Research on the Digital Transformation Path and Performance of BAIC from the Perspective of Resource Orchestration

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Abstract. Based on the resource orchestration theory, this study takes BAIC (Beijing Automotive Group Co., Ltd.) as a case and uses the grounded theory to explore its digital transformation path and its impact on corporate performance. Performance analysis shows that the investment in the initial stage of transformation leads to pressure on short-term profitability, but operational capacity continues to improve; non-financial performance has been significantly enhanced, with R&D investment increasing substantially, multiple national-level intelligent manufacturing certifications obtained, and market position strengthened. Comprehensive results indicate that resource orchestration effectively drives digital transformation, but it is necessary to strengthen industry-university-research cooperation, customer orientation, and resource synergy management to cope with performance fluctuations in the initial stage of transformation and achieve sustainable value creation. This study reveals the dynamic evolution mechanism of the resource orchestration theory in the digital transformation of the automotive industry, providing certain reference value for the digital practice of the manufacturing industry.

Keywords: Digital Transformation, Resource Orchestration, Corporate Performance

1. Introduction

Under the background of the "14th Five-Year Plan", intelligent manufacturing and green manufacturing promote the high-quality development of the manufacturing industry, and the digital economy has become the core driving force. China has actively promoted digital industrialization and industrial digitalization, and accelerated the integration of digital technology with the real economy. The scale of the digital economy reached 53.9 trillion yuan in 2023, and the digital transformation of the manufacturing industry is particularly crucial, where state-owned enterprises should play a pillar role. As a pillar of the national economy, the automotive industry must undergo digital transformation for high-quality development. As a backbone of the industry and a leading enterprise in digital transformation, BAIC relies on the "9211" top-level design to empower the "High-tech, Specialized, and Characteristic" strategy and play a vanguard role. The resource orchestration theory provides a new perspective for digital transformation through the path of "structuring-capabilization-leveraging", but its adaptation research in the transformation context is

still insufficient. Based on the perspective of resource orchestration, this paper deeply analyzes the impact of BAIC's digital transformation on corporate performance, aiming to enrich the research on this theory in the digital transformation of the automotive industry.

2. Literature review

2.1. Digital transformation

Internal and external factors jointly drive enterprises' digital transformation. External drivers mainly include: McKinsey points out that the expansion of the digital economy scale forces the deepening of transformation [1]; Li Xiaohua emphasizes that the intensification of global digital competition and national policy support are key driving forces [2]. Regarding the implementation path, Peter proposes a three-stage framework: digital asset confirmation and evaluation, technology-driven organizational restructuring, and digital strategic planning [3]. Zhao Lijin constructs a three-stage evolution model: the technology-led stage focuses on outsourcing and introduction, the customer-led stage moves towards mergers and acquisitions and market-driven development, and the ecosystem-led stage emphasizes independent innovation and collaborative upgrading, reflecting a strategic leap from efficiency improvement to value reconstruction [4].

2.2. The impact of digital transformation on corporate performance

Academic circles mainly hold two views on the impact of digital transformation on corporate performance: positive correlation and "U"-shaped relationship. Most studies support the positive correlation, believing that digital transformation improves corporate performance by optimizing internal governance and enhancing innovation capabilities. For example, based on data from A-share listed companies, Yi Luxia et al. point out that digital transformation can promote product performance growth [5]; Li Wen et al. confirm that digital technology capabilities have a positive effect on manufacturing performance [6]; Zhang Hanyu also finds that the application of digital technology significantly improves enterprises' financial and market performance [7]. Another view holds that the two present a "U"-shaped relationship. Research by Liang Linna et al. shows that the initial stage of digital transformation may lead to a short-term decline in financial performance, but with the continuous deepening of transformation, performance will gradually recover and achieve long-term growth [8].

2.3. Resource orchestration and digital transformation

The essence of enterprises' digital transformation is the integration, allocation, and optimization of resources, which is highly consistent with the resource orchestration theory. Sirmon et al. point out that resource orchestration emphasizes the identification, acquisition, integration of resources and capability building, providing a basis for dividing the stages of digital transformation [9]. Chen Dongmei et al. believe that strategy and resources are the core driving forces of digital transformation, and static resources are no longer sufficient to maintain competitive advantages [10]. Su Jingqin proposes that digital capabilities evolve from technical capabilities to reuse capabilities, and resource orchestration also shifts from integrated and self-consistent types to decoupled and external-exploitation types [11]. Zhang Zhengang emphasizes the interdependence between digital empowerment and platform value creation [12], and Zhang Zhipeng et al. point out that digital technology can reconstruct the resource orchestration process, helping enterprises accurately match resources with demands and transform innovation capabilities into market advantages [13].

