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Digital Transformation and Corporate Financial Performance: Empirical Evidence from Chinese Manufacturing Firms

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Abstract: *This paper empirically examines the impact of digital transformation on the financial performance of manufacturing enterprises, using Midea Group as a case study. Based on financial data from 2010 to 2024, vertical and horizontal comparative analyses reveal that digital transformation significantly improved Midea's profitability, asset utilization efficiency, short-term solvency, and operational cycle. Key strategies include: restructuring IT systems through the "632 Project" to reduce costs and enhance efficiency, optimizing supply chains and production processes via the "Dual Intelligence Strategy" and C2M model, expanding online sales channels through digital marketing, and increasing R&D investment to strengthen product competitiveness. The paper also highlights that digital transformation's effects exhibit a time lag, with initial high investments causing financial fluctuations but ultimately driving long-term value growth. This research provides practical insights for the home appliance industry and other traditional manufacturers, emphasizing the need for tailored digital strategies to achieve sustainable development.*

Keywords: *Digital Transformation, Midea Group, Financial Performance, Home Appliance Industry, Path Analysis*

1. Introduction

The rapid growth of the digital economy, driven by technologies such as 5G, the Internet, and artificial intelligence, is transforming manufacturing worldwide (Bonnet & Westerman, 2021). These technologies reshape business processes, resource allocation, and network connectivity, influencing overall performance (Urbach et al., 2017). In response to policy and market pressures, many firms have adopted digital transformation as a core growth strategy, using new technologies to foster innovation, redesign business models, enhance value, and strengthen stakeholder relationships (Li et al., 2018, 2021; Bresciani et al., 2018). While digital transformation can improve efficiency and reduce costs (Jian & Feng, 2023), implementation delays and poor strategic alignment may hinder value creation (Nylén & Holmström, 2015). The link between digital transformation and financial performance remains underexplored. Prior studies show mixed results: some report positive effects on operational efficiency and profitability (Tapscott, 2015; Chi et al., 2022), while others find limited or even negative impacts due to high costs and learning barriers (Bai et al., 2022; Hajli et al., 2015).

This paper examines the financial impact of Midea Group's digital transformation using 2010-2024 data. A vertical comparison assesses changes before and after transformation, and a horizontal comparison benchmarks performance against industry peers. Key initiatives include rebuilding the IT system through the "632 Project," adopting a sales-driven production model, implementing the "Dual Intelligence Strategy," and expanding the logistics network. These measures improved profitability, efficiency, and competitiveness. The study contributes by detailing the pathways through which digital transformation affects financial outcomes and by offering practical insights for the home appliance industry. The remainder of the paper is organized as follows: Section 2 reviews related literature and develops hypotheses; Section 3 describes the research design; Section 4 presents the result from profitability, solvency, operational efficiency, and growth analyses; Section 5 discusses impact mechanisms; and Section 6 concludes.

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2. Literature Review and Hypothesis Development

2.1 The path of Digital Transformation

Digital transformation requires a holistic upgrade across strategy, production, products, management, and marketing (Ma & Meng, 2017). It enables high-quality development by reconfiguring resources through data (Liu, 2024) and improving both internal efficiency and access to external resources (Quan et al., 2024). Successful transformation involves overcoming technical bottlenecks and building an integrated digital ecosystem to support industry consolidation (Zhang et al., 2019). Traditional industries face unique challenges, which can be addressed through three main routes: developing intelligent manufacturing chains, establishing digital platforms, and using ecosystem-based approaches to modernize industrial parks (Lv, 2019). Firms may pursue transformation by rapidly acquiring digital resources through investment or mergers and acquisitions, or by leveraging existing capabilities for gradual upgrading (Margiono, 2020). From a broader perspective, the process spans technology, organization, and environment, covering infrastructure, management reform, and adaptation to industry maturity and competitive pressure (Li et al., 2022).

2.2 Impact of Enterprise Digital Transformation on Financial Performance

Digital transformation can enhance operational efficiency, create customer value, and support economies of scale (Tapscott, 2015; Zhu & Ma, 2024). It improves financial performance by reshaping business models, manufacturing processes, and innovation capacity (Chi et al., 2022; Nwankpa & Roumani, 2016). Organizational learning and external collaboration further strengthen its positive impact (Hu, 2020). Even in the presence of redundant resources, digital initiatives can boost innovation and optimize resource allocation (Li et al., 2023). Effective use of big data is also critical for maintaining competitiveness (Serban, 2017). However, some studies report mixed or negative effects. Digital transformation can increase costs, extend learning curves, and, in some cases, depress performance or even trigger stock price crashes (Yu et al., 2024; Bai et al., 2022; Hajli et al., 2015). These findings highlight the need to balance potential gains with careful evaluation of risks and implementation costs. Based on the above analysis, I believe that digitalization has improved the efficiency of enterprise operations management and financial performance. This paper puts forward the following assumptions:

H1. Digital transformation improves ROA by enhancing operational efficiency, mediated through increased asset turnover ratio and inventory management optimization (e.g., T+3 model).

H2. Digital transformation strengthens the positive relationship between R&D investment and innovation output (e.g., patents), ultimately driving net profit growth, particularly in industries with high technological dynamism.

H3. Digital marketing strategies (e.g., omnichannel integration and precision advertising) positively impact revenue growth and customer conversion rates, with stronger effects in markets with high digital readiness.

3. Data Sources and Sample Selection

3.1 Data Sources and Measurement of Financial Performance

Financial data for Midea Group are sourced from the WIND database and annual reports (2010-2024). To mitigate survivorship bias, the study includes all available data points, even during atypical periods. This paper employs a comprehensive methodological approach combining quantitative-qualitative analysis, financial indicator analysis, and event study methodology to examine the impact of digital transformation on Midea Group's financial performance from 2010 to 2024.

3.1.1 Quantitative-Qualitative Analysis

The quantitative-qualitative analysis integrates empirical data with contextual interpretation to provide a holistic understanding of Midea Group's digital transformation. Quantitative data, including financial ratios and performance metrics, are extracted from the WIND database and Midea Group's annual financial statements. Qualitative insights are derived from corporate reports, strategic documents, and industry analyses to contextualize the numerical trends. This dual approach ensures both statistical rigor and depth of interpretation, enabling a nuanced evaluation of how digital initiatives translate into financial outcomes.

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3.1.2 Financial Indicator Method

Yang (2017) put forward the idea of building a financial performance evaluation model for commercial circulation enterprises. The model mainly focuses on four indicators: profitability, solvency, operational efficiency, and growth potential, and builds a performance evaluation system. In this paper, the indicators to measure profitability are gross profit margin on sales & net profit margin on sales, ROA & ROE, and the indicators to measure solvency are current ratio & quick ratio, debt-to-asset ratio, and debt-to-equity ratio. The index to measure operational efficiency is the inventory turnover rate, accounts receivable turnover rate, total assets turnover & current assets turnover rate, and operational cycle. The index to measure growth potential is the operating revenue growth rate and the net profit growth rate.

