CHALLENGES AND COUNTERMEASURES OF DIGITAL TRANSFORMATION FOR MANUFACTURING BUSINESSES IN THE POST-EPIDEMIC ERA IN CHINA

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AN INDEPENDENT STUDY SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE MASTER'S DEGREE OF BUSINESS ADMINISTRATION GRADUATE SCHOOL OF BUSINESS
SIAM UNIVERSITY

2022

CHALLENGES AND COUNTERMEASURES OF DIGITAL TRANSFORMATION FOR MANUFACTURING BUSINESSES IN THE POST-EPIDEMIC ERA IN CHINA

Thematic Certificate

To

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This Independent Study has been Approved as a Partial Fulfillment of the Requirement of International Master of Business Administration in International Business Management

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Date 29 / 7 / 2023

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Title: Challenges and Countermeasures of Digital Transformation for Manufacturing Businesses in the Post-epidemic ERA in China

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Degree: Master of Business Administration

Major: International Business Management

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27 / 7 / 2022

Abstract

This study aimed to analyze the challenges and countermeasures of digital transformation of manufacturing industry. The three objectives of this study were: 1) to analyze the current situation of digitalization in the manufacturing industry; 2) to procedure and utilize data from the manufacturing industry to unleash its value properly; and 3) to solve the problem of high costs and insufficient capacity of key tasks such as architecture design and data operation in the digital transformation of traditional industries.

This paper uses the documentary methodology to analyze the problems and found out the solutions to solve the research objectives by decision-making model, to propound the construction of a new innovative service platform, raise the scale of digital platform technology innovation. The study found that digital transformation is the only way for manufacturing factories, enterprises without digital transformation will inevitably be submerged in the tide of the times; utilize digital infrastructure models to process and utilize historical data from the manufacturing industry to appropriately unleash its value; and use decision-making model of manufacturing development to solve the problem of high cost and insufficient capacity of key tasks such as architecture design and data operation in the digital transformation of traditional industries.

Keywords: digital transformation, manufacturing industry, challenges, technological innovation

ACKNOWLEDGEMENT

As time goes by, my postgraduate life is about to end. I have benefited a lot from my study and life in recent years. After nearly a year's hard work, the graduation thesis was finally finished. Looking back on the process of collecting, sorting, thinking, stagnating, revising and finally completing this year, I have received a lot of care and help. Now I want to express my most sincere gratitude to them.

First of all, I would like to thank my tutor for his support, encouragement and suggestions. It is because of their strict, selfless and high-quality teaching that I can learn professional knowledge and rapidly improve my potential in the course of learning in these years. Secondly, I would also like to thank my professional teachers for their care, help and great help over the years. At the same time, I also want to thank my friends and classmates who have studied with me in recent years. Without mutual encouragement between us, there would be no common growth. Finally, I would like to thank all the teachers who participated in the review and defense of my thesis. It is you who have given me an opportunity to review the learning achievements of the past few years, so that I can clarify the direction of development in the future. Your help to me is invaluable wealth. I will redouble my efforts in my future work and study to achieve more results in return for myself and the society.

Declaration

I, XIE DIRAN, hereby certify that the work embodied in this independent study entitled "CHALLENGES AND COUNTERMEASURES OF DIGITAL TRANSFORMATION FOR MANUFACTURING BUSINESSES IN THE POST-EPIDEMIC ERA IN CHINA" is result of original research and has not been submitted for a higher degree to any other university or institution.

Xie Diran

(Xie Diran)
May 13, 2023

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1. Introduction

1.1 Research background

In 2012, IBM first proposed the concept of digital transformation. IBM believes that digitalization is a comprehensive deployment plan that combines digital and physical elements. On the basis of completing the transformation of production and operation modules, it will open up a new path in the industry. IBM analyzed three forms of transformation: first, customers; The activity starts from three games. We will combine the first two forms in a side-by-side way (Venkatesh, 2022). Promote the innovative development of manufacturing industry. In 2017, the concept of "digital economy" was put forward. Since then, the digital economy has promoted economic and social transformation at a higher level and accelerated the process of modern digital transformation. The "digitalization" in the "digital economy" is divided into three stages according to the degree of digitalization: information digitalization, business digitalization and digital transformation. Digital transformation has played a certain role in accelerating the process of social modernization (Vogt Horenstein, 2021). At present, the competition in the manufacturing industry has become white-hot. In addition to the impact of the epidemic, it is urgent to improve the manufacturing capacity in the post-epidemic era and deepen the digital transformation. By embedding emerging technologies, enterprises can improve production efficiency, strengthen product and management innovation, and reshape their core competitiveness. Under internal and external pressure, manufacturing enterprises have tried to implement the "Internet plus" strategy and actively explore the path of enterprise digital transformation. Dr. Liu Zhen, chairman of Aolin Technology, academician of IEEE FELLOW (Institute of Electrical and Electronic Engineering) and former president of Microsoft Asia Academy of Engineering, was invited to attend the 4th Industrial Internet and Intelligent Manufacturing Summit Forum on August 24, and delivered the keynote speech of "Digital Transformation of Manufacturing Industry: Challenges and Responses" (Dr. Liu Zhen, 2021), sharing the insights and views of "Industrial Internet in the era of digital intelligence needs enterprise-level digital twins". He shared: At present, in China's industrial Internet circuit, OT systems (such as MES and APS) and control systems (such as PLC and SCADA) at the bottom layer have achieved data acquisition of equipment, production lines and factories, as well as information control of factory equipment, but a large number of "dumb equipment" can not collect data, and the collected data exist in different types of equipment or systems, There is a serious "data island" problem between different systems, and the implementation cycle of the system

