Impact of Digital Transformation on Corporate Value Creation: A Case of Airbus

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Abstract: In the context of the global digital economy, digital transformation has become the core path for enterprises to break through the traditional value boundary and build new competitiveness. This paper takes Airbus as the research object to explore the impact mechanism of digital transformation on the value creation of aviation manufacturing enterprises. Through case studies and literature research, it is found that Airbus has reconfigured its value chain by integrating technologies such as digital twins and the industrial Internet of Things. This integration significantly enhances its R&D agility and production efficiency and drives the company's expansion from equipment manufacturing to service ecology. The findings indicate that digital transformation enables cross-chain collaboration, optimizes resource allocation, and reshapes competitive barriers through technological empowerment, the core of which lies in the systematic reconfiguration of business processes and business models and the transformation of technological value into commercial benefits. The practice of Airbus demonstrates that enterprises need to be customer demand-oriented, balancing technological innovation and ecological synergy. This provides theoretical references for the systemic impact of the digital transformation value chain, injecting sustainable growth momentum into the core industry chain, and providing replicable strategic paths for high-end manufacturing.

1 INTRODUCTION

Under the wave of global digital economy, digital transformation has become an important engine for sustained global economic growth. Digital transformation is a strategic process of reconfiguring the core architecture of an enterprise through the integration of digital technologies, the essence of which is to develop a market-driven capacity for continuous and rapid innovation through the systematic optimisation of production processes, technologies and operations (Westerman, G et al, 2014). Therefore, enterprise digital transformation has become a key way to improve the core competitiveness of enterprises. According to McKinsey & Company's 2023 report on the digitisation of the global manufacturing industry, although more than two thirds of manufacturing enterprises have begun to implement a digital strategy, less than 20 per cent of them have achieved financial efficiency gains through the vertical integration of core technologies (McKinsey & Company, 2023). In the field of aviation manufacturing, digital transformation not only implies the intelligence of the production process and the specialisation of the management mode, but also involves the reconstruction of the value distribution matrix of the industrial chain, as well as the in-depth optimisation of the efficiency of research and development and financial efficiency, and the enhancement of user satisfaction, thus forming a new transmission mechanism between technological inputs and capital returns. As one of the two giants in the global aviation manufacturing industry, Airbus occupies an important position in the global market. Since 2017, Airbus has been comprehensively promoting digital transformation, covering a number of cutting-edge fields including smart manufacturing, artificial intelligence, quantum technology, etc., and is gradually building up a full-chain digital ecosystem from design to service. According to Airbus's annual report for 2023 (Airbus, 2024), Airbus's full-year

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revenue reached 65.4 billion euros, with digital transformation-related projects contributing about 12% of profit growth, which is representative of its effectiveness (Airbus, 2024). In addition, existing research on digital transformation in the aerospace manufacturing industry is still insufficiently analysed. Most of the cases only focus on local technology application, and lack of systematic research on the synergistic mechanism of the whole industry chain. AlNuaimi, B. K. et al (2022) stated that current digital innovation focuses more on technological tools than on systematic business model and organisational reconfiguration, which leads to a disconnect between technological inputs and corporate strategy. There is a significant lack of research on the correlation between value creation and financial metrics. Given that most existing research focuses on a single technology application and lacks a systematic exploration of the impact of digital transformation across the value chain, there is an urgent need to explore this issue through case studies. Therefore, this paper takes Airbus as the research object, adopts the method of combining case analysis and literature research, and through systematically sorting out the motives and pathways of Airbus' digital transformation and its specific mechanism of value creation, it aims to reveal the internal logic of the synergy between digital technological empowerment and corporate strategy, and to provide a double inspiration for the theoretical construction and practical application. By analysing its digital transformation system and approach, and studying the impact and effect of transformation on enterprise value creation, it provides certain inspiration and reference for the aviation manufacturing industry and similar enterprises to achieve digital transformation and healthy operation.