3.1.3 Event Study Methodology

The event study methodology is applied to analyse the financial impact of key digital transformation milestones, such as the 2013 “632 Project” launch and the 2017 acquisition of KUKA. The study period is segmented into pre-transformation (2010-2012) and post-transformation (2013-2024) phases.

3.2 Sample Selection-A Case Study of Midea Group’s Digital Transformation

Founded in 1968 as a plastics producer, Midea Group later shifted to home appliances and evolved into a diversified, technology-driven manufacturer. Its digital transformation has progressed through five stages: Digital 1.0, “Internet Plus,” Digital 2.0, Industrial Internet, and Comprehensive Digitalization.

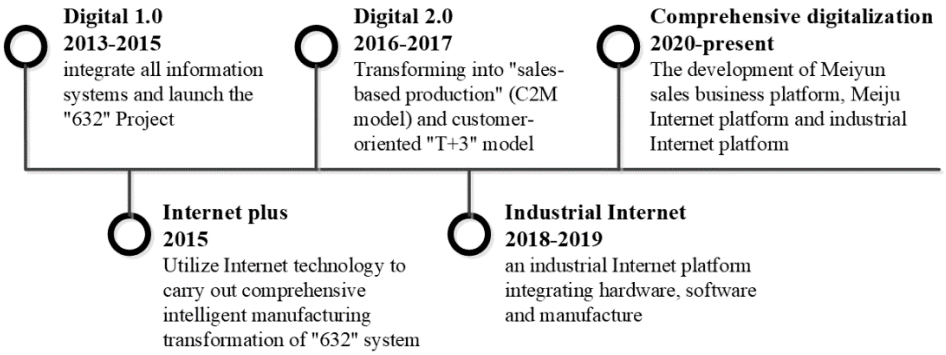

Figure 1 Digital Transformation Process of Midea Group

See Figure 1. In 2013, Midea launched the “632 Project” to rebuild its IT infrastructure, integrate departments, and develop smart factories using big data, IoT, and intelligent technologies. The 2015 “Internet Plus” stage brought increased R&D in intelligent manufacturing, partnerships in industrial robotics, and the acquisition of KUKA. In 2016-2017, the firm adopted the T+3 and C2M (sales-based production) models to reduce inventory costs, respond to demand in real time, and enhance production flexibility. By 2018, Midea entered the Industrial Internet phase, introducing IoT-enabled equipment and launching the “M.IoT” platform to link production with market demand. Since 2020, the company has pursued comprehensive digitalization, aiming to become a data-driven technology enterprise through advanced platforms such as Meiyun Intelligent Digital and the Industrial Internet 2.0 plan.

4. Analysis Results

This study examines Midea Group’s financial performance within the context of digital transformation, using data from 2013-2024. Performance is evaluated across four dimensions, including profitability, solvency, operational efficiency, and growth potential, through both longitudinal and cross-sectional analyses. The longitudinal approach captures changes before and after transformation, highlighting cumulative effects over time, while the cross-sectional comparison with major competitors (Gree Electric and Haier Smart Home) and the industry average identifies Midea’s strategic advantages and performance improvement pathways.

4.1 Profitability Analysis

4.1.1 Profitability Analysis Based on Sales Revenue

As shown in Figure 2, since 2013, Midea’s gross profit growth rate has risen steadily, driven by a

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2013 IT system overhaul that reduced raw material and labor costs, improved asset returns, and boosted profitability. The "Dual Intelligence Strategy" further lifted net profit margins, which reached 9.97% in 2015-2016, 70% higher than in 2010. In 2017, operating income and costs both grew by over 50%, but costs rose 4.8% faster, compressing margins. This was due to higher raw material prices, the KUKA acquisition, increased sales expenses, and greater R&D investment amid rising demand for smart home appliances. As a result, both gross and net margins fell compared with 2016. From 2018, profitability improved and remained stable even when the industry average declined. During the COVID-19 pandemic in 2020, Midea limited margin erosion by cutting sales expenses by 20.5% while increasing revenue. In 2023, the company achieved record-high revenue and profit under its "stable profit and drive growth" strategy. Overall, digital transformation strengthened profit stability and resilience. Comparatively in Figure 3, Gree's margins peaked in 2017 but fell due to diversification, lagged transformation benefits, and the 2020 pandemic. Haier's margins stayed relatively low, often below the industry average, reflecting cost structure and efficiency challenges.

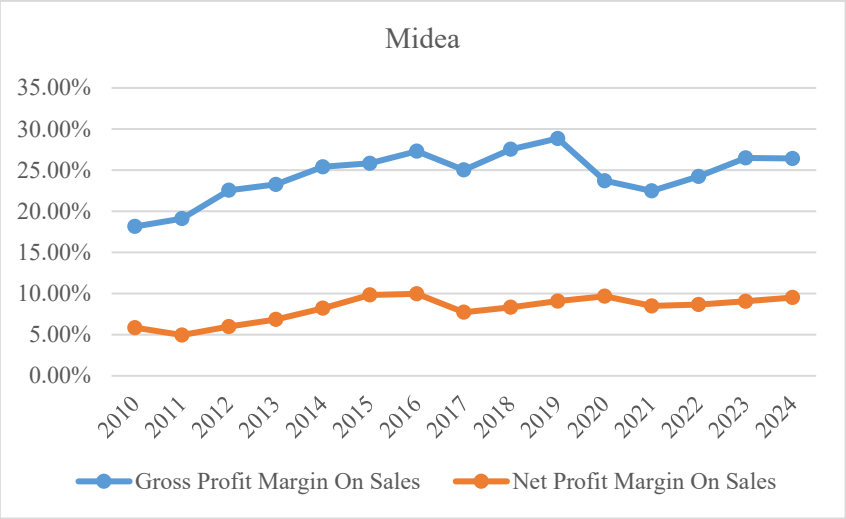

Figure 2 Midea Group's gross profit margin (%) and net profit margin (%) on sales from 2010 to 2024

