, and a large number of Internet and data analysis technologies are applied. The digital level of warehousing and logistics is also high
- Digitalization penetrates upstream of the supply chain, large enterprises build digital factories, strengthen production process visualization, and improve quality traceability capabilities

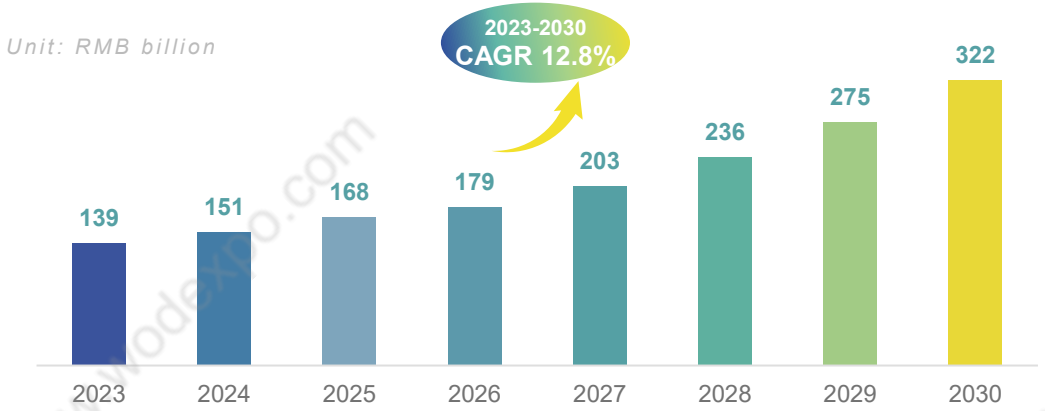
Future growth direction of digitalization

- R&D design - Use the Internet of Things, cloud computing, artificial intelligence and other digital technologies to collect data and analyze information such as raw material properties, nutritional characteristics and population nutritional characteristics, and design healthy products
- Production - Upgrading equipment, reducing manual intervention, improving production standardization and visualization, enhancing quality stability and traceability
- Quality traceability - Blockchain technology will be increasingly used in the Food & Beverage industry
- Marketing - The application of Internet marketing technology based on AI model will be further promoted in the industry
- Intelligent warehousing and logistics system will improve space utilization and logistics distribution efficiency

Source: National Statistics, Expert interview, Ipsos analysis

Automobile: Relatively high level of digitalization and high degree of industry chain integration. Under the trend of electrification, growing digitalization market size will be driven by new automotive capacity and demand for edge computing, intelligent software, etc.

Automobile industry digitalization market size forecast in China



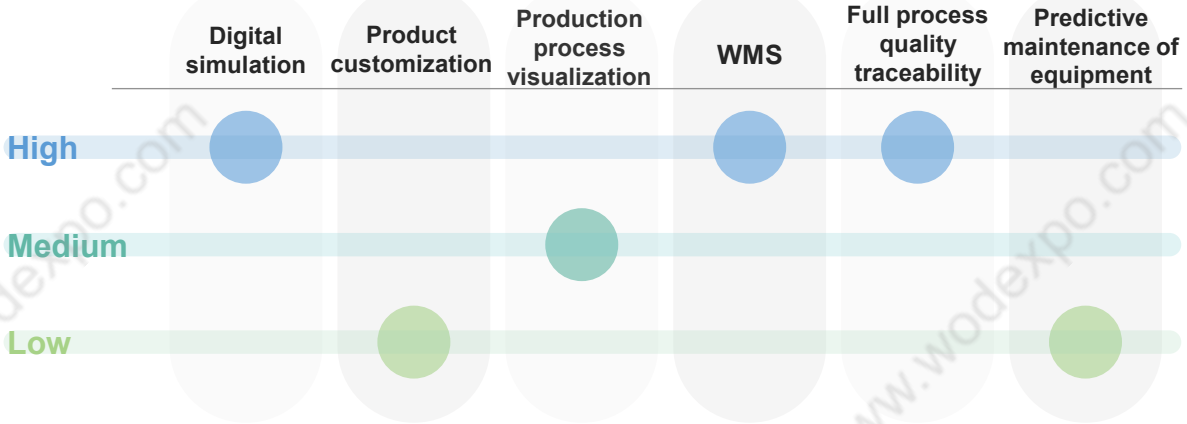
Industry characteristics: discrete type. The core value chain is R&D design, manufacturing, and quality traceability. The industrial supply chain has a high degree of integration and modular production. Technological barriers have decreased, leading to fierce competition in both domestic and international markets

Current digitalization status:

- The overall level of digitalization in the automobile industry is relatively high. Due to the high degree of integration of the industry supply chain, the digitalization of the industry core value chain, such as digitalized design and quality tracking, the overall investment is large and the digitalization level is high
- The industry chain integration platform initiated by the OEMs requires high investment for upstream SME suppliers, while mainstream suppliers have insufficient coverage of SME suppliers, which limits the digital capabilities of SMEs in the industry
- The domestic automobile industry is transitioning towards electrification and intelligence, and the penetration rate of electric vehicles has increased rapidly in recent years

Source: National Statistics, Expert interview, Ipsos analysis

Industry key digital detail indicators

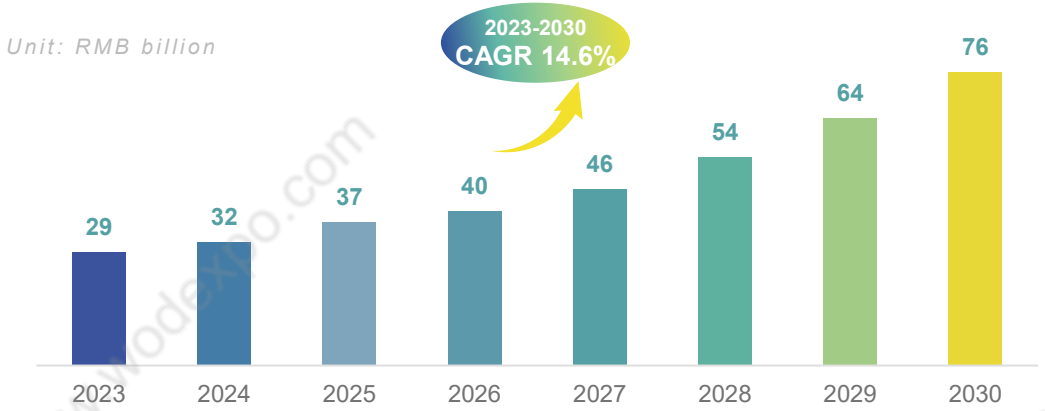


Future growth direction of digitalization

- Further integration of quality data between R&D and production ends, analyzing data to reduce quality costs
- Intermediate suppliers in the supply chain build their low-cost platforms to assist upstream SME suppliers in improving their digital capabilities
- The transition to electrification is driving new capacity and upgrading of existing production lines
- The demand for edge computing and intelligent software for intelligent connected vehicles and automated driving is growing rapidly
- The overseas production layout of domestic independent brands has led to the joint deployment of domestic intelligent manufacturing equipment, automated production line integrators and industrial software suppliers

Pharmaceutical: The overall level of digitalization is relatively low, and future digitalization will focus on compliant production and quality traceability as core values, empowering the entire lifecycle of products in the pharmaceutical manufacturing industry

Pharmaceutical industry digitalization market size forecast in China



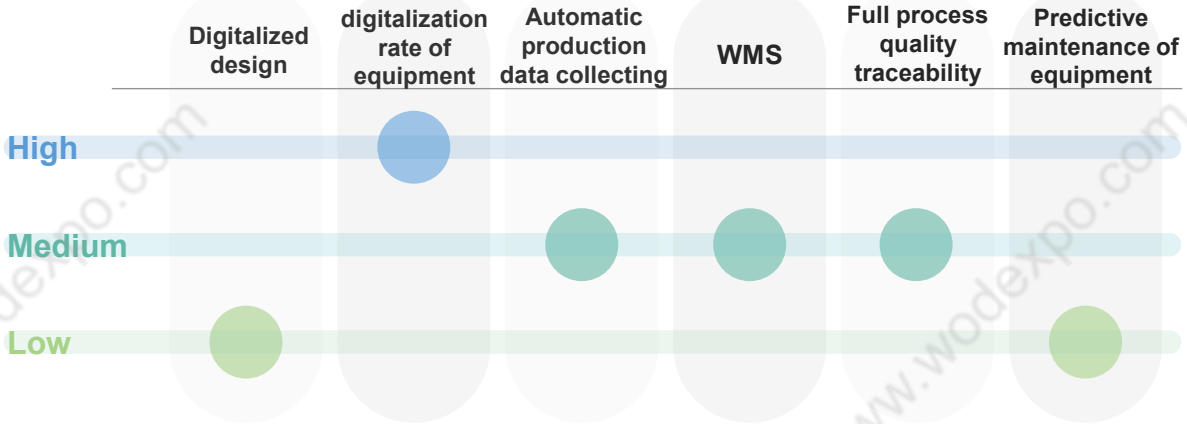
Industry characteristics: mixed type. The core value chain is compliance operation and quality traceability. Industry supervision is strict, and the R&D cycle is long and highly uncertain. The industry concentration is high and the profitability is higher than the average level of the manufacturing industry. In recent years, the implementation of medical insurance cost control, volume-based procurement, and the "two invoices" system has intensified competition in the pharmaceutical industry

Current digitalization status:

- The overall level of digitalization is not high. The digitalization of the industry mainly focuses on the core segment of the value chain such as compliance production and sales, quality traceability, KOL management, and the utilization rate of R&D equipment, and has made great progress. AI models are also being used in the development of synthetic drugs to help optimize the synthesis path
- SME pharmaceutical companies led by R&D teams focus on knowledge transformation, with little investment in digitalization

Source: National Statistics, Expert interview, Ipsos analysis

Industry key digital detail indicators



Future growth direction of digitalization

- Digital regulatory compliance and quality control (clinical management, supplier raw material tracking, batch production monitoring and recording, document management and submission, etc.)
- Digital marketing enables offline and online interaction between KOLs and patients
- Utilize digital technology to continuously improve the utilization and start-up rate of R&D equipment, as well as optimize the configuration of R&D personnel during the R&D phase
- The application of AI data models in the recommended drug synthesis path will further mature and be promoted
- The application of blockchain in tracking samples and tracing versions in the clinical stage will be further developed and expanded

Part 03

Market Outlook for Manufacturing Digitalization in Yangtze River Delta (YRD) in China

YRD the three major industrial economic zones with largest economic volume and a clear focus on industrial development