2 THE DRIVERS OF AIRBUS' DIGITAL TRANSFORMATION

2.1 Company Overview

Founded in December 1970 in France, Airbus is the world's leading civil aircraft manufacturer and Europe's largest aerospace company. In 2024, Airbus was ranked 183rd on the Fortune 500 list with revenues of $70.751 billion (Fortune, 2024). Its business covers aircraft design, manufacturing, supply chain management, customer service, etc., and its influence on the industry is significant. Airbus has set as its development goal to create a new chapter in sustainable aerospace and to commit to building a safe and harmonious world. By the beginning of 2024, Airbus had 147,893 employees and assets totaling US$131.2 billion (Airbus, 2024). Airbus has more than 180 locations in more than 150 countries and territories and is supported by 18,000 direct suppliers around the world, covering most of the world (Airbus, 2024).

In addition, Airbus is committed to leading the transformation and modernization of the aerospace industry to drive its continued growth. Since 2017, Airbus has been relying on advanced digital technologies to completely revolutionize the way it designs, manufactures, and operates its products (Airbus, 2024). This digital transformation extends to all levels of the company's operations, driving innovation and excellence throughout the ecosystem. The company is also actively promoting the use of digital tools to streamline workflows, increase efficiency, and completely transform traditional production methods. After the transformation, Airbus is doing well. According to the relevant data in Figure 1, although the company's operating performance declined in 2020 due to the impact of the epidemic and the global economic slowdown, it recovered quickly after the epidemic and showed a continuous and stable upward trend.

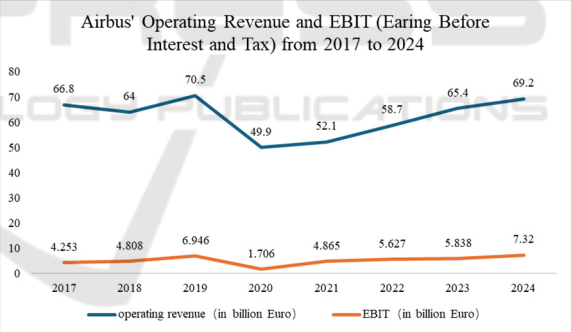


Figure 1: Airbus' operating revenue and EBIT (earing before interest and tax) from 2017 to 2024 (Airbus, 2024).

2.2 Airbus Digital Transformation Motivation

2.2.1 Industry Competition

Global competition in the aviation manufacturing industry has expanded from individual product performance to digital service capabilities across the value chain. According to Boeing's forecast, the size of the global aviation services market will exceed $14 trillion by 2041, prompting Airbus to accelerate its digital transformation to compete in emerging markets (Boeing, 2022). For example, by building the

Skywise platform, Airbus has achieved real-time monitoring of globally connected aircraft, increasing predictive maintenance accuracy to 98 percent and helping airlines reduce unscheduled downtime by a quarter (Boeing, 2022). This strategy not only consolidates Airbus' strength in aircraft manufacturing but also extends its business boundaries into a high value-added digital services ecosystem.

2.2.2 Technological Innovation

Industry 4.0 and artificial intelligence technology are driving innovation in the manufacturing process. The wave of industrial digitalization has led to the transformation of the manufacturing process system. Through the integration and application of Industrial Internet of Things and artificial intelligence technology, Airbus has realized the integration of cross-factory data chains and the intelligent iteration of production processes. It has significantly improved the efficiency of supply chain collaboration and the precision of composite material processing and built a differentiated technological competitive advantage. The digital factory can increase the efficiency of aircraft assembly by 30% and reduce the quality defect rate by 40%. It also proves that digital innovation contributes significantly to productivity improvements (Airbus, 2024).

2.2.3 Market Demand

Global air travel demand continues to recover in the post-epidemic era, with total airport passenger traffic expected to return to pre-epidemic levels by the end of 2023 (Qianqian Pendulum & Li Zhi, 2022). As a result, customer demand for lead time and customization has increased. For example, Airbus launched its "Digital Twin First" strategy to increase the response time for customized configurations to within 72 hours on the A220 program, directly supporting its premium terms in the competition for orders from Qatar Airways (Airbus, 2024). Market demand has thus redefined digital technology and opened a new chapter in the application of digital transformation to manufacturing processes and technologies.