Empirical research by Wang Yuxia et al. shows that digital transformation significantly promotes the innovation efficiency of industrial enterprises by improving resource integration capabilities [14].

3. Drivers of BAIC's digital transformation

3.1. Improving production efficiency and reducing costs

BAIC's digital transformation optimizes production processes and improves efficiency: the digital platform enables precise production scheduling, realizes component visibility, shortens the delivery time of customized trucks, and reduces the logistics damage rate; digitalization empowers detailed management and reduces costs.

3.2. Promotion by policies and strategic goals

National policies promote BAIC to accelerate the R&D of new energy technologies and industrial chain collaboration through digitalization. BAIC responds to the Beijing-Tianjin-Hebei integration strategy, drives local suppliers, and optimizes the supply chain layout. BAIC's "Three-Year Leap Plan" aims to achieve a total vehicle sales volume of over 3 million units by 2027, with new energy vehicles accounting for more than 50%, and digital transformation is an inevitable path to achieve this goal.

3.3. Pressure from market competition and brand upgrading

To cope with competition in the same industry, BAIC needs digital transformation to enhance product competitiveness. The brand renewal strategy has prompted the acceleration of digital transformation, and digital services are the key to brand value transmission. BAIC's net profit margin is low, and it is necessary to improve the profit structure through refined operations.

4. Process analysis of BAIC's digital transformation from the perspective of resource orchestration

4.1. Resource identification and accumulation stage

The top-level design of BAIC's digital transformation drives the targeted layout of resources: the digital 1.0 plan was launched in 2020, aiming to achieve digital operation by 2026, relying on the "9211 Project" to build 9 core systems and a cloud base. In terms of resources, it has built a hybrid cloud with JD Cloud, reducing costs by 50%; more than 2.6 million commercial vehicles have been connected to the Internet of Vehicles; it has strengthened the new energy industrial chain by cooperating with CATL, Xiaomi, etc.; integrated data from more than 600 suppliers; achieved second-level processing of business-finance automation; and laid out new energy production capacity bases in Tangshan and other places to build an elastic digital base.

4.2. Resource integration and architecture restructuring stage

BAIC Group promotes digital transformation through technology integration and ecological restructuring. Technically, it has built a hybrid cloud platform with JD.com, reducing IT costs by 50% and achieving a business satisfaction rate of over 95%; the industrial Internet platform collaborates with more than 600 suppliers in the Beijing-Tianjin-Hebei region; more than 2.6 million

vehicles have been connected to the Internet of Vehicles; the "integration of business and finance" has achieved automation and efficiency improvement. Ecologically, it drives the entire product cycle through digitalization and develops software-defined vehicles; flexible manufacturing reduces costs, and the digital platform monitors carbon emissions; the hybrid cloud optimizes marketing services, realizing the optimization of the entire value chain from R&D to marketing.

4.3. Resource utilization and value creation stage

BAIC has achieved significant cost reduction and efficiency improvement through digital transformation: the total vehicle cost has been reduced by nearly 1%, the automation of production scheduling has improved efficiency, the delivery cycle of customized trucks has been shortened, and the logistics damage rate has decreased. The Internet of Vehicles platform has access to more than 2.6 million commercial vehicles, supporting precise marketing and real-time monitoring. Breakthroughs have been made in new energy technologies: the independently developed electric drive system has a speed of 30,000 revolutions per minute and won an innovation gold award; a complete new energy R&D system has been built, covering hydrogen fuel buses, pure electric vehicles, and models with a cruising range of over 800 kilometers co-developed with Huawei. At present, the sales volume of independent passenger new energy vehicles accounts for more than 48.5%, and all R&D products are new energy-oriented. Data-driven new business formats have developed: relying on real-time vehicle data to dynamically optimize model launch, promoting customized production (Customer-to-Manufacturer, CtoM) through direct user connection via APP, and facilitating green production and precise marketing.

5. Performance analysis of BAIC's digital transformation from the perspective of resource orchestration

5.1. Financial performance

To deeply analyze the effect of BAIC's digital transformation, this study selects key indicators of financial dimensions such as profitability, operational capacity, solvency, and development capacity, and uses BAIC's data from 2018 to 2024 to analyze the specific impact of digital transformation on the company's performance and operational status.