is long, the degree of customized development is high, and the cost is high, which is difficult for small and medium-sized enterprises to bear. The industrial internet platform in the middle layer realizes the cloud of equipment data+visual management+analysis based on equipment data, but this part of data is limited to the level of equipment and production line and lacks the integration with OT and IT data. Similarly, the input-output ratio cycle is very long. The industrial APP on the top layer realizes local scenario optimization, such as equipment prediction and maintenance, production monitoring, energy consumption management, post-market service, etc., but its disadvantage is that it does local optimization, does not provide overall analysis and optimization scheme, and is disconnected from the operation and management of enterprises. The digital transformation from the bottom up is the mainstream practice of the industrial Internet at present, but the disadvantages and pain points are as shown above. Among the top 1000 enterprises in China, 50% take digital transformation as the core of their strategy, but the failure rate of digital transformation of traditional enterprises is as high as 70-80%. Academician Liu Zhen believes that the industrial Internet in the era of digital intelligence needs more advanced concepts and technologies to build enterprise-level digital twins, which will be the new trend of the industrial Internet. In the era of digital intelligence, the industrial Internet tends to design the digital transformation of enterprises from top to bottom, using data+AI algorithm to support decision-making, and taking the confusion, pain points and needs of the enterprise management as the source of the problem, the solution is no longer the "department problem" of each business area, but the overall problem of enterprise operation. "In fact, not all data need to be collected and analyzed. It is a new trend of the industrial Internet in the era of digital intelligence to make digital transformation vertically and with a clear aim from top to bottom." Academician Liu Zhen emphasized in his speech. Liu Zhen said: "In the era of digital intelligence, the industrial Internet pursues the value orientation of real cost reduction and efficiency increase. That is to say, not all businesses need to be digitalized. We expect and focus on collecting the data to be collected and commercializing this part of data." The value of data commercialization will first be reflected in the management decision-making level. Through the big data algorithm, make the prediction and simulation of enterprise operation, and then give the best suggestions for major decisions. The value that this brings to the enterprise will be very obvious. Therefore, to promote the digital transformation, enterprises need not only the intellectualization of production links, but also the digitalization of operation and management. All aspects of production and management should be considered as a whole. We are talking about the global optimization of the industrial Internet in the era of digital intelligence.

1.2 Research Problems

The following challenges and problems still need to be solved in the actual transformation process of enterprises.

First, the lack of digital transformation capability leads to "no transformation". Secondly, the scale effect of digital platform technology innovation is insufficient. In the process of economic growth, capital and labor force have less and less influence on the economic growth trend, and the promotion of digital innovation technology has become the core of the economy. However, about 76% of industrial e-commerce platforms lack scale effect and technological innovation capability (Xue, Zhao&Tan, 2022). Thirdly, the high cost of digital technology transformation projects and the insufficient capital reserves of their own enterprises lead to "no transfer". Small and medium-sized enterprises are the main force. Faced with the continuous development of the current society and the catalytic role of the epidemic, small and medium-sized enterprises lack coping means (Steiber et al., 2021). Moreover, enterprises lack digital talent reserves "dare not transfer". In addition to theoretical basis and institutional support, the core of enterprise transformation is nothing more than digital talent. Of course, the demand for high-quality and high-level skilled workers and digital management technicians is accelerating (Sarabdeen&Alofaysan, 2023). However, according to the national statistics, more than 60% of enterprises said that the serious lack of new management talents was the biggest "roadblock" in the transformation and upgrading of enterprises. Possessing digital talents is the basis for smooth and efficient digital transformation of enterprises.

Therefore, the problem scope of this study is: this paper will focus on the key issues of the challenges faced by enterprises in the process of digital transformation, and what factors will affect the success of enterprises in the digital transformation of China's manufacturing industry. This article will also try to recommend how to solve these problems and how enterprises can realize digital transformation.

1.3 Objectives of the Study

The objectives of this paper is based on the current wave of digitalization, represented by the rapid development of new generation digital technologies such as big data, cloud computing, and artificial intelligence, which have given birth to the digital economy as a new form of economic development (Marcy, 2022). First of all, many enterprises do not fully understand and lack methodological support. Digitalization is not only a technological update, but also a comprehensive change in business philosophy, strategy, organization and operation, which needs to be planned from a global perspective. At present, most enterprises have a strong desire to promote

digital transformation, but they generally lack clear strategic objectives and practical paths. They focus more on how to introduce advanced information systems at the production end, and do not plan from the height of enterprise development strategy. It is difficult to reach consensus within enterprises, especially among senior managers. At the same time, digital transformation is a long-term and arduous task, facing challenges in technology innovation, business capacity building, talent training and other aspects, which requires enterprises to achieve effective coordination at the global level. At present, most enterprises do not have strong institutional design and organizational restructuring, the responsibilities and rights of digital transformation between departments are not clear, and there is also a lack of effective supporting assessment and institutional incentives. Secondly, the accumulation of data assets is weak and the scope of application is narrow. Digital transformation is the process of continuous accumulation and application of enterprise data assets. Data assets are an important support for digital transformation. How to process and utilize data and release data value is an important issue facing enterprises. At present, most enterprises are still in the perception stage rather than the action stage of data application, and the industrial data chain covering the whole process, the whole industry chain and the whole life cycle has not been built; Internal data resources are scattered in various business systems, especially the underlying equipment layer and process control layer cannot be interconnected, forming a "data island"; The degree of external data fusion is not high, and the distribution and update of data cannot be fully perceived in time. Limited by the scale, type and quality of data, most enterprises are still in the initial stage of data application, mainly focusing on limited scenarios such as precision marketing, public opinion perception and risk control, and failed to carry out predictive and decision-making analysis from the perspective of business transformation, which is difficult to better explore the potential value of data assets. Over the years, the full development of the consumer internet has provided important opportunities for the innovation of digital technology, the growth of digital enterprises, and the vigorous development of the digital industry in China. With the integration and application of digital technology and the continuous deepening of China's supply side structural reform, accelerating the integration and development of digital technology and the real economy has become a consensus.