2.2.4 Policy Compliance

In response to the European Union's (EU) sustainability needs to implement the EU's Clean Skies 2.0 framework (2021-2027), which sets dual targets for airframe weight reduction and carbon emissions, Airbus has been prompted to increase the proportion of its investment in Digital Thread technology (European Commission, 2018). The European Union Aviation Safety Agency (EASA) has mandated that aircraft manufacturers reduce fuel consumption by 50% by 2035, as outlined in the 2050 Aviation Carbon Neutral Roadmap (Royal, N. L. R., & Economics, 2024). Airbus is relying on digital twin technology to complete the ZEROe hydrogen-powered aircraft program, accelerating its goal of commercializing a zero-carbon aircraft by 2050 (Sacchi, R. et al., 2023). Consequently, a strategic alignment of digital transformation to support the EU aviation emissions reduction milestones is imminent.

3 PATHWAYS AND MECHANISMS FOR AIRBUS' DIGITAL TRANSFORMATION

3.1 Airbus Digital Transformation Pathway

Airbus is using digital technologies to revolutionize the way it designs, produces, and operates its products (Airbus, 2024). As shown in Figure 2, its digital transformation encompasses the following five different aspects of the pathway.

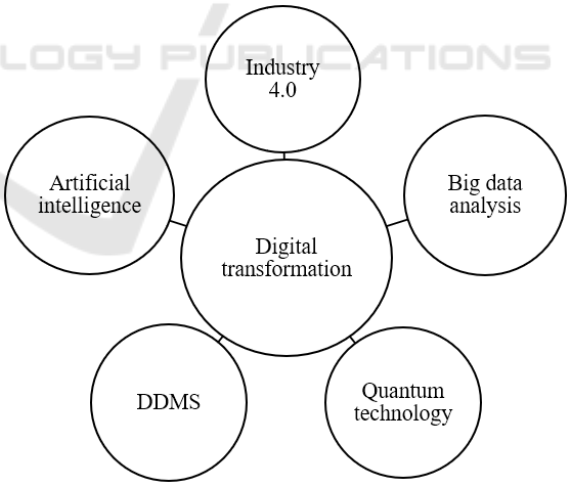


Figure 2: Airbus digital transformation relationship map (Airbus, 2024).

3.1.1 Industry 4.0

Changing market demands and customer expectations are profoundly affecting aircraft design and manufacturing. Airbus is following the pace of Industry 4.0 and exploring advanced manufacturing technologies. It is Applied the latest advanced

manufacturing technology achievements, such as robotics, virtual reality, digitalization, and 3D printing, to the factory of the future, to promote the industrial ecology towards intelligence and digitalization, and to fully open the path of digital transformation of the product lifecycle (Sigov, A.et al, 2022).

3.1.2 Artificial Intelligence (AI)

AI is at the heart of future technologies and has a profound impact on all areas of society. For Airbus, it is the key to competitive advantage. The Skywise platform, which relies on AI technology to identify potential problems and delays in a timely manner, is an innovation that is disrupting the aviation industry. The platform enables connectivity capabilities to ease real-time information propagation within the airline's digital ecosystem, applying AI and Machine Learning (ML) engineering to advance predictive and health monitoring (Bernard & Hoffmann, 2023). AI is therefore fully integrated into corporate governance to ensure responsible and sustainable technological development.

3.1.3 Quantum Technology

Quantum technology has the potential to transform the way aircraft are built and flown. Airbus fully recognizes the importance of this technology in enhancing the performance of its products and services and is using it to address complex aerospace challenges.

3.1.4 Digital Design, Manufacturing, and Services (DDMS)

The DDMS initiative, shown in Figure 3, uses end-to-end digital methods and tools to optimize business processes. The goal is to increase the capability readiness level (CRL) of various modeling and simulation functions, including multidisciplinary analysis and optimization (MDAO) capabilities (Sarda, N. et al., 2023). In addition, Airbus' use of the Dassault Systèmes 3DEXPERIENCE platform provides digital continuity from design to operations, enabling Airbus to achieve enterprise-wide digital design, manufacturing, and services (Courtney, M, 2015). This results in lower costs, faster time to market, and meets the high standards of quality, safety, and environmental performance demanded by customers (Courtney, M ,2015).

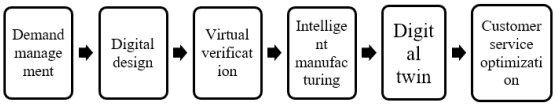


Figure 3: Airbus DDMS programme core processes and tools framework diagram (Airbus, 2024).

