EXPLORING THE MOTIVATIONS AND VALUE CREATION PATHWAYS OF SANY HEAVY INDUSTRY'S DIGITAL TRANSFORMATION

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Abstract: With the rapid development of science and technology and the increasingly fierce global competition, digital transformation has become a key path for enterprises to enhance competitiveness and achieve sustainable development. Taking SANY Heavy Industry as an example, this paper explores the motivation, implementation process and value creation path of its digital transformation. In the face of uncertainty in the global economic environment, intensified competition in the industry and changes in customer demand, SANY Heavy Industry improves its production efficiency, optimizes resource allocation and strengthens market competitiveness through digital transformation. By introducing advanced technologies such as smart factory, automated production line, Internet of Things and big data, SANY Heavy Industry has realized a comprehensive digital upgrade of its production process, which reduces costs and improves product quality and production efficiency. At the same time, the digital transformation also promotes the innovation of the enterprise's products and services, improves customer satisfaction, and creates significant economic value for the enterprise. It aims to provide useful reference and inspiration for other manufacturing enterprises in the process of digital transformation.
Keywords: Digital transformation; Value creation; SANY Heavy Industry; Motivation

1 INTRODUCTION

With the rapid development of technology and the trend of globalization, digital transformation has become an important driving force for the sustainable development of enterprises. In the manufacturing sector, this trend is particularly obvious. As a leading enterprise in China's construction machinery field, SANY faces the challenges of global competitive pressure and diversified market demand. In order to enhance the core competitiveness of the enterprise and meet the growing market demand, SANY Heavy Industry must carry out digital transformation.

At present, the widespread application of advanced information technologies such as big data, cloud computing and artificial intelligence provides powerful technical support for the digital transformation of enterprises. These technologies can not only help enterprises realize the intelligence and automation of the production process, but also improve production efficiency and product quality, reduce production costs and enhance market competitiveness. In addition, digital transformation is also an inevitable choice to cope with industry changes. With the constant changes in the global economy and the increasing diversity of customer needs, the traditional manufacturing model has been difficult to meet market demand. Through digital transformation, enterprises can more flexibly respond to market changes and quickly respond to customer needs, so as to maintain a competitive advantage.

The study of the motivation and value creation path of SANY Heavy Industry's digital transformation has multiple significance: firstly, through the case analysis of SANY Heavy Industry, the theoretical system of enterprise digital transformation can be further enriched and improved to provide theoretical support for the digital transformation of other enterprises[1] . Secondly, studying the motivation of SANY Heavy Industry's digital transformation can help reveal the deep-seated reasons for digital transformation and provide reference for other enterprises to formulate digital transformation strategies. Third, SANY Heavy Industry is a pioneer in digital transformation, and its successful experience is of great significance for other enterprises. Through the study of its digital transformation path, it can provide a practical model for other enterprises to learn from. Fourth, it enhances the competitiveness of enterprises, promotes industrial upgrading, promotes sustainable development, and improves customer satisfaction. Finally, studying the value creation path of SANY Heavy Industry's digital transformation will help other enterprises understand how digital transformation creates value for the enterprise, thus guiding them to better promote digital transformation in practice.

2 THEORETICAL FOUNDATIONS

2.1 Technology Facilitation Theory

Digital transformation is an inevitable result driven by technological progress. With the rapid development of advanced information technologies such as big data, cloud computing and artificial intelligence, it has become possible for enterprises to use these technologies to optimize production processes, improve production efficiency and reduce production costs[2] . SANY Heavy Industry, as a leading enterprise in the construction machinery industry, follows the

technological development trend and enhances its core competitiveness through digital transformation.

2.2 Theory of Changing Market Demand

Changes in market demand are an important driver for enterprises to carry out digital transformation. With the continuous development of the global economy and the increasing diversification of customer needs, the traditional manufacturing model has been difficult to meet market demand. Through digital transformation, SANY Heavy Industries can better meet customers' individual needs and improve customer satisfaction and loyalty.

2.3 Theories of Sustainable Development

Digital transformation helps enterprises achieve sustainable development. By optimizing production processes and reducing energy consumption and pollution, enterprises can achieve green production and contribute to the sustainable development of society. SANY Heavy Industry focuses on environmental protection and sustainable development in the process of digital transformation, and is committed to becoming a green benchmark in the industry[3] .