1. To analysis the current situation of digitalization in the manufacturing industry.

2. To process and utilize data from the manufacturing industry to unleash its value properly.

3. To solve the problem of high cost and insufficient capacity of key tasks such as architecture design and data operation in the Digital transformation of traditional industries.

1.4 Scope of the Study

The research scope of this paper starts from the prominent issue of imbalanced

and insufficient digital development in traditional industries. It elaborates on the low level of digitalization and weak foundation of networking and intelligence in most small and medium-sized enterprises. Despite strong aspirations, limited by human and financial constraints, the digital divide between large and small enterprises is very obvious (Jerome, Jesse, & Mars,2021).

In the paper "How Mercedes Benz Responds to Digital transformation with Integrity" in the Journal of Organizational Change Management, it was written that the Digital transformation of manufacturing industries such as automobiles needs the change of managers and the thorough innovation of technology. It was mentioned in Digital transformation and Value based Sales Activities: A Seller's and Buyer's Perspective in the Baltic Management Journal that Digital transformation has endless benefits for the public, but is relatively difficult for enterprise manufacturers. In the paper "Digital transformation of Aalborg University: Interdisciplinary Issues and Project based Learning in the Post digital Era", it was mentioned that the difficulty of Digital transformation lies in interdisciplinary aspects, and interdisciplinary talents are also scarce in the international market, so diversified education and teaching should be carried out in talent training. In Engineering, Construction and Building Management, the operable strategic framework for Digital transformation of AECO industry elaborates the current situation of Digital transformation of manufacturing industry in detail, and refines its operable framework. On page 697 of TQM Journal, Digital transformation Challenges: Strategies Emerged in the Multi stakeholder Approach, the relevant Digital transformation strategies are described in detail. For enterprises, Digital transformation is bound to strike some vested interests, but it is an inevitable trend in terms of the long-term development of enterprises.

The theoretical scope of this paper includes the "digitalization" of "Digital transformation", including three aspects: "asset digitalization, operation digitalization, and labor digitalization". Asset digitization "refers to the digitization of actual assets, enabling them to have offline attributes in virtual network space, such as transactions, operations, etc. In short, endowing fixed assets with circulating value. 'Digitalization of Operations' refers to the transformation of traditional action models based on human subjective experience into action models based on automation (Craggs, 2022). Second, practical significance: in life, a large number of traditional manufacturing enterprises are not fully aware of the Digital transformation of enterprises, although some enterprises are aware of the necessity of transformation. However, on the road of Digital transformation, it is blocked by "unable to turn", "unable to turn", "dare not turn", "not good at turning" and "unwilling to turn". The fundamental reasons are innovation capabilities, funding shortages, talent shortages, unclear paths, and chaotic organizational structures (Bozkurt&Sharma, 2022). Therefore, this paper has certain reference significance for the relevant strategic guidance of the Digital transformation practice of traditional industrial agglomeration. The application of decision Tree model can be used as a Decision model to evaluate the effectiveness of enterprise Digital transformation. Judging the effectiveness of actions taken by different enterprises and industries in the process of Digital transformation can provide some effective strategic guidance for transformed enterprises and industries.

1.5 Research Significant

The research significance of this article includes two parts: theoretical significance and practical significance. First, theoretical significance: "digitalization" of "Digital transformation" includes "asset digitalization, operation digitalization and labor digitalization". Asset digitization "refers to digitizing actual assets to enable them to own offline assets, such as transactions and operations in virtual cyberspace. 'Digitization of operations' refers to the transformation of traditional action models based on human subjective experience into action models based on automation (Craggs, 2022). Second, practical significance: in life, although some enterprises are aware of the necessity of transformation, a large number of traditional manufacturing enterprises are not fully aware of the Digital transformation of enterprises. However, on the road of Digital transformation (Bozkurt, 2022), it is blocked by "being unable to turn", "not daring to turn", "not good at turning" and "unwilling to turn". The root cause is a lack of innovative ability and talent, as well as unclear paths and chaotic organizational structure (Bozkurt & Sharma, 2022). This paper has certain reference significance for the relevant strategic guidance of the Digital transformation practice of traditional industrial agglomeration.

2. Literatures Review

2.1 Digital Transformation

Digital transformation“is a high-level transformation based on digital transformation and digital upgrading, which further touches the core business of the company and aims at creating a new business model. （Digital transformation framework， see Figure 1） Digital transformation is to develop digital technology and support capabilities to create a dynamic digital business model. Digital transformation shows that success can only be achieved when an enterprise redefines its business systematically and thoroughly (or significantly and completely) - not only IT（Martin，2021）, but also all aspects of organizational activities, processes, business models and employee capabilities. On the afternoon of May 13, 2020, the National Development and Reform Commission launched the "Digital Transformation Partnership Action" initiative on its official website. At the "2022 Digital Transformation Development Summit Forum" held in 2022, the Chinese Academy of Information and Communications released "New IT reshapes the digital transformation of enterprises (2022)". On the afternoon of May 13, 2020, the National Development and Reform Commission launched the "Digital Transformation Partnership Action" initiative on its official website. The initiative proposes that the government and all sectors of society work together to build a joint promotion mechanism of "government guidance - platform empowerment - leading leadership -

institutional support - multiple services", focusing on driving the digital transformation of small and medium-sized enterprises, to promote the universal "cloud based digital intelligence"(Patrick, 2020) service in a broader and deeper scope, improve the supply capacity of transformation services, speed up the creation of digital enterprises, and build a digital industrial chain, Cultivate digital ecology, form a digital ecological community of "digital leading, combating epidemic, working together for innovation and win-win", and support high-quality economic development.