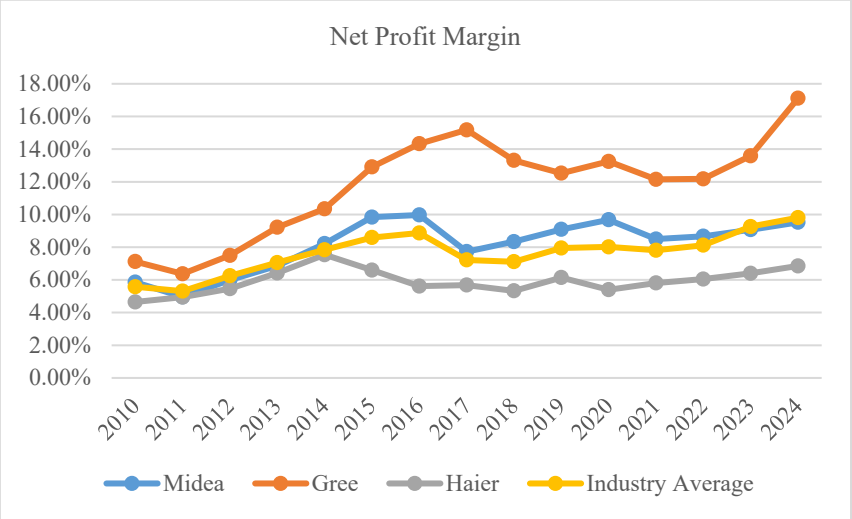

Figure 3 Net profit margin (%) compared to industry average from 2010 to 2024

4.1.2 Profitability Analysis Based on Assets

Compared with the pre-transition period, Midea's ROA and ROE improved markedly after 2013. In Figure 4, before the digital transformation, ROA fell from 10.41% in 2011 to 6.90% in 2013, but both indicators rebounded in 2012 following an IT system overhaul, cost control, organizational restructuring, and higher production efficiency. These changes directly boosted ROA by reducing costs and streamlining operations, supporting Hypothesis 1. ROA continued to rise, reaching a decade-high of 10.94% in 2015, while asset and income stability increased. From 2016, ROE growth slowed as acquisitions of KUKA and Toshiba expanded assets by over 30% for two consecutive years. In 2018,

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intense global competition dampened sales and profit growth, but Midea's ROE rose against the industry trend in 2018-2019 due to continuous product innovation, responsiveness to market demand, and brand expansion. Despite a slight dip during the COVID-19 pandemic in 2020-2021, ROE remained above 20%, consistently outperforming the industry average and indicating strong capital profitability and stable development. For comparison in Figure 5, Gree's ROE stayed near 30% from 2013-2017 but declined after 2017 as profit growth lagged asset expansion and large-scale promotions in 2019 increased costs. The pandemic in 2020 further reduced ROE, though digital supply chain management since 2020 improved procurement, inventory, and logistics, lowering costs and slightly lifting ROE by 2024. Haier's ROE was lower throughout and trended downward. Its 2015 "Human-Order Integration Model 2.0" yielded a 16.22% ROE, and subsequent cost optimizations, including integrating the value chain and reducing the selling expense ratio by 1.6% over 2022-2024, improved profitability potential.

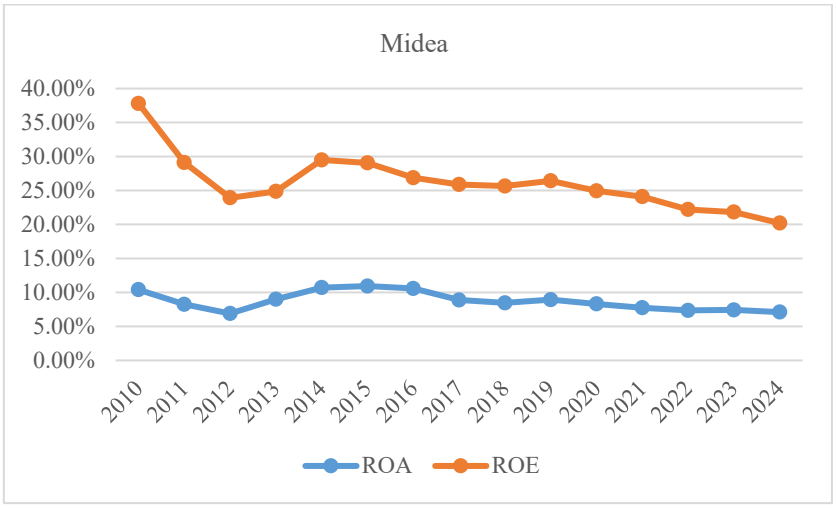

Figure 4 Midea Group's ROA (%) and ROE (%) from 2010 to 2024

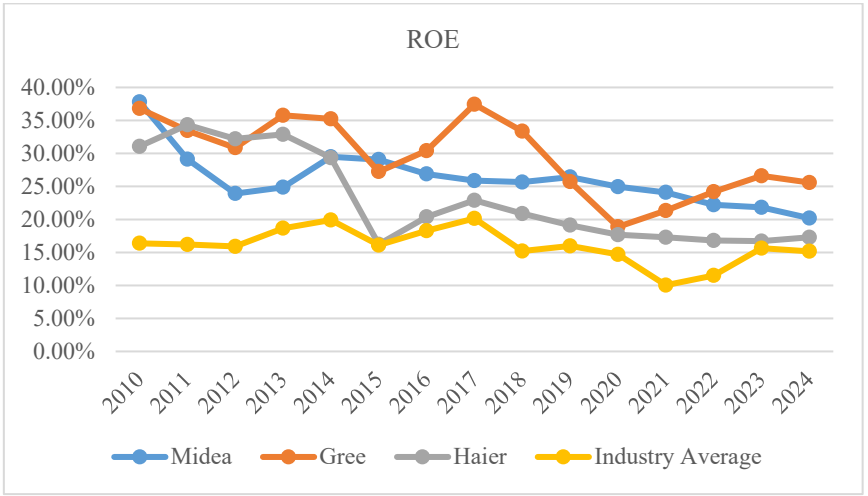

Figure 5 Return on equity (%) compared to industry average from 2010 to 2024

4.2 Solvency Analysis

4.2.1 Short-Term Solvency Analysis

The current and quick ratios are key indicators of an enterprise's short-term solvency. Before digital transformation, Midea's turnover ratio was below the industry average, though its working capital had risen steadily since 2010. Both ratios dipped slightly in 2011-2012 but began to increase following the 2012 digital transformation, driven by business model innovation and the growth of online sales, which reduced credit sales and boosted working capital. The "632 Project" further enhanced the cloud-based full value chain system, and by 2015, Midea's ratios exceeded the industry average, with the gap widening thereafter. As can be seen from Figure 6, in 2017, despite heavy spending on strategic digital M&A, raising costs to RMB 180.46 billion, up 56.09% from 2016. Both ratios remained stable, reflecting

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stronger short-term solvency. The "T+3" production model and intelligent manufacturing reduced inventory levels, improving turnover efficiency. Even excluding inventory, the quick ratio stayed above the industry average and grew steadily. The cash ratio fluctuated due to continuous R&D investment, which reduced cash reserves. In 2019, the current ratio fell from 1.50 to 1.12 and the quick ratio from 1.28 to 0.91, as Midea invested heavily in its industrial internet platform, increased safety stock to mitigate chip shortages, and took on more short-term borrowings, which reached RMB 31.01 billion in 2024 due to M&A. Despite industry downturns and the pandemic, Midea's turnover ratio remained relatively strong, indicating that digital transformation enhanced financial resilience and solvency. In comparison presented in Figure 7, Gree's ratios have trended upward since its 2018 digital transformation, though remaining slightly below Midea's. Growth slowed in 2021 but rebounded slightly by 2024, suggesting better liquidity management. Haier's ratios declined after 2018, with its quick ratio consistently below Midea's, as frequent M&A and debt financing raised short-term liabilities. While its quick ratio fell in 2021, Haier redirected idle funds into manufacturing systems and smart factories, generating additional returns.

