

Industrial Internet-Driven Digital Transformation in Manufacturing: A Case Study of Foxconn's BEACON Platform

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Abstract: With the advancement of digital transformation in the manufacturing industry, the industrial internet has become a key technology for improving production efficiency and product quality, and achieving intelligent manufacturing. This paper takes Foxconn Technology Group as an example to explore how it has utilized the industrial internet platform BEACON for digital transformation, as well as the practical experience and effectiveness in this process. Foxconn has integrated cloud computing, the Internet of Things, big data, mobile internet, and smart factory technologies by constructing the BEACON platform, achieving automation, intelligence, and networking in production, and enhancing management efficiency and supply chain response speed. In addition, Foxconn also focuses on talent cultivation and corporate culture construction, developing a large number of talents with innovative thinking and digital skills through internal training and educational platforms. The research conclusion of this paper points out that the industrial internet is an important driving force for the digital transformation of the manufacturing industry, and proposes policy recommendations such as strengthening infrastructure construction, promoting in-depth integration of industry, academia, research, and application, and formulating and improving relevant policies and regulations to promote high-quality development and competitiveness enhancement of the manufacturing industry.

Keywords: Industrial Internet, Digital Transformation, Case Analysis.

1. Introduction

In the wave of digital transformation in the manufacturing industry, industrial internet plays an essential role. By integrating cutting-edge technologies such as the Internet of Things (IoT), big data, and artificial intelligence (AI), it has injected new vitality into the manufacturing sector and constructed an innovative development platform. This platform not only greatly enhances production efficiency and product quality but also promotes the leap of the manufacturing industry towards intelligent manufacturing, enabling enterprises to adapt more agilely to market fluctuations and consumer personalized needs.

The core advantage of the industrial internet lies in its integration capability, which can effectively integrate resources from upstream and downstream of the industry chain, achieving data integration and sharing, thereby improving the efficiency and accuracy of decision-making. This capability allows the manufacturing industry to respond quickly to market changes, optimize resource allocation, and promote high-quality development of the industry. In addition, the industrial internet also stimulates the transformation of the manufacturing industry in innovation and service models. Through new models such as platform-based design, intelligent manufacturing, and networked collaboration, enterprises can provide more personalized products and services, and by extending services, provide full lifecycle support for customers, enhancing the competitiveness of enterprises in the market.

Despite the huge potential of the industrial internet, research on how manufacturing enterprises can effectively use the industrial internet to achieve development is still relatively scarce. In reality, some companies have successfully transitioned from traditional manufacturing to intelligent manufacturing through digital transformation

strategies, significantly improving production efficiency and product quality by investing in the research and development of automated production lines and implementing robotic technologies, while reducing dependence on manual labor.

This article takes Foxconn as an example to explore how it has achieved digital transformation through the industrial internet. The case of Foxconn provides valuable references for manufacturing enterprises, demonstrating the potential and challenges of the industrial internet in practical applications. By analyzing Foxconn's experience, this paper aims to provide in-depth insights and practical guidance for the digital transformation of the manufacturing industry.

2. Case Selection and Data Sources

Foxconn, as the world's largest electronic manufacturing service provider, is highly representative in the manufacturing industry. It not only represents the advanced productive forces in manufacturing but also demonstrates a model for digital transformation in the application of industrial internet. Foxconn has achieved automation, intelligence, and networking in the production process by building the industrial internet platform BEACON, significantly enhancing production efficiency and product quality. Moreover, Foxconn's "Lighthouse Factories" promote digital management decisions oriented towards orders and products by integrating data, combining automation, digitalization, intelligence with industrial internet, and improving management efficiency. Foxconn's industrial internet practice is not limited to optimizing internal processes but also extends to the management of the entire supply chain. Through the industrial internet platform, Foxconn has achieved data sharing and process collaboration with suppliers, customers, and other partners, enhancing the response speed and operational efficiency of the entire supply chain.

The digital transformation of Foxconn is an inevitable

choice for it to adapt to market changes and enhance competitiveness. Through efforts in technology upgrading, talent cultivation, and building partnerships, Foxconn has achieved significant results. Therefore, we select Foxconn as the research subject of this paper.

The research materials for this paper mainly come from the official website of Foxconn Technology Group and related industry research reports. Through the Foxconn official website, we can obtain direct information about Foxconn's latest developments in the field of industrial internet, press releases, technological innovations, and corporate culture. At the same time, related industry reports provide in-depth analysis and theoretical support for Foxconn's digital transformation practices, offering valuable perspectives and data for understanding how Foxconn uses industrial internet to achieve development in the manufacturing industry.