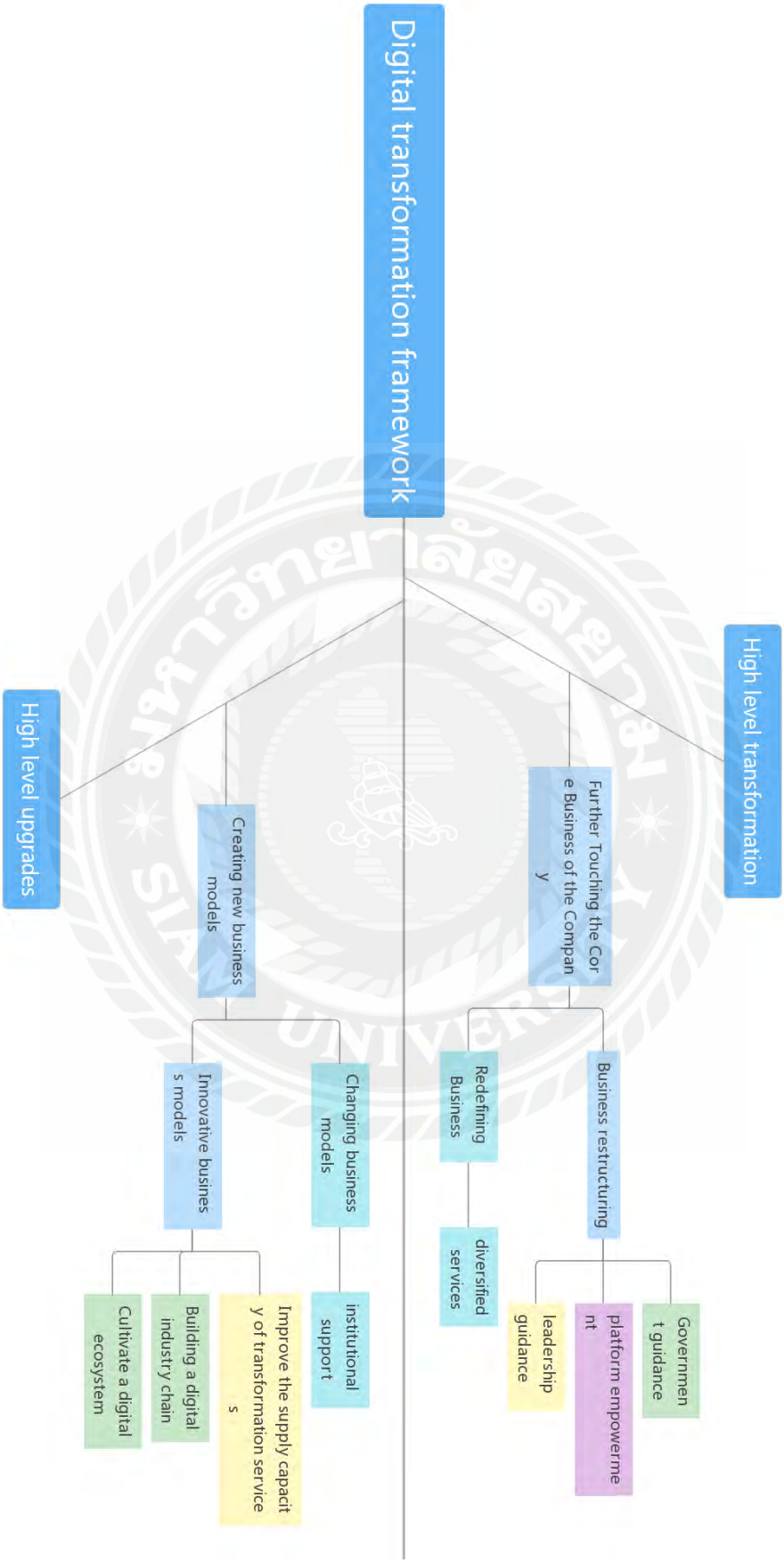

Figure 1: Digital transformation framework

2.2 Manufacturing Industry

Manufacturing industry refers to the industry in which certain resources (materials, energy, equipment, tools, capital, technology, information and human resources) are used in the era of mechanical industry to transform into large tools, industrial products and consumer products for people to use and use according to market requirements through manufacturing process. Manufacturing directly reflects the productivity level of a country and is an important factor to distinguish developing countries from developed countries. Manufacturing occupies an important share in the national economy of developed countries. According to the material forms used in production, manufacturing can be divided into discrete manufacturing and process manufacturing (Mars, 2021). The manufacturing process includes product manufacturing, design, raw material procurement, equipment assembly, warehousing and transportation, order processing, wholesale operation, retail, etc. In February 2023, the Statistical Bulletin of National Economic and Social Development of the People's Republic of China in 2022 was released, showing that the added value of high-tech manufacturing industry in 2022 increased by 7.4% over the previous year, accounting for 15.5% of the added value of industries above designated size; The added value of equipment manufacturing industry increased by 5.6%, accounting for 31.8% of the added value of industries above designated size. As a pillar industry of the country, China's manufacturing industry has maintained a good development trend(Paul, 2020) .However, with the disappearance of China's population dividend and the increase of labor costs, the path of traditional manufacturing industry relying on human development has become narrower and narrower. At the same time, intelligent equipment, represented by industrial robots, is bringing revolutionary industrial changes to the production methods of traditional equipment manufacturing, logistics and other related industries. Analysts pointed out that intelligence is a high-level control technology that integrates information technology, system control technology, electronic technology, optoelectronic technology, communication technology, sensor technology, software technology and expert system to achieve the purpose of expanding or replacing mental labor, and is an important technical basis for realizing digital chemical plants. The development of China's manufacturing industry in the new era and new form will be accompanied by intelligence and automation. The typical representative of intelligent equipment is industrial robot, which has many advantages in industrial production. First of all, they can replace people to do some monotonous, frequent and repetitive long-term work, or work in dangerous and harsh environments. Secondly, it can maintain high accuracy in repetitive actions to ensure the stability of product quality. Third, robots can work continuously and have a short payback period. Finally, the use cost of robots is low and easy to control, which can reduce the expensive labor costs and save a lot of costs for enterprises. Intelligent equipment is supporting the transformation and upgrading of China's equipment manufacturing industry. The strong demand for robots in the Chinese market has always maintained a high growth rate. Relevant data shows that by 2015, the Chinese robot market is expected to become