2.4 Value Chain Theory

Digital transformation achieves value creation by optimizing the enterprise's value chain. SANY Heavy Industry has been transforming and upgrading various links such as R&D, production, sales and service through digital means to improve the efficiency and value creation ability of each link. At the same time, digital technology also helps enterprises better connect the upstream and downstream industrial chain, realizing supply chain synergy and value co-creation.

2.5 Customer Value Theory

Digital transformation helps companies better meet customer needs and increase customer value. Through digital means, enterprises can more accurately understand customer needs and preferences and provide personalized products and services. At the same time, digital technology also helps enterprises establish closer customer relationships and improve customer loyalty and satisfaction. SANY Heavy Industry focuses on the enhancement of customer value in the process of digital transformation, and continuously optimizes customer experience and service quality through digital means.

3 LITERATURE REVIEW

3.1 Digital Transformation

The impact of digital transformation was far-reaching and multifaceted: it drove economic growth, optimized industrial structure and improved operational efficiency, while facilitating globalization and the efficient dissemination of information. However, there is also a need to pay attention to the digital divide, privacy and security, and labor market challenges to ensure that the dividends of technology reach a wider range of people and achieve sustainable development.
Xiaofan Wang (2024) provides an in-depth analysis of the relationship between corporate digital transformation and auditors' risk response behavior[4] . Digitalization of business increases the cost of auditing, but they are more willing to issue a standard unqualified audit opinion. Another analysis found that the digitalization of firms has a significant negative impact on audit quality, and the adoption of a standard unqualified audit opinion may increase the risk of auditing.
Wang, Xinlan and Shi, Meiqi (2024) found that SANY Heavy Industry, a leading company in China's construction machinery industry[5] , has a digital transformation process that profoundly embodies the company's determination to change and its action strategy in the face of growth pressures, environmental changes, and mission-driven. This process can be broadly divided into several key stages, each of which is accompanied by the optimization of resource orchestration and resource bundling, as well as the gradual enhancement of informatization, digitization, and intelligence capabilities. Wu, Zinyu and Yan, Jinhua found (2023)[6] that digital transformation of firms significantly improves the transparency of information. Mechanism tests show that internal control partially mediates the relationship between firms' digital transformation and information transparency. Another study shows that digital transformation has the greatest enhancement effect on information transparency among firms that are not audited by Big 4 audit firms and firms that face intense industry competition.

3.2 Value Creation

The impact of value creation is far-reaching: it enhances enterprise competitiveness, promotes economic growth and enhances social well-being. Through innovative products and services, value creation meets market demand and promotes industrial upgrading, while also bringing long-term economic and social benefits to enterprises and society.
Liu Guangqiang's (2024) research shows that the value creation logic of data assets to promote business high-quality development is elaborated from three aspects: the matching relationship between data assets and business high-quality development, the data asset value system is the source of value for business high-quality development, and data assets are the key production driver for business high-quality development[7] . Based on the logic of value creation, it

proposes that data asset capability enhances the company's basic value capability, data integration capability enhances the company's total factor productivity, three value effects of R&D data asset enhancement, production synergy and market allocation, three value dimensions of the company's structure, efficiency and innovation, and three value dimensions of data, business and value integration. Three value links are constructed on the supply side, production side, and demand side, and seven value creation paths are constructed on the product, enterprise, and industry levels to help companies grow in high quality. Zhang Yuan et al. (2024) found that in the continuous process of digital transformation of single breakthrough-multi-company integration-green interconnection[8], enterprises are adopting appropriate resource allocation behaviors to achieve value creation under the engine of efficiency-user demand-stakeholder demand. Xiang Guopeng et al. (2022) found[9] that the development of opportunities is carried out jointly by startups and users, and users are included in the value proposition and creation process to share the results of value creation; two paths of co-creation of value are formed between startups and users, i.e., startups and users discover and create entrepreneurial opportunities together to realize co-creation of value. In the process of developing opportunities, the digital environment provides a fundamental bridge for the two to interact to form entrepreneurial opportunities.