Table 1. Summary of BAIC's financial indicators

		2018	2019	2020	2021	2022	2023	2024
	Return on Net Assets	9.15	9.99	3.97	7.34	7.7	5.32	1.67
Profitability	Gross Profit Margin	24.36	21.45	23.81	21.4	22.23	20.24	16.04
	Operating profit margin	13.34	12.81	12.68	13.65	13.66	11.42	8.95
Operational capacity	Total asset turnover	0.9	0.96	0.91	0.94	1.08	1.16	1.13
	Accounts receivable turnover ratio	7.26	8.14	8.5	9.13	11.29	10.77	10.18
Solvency ratio	Current ratio	1.02	0.94	0.9	0.94	1.04	1.06	0.97
	debt-to-asset ratio	59.75	63.15	62.01	58.59	54.47	52.95	54.38
Development ability	Operating income growth rate	13.24	15.46	0.89	-0.6	8.27	3.93	-2.75
	Net profit growth rate	96.58	12.8	-59.39	90.14	8.79	-27.81	-68.45

Data Source: Guotaian Database

5.2. Non-financial performance

5.2.1. Expanded R&D investment and obvious innovation effects

In the process of digital transformation, BAIC has actively increased R&D investment and established a complete R&D system. BAIC plans to invest more than 100 billion yuan in R&D funds by 2030, with an R&D team of over 8,000 people.

Table 2. BAIC's R&D investment (100 million yuan)

2018	2019	2020	2021	2022	2023	2024
24.03	25.68	26.015	26.51	27.125	35.712	42.924

Source: Corporate Annual Reports

5.2.2. Strengthened market position and enhanced customer stickiness

In the process of digital transformation, BAIC has also won many honors, such as the 2023 China Intelligent Manufacturing Double Outstanding Award, the National-Level Intelligent Manufacturing Pilot Demonstration, the 2024 DCMM Steady Level Certification (Level 3), and ten outstanding cases of data assetization achievements. These honors have been recognized by the industry and proved the success of its digital transformation. The customer satisfaction rate reaches 96.6%.

5.3. Comprehensive performance analysis

5.3.1. Construction and calculation of evaluation system

① Dimensionless processing and analysis

This paper uses the min-max method to process BAIC's financial data, and the processing results are shown in the following table:

Table 3. Results of dimensionless and non-negative processing

		2018	2019	2020	2021	2022	2023	2024
	Return on Net Assets	0.90	1.00	0.28	0.68	0.72	0.44	0.00
Profitability	Gross Profit Margin	1.00	0.65	0.93	0.64	0.74	0.50	0.00
	Operating profit margin	0.93	0.82	0.79	1.00	1.00	0.52	0.00
Operational capacity	Total asset turnover	0.00	0.23	0.04	0.15	0.69	1.00	0.88
	Accounts receivable turnover ratio	0.00	0.22	0.31	0.46	1.00	0.87	0.72
Solvency ratio	Current ratio	0.75	0.25	0.00	0.25	0.88	1.00	0.44
	debt-to-asset ratio	0.67	1.00	0.89	0.55	0.15	0.00	0.14
Development ability	Operating income growth rate	0.88	1.00	0.20	0.12	0.61	0.37	0.00
	Net profit growth rate	1.00	0.49	0.05	0.96	0.47	0.25	0.00

② Standardization processing

To eliminate the impact of physical quantities and further calculate the characteristic weight of indicators in each year, this paper adopts the following calculation formula:

$$Pij = \frac{yij}{\sum_{i=1}^{m} yij}$$

Where Pij represents the standardized characteristic value, yij represents the i-th year, and j represents the dimensionless value of the indicator.

Table 4. Results of standardization processing

		2018	2019	2020	2021	2022	2023	2024
Profitability	Return on Net Assets	0.22	0.25	0.07	0.17	0.18	0.11	0.00
	Gross Profit Margin	0.22	0.15	0.21	0.14	0.17	0.11	0.00
	Operating profit margin	0.18	0.16	0.16	0.20	0.20	0.10	0.00
Operational capacity	Total asset turnover	0.00	0.08	0.01	0.05	0.23	0.33	0.29
	Accounts receivable turnover ratio	0.00	0.06	0.09	0.13	0.28	0.24	0.20
Solvency ratio	Current ratio	0.21	0.07	0.00	0.07	0.25	0.28	0.12
	debt-to-asset ratio	0.20	0.29	0.26	0.16	0.04	0.00	0.04
Development ability	Operating income growth rate	0.28	0.32	0.06	0.04	0.19	0.12	0.00
	Net profit growth rate	0.31	0.15	0.02	0.30	0.15	0.08	0.00

③ Calculation of entropy value, difference coefficient, and entropy weight

By substituting the existing data into the relevant formulas, the entropy value, difference coefficient, and entropy weight of each indicator are further calculated. The entropy value ranges from 0 to 1.