3. Case Analysis

3.1. Construction of the Industrial Internet Platform

Foxconn's construction of the BEACON platform is a systematic and strategic implementation path, with the core goal of creating a new industrial ecosystem that integrates cloud computing, the Internet of Things, big data, mobile Internet, smart factories, the Internet, and artificial intelligence, among other key technologies.

Firstly, the construction of the BEACON platform began with a deep understanding and strategic planning of the industrial internet. Foxconn established a "future development strategy—cloud, mobile, IoT, big data, AI, network + robots" and founded Foxconn Industrial Internet Co., Ltd. to fully promote the development of the platform. The platform is centered on the C2C (Component To Consumer) model, connecting all segments of the supply chain to create innovative value for enterprises, from DataHub, DataWarehouse, DataSupermarket to platform development, and the integration of microservices applications, achieving the goals of improving quality, increasing efficiency, reducing costs, and decreasing inventory.

Secondly, the architectural design of the BEACON platform is key to its success. It includes the edge layer, IaaS cloud network layer, PaaS platform layer, and SaaS application layer. This layered architecture design allows for the effective flow and processing of data from the equipment layer, workshop layer, and enterprise layer. At the edge layer, various communication methods connect a vast array of industrial equipment, along with extensive and in-depth data collection combined with edge computing, uploading data to the cloud. The IaaS cloud network layer, through Foxconn Cloud, optimizes and manages storage, network, and computing resource pools based on virtualization, distributed storage, parallel computing, and load scheduling technologies. The PaaS platform layer provides one-stop platform development services for enterprises and developers, supporting the development, scheduling, and management of industrial model development and the full lifecycle management of industrial microservices encapsulated based on industrial models. The SaaS application layer meets the needs of different industries and scenarios for industrial SaaS and industrial APPs, forming the ultimate value of the industrial internet platform.

Lastly, Foxconn has achieved key technologies of

intelligent manufacturing through the BEACON platform, such as intelligent products and services, intelligent equipment, intelligent production lines, intelligent workshops to smart factories, all of which have helped the enterprise achieve innovation in production models. In addition, intelligent logistics and supply chain, intelligent decision-making, and other functions have also been realized through this platform, bringing innovation in operational models and scientific decision-making for the enterprise. Through these measures, Foxconn has not only improved its own production efficiency and product quality but also provided a demonstration and leading role in the digital transformation of the entire manufacturing industry.

3.2. Industrial Internet Provides Intelligent Services

Foxconn uses the industrial internet platform to provide intelligent manufacturing and technology services for SMEs. This includes communication network equipment, cloud service equipment, precision tools, and industrial robots, which are provided to SMEs through the industrial internet platform to help them improve production efficiency and product quality. Foxconn's industrial internet platform BEACON has achieved significant results in intelligent manufacturing and technology services, especially in the application of precision tool machining production. Through the BEACON platform, Foxconn has achieved real-time collection and analysis of tool machining data, significantly improving production efficiency and product quality. For example, in precision tool machining production, the BEACON edge computing platform CorePro has solved the needs for device networking and cloud access, intelligent equipment management and analysis, multi-platform applications, and data intercommunication, providing a complete set of data collection and processing scene solutions for production services, production execution, production processes, and production design links.

Furthermore, Foxconn's industrial internet platform BEACON has also promoted the development of green intelligent manufacturing. Foxconn-led development of the "Intelligent Green Recycling Manufacturing System" regenerates and utilizes waste precious metal waste from the manufacturing process, achieving efficient and environmentally friendly use of resources. This system recycles 300 tons of tungsten carbide materials annually, and the saved water and electricity resources can supply 3000 households for a year, demonstrating significant economic and social benefits. Through these innovative applications, Foxconn has not only improved its own production efficiency and product quality but also provided a demonstration and leading role in the digital transformation of the entire manufacturing industry.

3.3. Industrial Internet Promotes Intelligent Operations of Manufacturing Enterprises

Foxconn's BEACON platform also models custom data structures through the data warehouse Dingo system and uploads them to the cloud, integrating different control system protocols into a unified interface for other systems to dock data. Combined with the data visualization system IDS, it provides intelligent data services that generate data in real-time, process data quickly, and provide immediate feedback on knowledge, further optimizing the production decision-making process. These application cases demonstrate how

Foxconn uses the industrial internet platform for data collection and analysis to achieve intelligent manufacturing and improve operational efficiency.

Firstly, through the industrial internet platform BEACON, Foxconn has achieved cloud-based management of equipment, including data collection, equipment monitoring, and intelligent analysis. This move has greatly improved equipment management efficiency, reduced maintenance costs, and extended equipment life. At the same time, through intelligent optimization of machine tuning functions, processing errors are effectively reduced, debugging downtime is decreased, labor is saved, thereby improving product quality and production efficiency.