the largest market in the world, with a total demand of 36000 units, accounting for 18% of the global market. The sales volume of robots in China will increase by 118000 sets in the next three years. At 300000 yuan per unit, China's robot monomer market averages 10-15 billion yuan per year. In the Research Report on the Development Trend and Investment Opportunities of China's Robot Industry (2013-2017), it was mentioned that the profits of traditional manufacturing enterprises have been continuously compressed, and the disappearance of population dividend has made labor-intensive enterprises face unprecedented pressure. It has become the general consensus of the manufacturing industry to strengthen the transformation of equipment automation, improve the degree of production automation, reduce labor intensity and improve the working environment. Intelligent equipment is rapidly and effectively driving the transformation and upgrading of traditional manufacturing industry.

The advantage of China's manufacturing industry is its low labor cost, advantages in labor-intensive industries and product fields, and strong competitiveness. Moreover, the quality of China's labor force is relatively high. For example, a portion of the labor force in Guangdong and Zhejiang are high school students from rural areas. These people have quite good qualities and have a large potential consumer market, which can accommodate these products and promote their rapid formation into a standardized economy. Usually, a country's products must first be sold domestically, gain certain experience, reach a certain production scale, and then enter the international market. The large domestic consumer market in China has created basic conditions for the development and development of products. The foundation of China's manufacturing industry is relatively sound. Over the past 20 years of reform and opening up, the development of China's manufacturing industry has made remarkable achievements. As the main and pillar Sex industry of the national economy, manufacturing industry has laid a solid foundation for the future development of China's national economy. Entering the 21st century, the international and domestic environment facing the development of China's manufacturing industry has undergone profound changes. China's accession to the WTO has brought China's economic system reform and opening up to a broader and deeper stage. Moreover, manufacturing production is relatively concentrated, mostly distributed in areas with abundant related resources. The country attaches great importance to the development of manufacturing related industries, so many large manufacturing industries in China have a relatively good production resource base, and their market-oriented role in economic regulation is also conducive to the development of the manufacturing industry. But China's manufacturing industry also has disadvantages, such as weak technological development and innovation capabilities, and a lack of vitality in enterprises. Moreover, outdated management mechanisms and ideas hinder the development of productivity. The market mechanism is also imperfect, competition is incomplete, and China does not have the basic laws required for a market economy. Heavy manufacturing and light R&D are also the drawbacks of Digital transformation. Therefore, many products in China rank first in the world, but many R&D are introduced from abroad. Therefore, this paper believes that the Digital transformation of the manufacturing industry is imperative.

2.3 Decision-Making model

The theoretical basis of this paper is based on professional disciplines such as Digital transformation, manufacturing, information digitalization, business digitalization, etc.（Matthew, 2021）Therefore, it is necessary to conduct research on these professional theories. First, Digital transformation is a high-level transformation based on digital transformation and digital upgrading, which further touches on the company's core business and aims to create a new business model. In the afternoon of May 13, 2020, the National Development and Reform Commission released the "Digital transformation Partnership Action" initiative on its official website. It is proposed that the government and all sectors of society should work together to build a joint promotion mechanism of "government guidance - platform empowerment - leader leadership - institutional support - diversified services", focus on driving the Digital transformation of small, medium-sized and micro enterprises, promote universal "cloud based digital intelligence"(Francis, & Karlsdotter, 2022) services in a broader and deeper scope, improve the supply capacity of transformation services, accelerate the creation of digital enterprises, and build a digital industry chain, Cultivate a digital ecosystem, form a digital ecological community of "digital leadership, combating the epidemic, working together for innovation, and inclusive win-win"(Li, 2020), and support high-quality economic development. Secondly, manufacturing industry is an industry in the era of mechanical industry that utilizes certain resources and transforms them into large-scale tools, industrial products, and consumer goods that can be used and utilized by people through manufacturing processes according to market requirements. The manufacturing industry directly reflects a country's productivity level and is an important factor that distinguishes developing and developed countries (Adrian, 2022). It holds an important share in the national economy of developed countries. Thirdly, digitization of information requires an understanding of information and information technology, as well as the concept of mathematization of information, and an understanding of the impact of computer technology on information technology (Hunk, 2019). Similarly, in expanding domestic demand, the weight of online consumption is not lighter than offline consumption; Similarly, promoting employment, new professions such as delivery anchors and delivery riders have a large employment capacity, and their role is not inferior to that of traditional professions. The changes brought about by the deepening of informatization into specific fields are often enormous. Faced with the endless emergence of new technologies, formats, and fields, we not only need to break away from our inherent thinking and methods, broaden our horizons to discover and embrace, but also need to plan ahead, lead ahead, and use innovative thinking to serve and drive technological innovation. Business digitization refers to the process of recording and transforming various traces or original information generated in business processes into data (Colin, & Lance Marks, 2019). Business digitization is essentially using data to represent and interpret business. Business digitization has actually started a long time ago, or was previously called informatization. In fact, CRM system, OA system and ERP system all belong to