4 CASE PRESENTATIONS

4.1 Introduction of SANY Heavy Industry

Since its establishment in 1994, SANY Heavy Industry has achieved sustained rapid development, is the world's leading construction machinery manufacturer, is also the world's largest manufacturer of concrete machinery, and in 2020 with 98,705 units of excavator sales, the first to win the global sales champion of excavators. Among them, concrete equipment is the world's No. 1 brand, excavators, large-tonnage cranes, rotary drilling rigs, pavement equipment and other leading products have become China's No. 1 brand.

The company has established a first-class service network and management system centered on customer needs and "all for the sake of customers and creating customer value". From 800 green channel, 4008 call center to ECC enterprise control center, the company took the lead in the industry to launch the "6S" center service mode and "one-click" service, and took the lead in the industry to put forward the "123" service value commitment, "110" service speed commitment and "123" service speed commitment. The company was the first in the industry to introduce the "6S" center service model and "one-click" service, and the first in the industry to put forward the "123" service value commitment, the "110" service speed commitment and the "111" service resource commitment to make the service to the point of no return. The company set up enterprise control center ECC in the industry, relying on the Internet of Things platform "cloud + terminal" to establish an intelligent service system, to achieve the global engineering equipment 2 hours to the scene, 24 hours to complete the service commitment; the launch of the customer cloud 2.0, the realization of the interconnection of equipment, equipment data sharing, query of the working conditions, equipment navigation, equipment maintenance reminders. The customer cloud 2.0 was launched to realize equipment interconnection, equipment data sharing, working condition query, equipment navigation, equipment maintenance reminder.

4.2 The Digital Transformation History in SANY Heavy Industry

In the global engineering machinery manufacturing field, SANY Heavy Industry is the absolute industry authority. Its business covers more than 150 countries and regions around the world, and its concrete machinery products are firmly ranked as the world's No. 1 brand.

The production model of construction machinery is a typical discrete manufacturing model, facing many problems, seriously restricting the improvement of production efficiency. Therefore, the construction machinery industry, "intellectual upgrading" is imminent.

In such a situation, SANY Heavy Industry to "not turn over, or turn over the boat" determination to promote digital transformation, through digitalization, network connectivity, sharing and data security to "empower wisdom".

4.2.1 Initial exploration and information construction
SANY's road to digital transformation began with its earlier informationization. in 1989, SANY Group was founded in Lianyuan, Loudi, Hunan Province, initially focusing on welding materials. With the expansion of its business, SANY entered the construction machinery industry in 1994 and moved its headquarters to Changsha, where it began to produce concrete machinery products. During this period, SANY Group began its initial attempts at informationization, such as the deployment of internal networks, mailbox systems and financial software, laying the foundation for subsequent digital transformation.

4.2.2 Informatization in-depth promotion phase (2013-2015)
Facing the cyclical fluctuations of the construction machinery industry and the intensification of market competition, SANY Heavy Industries officially launched the first phase of digital transformation in 2013 - in-depth promotion of informatization. The company set up a process informatization headquarters, comprehensively sorted out core business processes, promoted the popularization of process culture, and introduced partners such as SAP and IBM to jointly build an end-to-end business management platform. At this stage, SANY also launched the first phase of the CRM system project, promoted product lifecycle management (PLM1.0), and initially built a big data soft and hard technology platform to enhance the ability of market prediction, fault diagnosis, and customer credit collection.

4.2.3 Digital platform building phase (2016-2017)
With the deepening of informatization construction, SANY Heavy Industry has entered the stage of digital platform

construction. The company has increased its investment in industrial internet, intelligent manufacturing and other fields, and has gone online with ERP, PDM and other systems, realizing the integration of finance and business, and the integration of production, supply and marketing planning system. At the same time, SANY also initiated the construction of intelligent manufacturing factories, such as Changsha Plant No. 18, which promoted the transformation of the manufacturing industry to integrated automation, numerical control and intelligence through the implementation of intelligent machining centers, production lines, warehousing and transportation and distribution subsystems.