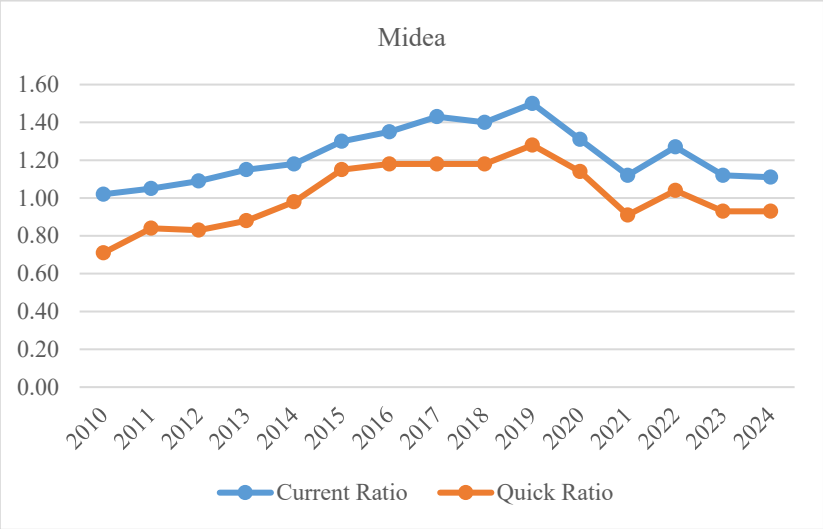

Figure 6 Midea Group's current ratio and quick ratio from 2010 to 2024

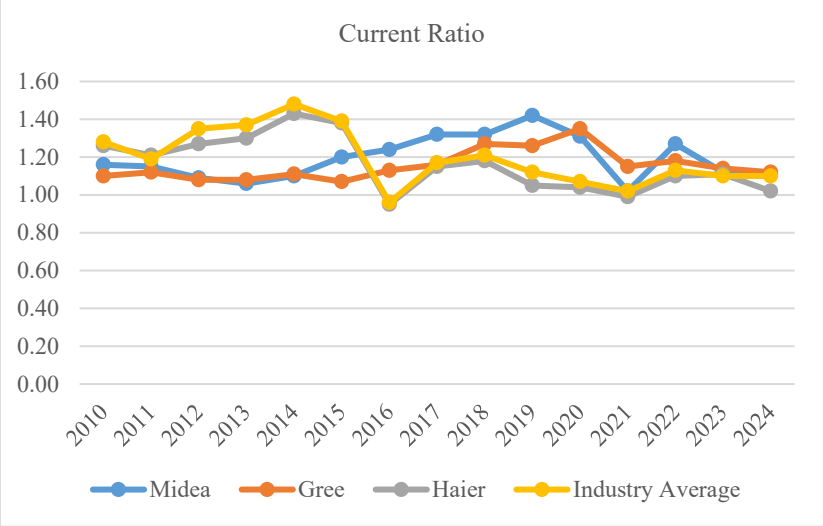

Figure 7 Current ratio compared to industry average from 2010 to 2024

4.2.2 Long-Term Solvency Analysis

The debt-to-asset ratio reflects the extent to which a company relies on creditor funds for operations and is an important measure of long-term solvency. As shown in Figure 8, Midea's ratio declined from 2011 to 2015, particularly after the 2012 acquisition of Little Swan, which reduced debt and increased shareholder equity. However, between 2015 and 2017, large-scale bank loans, bond issuances, and multiple M&A caused long-term liabilities to surge, pushing the ratio to nearly 70%, above the industry

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average. This heightened debt risk, strained capital flow, and limited financing capacity. The KUKA acquisition further amplified leverage. From 2018 to 2024, as digital transformation matured, the ratio stabilized at around 65%. While capital structure adjustments and asset growth improved solvency, the company remained in a high-debt, high-risk position, indicating that digital transformation had only a limited effect on long-term debt reduction. Midea still needs to optimize its capital mix, balance debt and equity, and maintain financial stability to lower debt risks. Over 2010-2024, Midea's ratio stayed relatively high, reflecting significant reliance on debt financing. By leveraging suppliers' funds, the company strengthened its position in the industry chain and used financial leverage to enhance profitability, suggesting that high debt levels have not translated into severe financial distress. In contrast, Gree's ratio remained stable from 2013 to 2016 but declined after 2017, reaching 58.14% in 2020 following its 2018 digital strategy, indicating improved long-term solvency. The ratio rose again from 2021 due to substantial investments in 5G and smart factories, increasing short-term debt risk but potentially supporting long-term growth. Haier's ratio dropped from 67.23% in 2013 to 59.19% in 2024, reflecting tighter debt control. The decline in 2021-2022, which kept the ratio below Midea's, resulted from business model innovation, new product development, and market expansion, boosting cash flow and debt management capacity.