business data, but because many businesses in traditional industries are carried out offline, it is very difficult to fully data (Joshua, & Mars, 2022). With the popularity of the internet, especially mobile internet, and the advent of the DT era, it is possible to achieve complete business digitization.Digital transformation of manufacturing enterprises has become a general trend, but the huge investment challenge in reality may not achieve the desired results. Unlike internet companies, the challenge for manufacturing companies lies in delivering physical products and organizing the supply chain. However, many fashion concepts constructed by internet companies have less impact on transformation than on marketing. Shi Chen, the general manager of CCID Research Institute's Financial Media Center, pointed out in the National Governance Weekly that it is necessary to build a framework based on the value chain, sort out the priorities and challenges of different enterprises in Digital transformation, so as to help manufacturing enterprises choose more targeted benchmarking models and partners. Digital transformation of Chinese manufacturing enterprises is in the ascendant. However, as long as one has been to the forefront of research, one often comes across the saying "transform without waiting for death, transform without seeking death". This is not a simple joke. In reality, many enterprises have realized that Digital transformation is the trend of the times, but many practices have failed, and some even paid a high price. Why is Digital transformation going bankrupt? We can see that "Digital transformation" is often full of buzzwords. When many enterprises plan for Digital transformation, what they often expose is not a framework - what suppliers can and cannot do, what needs can and cannot meet, but a series of preconceived abstract concepts such as "Zotye", "Microservices", "cloud platform", as well as accompanying contracts and quotations. In this situation, it is often difficult for companies to make wise choices. In fact, behind the Digital transformation, in the past few decades, China's enterprise information service market has been dominated by foreign companies for a long time. With the rapid development of China's digital technology in recent years, local enterprises have begun to try to overtake on curves, which is an important background that cannot be ignored in the Digital transformation of enterprises. Therefore, instead of inputting various abstract terms, it is better to build a new analytical framework, sort out the evolution background of Digital transformation trend according to terms, and help manufacturing enterprises cope with changes. In this framework, the most important thing is to distinguish the intertwined concepts of different industries; Identify the different challenges faced by enterprises at different positions in the value chain; Finally, help them select appropriate benchmark cases and establish constraints and constraints. The first level of Digital transformation is the consumer side, which is what we traditionally call "To C". The main form is actually e-commerce. In this regard, Chinese internet companies have enormous advantages and are the so-called "local" digital enterprises that traditional enterprises envy. With the increasing saturation of consumer Internet and the tightening of supervision, Internet enterprises have begun to enter the production end of to B, hoping to expand new business in the Digital transformation of traditional enterprises. Technical concepts such as "Zotye" and "Microservices" actually come from e-commerce enterprises' own information systems and business experience, and then expand to other sales focused

industries, such as consumer goods and retail. The core digital element in this field is customer data. The corresponding digital applications mainly involve marketing analysis, including product positioning, marketing management, advertising effectiveness, customer profiling, and precision marketing. The Digital transformation in this field can help traditional enterprises solve the problem of "finding people for products".

2.4 Technological Innovation

Faced with the sudden COVID-19, masks became a scarce commodity on the market. Most of the enterprises that can produce masks in a special period have highly automated and digital production lines, so as to avoid the spread of the epidemic caused by the gathering of personnel while resuming production (Keith, Ignatz, Harrison, Oscar, Alfred, Neil, & Luke, 2021). At the same time, in addition to the traditional mask manufacturers, manufacturing enterprises represented by Foxconn, SAIC-GM-Wuling and Changying Precision, and intelligent manufacturing system integration enterprises such as Liyuanheng and Pioneer Robot also quickly joined the mask production team. These cross-border manufacturers rely on strong flexible production capacity and digital basic support to form mask production capacity in a very short time (Wu&Chang,2021). Flexible production system refers to an engineering manufacturing system that allows product changes to a certain extent due to predictable or unexpected changes and can be produced automatically. The reason why flexible production system can achieve different degrees of flexibility is related to the components of the system and its degree of digitalization (Peter, 2021). The main feature of flexible manufacturing system is that when changing the product type in the production process, it is not necessary to change the production machinery frequently. Only by relying on its flexible components and complete digital production system to modify the system parameters, can it meet the diversified product requirements (Leonard, 2022). Therefore, behind the flexible production is the result of the digital transformation of enterprises. Under the critical situation of the epidemic, it can reproduce at the first time, which truly reflects the role of flexible production and production system digitalization supported by production intelligence in responding to the demand for a large number of diversified products in the short term (Kenny, 2021). The shortage of labor force in a short time can be said to be the biggest impact of the COVID-19 that broke out during the Spring Festival on the manufacturing industry. The total number of people of working age in China has been declining year after year (see Figure 2), which will undoubtedly make the situation worse for enterprises that already have insufficient labor force. However, it may become another driving force to promote the intelligent transformation of enterprises.