4.2.4 Full digital transformation phase (2018-present)

Since 2018, SANY Heavy Industry has entered a comprehensive digital transformation stage. The company has established a development strategy of digitalization and internationalization, and put forward the firm determination of "either turning over or capsizing". In this phase, SANY focused on promoting the data collection and management of "three present" (site, reality, present object) and "four meters" (water, electricity, oil, gas), realizing the digital management of the whole production process. At the same time, the company also released the data center and technology center, providing solid technical support for digital transformation.

In terms of manufacturing, SANY continues to promote the construction of "lighthouse factory", to improve production capacity, reduce labor demand and site costs through digital transformation. At present, SANY has built model projects of intelligent manufacturing workshop in several production bases, such as No. 18 plant in Changsha Industrial Park, and achieved remarkable results. In addition, SANY has also realized equipment interconnection, data sharing and intelligent decision-making through the industrial Internet platform Tree Roots Interconnection, further improving production efficiency and product quality.

4.2.5 Electrification and Intelligent Layout

Driven by digital transformation, SANY Heavy Industry also actively layout electrification and intelligent field. The company focuses on the development of tractor, excavator, crane and other electrified products, and the layout of the "three electric" (battery, motor, electronic control) core independent technology. In terms of intelligence, SANY has deepened the "cab revolution" to fully realize the de-buttoning analysis; in terms of intelligent operation and intelligent driving, it strives to reach the L2 level and build 3-5 L4 level products.

5 MOTIVATION AND VALUE CREATION PATHWAYS IN DIGITAL TRANSFORMATION

5.1 Motivation for Transformation

5.1.1 External motivation

First, the external market environment is constantly changing. With the continuous development of the construction machinery industry, the market competition is becoming increasingly fierce. In order to maintain its leading position in the market, SANY Heavy Industries needs to seek new growth points, and digital transformation is an important way to enhance competitiveness.

In the context of globalization, the uncertainty and complexity of the international trade environment have increased. As an international enterprise, SANY Heavy Industries needs to optimize global supply chain management, reduce operation costs and improve response speed through digital transformation to cope with the changes in the international trade environment.

In recent years, governments have introduced policies to support the digital transformation of the manufacturing industry and encourage enterprises to adopt advanced information technology to improve productivity and product quality. This policy environment provides strong external support for SANY's digital transformation.

Secondly, the rapid development of cloud computing, big data, artificial intelligence, Internet of Things and other advanced information technologies has provided strong technical support for the digital transformation of the manufacturing industry. By introducing these technologies, SANY Heavy Industry has realized the intelligence, automation and digitalization of the production process, and improved production efficiency and product quality.

Industrial Internet, as a product of the deep integration of new-generation information technology and manufacturing, is leading a profound change in manufacturing. SANY Heavy Industry actively embraces the industrial Internet, and through the construction of the industrial Internet platform, it realizes the comprehensive connection and efficient collaboration of equipment, products, customers and other elements, and promotes the digital transformation of the enterprise.

Third, with the continuous upgrading of market demand, customers have higher and higher demands for product personalization. Through digital transformation, SANY Heavy Industry has realized the transformation from mass production to personalized customization to meet the diversified needs of customers.

Customers not only pay attention to the quality and price of products, but also pay more and more attention to the quality and efficiency of services. Through digital transformation, SANY Heavy Industry has established a perfect customer relationship management system and after-sales service system to improve service quality and customer satisfaction.

5.1.2 Internal motivation

First of all, digital transformation is SANY Heavy Industry's strategic needs and long-term planning. SANY Heavy Industries regards digital transformation as a key way to enhance the core competitiveness of enterprises and realize sustainable development. In the face of the complexity and change of the global economic situation and the continuous innovation of information technology, SANY Heavy Industry actively responds to the national call for high-quality

development of the manufacturing industry, and optimizes the allocation of resources, improves production efficiency and product quality through digital transformation, in order to cope with the challenges of the future market.

Second, before its digital transformation, SANY Heavy Industries faced operational problems such as low production efficiency and cost control difficulties. Through digital transformation, SANY Heavy Industries can introduce advanced industrial Internet platform, big data and artificial intelligence technology to realize real-time monitoring and intelligent scheduling of the production process, improve production efficiency and resource utilization, and reduce operating costs.