3.1.5 Big Data Analytics

Making the right business decisions depends on big data analytics and insights. Airbus deals with complex, unstructured data and uses advanced analytics to ensure that the right information is available to the right people at the right time to make decisions.

3.2 Mechanisms for Airbus Digital Transformation

The essence of Airbus' digital transformation is to reconstruct the value creation system of the aviation manufacturing industry by means of digital capabilities. This transformation is evident in a sequential progression from the innovation of technical tools to the enhancement of the industrial ecosystem. Through the in-depth integration of digital technology and aviation manufacturing elements, Airbus has built a value-added network throughout the entire life cycle of its products, forming a new type of competitiveness with "digital continuity" at its core. Therefore, Airbus' digital transformation is based on a three-dimensional value chain system of "digital twin, intelligent manufacturing and ecological synergy" (Figure 4).

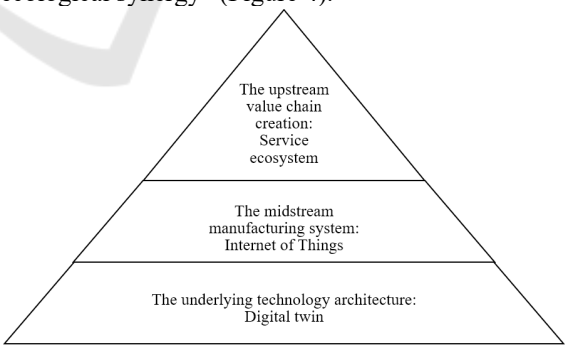


Figure 4: The three-dimensional value chain system of "Digital Twin - Intelligent Manufacturing - Eco-Collaboration" (Photo credit: Original).

At the level of the underlying technical architecture, digital twin technology constitutes the cornerstone of transformation. Airbus has extended the two-way connection between physical aircraft and

virtual models to the whole process of R&D, manufacturing, and operation, and most of the design verification process has been moved to the digital space. The A350XWB project has used the multidisciplinary collaborative simulation system to compress the development cycle of the prototype by up to 25%, which is a breakthrough marking the transformation of the aviation product R&D paradigm from physical iteration to virtual verification (Airbus, 2024). This innovative model of blending the real and the virtual has reduced the R&D cost of a single aircraft by $760 million and empowered the product to respond quickly to market demands (Airbus, 2024).

Midstream manufacturing system innovation focuses on the Industrial Internet of Things (IIoT) to reconfigure the logic of production. The 'factories of the future' in Hamburg and Toulouse are interconnected with more than 3,500 intelligent devices, capturing more than 28,000 production data streams in real time and building a dynamic scheduling system with autonomous decision-making capabilities (Airbus, 2024). Relying on this system, the total assembly efficiency of the A320 series has increased by 30 percent, setting a new industry record of one narrow-body airliner off the production line every minute (Airbus, 2024). This flexible production capacity supports Airbus in winning aircraft orders.

At the top of value creation, Airbus is breaking through the traditional boundaries of hardware sales to build a new data-driven service ecosystem. Its Skywise aviation big data platform has accessed real-time flight data from 12,000 aircraft worldwide and developed nine types of service products, including predictive maintenance and fuel efficiency optimization. Through subscription models such as 'pay by the hour,' the company's digital service revenue will reach 1.9 billion euros in 2022 (Airbus, 2024).

The deeper significance of Airbus' digital transformation lies in breaking down the physical boundaries of traditional aircraft manufacturing through digital continuity. This practice provides a triple revelation for the global high-end equipment manufacturing industry: the digital main line through is the technical premise of realizing the optimization of the whole value chain, data assetization is the key lever to break through the industrial value ceiling, and open ecological synergy is the strategic choice to cope with the challenges of the complex market.