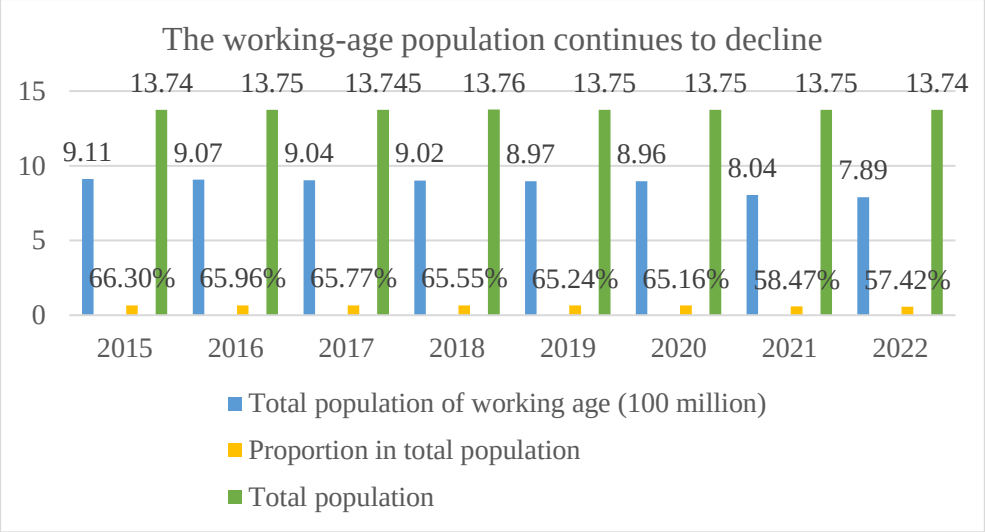

Figure 2: The working-age population continues to decline.

The arrival of the epidemic has made many Chinese manufacturing enterprises face the dilemma of being forced to stop production, while the development of the global manufacturing industry will not stagnate because of any regional shutdown (Chen & Wang, 2023). Many enterprises, including Toyota and Hyundai, have begun to urgently expand their procurement scale in China and Southeast Asia to cope with the capacity shortage of Chinese manufacturing enterprises, which will pose a greater challenge to the position of Chinese manufacturing enterprises in the global manufacturing supply chain. In the face of the potential capacity substitution crisis, domestic manufacturing enterprises need to respond to the changes in the international situation with a more forward-looking layout to ensure that China's manufacturing industry continues to maintain its unique advantages in the international competition. Facing this situation, accelerating the digital transformation of manufacturing industry is the best medicine for enterprises to save themselves. Baosteel's Shanghai Baoshan Base Factory, which is newly listed as the "lighthouse factory", has shown its unique advantages in responding to the epidemic: the intelligent production system covering the whole plant has not only improved production efficiency, but also achieved an effective balance between epidemic prevention and control and stable production in a special period (Bican & Brem, 2020). Foxconn's "light out factory" has achieved complete automation through the introduction of industrial Internet and intelligent manufacturing, and can complete production without human participation. No matter Foxconn or Baosteel, the enterprises that can go upstream in a critical time are the pioneers of the digital transformation of the manufacturing industry (Craggs, 2022). The sudden crisis may further accelerate the pace of enterprise transformation (Gastaldi, Appio, Corso, & Pistorio, 2018). The industrial Internet will continue to support the digital transformation of the manufacturing industry through the comprehensive connection of the whole factor chain, the whole industrial chain and the whole value chain of the industrial economy, and further reshape the industrial production and manufacturing and service system through the new technologies, new models and new industries that are constantly emerging.The focus of industrial Internet development will sink to the production line that produces industrial data, help the intelligent flow of industrial data with edge computing as the main direction, and serve industrial enterprises and various demand ends on the industrial Internet more accurately in the form of cloud edge collaboration (Fecioru, 2022).

3. Research Methodology

This paper uses the documentary method to analyze problems and solve problems in the digital transformation of the manufacturing industry. The Digital transformation collected in this paper should be objective and comprehensive compared with the literature, and try to make the materials and comments coordinated and consistent, which has certain pertinence for manufacturing factories in the digital transformation. In terms of the research objectives of Digital transformation, it outlines the main points, properly uses the statistical analysis charts and research problem in the literature, and conducts documentary analysis on the basis of not confusing the views and personal thoughts in the literature.The first step of using the documentary method to study the Digital transformation of manufacturing industry is to determine the topic of documentary review. The second step is to collect documentary related to digitization (Luo, 2020). The third step is to organize the documentary. The final step is to write a documentary summary.This paper investigates Philip&Gavrilova (2022) 's proposed digital transformation framework, which includes four levels: changes in value creation, structural changes, technological use, and economic aspects. Rof, Bikfalvi, and Marques (2022) believe that the core of transformation should be competitiveness, products and services, and marketing, rather than financing. However, in order for Digital transformation to succeed, it is also important to develop a clear digital strategy. Combining digital resources with physical resources, focusing on specific business outcomes. In addition, the latest research on Digital transformation business conducted among 181 surveyed enterprises shows that most organizations focus on incremental changes and improvements of existing business processes, combined with new technologies (Chen, Wang&Ortiz 2023). Therefore, some Digital transformation seems to be related to Business process management in the organization. In order to achieve a successful Digital transformation, it is necessary to automate the existing business processes in the organization through digitization, data integration and analysis, and establish new business models through digitization. At the same time, enterprises should also emphasize the important role of structured data and stable, reliable, and integrated processes in digital transformation (Taj, Kautz, and Bruno, 2021).