Third, with the increasingly fierce market competition, SANY Heavy Industry needs to enhance its market competitiveness through digital transformation. Digital transformation can help SANY to better meet the individual needs of customers, improve service quality and customer satisfaction; at the same time, through digital means to optimize the supply chain management, marketing and other links, to enhance the overall operational efficiency of the enterprise and market response speed.

5.2 Analysis of SANY Heavy Industry's value creation path in the context of digital transformation

5.2.1 Intelligent device introduction

With the progress of the times digitalization has been the trend, SANY Heavy Industry will combine digitalization and hardware to achieve a double breakthrough in the field of intelligent manufacturing software and hardware. The company broke through a number of key technologies such as fully automatic cutting, robot welding, etc., realizing the leap from "machine-assisted man" to "man-assisted machine", and the per capita operating efficiency has been greatly improved.

The automatic nesting system in SANY's No. 18 plant and No. 18 plant in the Zhilian Heavy Truck Industrial Park increased the average steel utilization rate from 70.8% to 81.8% through big data learning and precise calculation. The unit manufacturing cost decreased by 29%.

SANY Zhilian Heavy Truck Industrial Park in the production process used AGV moving vehicle (automatic guided vehicle) point-to-point distribution to the workstation The vehicle is used for assembly workers to find assembly materials in the factory, in more than 700 AGV unmanned transport robots connected through 5G signals Material distribution automation rate of more than 99% Workshop distribution efficiency increased by 50% Each AGV unmanned transport vehicle will be a one-time production of a whole car The parts of the car are transported to the workbench, which makes it possible to produce thousands of cars, and many kinds of models can be produced in a factory, which adapts to the current mode of orders for small batches and multiple vehicle types, and personnel efficiency has been increased by 98%, and each AGV has become the key to the flexible production of the heavy truck production line[10] .

Through the 18th factory and heavy truck industrial park can be seen, SANY Heavy Industry will be digital and hardware combination, mainly from the factory to improve productivity and flexibility, and reduce labor costs of the two ways to make the manufacturing cost down, and improve production capacity.

5.2.2 Introduction of intelligent control systems

SANY also cooperated with Dassault Systèmes to deploy MOM (Manufacturing Operation Management), i.e. "Manufacturing Management System", which is regarded as an upgraded version of the traditional MES (Manufacturing Execution System). The project is jointly developed by SANY Group and Dassault Systèmes (China), and will become a unified management platform for the future "lighthouse factory". Mr. Yi Xiaogang, Executive President of SANY Group, also said that the new system is connected to PLM (Product Lifecycle Management), WMS (Warehouse Management Systems), which is a warehouse management system. PLM, i.e. "Product Lifecycle Management Platform", WMS, i.e. "Warehouse Management System" and other systems, and the lower level connects to the IOT platform, which is the "Command Brain" of the smart factory manufacturing. By linking production, quality, logistics, inventory and other production links, and deeply integrating with production line automation equipment, MOM will establish a unified production data model, further refine the scheduling of production to people and equipment, and truly realize the full digital drive of the production process, and promote SANY's production and manufacturing "from local intelligence to comprehensive intelligence"[10] .

In the first paragraph, SANY Heavy Industries through the introduction of intelligent production equipment to improve factory capacity and control factory costs, if the factory is compared to a warrior, then the intelligent equipment is the warrior's blade, and intelligent control system is the brain of the factory, if SANY Heavy Industries want to carry out the digital transformation of the two indispensable.

5.2.3 Integrating customer service with digitalization

In the early stage of digital transformation carried out by SANY Heavy Industries, that is, the stage of large-scale application of the Internet of Things (IoT) developed the M2M remote data collection and monitoring platform platform, which is subdivided into three sub-platforms.

First, the equipment remote monitoring technology support platform. It includes a technical support platform for remote monitoring of equipment and an equipment data platform, which provides reference data for the continuous improvement of the quality of host equipment and the after-sales service of equipment.

The second is the intelligent service system of machine group. Through real-time data interaction and sharing of mixer truck location information, concrete distribution information, concrete consumption information, and information on the current operating status of pumping equipment and mixer trucks among the equipment of each machine group in the

mixing station, it realizes operation synergy and operation guidance among the equipment of each machine group. Accordingly, users can adopt more scientific vehicle scheduling strategies and equipment operation modes, improve enterprise operation efficiency and equipment utilization, and reduce overall operation costs.