The transformation drive mechanism is shown in Figure 5:

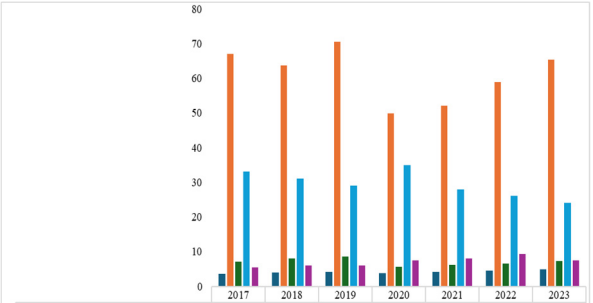
Figure 5: Airbus digital transformation mechanisms map (Photo credit: Original).

4 ANALYSES OF THE IMPACT OF DIGITAL TRANSFORMATION ON VALUE CREATION

4.1 R&D Efficiency and Costs

Airbus has gradually restructured its R&D system recently and consolidated its technological barriers with digital transformation at its core. Figure 6 shows that from 2017 to 2023, its R&D expenditure will increase from 3.68 billion euros to 4.83 billion euros, and its investment intensity (R&D expenditure as a proportion of operating revenue) will remain stable at 5-6 percent and gradually increase to more than 7 percent, which is significantly higher than the average level of the aviation manufacturing industry. This continuous investment and the deep integration of digital tools have created synergies: the introduction of the 'digital twin' technology in 2017 has enabled the design verification cycle of the A320 family of models to be compressed from 33 months in the traditional model to 24 months in 2023, resulting in significantly faster R&D efficiency and delivery (Airbus 2024). The efficiency gains also extend to production and delivery. In addition, the average aircraft delivery cycle has also been reduced from 33 months in 2017 to 24 months in 2023, according to the data, with digitalized assembly lines and predictive maintenance systems driving a return to pre-outbreak levels of capacity and delivery numbers.

Airbus has demonstrated that its R&D investment is not simply a matter of scaling up but of digitization to achieve 'precision efficiency.' This model strengthens short-term resilience (rapid recovery in operating income and cash flow) and lays the foundation for long-term technological leadership. According to the Airbus website, the proportion of digital technology-related patents has exceeded 25% (Airbus, 2024). This value creation logic of data-driven efficiency is reshaping the competitive paradigm of aviation manufacturing.



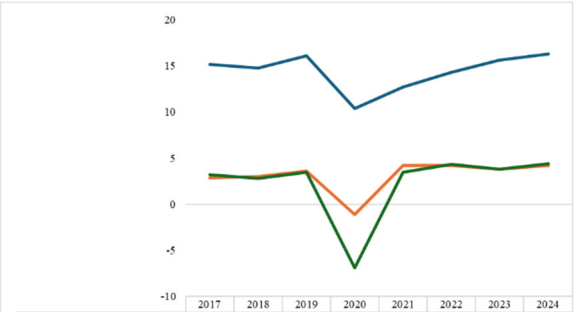
	2017	2018	2019	2020	2021	2022	2023
Research and Development Expenditure (in billion Euro)	3.68	3.91	4.16	3.71	4.23	4.55	4.83
Operating Revenue (in billion Euro)	66.9	63.7	70.4	49.9	52.1	58.8	65.4
Aircraft Delivery Quantity (unit: hundred aircrafts)	7.18	8	8.63	5.66	6.11	6.61	7.35
Average Delivery Cycle(unit: months)	33	31	29	35	28	26	24
Research and Development Intensity(%)	5.5	6.1	6	7.4	8.1	9.3	7.4

Figure 6: Airbus data on R&D efficiency and costs (Airbus, 2024).

4.2 Operations and Financial Performance

The movement of Airbus' gross margin and net profit confirms its ability to balance external shocks and management efficiency. As shown in Figure 7, Airbus' gross margin stabilized at 14-16% in 2017-2019 on the strength of delivery of high-value-added models such as the A350 and supply chain synergies. 2020 saw its gross margin plummet to an all-time low of 10.4% on the back of major factors such as epidemic shocks and idle capacity, as well as a 40% increase in the cost of raw materials such as titanium alloys. However, after 2021, through the strengthening of supply chain resilience and digital transformation of production, its operating capacity improved significantly, and its gross margin rebounded to 15.6% in 2023, reaching the pre-epidemic level.