Secondly, Foxconn has used the industrial internet platform to achieve intelligent logistics and supply chain management. For example, the independently developed ODIN system gathers inventory data through eight major functional modules and presents it visually in charts, meeting users' needs for real-time inventory information. This enables Foxconn to make accurate demand forecasting and supply planning, thus achieving intelligent logistics and supply chain management.

Lastly, Foxconn has promoted the implementation of intelligent decision-making through the industrial internet platform. The intelligent BI and IDS systems can respond to billions of data analysis requests in seconds, supporting flexible business combination analysis and arbitrary time window analysis. This helps enterprises adjust analysis reports in real-time according to changes in data analysis needs during the operation and production process, making scientific decisions.

3.4. Talent Training and Cultural Construction

Foxconn has taken various measures in talent training and cultural construction. Firstly, Foxconn Technology Group places great emphasis on the construction of corporate culture, committed to creating a positive, vibrant, and innovative working environment. Foxconn's corporate culture is based on the core values of "integrity, innovation, pragmatism, and excellence," with the purpose of "people-oriented, pursuing excellence." The company encourages employees to learn new knowledge and skills, and improves their professional capabilities and comprehensive quality through internal training and external cooperation. Foxconn is also committed to creating a competitive compensation system and comprehensive benefits, providing employees with a good working environment and development platform.

In addition, Foxconn has built a talent training mechanism for digital transformation, encouraging and incubating a group of digital transformation craftsmen to provide talent support for digital transformation and upgrading. Foxconn University, as an internal talent training and practical base of the group, won several awards in the Brandon Hall Excellence Awards for the first time, fully demonstrating Foxconn's positive efforts and fruitful results in talent training. Foxconn University adheres to the concept of spreading the group's corporate culture, business philosophy, and technological wisdom, and is committed to cultivating talents with creative ideas (Idea), innovative thinking (Innovation), internal entrepreneurship responsibility (Intrapreneurship), and entrepreneurial ambition and mission (Entrepreneurship) for the group. These measures have not only improved the personal abilities of employees but also laid a solid talent foundation for the long-term development of the enterprise.

4. Research Conclusions and Policy Recommendations

This paper, through the case analysis of Foxconn's industrial internet platform BEACON, demonstrates the key role of industrial internet in the transformation of the manufacturing industry. Foxconn's successful practice has proven that the industrial internet can not only improve production efficiency and product quality but also promote innovation in enterprise operation and service models. By constructing the BEACON platform, Foxconn has achieved automation, intelligence, and networking in the production process, creating a new industrial ecosystem that integrates key technologies such as cloud computing, the Internet of Things, big data, mobile Internet, smart factories, the Internet, and artificial intelligence. The case of Foxconn also highlights the importance of talent training and corporate culture construction in digital transformation. Through the construction of internal training and education platforms, Foxconn has cultivated a group of talents with innovative thinking and digital skills, providing strong human resource support for the long-term development of the enterprise. Furthermore, Foxconn's industrial internet practice has also promoted the intelligent management of the supply chain, enhancing the response speed and operational efficiency of the entire supply chain through data sharing and process collaboration. These achievements have not only brought competitive advantages to Foxconn itself but also provided valuable transformation experiences and references for the entire manufacturing industry.

In summary, the case of Foxconn shows that the industrial internet is an important driving force in promoting the digital transformation of the manufacturing industry. Through efforts in strategic planning, technological innovation, talent training, and cultural construction, manufacturing enterprises can achieve the leap from traditional manufacturing to intelligent manufacturing, enhancing their market competitiveness and sustainable development capabilities.

Based on the case analysis of Foxconn, we would like to raise three policy suggestions

First, strengthen the Construction of Industrial Internet Infrastructure. The government should increase support for the construction of industrial internet infrastructure, including cloud computing centers, big data centers, and network facilities, to provide stable, efficient, and secure data services for the manufacturing industry. At the same time, encourage enterprises to participate in the construction and application of industrial internet platforms, promoting the popularization and application of industrial internet technologies.

Second, promote In-depth Integration of Industry, Education, Research, and Application. It is recommended that the government, universities, research institutions, and enterprises establish closer cooperative relationships to jointly cultivate high-quality talents that meet the development needs of the industrial internet. By setting up joint research and development projects, laboratories, and internship and training bases, promote the transformation and application of scientific research results, and strengthen the technological innovation capabilities of enterprises.

Third, formulate and Improve Relevant Policies and Regulations. The government should formulate and improve policies and regulations related to the industrial internet, including data security, intellectual property protection, talent training, and incentive mechanisms, to provide a good policy

environment for the digital transformation of enterprises. At the same time, strengthen the supervision of industrial internet platforms to ensure the security and compliant use of data, protecting the interests of enterprises and consumers.

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