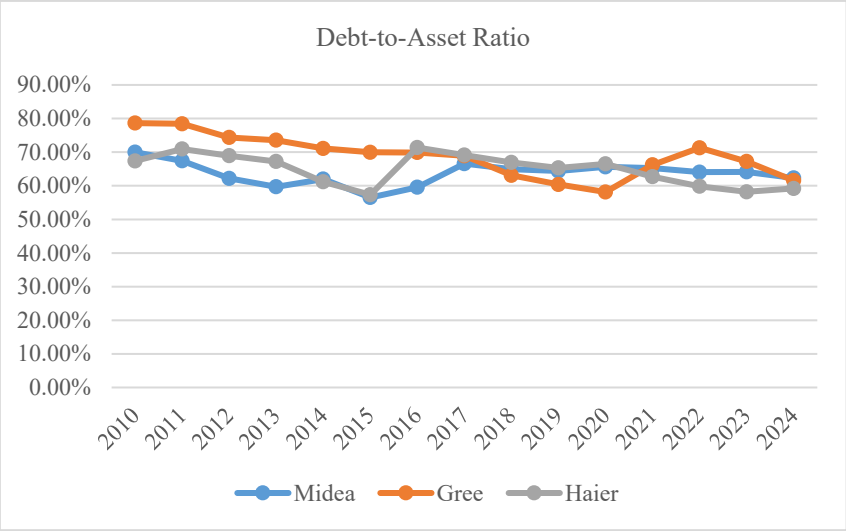

Figure 8 Debt-to-asset ratio from 2010 to 2024

4.3 Operational Efficiency Analysis

4.3.1 Inventory Turnover Rate Analysis

Since 2012, Midea Group has adopted a "production based on sales" model, reducing inventory pressure through omnichannel transparency and automated system adjustments. The integration of online and offline inventory sharing avoided stockouts in online channels and overstock in offline warehouses during peak seasons, accelerating inventory turnover. As shown in Figure 9, the turnover ratio rose from 5.35 in 2012 to 8.87 in 2016, surpassing the industry average. The "T+3" model and digital inventory management further enhanced asset turnover, supporting Hypothesis 1. From 2013 to 2016, inventory value remained around 15 billion yuan but later compressed to about 10 billion during the domestic economic downturn, naturally boosting turnover. However, in 2017, severe inventory backlog led to a drop in the ratio. Between 2020 and 2024, the turnover ratio fell from 6.50 to 5.07, as Midea increased safety stock in response to the chip shortage and rising raw material prices, shifting its focus from "reducing inventory" to "ensuring supply." The introduction of high-value, long-cycle smart home products also contributed to the decline. Overall, digital transformation has enabled Midea to control inventory effectively while expanding sales, reducing operational risks and maintaining an industry-leading position. Compared with peers, Midea's inventory turnover consistently outperformed Gree and Haier, even during the COVID-19 pandemic. Gree's ratio rose sharply in 2014 with the launch of "Gree Mall" but declined steadily after 2018, falling below 5 times by 2024 due to diversification into low-performing product lines and pandemic-related disruptions. Haier's ratio dropped from a higher level in 2010 to 4.92 in 2024. Despite efforts in 2017 to integrate online and offline channels and adopt smart manufacturing, the persistent decline, further affected by raw material shortages and production halts during the pandemic, indicates the need for deeper digital transformation to improve asset efficiency.

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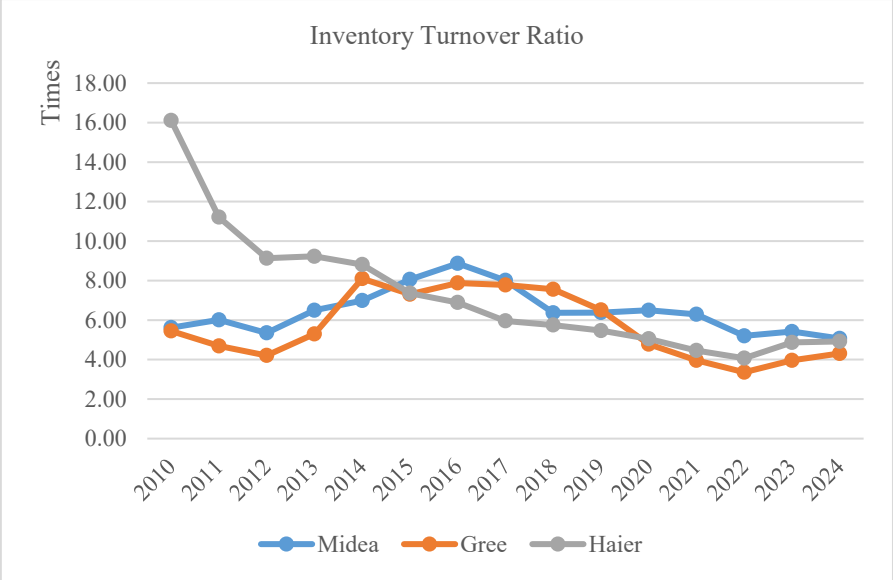

Figure 9 Inventory turnover ratio (Times) from 2010 to 2024

4.3.2 Accounts Receivable Turnover Rate Analysis

As shown in Figure 10, since the digital transformation in 2016-2017, the adoption of omnichannel digital marketing and a pay-before-delivery strategy effectively avoided credit sales risks, boosting profits and increasing accounts receivable. The introduction of Meiyun's intelligent operations further improved efficiency, shortened delivery cycles, and accelerated payment collection. In 2018 and 2019, net accounts receivable rose in line with sales revenue growth, yet the turnover ratio remained stable due to the combined effect of digital marketing and intelligent operations. Overall, Midea improved accounts receivable liquidity, easing working capital pressure and enhancing short-term solvency. From 2010 to 2024, Midea's accounts receivable turnover ratio stayed relatively stable, with only a slight dip in 2012 before rebounding, reflecting effective receivables management and steady cash recovery. In contrast, Gree maintained a higher turnover ratio from 2010 to 2014, but it fell sharply after 2015 due to overexpansion, delayed collection from online sales, and dealer stockpiling, which increased operational risks. Haier's ratio declined steadily from 2010 to 2024, as internal and external challenges slowed collection and weakened credit quality, raising the risk of bad debts.

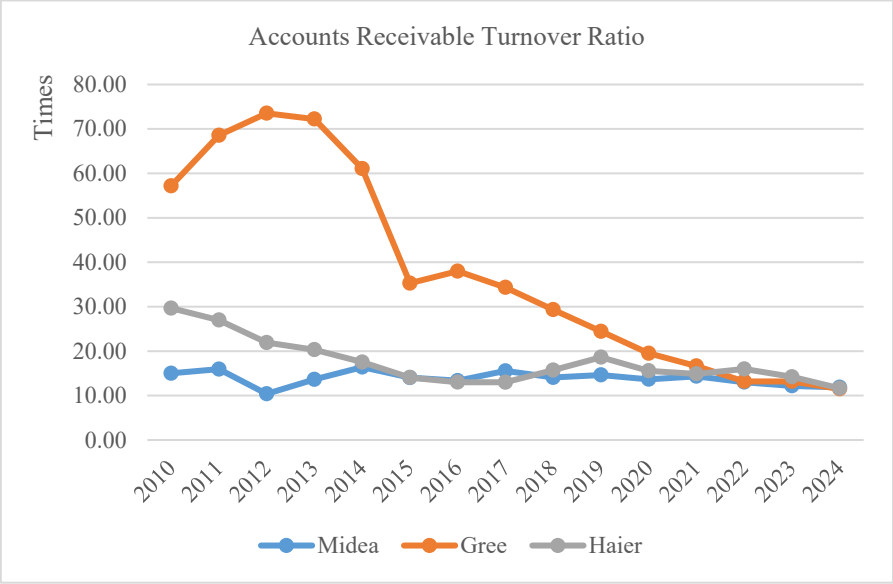

Figure 10 Accounts receivable turnover rate (Times) from 2010 to 2024

4.3.3 Assets Turnover Rate Analysis

Judging from Midea Group's total asset turnover, the rate has gradually slowed, though overall asset

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utilization remains strong. As shown in Figure 11, the first fluctuation occurred in 2013 at the start of digital transformation. In 2016-2017, both sales revenue and asset scale rose sharply, with revenue growth outpacing asset expansion, leading to the second fluctuation. However, the total asset turnover dropped from 1.02 in 2018 to 0.75 in 2024. Between 2017 and 2019, asset scale growth slowed but utilization did not improve, suggesting underuse of some assets, particularly financial rather than operating assets. Significant investments of over 20 billion yuan from 2020 to 2024 in industrial internet platforms and smart home products have long payback periods, leading to a short-term decline but laying the groundwork for long-term value once returns materialize. As shown in Figure 11, Gree Electric's turnover ratio is lower than Midea's and shows a downward trend. An initial rise in 2018 followed improvements in intelligent mold design and production, but the economic slowdown from 2019, weak domestic demand, and inventory backlogs drove it down. Heavy R&D and intelligent manufacturing investments added non-current assets without immediate output, further suppressing the ratio, while the pandemic intensified the decline. Haier Smart Home's turnover ratio, though higher in 2010, fell steadily to 2024. Current asset turnover remained stable from 2018 to 2022, reflecting digital transformation benefits, but the overall downward trend suggests room for improvement in asset management efficiency.