Table 5. Results of data processing

	information entropy value e	Information utility value d	weight coefficient w
Return on net assets	0.9056	0.0944	8.2635%
Gross Profit Margin	0.9274	0.0726	6.3550%
Operating profit margin	0.9302	0.0698	6.1088%
Total asset turnover ratio	0.7973	0.2027	17.7385%
Accounts receivable turnover ratio	0.8841	0.1159	10.1464%
current ratio	0.8801	0.1199	10.4973%
debt-to-asset ratio	0.8516	0.1484	12.9921%
Operating income growth rate	0.8457	0.1543	13.5056%
Net profit growth rate	0.8356	0.1644	14.3928%

5.3.2. Analysis of comprehensive evaluation results

On this basis, the comprehensive performance evaluation index values of AKD Company from 2017 to 2022 are calculated to evaluate its comprehensive performance. The specific formula is as follows:

$$zij = \sum_{j=1}^{n} wj * xij$$
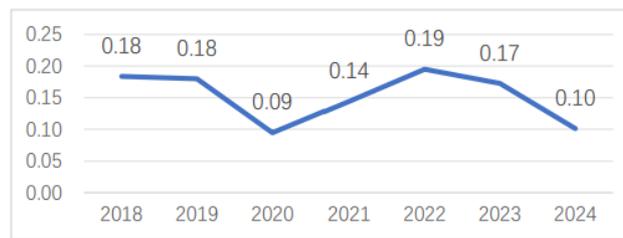
The results are shown in Figure 1 below:

Figure 1. Line chart of comprehensive scores

The analysis based on the entropy method shows that BAIC's comprehensive performance declined from 2019 to 2020 due to the epidemic and increased investment in the initial stage of transformation; subsequently, with the deepening of transformation and the completion of the entire industrial chain and digital factories, performance gradually recovered. From 2022 to 2024, performance declined again, mainly due to systemic industry risks: upstream facing cost pressures of battery raw materials and chips, downstream encountering weak demand and shrinking fuel vehicle market, while the industry fell into "price wars" and "technological involution", and the withdrawal of national subsidies intensified profitability pressure. In this context, whether the enterprise's "active adjustment" can effectively respond will be the key to its ability to resist shocks and achieve recovery.

6. Conclusions and suggestions

6.1. Research conclusions

Taking BAIC's digital transformation and performance as a case, this paper first analyzes its transformation drivers and processes. Due to data and IT infrastructure challenges, the "9211 Project" was launched. From the perspective of resource orchestration, the grounded theory is used to analyze the three stages of transformation: the strategic planning and resource identification stage, which identifies problems and introduces new technologies; the resource integration and architecture restructuring stage, which builds platforms and promotes digital penetration; the resource utilization and value creation stage, which achieves cost reduction, efficiency improvement, technological breakthroughs, and marketing upgrading. In terms of corporate performance, financial performance is better than the industry average during the market downturn (solvency needs to be strengthened), and non-financial performance includes increased R&D investment and improved market position.

6.2. Suggestions

6.2.1. Strengthen industry-university-research cooperation and attach importance to talents

To deepen digital transformation, BAIC needs to strengthen industry-university-research collaboration and enhance technological reserves and talent training. It should actively use cutting-edge technologies such as artificial intelligence to optimize production operations and key resource management, achieving process efficiency improvement and precise operations. The essence of transformation is the dual upgrading of technological innovation and organizational capabilities, which must be supported by professional and management compound talents. It is recommended to quickly obtain innovative technologies, attract high-end talents, reduce R&D costs and transformation risks through models such as co-building laboratories, joint projects, and talent co-

cultivation, and actively strive for policy and financial support to ensure the continuous and in-depth transformation.

6.2.2. Enterprises should attach importance to the resource orchestration process in digital transformation

Enterprises promoting digital transformation need to use resource orchestration strategies to integrate internal and external resources to improve performance. First of all, transformation should consolidate the digital foundation, accumulate technology, data, and digital talents, and ensure the orderliness of resources; in the process of advancement, it is necessary to scientifically integrate innovative resources, stimulate data value, and form core competitiveness; at the same time, use digital resources to expand the industrial chain, optimize allocation, and promote industrial collaboration through resource synergy, achieving diversification and sustainable development.

6.2.3. Attach importance to the status of customers and achieve win-win results through multi-party collaboration

BAIC's promotion of digital transformation should be oriented to user needs and services, and upgrade the digital operation model with interconnected resources according to the main needs of the business chain. Use cutting-edge technologies to improve the digital customer platform, open up the consumer end, build an intelligent decision-making system, and enhance the ability to respond to consumer needs; also share and connect data across borders, build a stable ecological data network, realize enterprise collaborative creation, efficiently utilize resources, and achieve multi-party co-creation of value.

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