The third is the remote monitoring and maintenance system for pump trucks. Through researching the theory of intelligent front-end of construction machinery, developing the industry*s first intelligent products with independent intellectual property rights, enhancing the operation capability and level of construction machinery, designing and constructing the *advanced remote monitoring system, and comprehensively improving the information service level and operation efficiency of the enterprise.

In the stage of big data and cloud platform, SANY Heavy Industry has independently developed a big data storage and analysis platform, namely "ECC Customer Service Platform", including all the hardware and software of the bottom layer control of the equipment, which is capable of realizing two-way interaction and remote control of the equipment, and transferring the data of real-time operation of more than 200,000 sets of customer equipment to the backstage for analysis and optimization by means of sensors. Back-office for analysis and optimization. Daily real-time monitoring of equipment operation information (such as position, working hours, speed, main pressure, fuel consumption, etc.), the system is aimed at four main types of users: agents, operators, excavator owners and R&D personnel. The main points of big data design start from the four focuses of agents, operators, excavator bosses and R&D personnel, and use the base matrix to split into base vectors, then split into eigenvalues, and the eigenvalues are recombined to form customized vectors and then combined to form matrices of equipment information, health, etc., so as to provide the value-added services of the whole lifecycle. Users can grasp the status of the machine in all aspects at anytime and anywhere through the webpage or cell phone APP. Based on big data analysis, precise control is carried out for commonly used gears by area, load, and temperature respectively, so that the powertrain efficiency of the new product is increased by 8% and fuel consumption is reduced by 10%.

At this stage, the RootCloud platform is an industrial Internet empowerment platform built by Shugen Internet Technology Co. Ltd (invested and formed by SANY Heavy Industry). The platform focuses on strengthening the depth of the industrial Internet platform to help customers create end-to-end high-value solutions from equipment access, IoT presentation to segmented industry applications.

The RootCloud platform helps enterprises carry out digital transformation by providing core technical services such as device access and modeling, IoT data management, IoT analysis services and industrial blockchain. The RootCloud platform collects various parameters of machine operation of each category of equipment in real time, such as geographic location information, fuel consumption information, and equipment operating condition information, and stores the data for real-time analysis.

Analyze equipment working condition data to solve equipment and daily management and operation problems. Such as equipment running track, historical working condition analysis, fleet management analysis, real-time equipment monitoring and analysis. Through the big data analysis of the overall equipment or parts operating status, abnormal conditions, wear and tear and other technical parameters, it supports customers to monitor and manage the equipment anytime and anywhere. Manage the operation status of the equipment, and make statistics on the operation volume of the equipment (total working time, work square volume, fuel consumption, engine speed, etc.), which is convenient for the customer's work arrangement and cost control. By acquiring and analyzing the real-time diagnostic data of the equipment, it can deeply understand the needs of the customers, realize the monitoring of the user's usage condition and product life cycle, provide timely reminders of the abnormal state of the equipment for the customers to prevent losses, and also provide the basis for the service engineers to repair.

Real-time acquisition and processing and analysis of equipment operation data, real-time alarms such as alarms for illegal operation, abnormal equipment alarms, and alarms for deviation from predetermined positions according to set rules, as well as remote diagnosis and maintenance of faults, and accordingly integrating with the intelligent service platform for one-button intelligent dispatching services.

Based on the data stored in the big data storage and analysis platform, through the equipment and service data such as equipment usage data, working condition data, host and accessory performance data, accessory replacement data, etc., it carries out the prediction of equipment failure, service and accessory demand, provides technical support for active service, prolongs the service life of the equipment and reduces the failure rate.

Equipment unlocking management: realize system remote locking/unlocking, multi-level locking control, locking process management, and locking history management. Equipment Maintenance Management: It can formulate a reasonable maintenance plan based on customized parameters and provide accurate maintenance reminders and records. Equipment file management: realize equipment atlas management, equipment parts management, operation and maintenance manual management, and equipment basic information management.

Customers can centralize the management of different types of equipment they own; purchased users, users with equipment needs, project contractors, etc. can carry out demand management on the platform. Users can release equipment use demand or equipment use demand, project contractors can release equipment demand and carry out fleet management for the equipment involved in the project in the form of a virtual project, and actively push out relevant information.