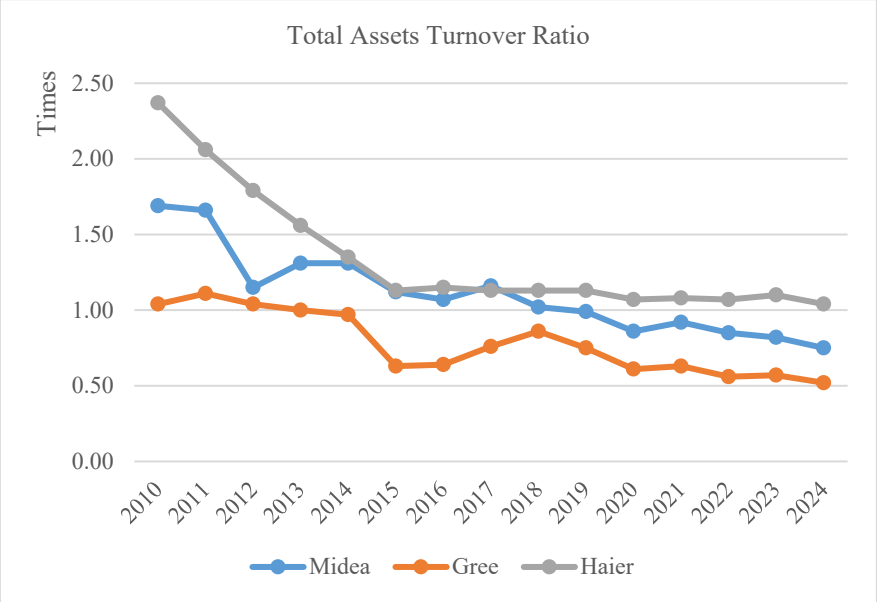

Figure 11 Total assets turnover rate (Times) from 2010 to 2024

4.4 Growth Potential Analysis

4.4.1 Analysis of Operating Revenue Growth Rate

As shown in Figure 12, from 2013 to 2014, the end of the government subsidy policy shifted consumer demand toward high-end home appliances. Leveraging its online channels and ongoing product development, Midea expanded its market share, with operating income growth exceeding 15% for two consecutive years. In 2015, global economic volatility and a domestic slowdown led to a revenue decline. In 2016, product upgrades and new launches restored growth, and in 2017, the acquisition of KUKA added robotics and automation, driving a 51% increase in operating income. In 2018, growth slowed sharply as the Chinese home appliance market moved from expansion to saturation and business integration after KUKA proved less effective. Weak global demand in the automotive and electronics sectors further pressured revenue. From 2020 to 2024, operating revenue rose from 284.22 billion yuan to 409.12 billion yuan, with growth accelerating from 2.16% to 9.44%. The main driver was the expansion of the smart home ecosystem. By 2024, the Meiju APP had over 60 million registered users, the IoT platform connected more than 100 million devices, and shipments of smart-enabled products exceeded 60 million units. Revenue from the smart home business reached 209.5 billion yuan, or 66.2% of total revenue. These results show that product innovation, channel optimization, and mergers and acquisitions, underpinned by digital transformation, drove sustained growth. In comparison, Gree Electric recorded negative revenue growth in 2015 due to weak cost control and reduced margins from its "Billions in Benefits" campaign. After peaking in 2017 during supply-side reform, revenue fell again in 2020 with the COVID-19 outbreak but rebounded as conditions improved. Haier Smart Home maintained steady growth through overseas brand building and high-end positioning. In 2021, overseas

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revenue surpassed domestic sales. Despite weaker overseas demand in 2024, revenue reached 285.981 billion yuan, up 4.29% from 2023, with overseas growth continuing to outpace domestic performance.

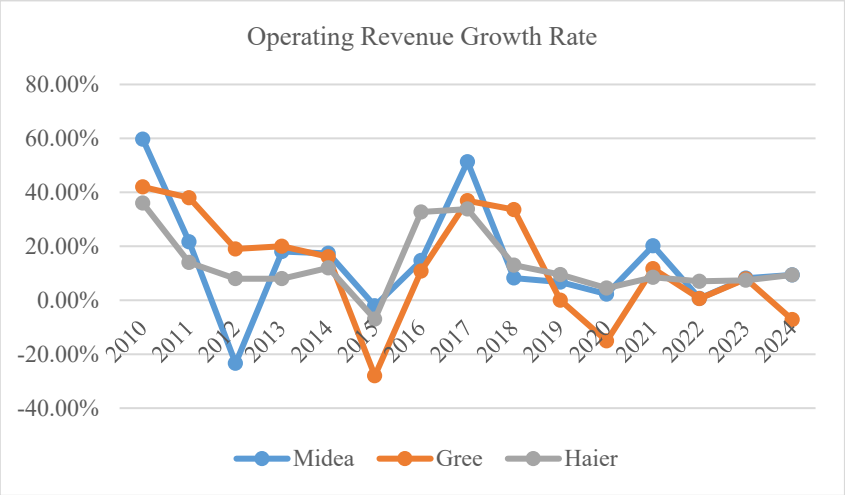

Figure 12 Operating revenue growth rate (%) from 2010 to 2024

4.4.2 Analysis of Net Profit Growth Rate

As shown in Figure 13, since 2013 Midea's net profit has grown by about 2 billion yuan annually. After 2015, growth stabilized at 16-17%, indicating saturation in traditional business segments and driving the company toward digital transformation. Between 2015 and 2017, the acquisition of KUKA expanded into robotics and automation, diversified the business portfolio, optimized income structure, and strengthened profitability. In 2020, higher raw material costs and the COVID-19 pandemic slowed profit growth. From 2020 to 2024, the growth rate formed a "U" shape, falling from 17.33% to 2.74% before recovering to 14.85%, reflecting the lag between investment and returns. By 2024, robotics R&D began yielding results: KUKA's domestic industrial robot market share reached 8.2%, sales and orders grew, and overseas operations generated over half of their revenue abroad, significantly boosting group profits. From 2010 to 2024, the three companies followed different paths. Midea maintained the most stable growth, with its early digital transformation pushing net profit growth close to 40% in 2014 and sustaining positive results during both the 2015 industry downturn and the 2020 pandemic. Gree saw sharp swings, peaking at 44.99% in 2017 before falling to -10.28% in 2020 due to inventory adjustments and strategic transitions; its 2018 digital push lifted revenue by 33.33% but profits stabilized only from 2021. Haier's performance was more moderate. After 2019, profit growth outpaced revenue growth through premium branding and scenario-based sales, though fluctuations occurred in 2013-2014 and 2016-2017. Despite pandemic pressures in 2020, Haier avoided negative growth, and rising overseas revenue supported a 5% increase in 2024. Overall, Midea's early digitalization and supply chain resilience ensured stability, Gree's volatility reflected transitional costs, and Haier's dual-track strategy improved consistency but still lagged behind Midea.