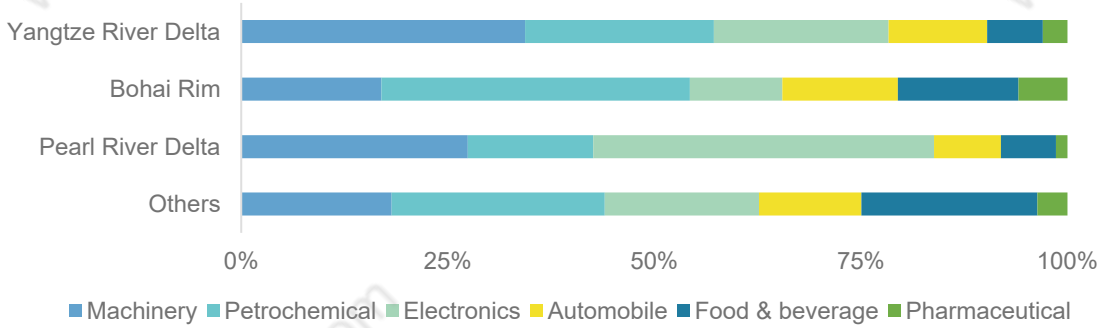
The widening gap in regional development of manufacturing industry: China has formed an intelligent manufacturing base with three major industrial economic zones (namely, the Yangtze River Delta, the Bohai Rim, and the Pearl River Delta) as the core. These three major economic zones have further widened the gap compared to other regions in terms of local incentive policies, digital maturity, number of lighthouse factories, leading cities for high-quality development, and market size for manufacturing digitalization

The three major regions have different industrial priorities and coordinated development:

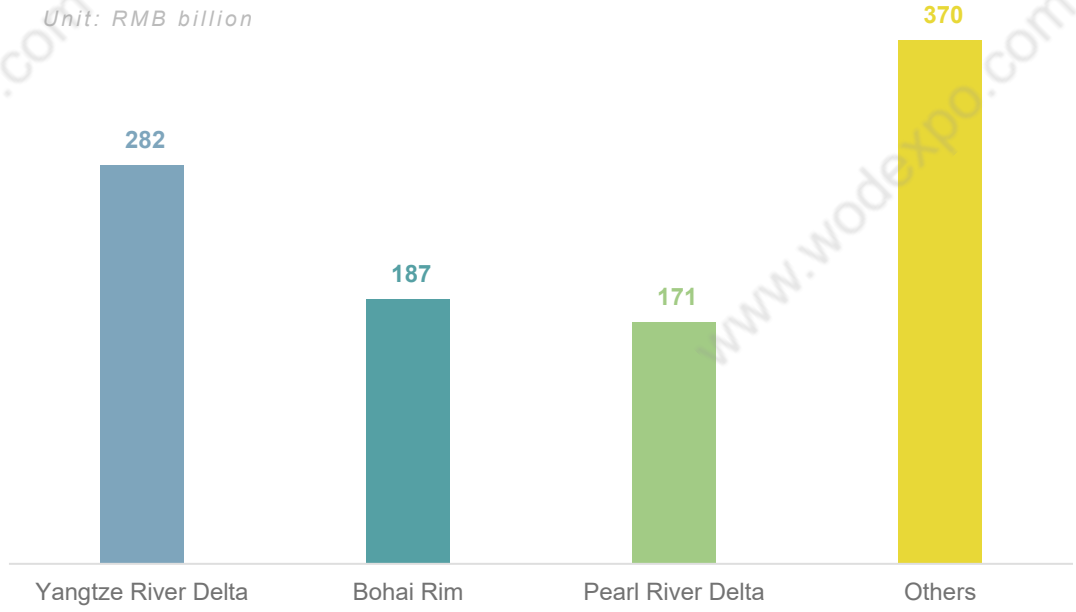
- **Yangtze River Delta:** top six major industries in the Yangtze River Delta have balanced development with machinery being the strongest of the three regions
- **Bohai Rim**: has formed a cluster in the petrochemical industry
- **Pearl River Delta**: strong in the electronics and machinery industries

The three major regions are accelerating the layout of new generation information technology, new energy vehicles, integrated circuits, biomedicine and other emerging industries

Operating revenue of "above designated enterprises" in China in 2021



Manufacturing digitalization market size of three major economic zones in China in 2023

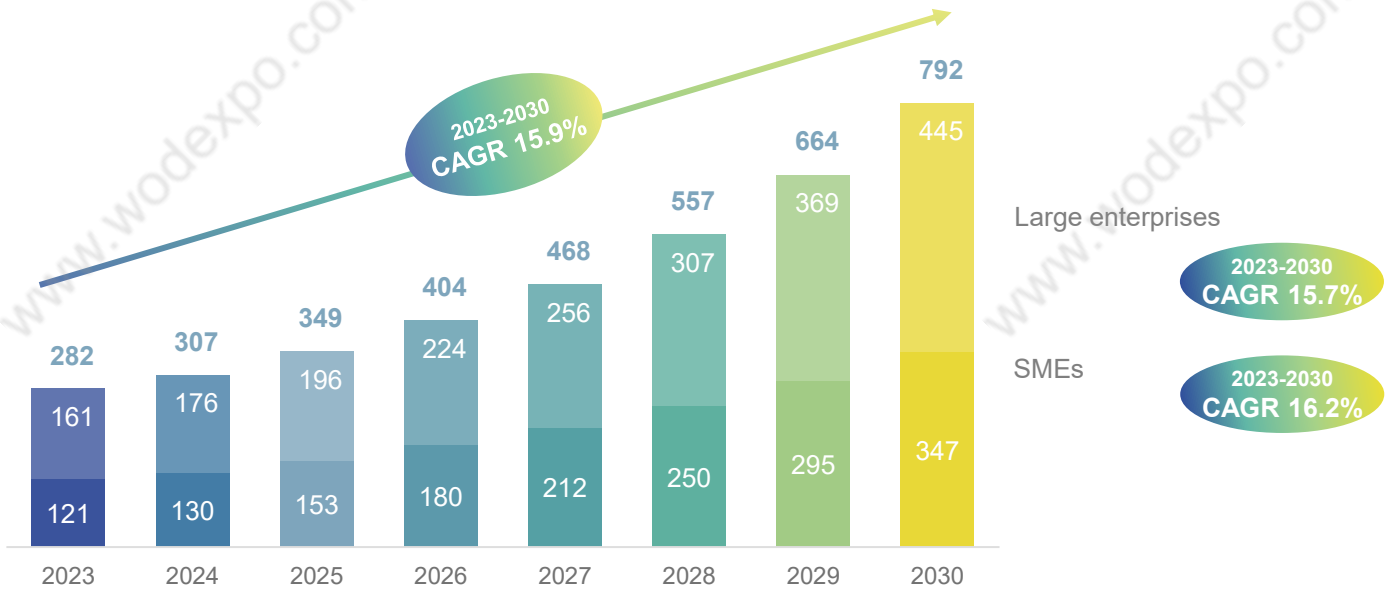


Source: National Statistics, Expert interview, Ipsos analysis

YRD has leading enterprises in advantageous industries, leading the process of digitalization. Moreover, with the endogenous demand for solving labor shortage and improving management of SMEs, manufacturing digitalization market is expected to grow rapidly, higher than national average

Market size forecast for manufacturing digitalization in the Yangtze River Delta in China

Unit: RMB billion



** Note: SME refer to enterprises with less than 1,000 employees or operating income of less than RMB 400 million.*

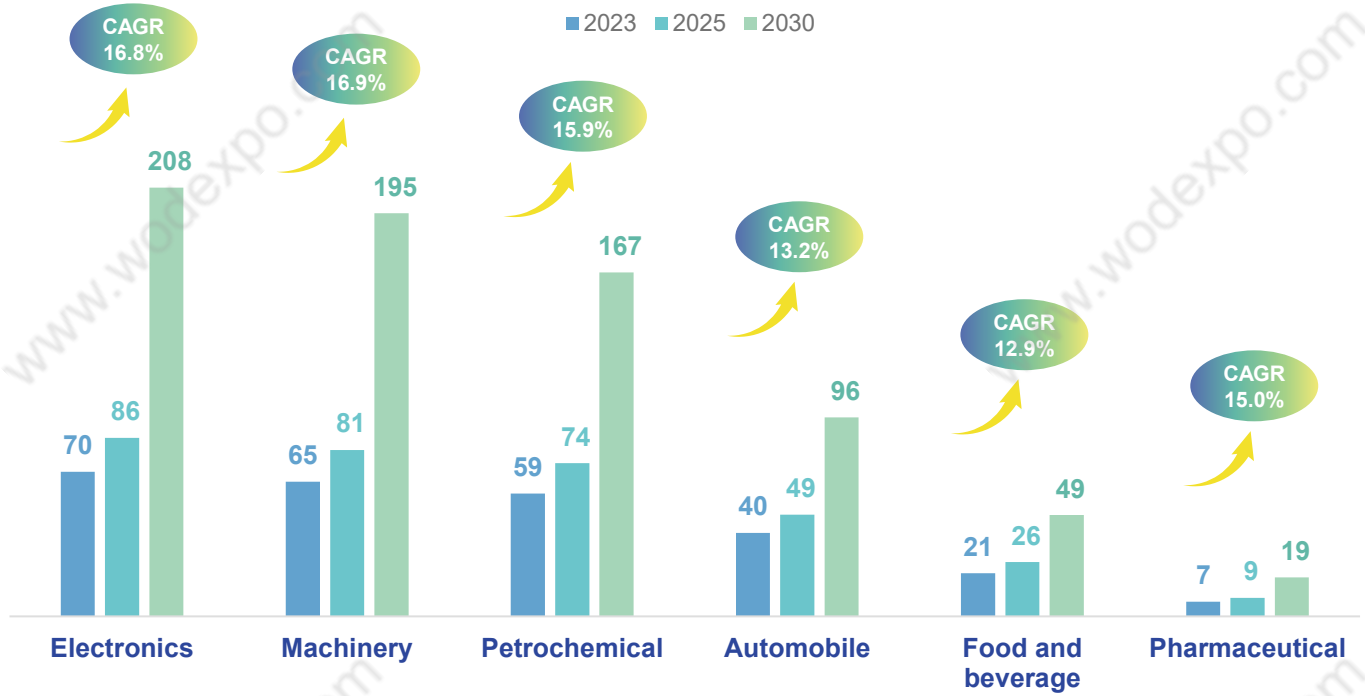
Source: National Statistics, Expert interview, Ipsos analysis

Opportunities for manufacturing industry digitalization in the Yangtze River Delta in China

- The maturity level of regional digitalization is relatively high on average, with advantageous industries such as automotive and electronics leading the digitalization process. Downstream innovative industries such as integrated circuits and new energy have developed rapidly in recent years, and new production capacity has high requirements for intelligent manufacturing and digitalization
- The "employment difficulties" and rising labor costs in the Yangtze River Delta region will continue to drive the implementation of automation, digitalization, and intelligence in the business processes of enterprises
- The growth rate of SMEs digitalization market size in the Yangtze River Delta is higher than that of the whole country. Due to multiple factors such as management improvement, cost reduction and efficiency improvement, and chain owner promotion, there is a need for cost-effective R&D, production, and management systems with small initial investments, such as upstream supporting parts manufacturers
- The government's encouragement policies will drive enterprises to invest in digital diagnosis, consulting, intelligent manufacturing, and digital transformation
- Private enterprises in Jiangsu, Zhejiang, Anhui and other places are facing a window period of second-generation succession. digitalization has become a key optional path for standardizing operations, streamlining management processes, accumulating first-generation capabilities, and ensuring the survival and development of enterprises

Key manufacturing industries in YRD focus on digitalization and development based on industrial characteristics: electronics – developed key advanced manufacturing industry; petrochemical - large proportion of SMEs; machinery - mature industry chain cluster

Market size forecast for manufacturing digitalization in the Yangtze River Delta in China - by industry