In contrast to the volatility in gross margins, net profit and free cash flow have shown more resilience and positive development, stabilizing at around €3 billion in the pre-epidemic period. Despite a severe shock in 2020, when both were negative, an all-time low, they turned positive instantly a year later and recovered quickly to grow to record highs of over €4 billion from 2022 onwards. This phenomenon reflects the fact that digital transformation is driving Airbus to be a thriving and resilient company and a source of value creation for the company. At the same time, it is a sign that the company's digital transformation strategy is paying off.



	2017	2018	2019	2020	2021	2022	2023	2024
Gross Profit Margin(%)	15.2	14.8	16.1	10.4	12.7	14.3	15.6	16.3
Net Profit (in billion Euro)	2.9	3	3.6	-1.1	4.2	4.2	3.8	4.2
Free Cash Flow (in billion Euro)	3.2	2.8	3.5	-6.9	3.5	4.3	3.8	4.4

Figure 7: Airbus data on operations (Airbus, 2024).

4.3 Customer Satisfaction

Digital transformation significantly improves customer satisfaction by building a proactive service system, and predictive maintenance and full-process optimization form a closed loop of value. The Skywise system deployed by Airbus, based on the analysis of real-time data of 7,000 aircrafts worldwide, achieves 92% fault prediction accuracy, enabling the airline to reduce unplanned downtime by 30%, increase on-time performance by 23%, and increase customer retention rate by 15% (Airbus, 2024). The upgraded service efficiency is further reflected in the digital delivery system: the e-signing process is 70% faster, and the delivery cycle time is 22% shorter, driving incremental orders of €460 million from airlines in 2024 (Airbus, 2024). With a spontaneous overall satisfaction index of 84.9 percent, Airbus has an advantage in terms of fleet versatility, operational flexibility, training requirements, etc., and the A320's cabin comfort and width are better than that of Boeing's 737 model (Flight School USA ,2024). As a result, the digital service network established by Airbus is restructuring the customer value model of the aviation manufacturing industry through accurate insights and rapid response.

5 CONCLUSIONS

The practice of Airbus shows that the digital transformation strategy through the dual path of technological empowerment and ecological reconstruction has profoundly reshaped the logic of value creation in the aviation manufacturing industry. At the technological level, the deep integration of digital twins, the Industrial Internet of Things, and artificial intelligence has promoted the improvement

of R&D efficiency, production process optimization, and service model innovation, forming a differentiated competitive chain of 'accurate R&D - agile manufacturing - data-driven service'; on the ecological level, digital transformation has broken the industrial boundaries and built a new competitive chain based on data assets and services. On the ecological level, digital transformation has broken the industrial boundaries, built a value network with data assets as the core and multi-party collaboration, and promoted the transformation of enterprises from traditional equipment suppliers to comprehensive service providers.

In summary, the application of digital tools has the potential to drive value creation by improving operational efficiency and financial resilience. Furthermore, these tools can provide long-term power for enterprises by upgrading customer experience, sharing ecological value, and building strategic barriers. The case of Airbus demonstrates that the logic of digital transformation empowering enterprise value creation is not purely a superimposition of technology but rather lies in the systematic reconstruction of business processes and optimization of the resource allocation model, which ultimately realizes the transformation of technological dividends into sustainable business value. Its experience reveals that digital transformation is a systematic innovation of strategic thinking and business model, and enterprises need to be based on long-term value objectives, take customer demand as the traction, and deeply integrate digital capabilities into the core value chain so as to seize the first opportunity in the industrial change.

Despite the systematic exploration of the impact of digital transformation on value creation, as exemplified by the Airbus case study, the study is not without its limitations. Firstly, the research focuses on top enterprises that have specificity. As a result, the research conclusions lack universality for small and medium-sized enterprises. Secondly, the long-term economic effects and social impacts (e.g., changes in the employment structure, technological and ethical risks) of digital transformation have not yet been sufficiently discussed. Thirdly, there is insufficient empirical analysis of the value transformation paths of quantum computing and other technologies. In the future, it is necessary to expand the research on the transformation paths of enterprises in multiple industries and of different scales and, at the same time, pay attention to the impact of technological iteration on the governance model of the industrial chain, as well as the synergistic mechanism between digital transformation and the goal of carbon neutrality. The purpose of this theoretical research is to provide support for the construction of a more inclusive and sustainable transformation paradigm.

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