In addition, Business process management activities are undergoing an evolutionary process from process improvement to business transformation. The cooperation between Digital transformation and Business process management can bring new opportunities for Business process management, because Business process management currently lacks the initiative, opportunity and initiative to seek innovation. In fact, in recent years, many members of academia and practice have recognized the importance of Business process management for Digital transformation. In addition, Jedynak et al. (2021) explained how Business process management plays a role in the process of Digital transformation by pointing out five ways, namely, using process engines, effectively using business analysis, effectively using content management, using collaboration tools, and using automation. Through the above research, we found the research problems of this paper, which is to solve: First, what challenges enterprises

face in the process of Digital transformation. Second, what factors can affect the success of enterprises in Digital transformation. Third, how to solve these problems and how to achieve Digital transformation. Therefore, this paper will focus on the key issues of the challenges faced by enterprises in the process of Digital transformation, and what factors affect the success of enterprises in China's manufacturing Digital transformation. This article will also try to recommend how to solve these problems and how enterprises can achieve Digital transformation.

4. Finding and Conclusion

According to the development trend of the digital economy after the epidemic, this paper found the problems existing in the current situation of the manufacturing industry in the Digital transformation, as well as the problems such as high cost and insufficient capacity of key tasks such as architecture design and data operation in the Digital transformation. Through literature review, this paper identified and summarized the following three points, achieving the research objectives.

Digital transformation is the only way for manufacturing factories, enterprises without digital transformation will inevitably be submerged in the tide of the times. The rapid development, wide coverage, and unprecedented depth of influence of the digital economy have become a key force in changing the competitiveness of enterprises. Faced with the impact of the epidemic, in such a passive situation, it is imperative to implement Digital transformation from both internal and external factors. Taking data as the core driving factor and promoting profound changes in economic development and social operation through the application of new generation information technology is an important historical process in building a new economic and social form. Only by realizing data interconnection, can we constantly reconstruct and upgrade the new model of digital infrastructure construction, as the support of innovation and transformation, and realize the upgrading iteration of enterprise Digital transformation. Therefore, data-driven production is the "brain" of Digital transformation, which can make resource allocation more reasonable and process more standardized, time-saving and efficient. It can be seen that Digital transformation is the only way for enterprises to develop and survive.

Utilize digital infrastructure models to process and utilize historical data from the manufacturing industry to appropriately unleash its value. The epidemic has made enterprises more deeply aware of the importance and urgency of Digital transformation, and accelerating the Digital transformation of enterprises has become the consensus of all circles. On the one hand, due to the normalization of the epidemic, the operation of offline businesses has been hindered, and it is necessary to rely on online operations or emerging technological means to restore stable operations as soon as possible; On the other hand, digital technology is a new type of productivity, which has Absolute advantage in terms of enterprise operation efficiency, marketing forecast and cost. During the epidemic, new models such as flexible office, digital factory and smart workshop created more demand for Digital transformation. The use of these models can

greatly improve the production efficiency of enterprises and is an accelerator of Digital transformation of enterprises. The concept brought by digitization to social development is to integrate the basic resources of data into various social resources with the support of digital technology, in order to better create value. This is actually the concept of "cross-border" and "integration" that is often referred to in the digital economy.

Use a clear new model of manufacturing development to solve the problem of high cost and insufficient capacity of key tasks such as architecture design and data operation in the Digital transformation of traditional industries. The main role of "cross-border" and "integration" in enterprises is not to build a large digital team on their own, but to achieve digitalization of factories, sales, and offices by formulating correct digital strategies and directions, utilizing data, tools, technologies, and methods based on basic human resources. In the post epidemic era, Digital transformation is the only way for manufacturing factories. Enterprises without Digital transformation are bound to be submerged in the tide of the times.

5. Recommendation

Suggest enterprises to create a new innovative service platform. Follow the three innovation paths of "technological innovation, independent innovation, and breakthrough innovation". Expand the regional scale and promote the "Butterfly effect" of industrial clusters. At the same time, it will further guide and promote a large number of specialized enterprises based on the industrial chain to gather highly in space, improve the level of specialization in the whole region, strengthen the coordination ability in the development process of enterprises, establish regional brand image, form regional competitive advantages, and realize the Butterfly effect (Oliveira&de Souza, 2022).There are three suggestions for the digital transformation of enterprises: first, clear the awareness of digital transformation. Digital transformation is a great transformation for enterprises, which will inevitably encounter difficulties in this process. However, when an enterprise has completed a series of digital transformations such as business form, organizational structure, technical management and corporate culture, it will grow and grow in the digital wave at an efficient and agile speed, and be more able to respond to emergencies such as the COVID-19 in an orderly manner. In this regard, first of all, we should improve the awareness of all employees of the enterprise, especially the middle and senior managers. Further build a technology platform system that can support continuous business innovation with data as assets, technology as means and talent as support. Second, accelerate the embrace of the new generation of information technology. The application of the new generation of information technology in the manufacturing industry is not only the automation of the production line, but also in the fields of enterprise management, remote collaboration,

and even online conference. Since the outbreak of the COVID-19, "cloud office", "virtual production" and "cloud manufacturing" have all become popular words during the war. Many remote office software even occupy the top few of the APP list. Alibaba nailed ahead of WeChat for the first time, leaping to the top of the Apple App Store list, while enterprise WeChat rose to the third of the list and the fourth of Tencent Conference. The stability and intelligence of remote office software are the main factors that affect the user experience. Various emerging applications will also help manufacturing enterprises comprehensively upgrade from management, operations, production, logistics, sales, and other aspects. The third is to clarify the path of Digital transformation of manufacturing enterprises by promoting digital pairing and virtual production. Unlike pure CAD, CAE, CAM, etc., digital twinning is a new manufacturing mode driven by data and models, supported by digital twinning and digital threading. At present, international political tensions and the COVID-19 continue to spread, the instability and uncertainty of world economic development increase, and the development situation is more complex and severe. In this context, the digital economy has gained rapid development opportunities due to its prominent features such as data-driven and platformization, and new models and forms of the digital economy are thriving.

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