Source: National Statistics, Expert interview, Ipsos analysis

The growth rate of digitalization markets in various industries in the Yangtze River Delta Economic Zone is slightly higher than the national average, but the development focus of digitalization markets in major industries varies

Electronics: Key advanced manufacturing industries are developing rapidly, such as integrated circuits, semiconductors, chips, etc. These emerging enterprises have a high starting point and high demand for digitalization. And the relevant industry funds in the region are active, providing resources and impetus for digitalization for the invested enterprises

Petrochemical: The proportion of SMEs in this industry in the Yangtze River Delta region is much higher than the national average, especially in the chemical, rubber, and plastic industries. These types of enterprises are mostly in the automation stage, and there is a strong demand for digital upgrading

Machinery: The Yangtze River Delta mechanical equipment manufacturing industry chain cluster is mature and developed. Numerous industry leaders and chain owners can drive the digital transformation of the entire chain. The demand for intelligent products and equipment will also drive the development of the machinery manufacturing industry

Pharmaceutical: The development of innovative biopharmaceuticals in the Yangtze River Delta is rapid, and the demand for digitalization will gradually be released as enterprises' transition from R&D to production

The support ideas of various governments in the Yangtze River Delta for manufacturing digitalization are tailored based on local conditions

Shanghai	Implementation Plan for Digital Transformation of Manufacturing Industry in Shanghai	• Full coverage of digital diagnosis for "above designated enterprises" • The “above designated enterprises” of "five new cities” complete the L2 upgrade of their smart factories • Build 20 benchmark smart factories and construct 200 demonstration smart factories • Cultivate 40 “industrial empowerment chain owners” and promote the digital transformation of 1,500-2,000 SMEs on the chain • Introduce and cultivate 200 digital professional service providers • 400,000 SMEs starts to use cloud platforms • Increase support for key projects such as "chain owner enterprises" and implement evaluation and rewards for excellent digital platforms and professional service providers
Jiangsu	Three Year Action Plan for Intelligent Transformation and Digital Transformation of Manufacturing Industry in Jiangsu Province (2022-2024)	• Comprehensive implementation of intelligent transformation and digital transformation for "enterprises above designated size" throughout the province • To build 30 national intelligent manufacturing demonstration factories and 300 provincial intelligent manufacturing demonstration factories • To provide free intelligent manufacturing diagnostic services for SMEs above designated size through government procurement • Cultivate a group of ecological leading industry chain "chain owners" enterprises and establish 10 key industry chain collaboration platforms • The penetration rate of industrial Internet platforms of key enterprises across the province is close to 40% • The annual revenue of industrial software products in the province to exceed RMB 85 billion and to promote more than 4,000 industrial APPs • Provincial finance allocates RMB 1.2 billion of special funds annually to support industrial enterprises smart transformation and digitalization
Zhejiang	Action Plan for the Construction of "415X" Advanced Manufacturing Cluster in Zhejiang Province (2023-2027)	• Create 4 world-class advanced industrial clusters and enhance the competitiveness of 15 characteristic industrial clusters • Accelerate the upgrading and transformation of enterprise equipment, and implement over 5,000 key technological transformation projects annually • Cultivate 50 "chain owner" enterprises, 500 "chain owner" partner-enterprises, and 200 industry chain upstream and downstream enterprise communities • To construct over 120 future factories and over 1,200 intelligent factories or digital workshops, accelerate the full coverage of digital transformation for “enterprises above designated size”. Promote full coverage of digital transformation for SMEs in key segmented industries • To build a provincial-level "4+2" financial support system, with local governments coordinating and integrating various manufacturing financial support policies • Strengthen fund guidance. Iterative Industry Fund 3.0 version, establishing 4 industry cluster special funds and 1 "specialized, refined, special and new" parent fund, with each fund size not less than RMB 10 billion • Improve the financial service model and encourage financial institutions to increase loans for technological transformation
Anhui	Implementation Plan for Promoting High end, Intelligent, and Green Development of Manufacturing Industry through Digital Transformation (2023-2025)	• Every year, more than 10 provincial key industrial Internet platforms are added and 100 provincial typical demonstration projects of digital transformation are created. 200 provincial intelligent factories and digital workshops are added, and 20 regional models of digital transformation are built • Realize full coverage of digital transformation for key industries in the province, including "above designated enterprises • The popularization and application rate of industrial Internet platforms reach 45%, and the cloud application rate of enterprise industrial equipment reaches 30% • Increase financial support through enterprise diagnosis, equipment subsidies, application software service packages, and creating regional models

Source: Compiled and summarized based on targets announced by provincial and municipal governments, as well as publicly available data such as statistical yearbooks

Shanghai is seeking practical digital application scenarios to promote AI. Jiangsu proposes to fully implement digitalization for large size enterprises, with a focus on automation applications

Shanghai

Implementation Plan for Digital Transformation of Manufacturing Industry in Shanghai

+200 smart factories	+1,000 application scenarios	+30 industrial Internet platforms	Affects 400,000 SMEs
Build 200 demonstration smart factories	Promote 1,000 excellent intelligent manufacturing scenarios	30 industrial Internet platforms, 40 "industrial endowment chain owners"	400,000 SMEs start using cloud platforms

Jiangsu

Three-Year Action Plan for Intelligent Transformation and Digital Transformation of Manufacturing Industry in Jiangsu Province (2022-2024)

+300 smart factories	100% comprehensive intelligent & digital transformation	+200 industrial Internet	Renovation of ~60,000 enterprises
Build 300 provincial-level intelligent manufacturing demonstration factory projects	The CNC rate of key processes in key enterprises reaches 65%	Build 200 industrial Internet benchmark factories and 10 5G full connection factories	Comprehensive implementation of intelligent transformation and digital transformation in "above designated enterprises"

Source: Compiled and summarized based on targets announced by provincial and municipal governments, as well as publicly available data such as statistical yearbooks

Zhejiang aims to influence 200,000 SMEs via high-quality digitalization providers. Anhui focuses on building demonstration projects, with full coverage of digital applications for key industries and SMEs

Zhejiang

Action Plan for the Construction of "415X" Advanced Manufacturing Cluster in Zhejiang Province (2023-2027)

+1,200
Smart factories
To construct over 120 future factories and over 1,200 intelligent factories or digital workshops

+10
Benchmark enterprises
Promote the cultivation and construction of digital factories

+1,000
High quality digital service providers
Cultivate 1000 high-quality digital service providers

Affects ~200,000 SMEs
More than 30 key segmented industries have achieved basic digital transformation for SMEs

Anhui

Implementation Plan for Promoting High-end, Intelligent, and Green Development of Manufacturing Industry through Digital Transformation (2023-2025)

+30
New industrial Internet platforms
More than 10 provincial key industrial Internet platforms are added every year

+100个
Provincial demonstration projects
Create 100 typical demonstration projects for provincial digitalization

+200
Smart factories and digital workshops
200 new digital navigation enterprises, intelligent factories, and digital workshops

Affects ~130,000 enterprises
Full coverage of digital transformation for enterprises above designated size in key industries

Source: Compiled and summarized based on targets announced by provincial and municipal governments, as well as publicly available data such as statistical yearbooks

Part 04

Market Outlook for Manufacturing Digitalization in Asia

Asia is one of the world's major economies, and manufacturing industry occupies an important position in major Asian countries

	GDP in 2022 (Billion US$)	The proportion of industrial value - added to GDP in 2022	Population in 2023 (Million)	Digital Competitiveness Score	
China	17,963	32.5%	1,425	84.4	Tier 1
Japan	4,231	23.3%	123	75.4	Tier 1
India	3,385	19.7%	1,429	57.7	Tier 3
Korea	1,665	29.7%	52	94.8	Tier 1
Indonesia	1,319	27.5%	278	60.4	Tier 2
Thailand	495	32.1%	72	70.5	Tier 2
Singapore	467	23.8%	6	97.4	Tier 1
Vietnam	409	31.3%	99	N/P	Tier 3
Malaysia	406	33.6%	34	75.3	Tier 1
Philippines	4043	23.9%	117	48.3	Tier 3

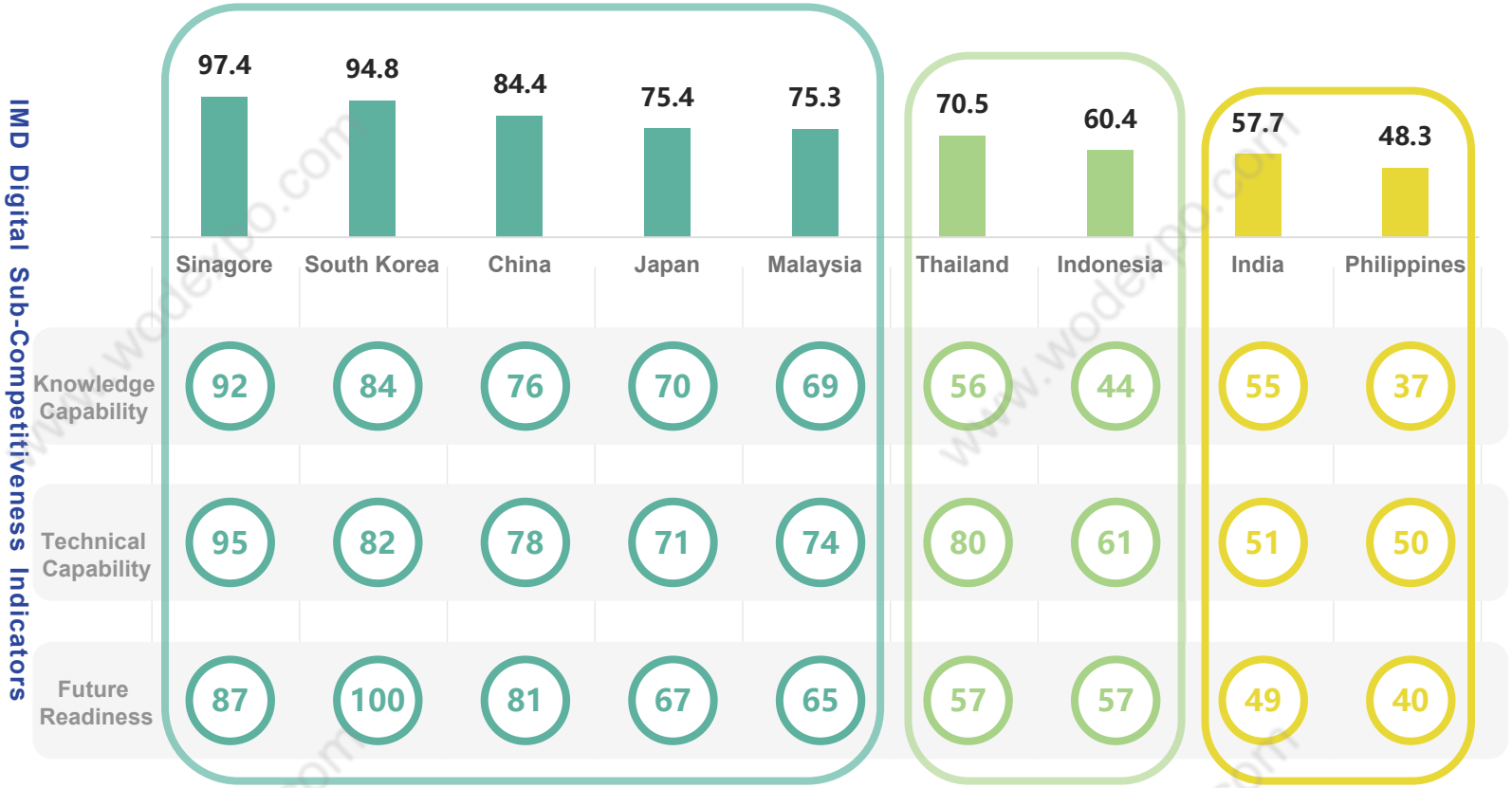
Source: IMD Global Digital Competitiveness Report, International Year book of Industrial Statistics (2023)

Asia is one of the world's major economies, with a population accounting for 60% of the world's total and a GDP representing 49% of the global total

- In major East Asian and Southeast Asian countries, the manufacturing industry contributes a significant proportion to the country's GDP. All these countries have realized that manufacturing digitization will bring a huge impetus to their economic development
- Affected by global trade frictions and geopolitics, some industries have accelerated their transfer to Southeast Asia, especially to Vietnam, India, and other regions. However, these countries face issues such as industrial upgrading and varying degrees of infrastructure development. China and its neighboring countries and regions demonstrate a hierarchical development trend in the development of digitalization and intelligent manufacturing

The development of manufacturing digitalization in Asian countries presents a stepped pattern, with Japan, South Korea, and Singapore maintaining their leading positions

IMD 2023 National Digital Competitiveness Scores



Note: Vietnam did not participate.