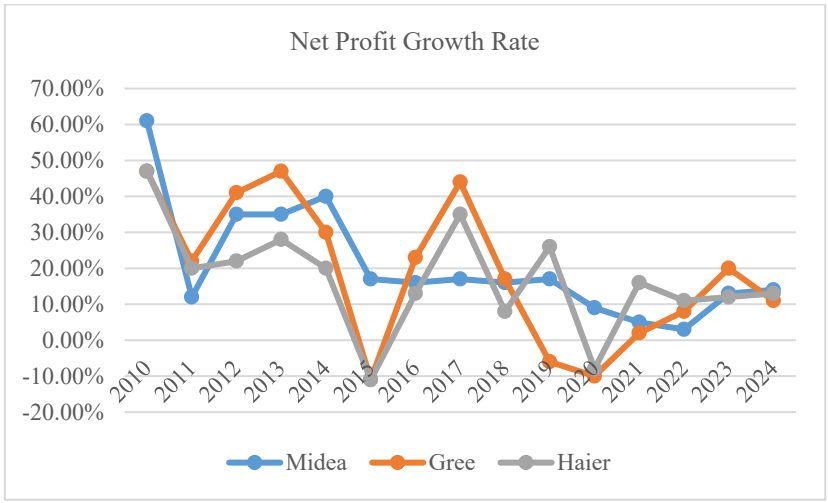

Figure 13 Net profit growth rate (%) from 2010 to 2024

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5. The Impact Path of Digital Transformation on Enterprise Performance

5.1 Digital Marketing Promotes Online Sales

In today's digital economy, rapid growth in e-commerce, the widespread adoption of multimedia and online shopping applications, and ongoing innovation in China's consumer market present both opportunities and challenges. Midea Group strengthened its cooperation with platforms such as Tmall and JD.com and launched its own "Midea Official" Mall in 2014. These initiatives expanded its online sales channels, captured market share, and supported sustained sales growth. By leveraging digital marketing, targeted advertising, data analytics, and customer profiling, Midea enhanced engagement, improved conversion rates, and increased customer satisfaction. Customers benefited from convenient ordering and service access, fostering closer interaction between the company and its user base. This interaction facilitated the implementation and promotion of the C2M (customer-to-manufacturer) model, enabling more personalized product offerings. Through the integration of online sales channels and precision marketing, Midea successfully expanded its market reach, attracted new users, and strengthened brand awareness and loyalty. The effectiveness of targeted digital engagement reinforces Hypothesis 3. Digital transformation has enabled smoother, more personalized customer interactions, creating opportunities for Midea to refine its digital strategy and internet marketing approach. Looking ahead, the company can further optimize its digital marketing by enhancing user experience, deepening data analytics, and offering more customized services, thereby maintaining its competitive advantage.

As shown in Figure 14, the proportion of Midea's online revenue to total revenue rose steadily from 5.94% in 2013 to 65.76% in 2024. According to Midea's annual report, its total online sales exceeded 86 billion yuan, ranking first among all home appliance categories. This upward trend demonstrates that digital transformation has been a key driver in the expansion of online channels and improvement in corporate performance, with e-commerce partnerships and precision advertising serving as important contributors, consistent with Hypothesis 3.

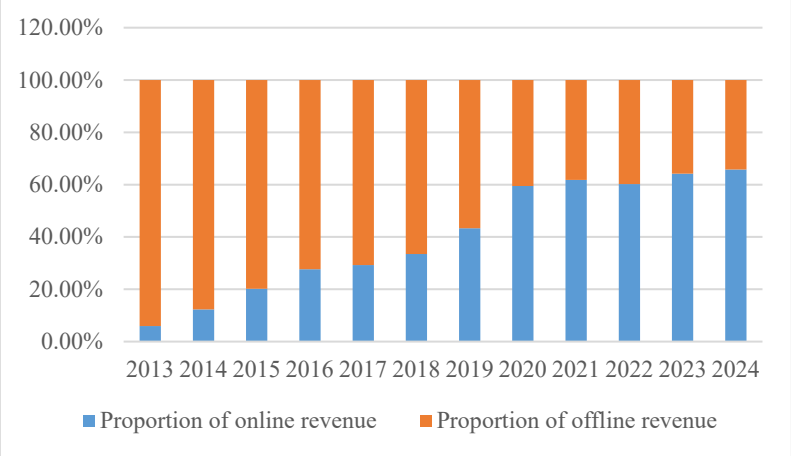

Figure 14 The proportion of online income and offline income to total income of Midea Group in 2013-2024

5.2 R&D to Enhance Product Competitiveness

Midea Group leverages digital technology to integrate consumer and industry information, accurately forecast market demand, and embed advanced technology into product research and development, thereby enhancing product quality and securing a competitive advantage. Since initiating its digital transformation in 2012, the company has adhered to independent R&D as a core strategy, increasing investment, driving product innovation, improving innovation efficiency, and sustaining its leading market position.

As shown in Figure 15, in 2016 Midea established a "4+2" R&D network. The second level consists of divisional R&D platforms and the Academia Sinica, while the fourth level encompasses product development, individual technology research, common technology, and cutting-edge technology research. Product development at the divisional level focuses on short-term projects, typically completed within one year. Individual technology research requires two to three years, serving as a reserve for subsequent medium-term to long-term innovation. The common and cutting-edge technology research conducted by

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the Academia Sinica forms the core of Midea's R&D system, covering consumer appliances, HVAC equipment, robotics, industrial automation, and modern logistics. The interlinked structure across all levels ensures that R&D inputs are effectively translated into innovation outputs.