SANY Heavy Industry's M2M platform, ECC platform and root cloud platform are interrelated and progressive in the development of its industrial Internet of Things. the M2M platform provides basic technical support for remote monitoring and management of equipment; the ECC platform adds the ability of big data storage and analysis on the basis of the M2M platform; and the root cloud platform is a more comprehensive and efficient platform for

empowerment of the industrial Internet, which combines the latest technology and development trend of the industrial Internet on the basis of the M2M and ECC platform. On the basis of M2M and ECC platforms, RootCloud platform is a more comprehensive and efficient industrial Internet empowerment platform by combining the latest technology and development trend of industrial Internet[11] .

In short, the root cloud platform makes it possible to deliver from the factory after production to the hands of the customer no longer lost contact, SANY Heavy Industry can monitor the status of the machinery in real time and provide technical support at any time, so that the customer's after-sales experience has been improved.

5.2.4 Personalization

In the field of construction machinery, SANY Heavy Industry continuously optimizes the production process through the use of digital technology in order to better meet the individual needs of customers and provide customized products and services. The following are the specific practices:

SANY Heavy Industry's intelligent factory is equipped with self-developed intelligent production management system and APP, which is able to synthesize customer delivery requirements, production material preparation, etc., and carry out efficient intelligent scheduling and intelligent dispatching. Even in the face of hundreds of products and only a small amount of demand for each product, the system can ensure that the production is well organized through the optimal decomposition and combination. This system not only improves production efficiency, but also greatly shortens the production cycle of customized products.

SANY's flexible manufacturing capabilities allow for the conversion of customers' individualized orders into batch chemical orders. Through the intelligent system, the company can flexibly adjust the production process to ensure that each piece of equipment is customized according to customer needs. This capability not only improves customer satisfaction, but also enhances market competitiveness.

SANY Heavy Industry carries out marketing and promotion through various digital channels such as the official website, social media and e-commerce platforms. The enterprise uses big data to analyze customer behavior and accurately place advertisements to improve marketing efficiency. At the same time, the enterprise also demonstrates product performance and use scenarios through online live broadcasts and short videos to attract potential customers.

SANY Heavy Industry has established a perfect digital service platform, such as "SANY Truck APP", which provides customers with convenient repair and maintenance appointments and service evaluation functions. Customers can select the nearest service station on the APP, submit repair or maintenance appointments, and make evaluations after the service is completed. This platform not only improves customer experience, but also incentivizes service stations to improve their service quality by associating customer evaluation with service station revenue.

In the overseas market, SANY Heavy Industries has implemented the business strategy of "focusing on us, local management, and service first". Through the establishment of more than 400 subsidiaries, joint ventures, agents, and the employment of international staff, the company is able to respond quickly to the needs of the local market and provide high-quality after-sales service. At the same time, the international service network exceeds 1,200, providing customers with back-end rapid supporting service system.

In terms of internal management, SANY Heavy Industry uses digital tools to optimize management processes and improve decision-making efficiency. For example, the enterprise has realized the digitization of many business areas such as research and development, planning and scheduling, production, quality monitoring, procurement, and warehouse management through the data middle platform project. This initiative not only improves management efficiency, but also provides strong support for corporate decision-making. In summary, SANY Heavy Industry has further consolidated its leading position in the construction machinery field by continuously improving customer experience and brand influence through personalized customization and digital marketing services.

6 CONCLUSIONS

This study shows that the drivers of SANY's digital transformation mainly include improving production efficiency, enhancing competitiveness and adapting to market changes. In terms of the value creation path, the introduction of advanced digital technology has realized the intelligence and automation of the production process, improving product quality and production speed. Meanwhile, the digital transformation also optimized supply chain management, reduced costs, and improved the operational efficiency of the enterprise. In addition, SANY Heavy Industry has used the digital platform to strengthen its interaction with customers, better meet customer needs and improve customer satisfaction. In short, SANY Heavy Industry's digital transformation has brought significant value creation for the enterprise, which provides a reference for other manufacturing enterprises.

COMPETING INTERESTS

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