Source: IMD Global Digital Competitiveness Report, International Year book of Industrial Statistics(2023)

Countries vary in their strengths, capabilities, and stages of development in manufacturing digitalization

- According to the IMD's 2023 national digital competitiveness scores, Singapore, South Korea, Malaysia, and Japan occupy a higher position in competitiveness
- The countries in the first tier all have a strong industrial base and pay more attention to the digitalization of advanced manufacturing, such as semiconductors, new materials, pharmaceuticals, etc.
- The countries in the second and third tiers generally still focus on the "enlargement" stage of manufacturing, placing more emphasis on automation and informatization in labor-intensive industries, such as textiles and electronics

While maintaining their leading positions, the first-tier Asian countries continue to increase their investments in digitization related to advanced manufacturing

- Governments of Singapore, South Korea, Japan, and other countries have formulated forward-looking strategies for advanced manufacturing, enhancing manufacturing efficiency and maintaining profitability leadership in the manufacturing industry by incubating technologies and commercializing them
- Companies in these countries are also participating in the digitalization of local enterprises in other Asian countries through their investments, such as the digitalization of production bases in Vietnam by Japanese and Singaporean companies
- While providing digital infrastructure to these leading countries, Chinese enterprises can also draw on the experience of foreign intelligent and advanced manufacturing, connect with foreign advanced manufacturing models, and jointly develop markets

Countries	IMD Digital Competitiveness	Value Added by Manufacturing in 2022 (in USD billion)	Regulations and Policies on Digitalization
Singapore	97.4	111	2021: Released the "Manufacturing Vision 2030," focusing on investing in advanced manufacturing infrastructure and establishing digital and intelligent production systems
South Korea	94.8	495	2023: Released the "Strategy for Advancing New Digital Manufacturing Innovation by 2027," emphasizing the development of technical capabilities in artificial intelligence, smart semi-conductors, 5G/6G communications, quantum computing, virtual worlds, and cyber security
Japan	75.4	986	2023: Released the "Manufacturing White Paper," formulating guidelines for "ensuring stable supply" for "11 specific important commodities."
Malaysia	75.3	137	2018: Released the "Malaysian National Industry 4.0 Policy," focusing on the development of intelligent manufacturing driven by talent, processes, and technology, ultimately introducing smart cities, smart grids, and other intelligent solutions through intelligent manufacturing

Key Related Industries

Source: IMD Global Digital Competitiveness Report, International Year book of Industrial Statistics(2023)

Tier 2 and 3 Asian countries are accelerating their digitalization efforts, starting from their core industries

- Generally, second-and third-tier countries choose their key industries as the focus of manufacturing digitalization. Domestic digital suppliers can actively layout in the key industries of these countries based on domestically mature industry solutions.
- Second-and third-tier Asian countries enjoy a demographic dividend of labor force and are the main countries that have taken over the transfer of China's low-and mid-end manufacturing industries. This type of manufacturing transfer will adopt automation and digitalization technologies and solutions that are comparable to or even higher than those used domestically.

Countries	IMD Digital Competitiveness	Value Added by Manufacturing in 2022 (in USD billion)	Regulations and Policies on Digitalization
Thailand	70.5	159	2016: The "Thailand 4.0" strategy was launched, marking a comprehensive advance into high-value-added industries, with ten target industries identified as the new engines for Thailand's economic development
Indonesia	60.4	363	2018: The “Enabling Indonesia 4.0" Plan and Roadmap were released, focusing on promoting digital transformation and the development of digital infrastructure
India	57.7	667	2018: The "National Artificial Intelligence Strategy" was published, outlining five key areas of focus for digital development
Philippines	48.3	97	2017: A comprehensive innovation industry strategy was announced to promote technological upgrading in the manufacturing sector and support industries such as automobiles and electronics
Vietnam	Not participated	128	2020: The 'National Digital Transformation Plan up to 2025 and Development Directions up to 2030' was released, driving automation and digitization in key manufacturing industries

Key Related Industries

Source: IMD Global Digital Competitiveness Report, International Year book of Industrial Statistics(2023)

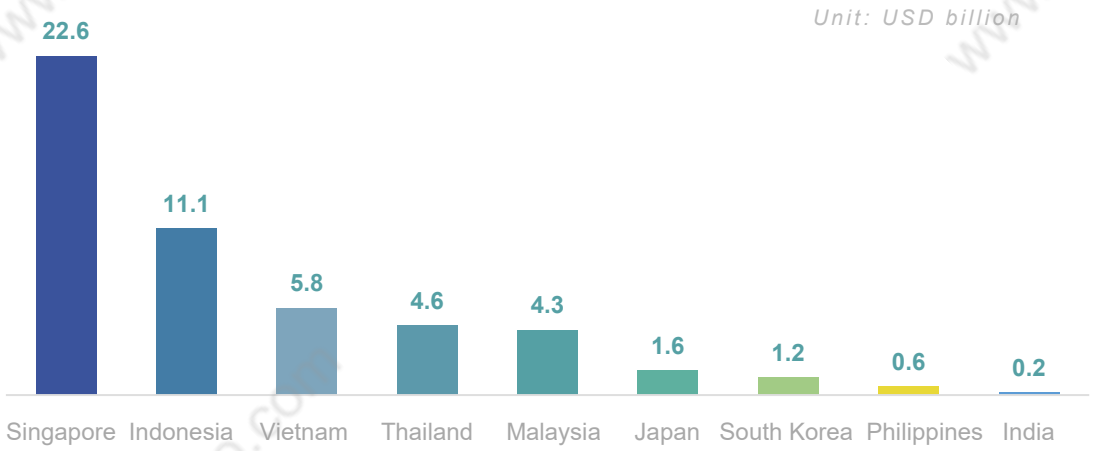
Chinese enterprises actively participate in Asian digitalization; Offshoring enterprises can replicate and implement digital solutions that have already been implemented domestically in China

- Chinese enterprises have enthusiasm for overseas investment, with Southeast Asian countries ranking top. Direct investment and equipment exports by domestic enterprises to Southeast Asia, will drive domestic manufacturing digital solution suppliers to expand the market
- In 2022, China's investment flows to Asia reached USD 124.3 billion (including USD 97.5 billion of direct investment to Hong Kong, China), accounting for 76% of the year's outbound direct investment flows
  - China's direct investment flows to ASEAN were USD 18.7 billion, accounting for 70% of direct investment in Asia excluding Hong Kong, China
  - In ASEAN's direct investment, the manufacturing sector topped the list, accounting for USD 8.2 billion, or 44%
- In 2023, China's motor and electrical exports maintain growth, in addition to South Korea and Japan, Southeast Asian countries are also the main export destinations. This category constitutes the basic equipment for the digitalization of manufacturing industry

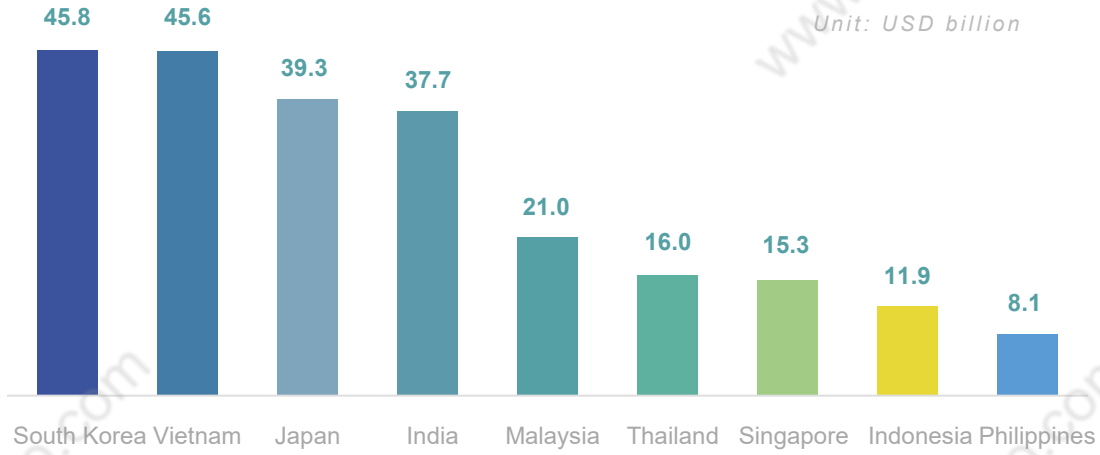
Case study:

One of the surveyed companies exported its digitalization solutions in China to its sister factories in Indonesia, helping Indonesian factories effectively improve their performance and winning Industry 4.0 awards from the Indonesian government

China's outbound direct investment (2020-2022)



Motor and electrical products export revenue (2023)



Source: 2022 Statistical Bulletin of China's Outward Foreign Direct Investment by the Ministry of Commerce, China Customs Information Platform

Part 05

Demand-Side Case Study of Manufacturing Digitalization

The digitalization plan for manufacturing enterprises needs to be tailored according to their own situation

The digitalization plan of manufacturing enterprises is influenced by various factors, such as the characteristics of the industry, the size of the enterprise itself, implementation method, and even corporate culture. There is no universal plan, and it must be tailored according to the enterprise's situation. The six digitalization cases selected in this report cover the main considerations mentioned above and are compiled through in-depth interviews with relevant participants from the case companies. We hope to provide readers with some inspiration and assistance for their digitalization project