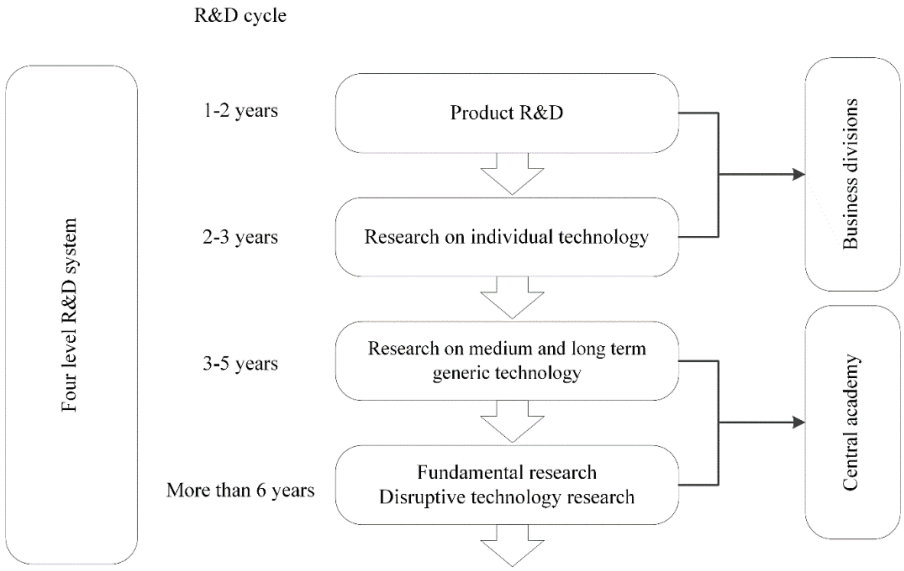

Figure 15 Midea Group's four-level R&D system

Source: Midea Group's 2016 Social Responsibility Report

As shown in Table 1, Midea Group's R&D personnel and investment have grown steadily. The number of R&D staff increased from 6,258 in 2013 to 23,693 in 2024, more than tripling, with the proportion of R&D personnel in the workforce also rising. R&D investment expanded from 3 billion yuan in 2013 to 16.23 billion yuan in 2024, with R&D intensity fluctuating between 2.48% and 3.99% over the period. In 2019, the company achieved significant scientific research results, with 12 projects winning the Science and Technology Progress Award of the China National Light Industry Federation. Notably, 25 achievements, such as the "research and industrialization of key technologies of human perception and interaction of room air conditioners", which were recognized as "international leading." In 2024, Midea filed over 1,500 patent applications, obtained nearly 400 invention patents, and received the 24th China Patent Excellence Award. These outcomes demonstrate how digital transformation has driven higher R&D investment, producing tangible innovation outputs such as patents, thereby supporting Hypothesis 2.

Table 1 2013-2024 Midea Group's R&D Personnel Numbers, R&D Expenses

Year	Number of R&D Personnel	Proportion of R&D Personnel	R&D Expense Amount (in Billions of Yuan)	Proportion of R&D Investment in Operating Revenue
2013	6258	5.74%	30.00	2.48%
2014	6917	6.40%	45.30	3.20%
2015	8672	9.30%	52.62	3.80%
2016	8741	9.07%	60.46	3.80%
2017	10520	10.33%	85.00	3.53%
2018	12321	10.74%	98.11	3.78%
2019	13727	10.18%	96.38	3.46%
2020	15265	10.23%	101.19	3.56%
2021	18105	10.92%	120.15	3.52%
2022	20782	12.50%	126.19	3.67%
2023	23242	11.69%	145.83	3.92%
2024	23693	11.94%	163.24	3.99%

Source: According to the annual report of Midea Group

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5.3 Flexible Manufacturing to Reduce Costs and Increase Efficiency

Digital transformation enables enterprises to optimize production and operate intelligently by applying advanced production technology, information systems, and efficient digital tools such as cloud platforms. These tools help reduce costs and improve operational efficiency. Guided by market demand, Midea Group adopted the "T+3" customer order production and sales model, which drives the supply chain, production, and resource allocation based on customer orders. This approach streamlines intermediate processes, optimizes sales channels, enables online order handover, and improves both efficiency and cost control. The result is a more flexible manufacturing model and stronger market competitiveness. Looking ahead, Midea plans to further expand the application of digital tools, deepen value chain management, optimize production processes, and enhance both efficiency and product quality to meet market demand, sustain its digital transformation, and maintain long-term competitiveness.

As shown in Table 2, Midea Group's cost-expense ratio fell from 93.03% in 2013 to 85.44% in 2024, indicating a significant long-term decline. After its listing in 2013, the company's sales scale expanded rapidly, accompanied by a sharp rise in both revenue and costs. Digital transformation subsequently improved organizational efficiency, optimized supply chain and inventory management, and successfully reduced the cost-expense ratio, supporting sustainable growth. Exceptions occurred in 2017, when raw material costs surged by 35.72% and overseas expansion to acquire advanced technology raised expenses, and in 2020, when the pandemic disrupted the industry and increased costs. Nevertheless, except for these years, the ratio maintained a downward trend, and by 2020 it was around 10 percentage points lower than in 2013. This confirms that digital transformation has played a key role in lowering costs and improving financial performance, even as overseas market development and industry changes occasionally caused short-term increases.

Table 2 Midea Group's Cost and Expense Ratios (in Billions of Yuan)

Year	Operating Revenue	Operating Costs	Selling Expenses	Administrative Expenses	Financial Expenses	R&D Expenses	Cost and Expense Ratios
2013	1209.75	928.18	124.32	67.33	5.64	0.00	93.03%
2014	1416.68	1056.70	147.34	74.98	2.51	0.00	90.46%
2015	1384.41	1026.63	148.00	74.42	1.39	0.00	90.32%
2016	1590.44	1156.15	176.78	96.21	-10.06	0.00	89.23%
2017	2407.12	1804.61	267.39	147.80	8.16	0.00	92.56%
2018	2596.65	1881.65	310.86	95.72	-18.23	83.77	87.42%
2019	2782.16	1979.14	346.11	95.31	-22.32	96.38	86.20%
2020	2842.21	2128.40	275.22	92.64	-26.38	101.19	86.90%
2021	3412.33	2645.26	286.47	102.66	-43.86	120.15	87.64%
2022	3439.18	2605.39	287.16	115.83	-33.87	126.19	86.49%
2023	3720.37	2734.81	348.81	134.77	-32.62	145.83	85.63%
2024	4091.15	2996.24	387.50	145.11	-33.29	162.30	85.44%

Source: According to the annual report of Midea Group

6. Research Conclusions

Based on Midea Group's financial data from 2010 to 2024, this study analyses the impact of digital transformation on its financial performance and summarizes the successful transformation path, offering valuable reference for the industry. The findings indicate that digital transformation has significantly enhanced operational efficiency and financial performance. Through the "632 Project", Midea reconstructed its IT system, standardized data management, eliminated information silos, strengthened cross-departmental coordination, and optimized manufacturing and operational processes. By adopting the C2M model, the company achieved flexible production and rapid delivery, substantially reducing procurement and unit costs. Under the "Dual Intelligence Strategy", Midea successfully developed digital products and smart home solutions, expanding market share. In addition, digital tools were applied to extend the logistics network, optimize distribution channels, and strengthen customer engagement, thereby driving sales growth. Overall, digital transformation has improved synergy across operations, optimized the supply chain, and enhanced product development capabilities.

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Financially, the early stage of digital transformation was accompanied by a temporary decline in return on assets due to the lag in returns from long-term investments. However, over time, it stabilized asset utilization efficiency, supported net profit growth, and improved short-term solvency. Digital initiatives shortened the operational cycle, improved efficiency, and demonstrated strong growth potential. Through marketing reform, R&D innovation, flexible manufacturing, and process optimization, such as establishing online sales channels, implementing a "4+2" R&D system, adopting the "T+3" production-marketing model, and reconstructing internal information systems. Midea significantly enhanced both efficiency and competitiveness.

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