Case NO.	Industry	Establishment period	Scale (Operating revenue)	Features
Case 1	Electronics	> 10 years	RMB 2~3 billion	The enterprise is a specialized and innovative small giant enterprise, that improves delivery, quality and reduces costs through lean production and automation digitalization
Case 2	Machinery	> 30 years	> RMB 10 billion	As a well-established manufacturing enterprise, the company has steadily increased its production capacity over the past decade while undergoing digital transformation to achieve industry-leading levels
Case 3	Automotive	20 – 30 years	RMB 0.6~1 billion	As a mid-stream supplier in the automotive supply chain, the enterprise deeply integrates digital solutions with the OEMs and builds its platform to assist its upstream suppliers in improving digital operations
Case 4	Pharmaceutical	20 – 30 years	> RMB 10 billion	Different from general manufacturing, digitalization in the pharmaceutical industry focuses more on compliant production and digitalization in the research and development stage
Case 5	Petrochemical	20 – 30 years	RMB 0.1~0.5 billion	The company relies on a strong internal IT team to independently develop and implement digital solutions
Case 6	Food & Beverage	< 10 years	RMB 0.6~1 billion	The enterprise starts from the core segment of its own value chain, focuses on digitalization of marketing management, and expands to the production management

Case Study I: Electronic device manufacturer to lead the exploration of digital transformation through staged strategy implementation (1/2)

Background

Industry	Electronics
Location	Jiangsu province
Revenue	RMB 2~3 billion
Business	Industrial electronic products

Digitalization process

2015 – 2017	**Lean Production -** Value chain integration, improving production coordination, optimizing valuable processes, eliminating waste
2017 – 2019	**Process modularization -** For multi-varieties and small batches production mode, form process groups
2019 – 2021	**Automation -** Implement automation for modular processes and hazardous processes
2021 – till now	**Digitalization and intellectualization -** Through data platforms and BI, establish data models and algorithms to predict and optimize core production processes

Benefits

- **Production plan accuracy: increased from 65% to 95%**
- **Order prediction accuracy: increased by 30%**
- **Delivery timeliness rate: increased by 30%**
- **Capacity utilization rate: increased by 20%**
- **Production personnel: reduced by 15%**
- **Production and manufacturing efficiency: increased by 30%**
- **Product gross profit: increased by 3%**

Talent issue

Talent is a major issue that companies face. The training of engineering and technical personnel and workers is slow and difficult to retain. It takes 1-2 years to train a person within the company. After the training is completed, they are likely to be poached by industry competitors or industrial automation, new energy companies, etc.

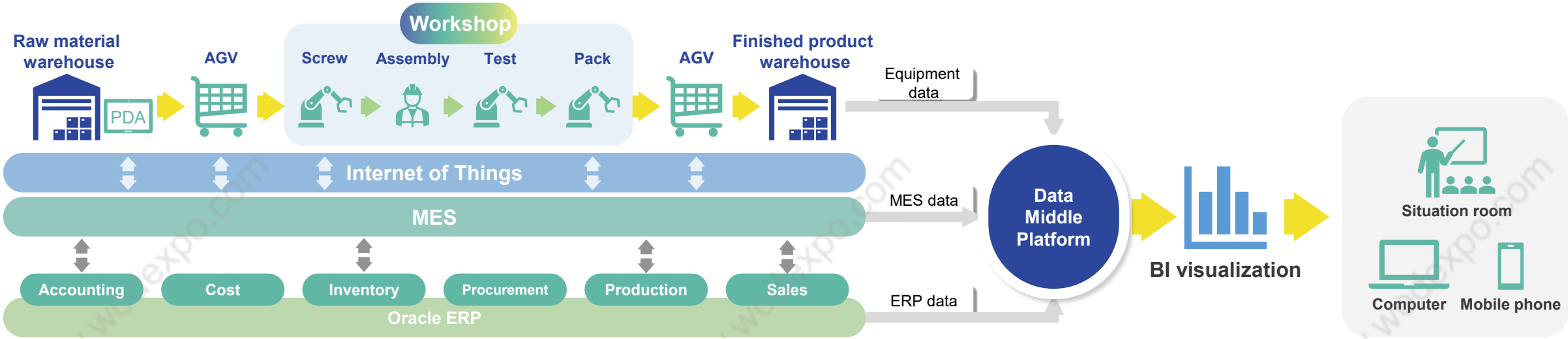
Solution

Reduce manual processes and minimize reliance on skilled workers for critical operations through automation. Distribute the process to the equipment through MES. By using visual recognition, intelligent prediction and other methods, the detection rate of defective products can be improved, and manual labor can be reduced

Strategy and path selection

Four core issues	Goals for digital transformation	❶ Lean production	❷ Process modularization	❸ Automation	❹ Digitalization & intellectualization
Delivery	Shorten product delivery time	☐ Integration and analysis of production value chain	☐ Modularize process of the same type	**Automation**	☐ Equipment data collection
Quality	Improve efficiency Reduce manufacturing costs	☐ Eliminate waste	☐ Reduce non-standard workstation process	• Modular process	☐ Data platform construction
Cost	Improve production flexibility	☐ Optimize process	☐ Improve the standardization level of process	• Dangerous process	☐ BI data visualization
Talent	Data security			**Data integration**	☐ Data modeling and algorithms, predictive optimization
	Improve product quality			• Process parameters distribution	
				• Result collection	

Case Study I: Electronic device manufacturer to lead the exploration of digital transformation through staged strategy implementation (2/2)



Breaking down data barriers around existing MES upgrades

Outsourced SiE MES for secondary development and integration, connecting ERP, MES and equipment to improve data integration

- Connect end-to-end data from business to production through MES to improve production planning accuracy and timely delivery rate
- Business management, planning management, and production execution are completed in MES. Integrate data into the data platform
- MES controls various nodes, collects information from different stages of production, and ensures the execution process and traceability of products
- The process parameters are transmitted from the database server to the automation equipment or workstation through MES
- The production line personnel use MES as the front desk to operate the physical transfer and interface with ERP

Future key digital projects

- Currently, MES data processing speed is slow and gradually unable to meet the requirements. After implementing SCADA, it is necessary to make minor adjustments to production equipment, using existing equipment sensors or visual recognition as tools for perception and data collection
- Implementation of digital R&D collaboration software for product development
- Currently, manual operations are being carried out within the warehouse. By 2026, automated storage and warehousing will be put into use
- The new production base under construction is built according to the standards of "lighthouse factory", which increases production capacity and further improves delivery, quality and reduces costs. It will also reach the industry's benchmark level of automation and digitalization

Successful digital experience sharing

- Digitalization requires top-level design, and the management reaches a consensus on the acceptable level of capital investment and digitalization
- Breaking down the big goal into small goals for each stage and executing from small goals to achieving the big goal. Automation and digitalization cannot be achieved quickly
- Talent-driven: It is necessary to reserve and cultivate engineering and IT talents. Meanwhile, digital projects are not IT projects, which require both business and IT drivers. The company has evolved from initial engineers and IT staffing only to involvement from planning, procurement, warehousing, sales and operation staffs
- Resources: Long-term planning and budgeting in terms of funding, including the upgrade of ERP, MES, and production line equipment

Case Study II: Specialized equipment manufacturer prioritizes "manufacturing" and continuously iterates on intellectualization

Background

Industry	Machinery manufacturing
Location	Shanghai
Revenue	> RMB 10 billion
Business	Special equipment manufacturing

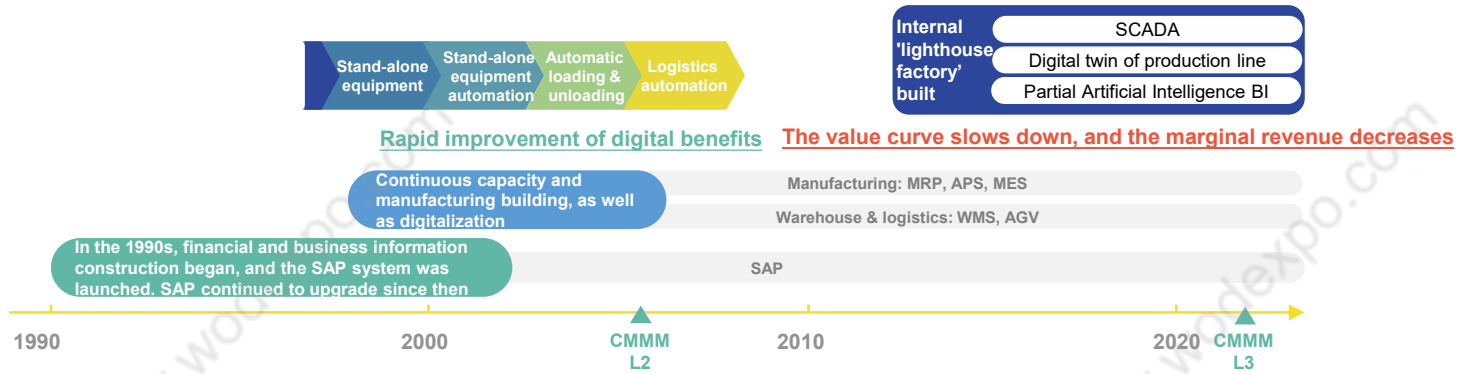
Digitalization process

1995 – 2002	**Informatization** - Implementing ERP and launching business processes
2003 – 2018	**Automation** - Automation of equipment and production lines
2019 – 2022	**Intelligent manufacturing and digitalization** - Integrated optimization of design, manufacturing, sales, and services (MES/FMS/SCADA, etc.)
2023 – till now	**Intelligent construction** - Data-driven, intelligent factory, intelligent products

Benefits

- **Adopting robot technology in warehousing, transferring, welding, assembly and painting processes to create unmanned factories**
- **Using advanced sensors to collect data from production line equipment, improving quality and output**
- **Build a data lake BI and use data modeling and artificial intelligence to perform predictive optimization**
- **Create a digital twin of production line equipment to achieve real-time monitoring and visualization of the main parameters of the equipment and the operational efficiency of the production line**

In the past 20 years of development, the Case enterprise has continuously expanded its production capacity while carrying out digitalization, and its digital capabilities have taken a leading position in related industries. Based on the characteristics of discrete manufacturing, the enterprise first carried out the construction of individual workstation automation, and then connected points into lines to achieve networking. It reached CMMM Level II around 2006. Afterwards, with the joint promotion of production capacity construction and digitalization, it reached CMMM Level III around 2020



1 - Informatization stage

Difficulties: Sorting and optimizing the upstream and downstream processes within the enterprise

- ✓ Informatization and standardization of financial systems
- ✓ Improvement of internal control
- ✓ Improvement of the capabilities and efficiency of the middle and back-end departments
- ✓ Improved availability of financial, procurement, sales, and cost data

2 - Automation stage

Mainly focused on the automation construction of equipment and production lines

- ✓ Improve production efficiency and output
- ✓ Reduce labor costs
- ✓ Reduce dependence on people and improve product quality

3 - Digital integration stage

Full lifecycle digitalization and integration - data integration for R&D, procurement, warehousing and logistics, production, equipment, sales, and finance

- ✓ Cross departmental data flow drives the improvement of management and operational capabilities
- ✓ Shortening the R&D cycle, optimizing procurement and inventory, quality control and cost optimization in the production process, and improving energy efficiency on the equipment side

4 - Intelligent optimization stage

Data collection of equipment and various processes into the 'lake', BI analysis, digital twin of production line equipment

- ✓ The difficulty of digital twin in the R&D stage is high due to the particularity of the drawing system and the high cost of 3D modeling
- ✓ SCADA collects industrial data, but its intelligent analysis capabilities are insufficient. Meanwhile, it is necessary to explore application scenarios with practical value output

Future project focus:

- Modeling of industrial big data and optimizing the application of artificial intelligence (AI)
- Explore digital scenarios and achieve the second growth curve of ROI in digitalization
- Continuously promoting intelligent products, intelligent services, and intelligent operation and maintenance
- Research and development of digital collaboration (PLM), with a focus on equipment development

Experience sharing:

- Advanced layout in intelligent manufacturing planning: "Pre research one generation, design one generation, manufacturing one generation"
- Intelligent manufacturing prioritizes "manufacturing" and digital tools are necessary means. The prerequisite is to pay attention to the construction of manufacturing and production organization capabilities
- The digital transformation of enterprises and digital tools are inseparable. Excellent digital solutions require finding experienced digital solution providers who utilize their products and experts' deep understanding of the industry and products to help businesses avoid detours

Case Study III: Automotive parts company leverages 95% industry +5% self-developed solutions for intelligent transformation

Background

Industry	Automotive
Location	Zhejiang
Revenue	< RMB 1 billion
Business	Automotive parts manufacturing

Digitalization process

2016 – 2019	**Enterprise informatization** - EPR and other core software upgrades
2020 – 2022	**Digitalization of production operations** - Launching MES, QMS, PLM systems
2022 – till now	**Supply chain collaboration** - R&D and production collaboration, connecting SRM and EDI with customers and suppliers; **Cross regional collaboration** - plans to invest in factories in other provinces, replicate and expand existing digital solutions

Benefits

- **Inventory and defect rate decrease, profit margin increases by 4-5%**
- **Realize T-1 day of supplier arrival, reducing overall inventory to 1-2 days**
- **The R&D time has been significantly reduced, and the verification speed has been shortened from 10 hours to 10 minutes**
- **Government rewards and subsidies worth millions of RMB**

The enterprise digitalization is driven by the need **for upstream and downstream collaboration between the OEMs and suppliers**, as well as **the demand for cost reduction and efficiency improvement caused by industry competition**

- The enterprise prioritizes ERP upgrades to lay the foundation for informatization, and then implements or upgrades MES, QMS, and PLM, and deploy simulation design and supercomputing clusters
- Collaborate with OEMs through mainstream universal solutions in the automotive industry. The key areas include R&D collaboration, supply chain and quality management system
- Due to the high cost of mainstream solutions, self-built platforms are integrated and coordinated with upstream suppliers

Collect, clean, and analyze data on labor, material consumption, energy consumption, and scrap costs, benchmark relevant operational indicators against industry standards, analyze causes, and improve indicators by connecting key processes and equipment → **Profit margin increases by 4-5%**

Upgrade PLM from simple collaboration between logistics and BOM to cross R&D center collaboration - using OEM's platform to deal with OEMs and building a platform for upstream suppliers to enable engineers from different R&D centers to provide modification suggestions for the same product → **Shorten product design cycle and reduce costs**

The overall solution adopts a general industry solution + internal self-built mode:
80% of the functions are provided through international manufacturers' industry solutions +
15% of the functions are provided through domestic alternative solutions +
5% of the internal IT team (<10 people) to develop their own solutions → **Effectively achieve expected functions with controllable costs**

Future project focus:

- Through digital application and analysis, the quality cost is further reduced by 50%
- For low digital capability of SME suppliers, to implement digital assistance solutions
- The company plans to invest in factories in other regions and needs to replicate existing processes and systems. Collaboration between factories is also a key focus of work

Experience sharing:

- The integration of data between R&D and manufacturing is the key to improving efficiency and reducing quality costs. Enterprises can increase investment in this area
- Universal solutions are already mature and standardized in key industries, so enterprises do not need to start from scratch. Internal teams can conduct in-house research of 5% based on enterprise characteristics, using general industry solutions that are cost-effective and can achieve rapid implementation
- Smaller upstream suppliers (stamping plants, die-casting plants) can collaborate with higher-level enterprises in the supply chain to improve their digital capabilities through their platforms and experiences, such as connecting design processes, order matching, logistics and warehousing, etc.

Case Study IV: Pharmaceutical company to leverage digitalization to improve compliance and operational systems, enhance quality and efficiency

Background

Industry	Pharmaceutical
Location	Jiangsu
Revenue	> RMB 10 billion
Business	Contract research and development and manufacturing organization (CRDMO)

Digitalization process

2012 – 2017	**Informatization** - Regulatory compliance informatization, launching core business processes
2017 – 2021	**Digitalization** - Addressing the pain points of data silos in core business platforms, achieving data-driven decision-making and operations
2022 – till now	**Intellectualization** - empowering core businesses with big data models, such as pharmaceuticals development and synthesis pathways

Benefits

- **Compliance testing satisfaction: increased by 20%; Major discoveries in quality management: reduced by 80%; Clinical trial traceability: achieve 100%**
- **R&D efficiency: increased by 80%; AI path recommendation effectiveness: reaches 30%; R&D time: reduced by 30%**
- **Warehouse operation costs: reduced by 40%; Inventory capital occupation: reduced by 33%**

The Case enterprise focuses on **compliance operation, quality traceability, cost reduction and efficiency improvement** as the main objectives, and utilizes industry solutions and self-developed assistance to implement digitalization according to the key processes of the supply chain

		Compliance operation
New drug R&D	Establish big data analysis model and AI technology to intelligently identify and recommend the optimal synthesis pathway for target molecular compounds.	
Clinical trial	Track the historical trajectory and versions of samples through blockchain technology	**Samples, historical trajectoires, versions, etc.**
Raw material purchasing	SAP Ariba as a solution to ensure supplier management system	**Supplier selection, identification, change, and certification authorization**
Warehouse management	Implement WMS system, strengthen regulatory standards and compliance requirements, and achieve digital warehouse management	**Raw material packaging specifications, expiration date, storage conditions, standards for quality inspection and delivery of inbound and outbound goods**
Manufacturing	Implement MES system as a batch production record system, track and manage production instructions, conduct real-time inspection and quality control	**Production instructions, environmental conditions of process procedures, feeding time, operators, inspection submission**
Sales management	Adopting advanced document management and submission systems, implementing document library control and version control	**Instructions, specifications, tracking records, production records, and version control**

Enterprise pain points and digital solutions:

Current pain points	Future plans
Difficulty in improving the efficiency of R&D personnel and unsustainable business models	By utilizing big data and AI technology, the enterprise can improve personnel time management in R&D analysis, increase reliance on core personnel, and reduce the number of ordinary laboratory personnel
The utilization rate of R&D and production equipment assets needs to be improved	Through IoT technology, the enterprise can achieve the Internet connection of original equipment, realize the data exchange between instruments and R&D analysis platform, realize the collaboration of data intelligence, and improve the utilization rate of R&D and production equipment
The efficiency of R&D path optimization needs to be improved	Further optimize AI model technology to improve the efficiency of model recommendations

Case Study V: Exploration of self-building digitalization in petrochemical enterprises

Background

Industry	Petrochemical
Location	Jiangsu
Revenue	RMB 0.1~0.5 billion
Business	Production and sales of high-tech special functional chemical products

Digitalization process

2019 – 2021	**Informatization factory** - ERP secondary development, data infrastructure construction, KPI visualization, paperless office
2022 – 2024	**Digital factory** – Software development and implementation; data collection, integration, and intelligent production
2025 – 2026 (planning)	**Intelligent factory** - Data modeling, predictive capability research and development, simulation system, digital twin factory

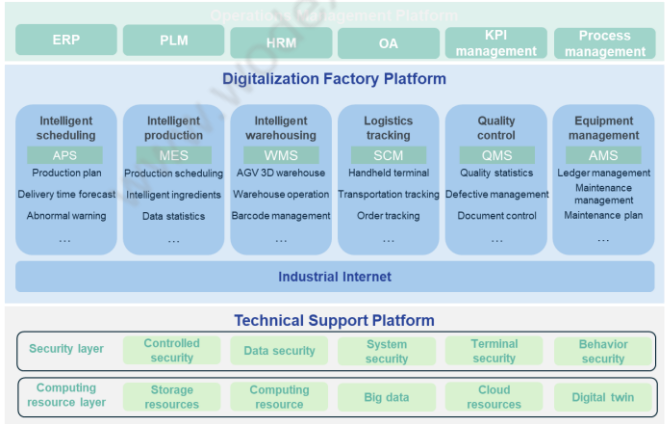
Benefits

- **OEE increased by 4%; Reduce scrap rate by 30%; No. of customer complaints decreased by 50+%**
- **Reached the national CMMM maturity level 3 certification and received corresponding rewards from local governments**
- **Obtain a relative competitive advantage in large-scale bidding projects, especially in state-owned enterprise bidding**

Digital driving factors: With the aim of reducing costs, increasing efficiency, and enhancing competitiveness, the group began implementing the Industry 4.0 strategy in 2019. The company has planned and implemented a digital path based on its own development stage and the overall strategy of the group

As a typical process-oriented production enterprise, the company already has a high level of production automation. In the process of digitalization, the company mainly focuses on monitoring the production process, collecting and analyzing data, and connecting the production process with the pre - and post storage logistics system

Due to the strong capabilities of the company's own IT team, project implementation is mainly achieved through independent research and development, greatly shortening the implementation cycle. The overall project cost is also lower than that of similar projects (the annual related investment only accounts for about 1% of the operating income)



Future project focus:

- In the process of digitalization, the large amount of data generated cannot be well applied, and investment in data modeling capabilities will be increased in the future
- Some planned functions did not achieve the expected results (i.e. APS only achieves part of its functions), and further optimization of is needed
- Continue the intelligent upgrade of the factory
  - Utilizing big data platforms to achieve real-time alerts for quality side detection anomalies
  - Increase investment in development of digital maintenance programs to achieve predictable maintenance of equipment
  - Implement overall PLM digitalization

Experience sharing:

- It needs to be a "top leader" project, and the CEO needs to fully support digital projects; Each business leader should fully participate
- Employee training needs to be strengthened and the functional application level of the system after implementation to be improved
- The overall plan is mainly developed internally, but due to insufficient planning, the project has caused a certain degree of waste and repetitive work in the actual execution process
  - The project has developed multiple systems, and there will be a significant investment in **system integration** in later stage
  - Insufficient data management planning results in a large amount of useless data
  - Due to limitations in internal capabilities and resources, some planning functions did not meet expectations

Case Study VI: The digital road of food production enterprises starting from the core value chain – sales management

Background

Industry	Food & Beverage
Location	Shanghai
Revenue	RMB 0.6~1 billion
Business	Alcohol production and sales

Digitalization process

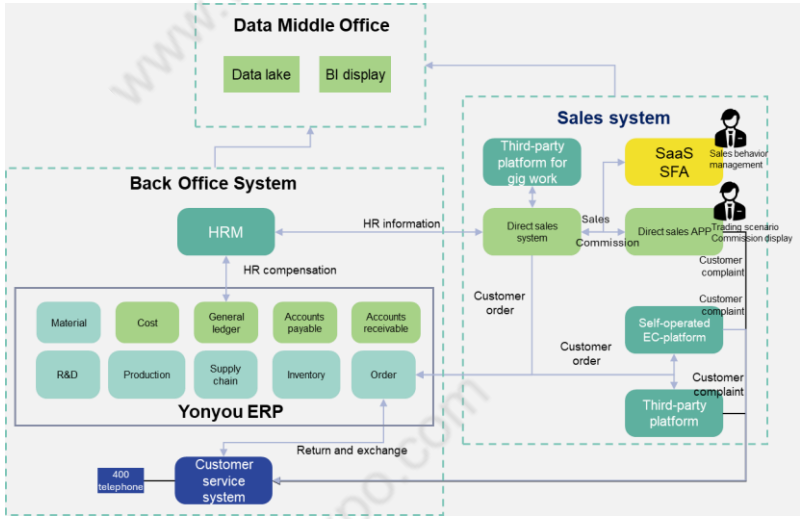
2020 – 2021	**Digitalization of sales** - Self-developed direct sales system, outsourced SFA system, built New Retail Model (i.e. EC shopping platform)
2021 – 2022	**Digitization of middle and back office** - Yonyou ERP, Beisen HRM and self-developed SaaS version customer service system
2022 – till now	**Data governance applications** - Data governance, data entering the 'lake' and building BI and data cockpits

Benefits

- **Empowerment - Support monthly sales to exceed 100 million**
- **Efficiency enhancement - Digitalization of sales management and sales scenarios to increase sales time and output**
- **Cost reduction - automatic calculation of sales team commissions and control of sales expenses**
- **Improve decision-making efficiency - business team automatically produces over 1,000 reports. Report time reduced by 95%**

Sales management digitalization

- **Outsourcing SFA (Sales Force Automation) with mature SaaS model**
  - Customer visits, sales visits, store inspections, check-in and verification of product displays
  - Scenario-based tools to prevent fraudulent performance evaluations of salespeople
- **IT team develops its own direct sales system**
  - Resolve issues in transaction scenarios and enable online transactions for salespeople
  - Issue sales policies and system online
  - Realize automatic commission calculation for 10,000 salespeople
  - Quickly consolidate sales and customer data, reduce reliance on salespeople



Middle and back-office digitalization

- **Yonyou ERP**
  - Based on the ERP finished product inventory module, priority is given to creating a closed-loop management system for order, delivery, after-sales service, returns, and exchanges
  - Subsequently, the digitalization of production front-end automation will be incorporated into the system
- **Data Lake and BI**
  - In the early stage, the digital lake was not built appropriately, and IT became the main focus, overly emphasizing the integrity of technology and data capture, while neglecting the timely application of digital technology
  - Later, data governance and utilization will be carried out simultaneously to achieve rapid digital empowerment of business

Future project focus:

- Production - Implement MES system in the processes of wine making, canning and packaging
- Inventory Management - Practice digital warehousing technology and equipment to improve the digitization level of cellaring and finished product warehouses
- AI technology - utilizing generative AI technology to explore corresponding business scenarios and enhance intelligence level

Experience sharing:

- Innovative SMEs need to focus on core business processes for digitalization investment, and the priority for digital paths in the consumer sector is digital marketing/sales management
- Realize digital productivity first, without forcing digital technology to be perfect
- The company chose to conduct its own research out of helplessness, as it was unable to find a solution supplier in the market that could understand its industry characteristics. Without professional channels such as platforms and exhibitions, the search cost for the enterprise would be high

Part 06

Supply-Side Capability Introduction of Manufacturing Digitalization

Mapping of supply-side companies of manufacturing digitalization industry

Consulting agencies providing digital strategic planning and implementation support ; Equipment and software solution providers offer enterprise and production management tools; Infrastructure and Cloud platforms companies provide foundation and data support

Industrial Internet and Cloud Platform

Deloitte. | pwc | EY | KPMG | 阿里云 | HUAWEI | accenture | IBM | pactera | Roland Berger | Neusoft | HCL

Equipment

Industrial

KUKA | FANUC | GREE格力 | OMRON | 埃夫特机器人 | YASKAWA | ABB

3D Printing

3D SYSTEMS | stratasys | H3D 汉邦科技 | 铂力特 | hp | SLM SOLUTIONS

Mazak | TRUMPF | DMG MORI | OKUMA | GREE格力 | HISION 海天精工 | Taikan 台群精机

Software

R&D Design

AUTODESK | DGT | SAP | DASSAULT SYSTEMES | Rockwell Automation | SIEMENS | PERA CHINA 安世亚太 | ORACLE

Manufacturing

Rockwell Automation | SAP | CS&S 中软国际 | DASSAULT SYSTEMES | 工业富联 | ORACLE | SIEMENS | HAND Better Experience

Data Integration

Honeywell | EMERSON | ABB | SIEMENS | 亚控科技 WellinTech | ControlEase | FANUC | 力控科技 FORCECON

Enterprise Management

SAP | ORACLE | Kingdee 金蝶 | salesforce | 用友 yonyou | 帆软 | Microsoft | Tencent 腾讯 | 泛微 weaver

Infrastructure

中国电信 CHINA TELECOM | 商汤 sensetime | China unicom 中国联通 | FANUC | SIEMENS | BROADCOM | Nabtesco | Senodia | SAMSUNG | DP TECHNOLOGY | ZTE中兴 | KUKA

Industrial Internet and Cloud Platform

阿里云 | 树根互联 ROOTCLOUD | 宝信软件 BAOSIGHT | COSMOPlat 卡奥斯 | 百度云 | 寄云科技 | HUAWEI | 用友 yonyou | Kingdee 金蝶 | inspur 浪潮 | 腾讯云 | 工业富联 | 金山云

Siemens - A comprehensive solution provider based on the enterprise value chain

Siemens is a global enterprise that provides digital solutions across the entire value chain, encompassing product development, manufacturing processes, and factory management. Siemens believes that both management operations and digitization require an assessment of performance across three value chains: the product lifecycle value chain, the asset operation value chain, and the business fulfillment value chain.

Value Chain

Product Lifecycle	Product Definition	Product Design	Product Verification	Manufacturing Process	Production	Product Performance	Product Maintenance	Product Upgrade
Business Fulfillment	Order Acquisition	Order Management	Supply Chain Management	Production Plan		Production Status	Warehousing	Logistics
Asset Operation	Production Capacity Planning	Factory Planning	Production Line Design	Engineering Debugging		Equipment Monitoring and Analysis	Equipment Maintenance	Equipment Upgrade

Industrial Automation Solution Architecture

Cloud Services	APP	Mind Sphere					
Management	MES						
Operations	SCADA	Network Management	TIA Portal	Energy Management	Industrial Edge		
Control	Controller	HMI	Industrial PC	Industrial Communication	Motion Control	CNC	
Operation	Power Distribution	Identification and Positioning	Distributed I/O	Drive System	Industrial Control		

Key Solutions Based on the Xcelerator Business Platform

SCADA System

Realize visualization of machinery, production lines, and entire factories to enhance transparency

SIMATIC Automation Control System

Integrated with relevant hardware (PLC, IPC, drives, sensors, etc.), it facilitates coordination among various control components to enhance efficiency

TIA Portal

Shorten product time-to-market through simulation tools and other means; improve factory productivity with additional diagnostic and energy management functions

SINAMICS

A highly efficient and precise motor control solution that optimizes the use of electrical energy through intelligent power conversion and motor control

SINUMERIK

A PC software solution for enhancing energy efficiency, covering the entire process from machine tool design to manufacturing process optimization

SIMIT Simulation

With SIMIT, comprehensive testing of automation applications can be conducted, providing operators with a realistic training environment prior to the launch of actual production

Assist enterprises in overcoming challenges in manufacturing digitization

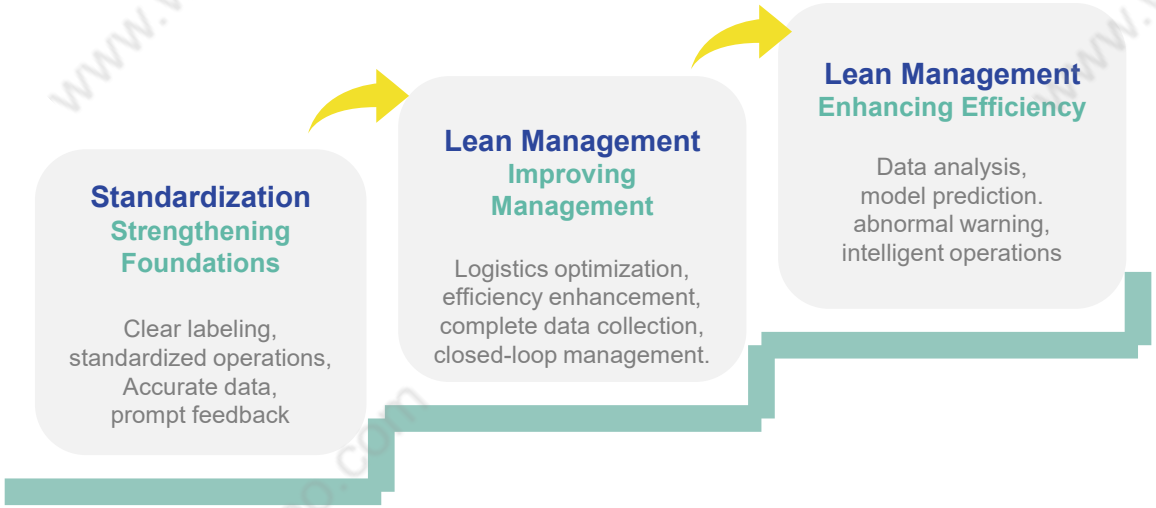
- Address flexible production and customized demands from end-customers in the market regarding R&D, supply chains, and production
- Reduce and manage delivery risks caused by quality non-traceability
- Further explore data value based on existing automation and informatization , converting it into productivity
- Connect upstream and downstream players, enabling collaboration among multiple enterprises and across systems
- Utilize digital technology to reduce carbon emissions from the source without compromising enterprise performance
- Develop a customized digitalization path for enterprises still in the Industrial 2.0 stage, ensuring substantial returns from digitization

Yonyou - Empowering manufacturing industry with ERP software as the foundation to build intelligent enterprises

Enterprise Informatization Service Solutions

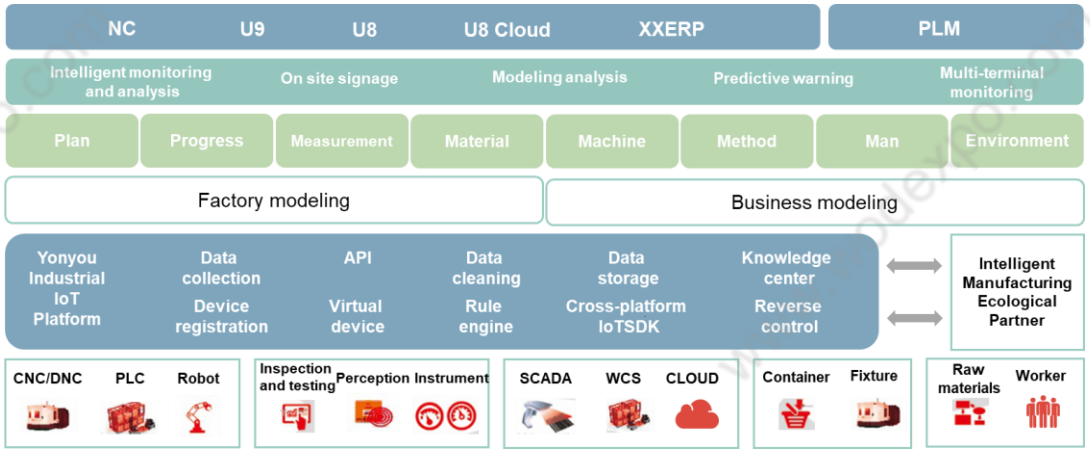
Since 2017, Yonyou has developed a new generation of products on its ERP platform-Yonyou BIP, which assists enterprises in informatization

Yonyou BIP provides innovative services covering ten areas for enterprise production and operation management, including intelligent finance, HR, supply chain, procurement, manufacturing, marketing, R&D, project management, asset management, and collaborative work. It assists enterprises in advancing their digital and intelligent transformation, becoming digital and intelligent enterprises, and moving towards high-quality development



Yonyou further extends its informatization solutions to Smart Factory Solutions:

Focusing on 8 dimensions of factory management, Yonyou's Smart Factory Solutions assist in continuously improving the real-time closed-loop management of "workshop planning and task execution" and the organic integration of "personnel, machines, materials, methods, environment, and measurement"



Assist enterprises in solving digital challenges in manufacturing:

- Implementing scientific production scheduling, visualizing production processes and task scheduling
- Continuously improving product quality through data utilization: enabling batch traceability and refined quality management
- Enhancing equipment management capabilities: enabling predictive maintenance
- Standardizing process management and enabling automatic issuance of operational documents

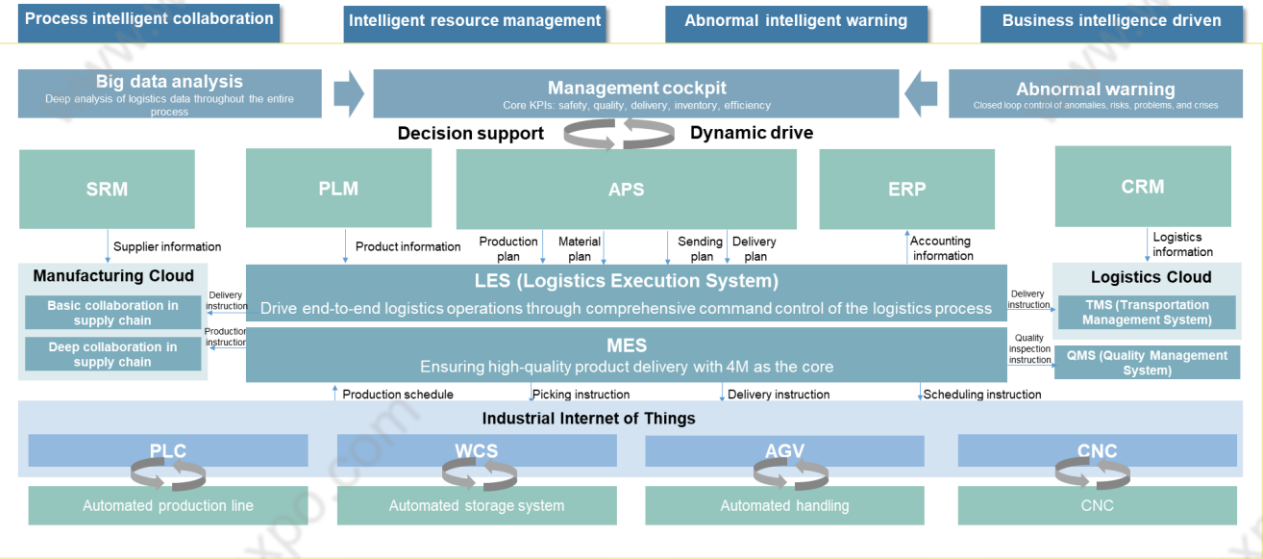
Hand - Transitioning from an ERP Implementation Service Provider to a Player in the Manufacturing Digitization Race

Introduction to Hand

Founded in 2002, Hand Information is a leading local high-end ERP consulting and implementation service provider, holding a leading position in both the SAP and Oracle fields

In recent years, the digital transformation of the manufacturing industry has rapidly accelerated. Starting in 2016, Hand has adapted to market demand trends and actively developed proprietary products and solutions, transitioning from a single implementation service provider to a comprehensive digital service provider offering "proprietary software + implementation services." Leveraging its years of accumulated industry experience, the company independently developed the "Industry Digitization C2M" solution and began to focus on the digital transformation track of the manufacturing industry

Hand Intelligent Manufacturing Application Architecture



Hand has developed proprietary software and platforms focusing on ERP to create two major digital solutions for "Industry" and "Finance"

Industry Digitization

- Intelligent Manufacturing: Hand Collaborative Manufacturing (HCM) forms a comprehensive functional system including advanced planning and scheduling, manufacturing execution, warehousing and logistics, quality management, equipment and asset management, and industrial IoT
- Digital Marketing: The self-developed Link CRM digital marketing software helps enterprises build a comprehensive online and offline digital marketing system with four major sections: "digital channel development, digital term
- Digital Supply Chain: includes SRM and WMS business for supply chain management and logistic management

Financial Digitization

- **Financial Digitization Operational Control**: Achieve the Plan-Do-Check-Act (PDCA) cycle for group finance, enabling closed-loop management from the formulation and break down of business plans to management accounting analysis and facilitating improvements
- **Financial Operations**: Comprehensively covers scenarios related to daily financial operations, achieving efficient integration of business and finance in areas such as revenue and expenditure management, taxation, and treasury
- **Shared Services**: Assist group enterprises in building a highly unified and reusables hared financial system to enhance internal control, reduce costs, and increase efficiency
- **Financial AI Applications**: Upgrade AI capabilities based on proprietary Easy-Link RPA product

Hand - Overview of Capability System

Hand's Industrial Digitization C2M: Digital Marketing, Intelligent Manufacturing, and Intelligent Collaborative Supply Chain

SAP | Oracle EBS | Microsoft | **Pan-ERP** (Consulting/ Implementation/ Overseas Promotion) | Net suite (Cloud) | Fusion (Cloud) | Peoplesoft

Group Management Control (GMC)

Operational Control
- Comprehensive Budgeting
- Statement Consolidation
- Management Accounting
- Compliance Control
- Business Analysis

Financial Operations
- Revenue Allocation and Settlement
- Cost and Expense Control
- Integrated Business-Finance Accounting and Reimbursement
- Tax Management
- Fund Management
- Financial Data Services

Shared Services
- Organizational Management
- Operational Management
- Performance Management
- Image and Archives Management
- Intelligent Processing

DevOps | Large-Scale Agility | Domains Models | Low-Code | Processes Orchestration | **Integrated Technology Middle Platform** | IoT Connectivity | Ecosystem Apps | Data Middle Platform | Integrated Integration | Artificial Intelligence

Digital and Intelligent Production and Sales C2M

Customers
- Omni-Channel Traffic Attraction
- Transaction Conversion
- Channels/Terminals
- Precision Marketing

- OMS Order Management
- Supply Chain Collaboration (SRM)
- Industrial Internet 1+n
- Transportation and Logistics Management (TMS)

Factory
- Advanced Planning and Scheduling (APS)
- Manufacturing Execution System (MES)
- Logistics Execution System (LES)
- Quality Management System (QMS)

System Operation and Maintenance | Offshore Development | Technology Outsourcing | **ITO** | Process Outsourcing | Cloud Business Operation and Maintenance | Application Optimization

Digital Transformation Summit for Automotive Manufacturing Industry

China Automotive Manufacturing Digitalization Market Research Report

officially released on August 30, 2024

Digital Transformation Summit for Electronics Manufacturing Industry Digital

Petrochemical Manufacturing Digitalization Market Research Report

officially released on February 18, 2025

Looking forward to ……

Digital Transformation Summit for Petrochemical Manufacturing Industry

Petrochemical Manufacturing Digitalization Market Research Report

Transformation Summit for Food & Beverage Manufacturing Industry

Food and Beverage Manufacturing Digitalization Market Research Report

Digital Transformation Summit for Pharmaceutical Manufacturing Industry

Pharmaceutical Manufacturing Digitalization Market Research Report

Digital Transformation Summit for Machinery Manufacturing Industry

Machinery Manufacturing Digitalization Market Research Report

Contact: Fancy Fang

Tel: 86-19901620390

CUSTOMIZED CEREMONY FOR MANUFACTURING DIGITALIZATION

WORLD DIGITALIZATION EXPO MANUFACTURING

Manufacturing Digitalization Expo (Shanghai)

June 3-5, 2026

Shanghai New International Expo Centre

Why to exhibit?

- One-stop access to the entire decision-making chain of manufacturing digitalization
- Effective generation of sales leads
- Ignite brand visibility
- Exclusive eco-system construction

Why to visit?

- Cover all-scenario digitalization solutions
- Meet one-stop procurement demand
- Enhance personal digitalization leadership and influence

WORLD DIGITALIZATION FORUMS

WOD World Manufacturing Digitalization Conference

Strategic Reconstruction, Leadership Leapfrogging

June 3-5, 2026 China • Shanghai

mDX Manufacturing Digitalization Summit

Hit the pain points of industry transformation, share experiences and cutting-edge solutions

June 3-5, 2026 China • Shanghai

mDX Manufacturing Digitalization Workshop

Empower with real - world case studies and guide you step - by - step to achieve transformation

June 3-5, 2026 China • Shanghai

More

WOD Think-Tank | The Bund

Think-Tank, Friendship, Opportunity

WOD Manufacturing Digital Transformation Award (mDX Award)

Gather Benchmark Forces, Empower Leading Glory

Themed Social Event | D Lounge

Achieve trend insights and resource docking in a relaxed and comfortable cross - border conversation

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Website: https://www.worldofdigitalization.com/en

Contact: Jane Shi

Tel: 86-17721157672

Digital Economy Institute Ltd.

Digital Economy Institute is a professional market research institute focusing on digital economy. Our expertise includes digital industry and traditional industry digitalization research

We share our unique insights into the digital economy on a regular basis by publishing original market research reports, organizing online and offline forums and seminars, as well as live visits to leading companies and opinion leaders in the industry, to help companies establish industry credibility and authority in their B2B strategic marketing

The Digital Economy Institute is headquartered in Hong Kong, and its core members have over 20 years of market research experience

Digit Events (Shanghai) Co., Ltd.

Digit Events is committed to becoming your B2B strategic marketing partner through its four core business units - market research, exhibition hosting, conference and event organization, and digital community

World of Digitalization (WOD) is our brand in the field of digital economy, aiming to promote the deep integration of digital technology and the real economy, and to stimulate the innovation and vitality of the digital industry

Digit Events is a "customer-centric" organization, and our organizational design and capabilities are built around understanding customer needs, delivering customer value and enhancing customer experience. Our mission is to bring people, innovative ideas and business opportunities together through high-quality exhibitions and conferences, providing B2B strategic marketing full value chain solutions for brand promotion, credibility building, leads generation and market expansion

Our core members have more than 15 years of experience in serving internationally recognized exhibition organizers

WORLD DIGITALIZATION | RESEARCH

THANK YOU!

FOR WATCHING

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