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Analysis on the Effect of Financial Flexibility of Guangpu Electronics under the Background of Digital Transformation

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Abstract. As the vanguard of China's innovative manufacturing, "specialized, refined, characteristic, and innovative" enterprises should actively integrate into the wave of digitalization and leverage digital transformation to achieve leapfrog improvement in innovation efficiency. Financial flexibility, as the core capability of enterprises to resist external shocks and seize technological opportunities, is naturally fragile due to the scale constraints of specialized, refined, characteristic, and innovative enterprises. This study aims to verify the impact of financial flexibility of Guangpu Electronics under the background of digital transformation. It analyzes the process of "technology empowerment - resource integration - resource leveraging - financial flexibility enhancement" in each stage of enterprise digital transformation, and explores the process of improving financial flexibility through resource orchestration in the continuous digital transformation of enterprises. An effect evaluation system is constructed, weights are assigned to each indicator, and the impact of the case company's digital transformation on the effect of enterprise financial flexibility is analyzed.

Keywords: Specialized, Refined, Characteristic, and Innovative Enterprises, Digital Transformation, Financial Flexibility

1. Introduction

Against the macro background of global economic integration, the high integration of commodity markets and the fierce competitive situation have brought new challenges to the development of small and medium-sized enterprises (SMEs). From a domestic perspective, China is experiencing the rapid rise of new pillar industries featuring high-end, intelligent, and green development, and "digital industrialization + industrial digitalization" has gradually become a new growth driver of the economy. Enterprise digital transformation is not only a strategic choice to achieve high-quality development but also an inevitable path to cultivate its own innovation engine. With the characteristics of specialization, refinement, characteristic, and innovation, specialized, refined, characteristic, and innovative SMEs have become an important carrier of the innovation-driven development strategy, playing an indispensable role in promoting industrial transformation and upgrading and enhancing the endogenous driving force of the economy. Therefore, taking specialized, refined, characteristic, and innovative SMEs as the research object and in-depth analyzing the impact mechanism of digital transformation is of great practical significance for

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promoting the effective implementation of the "specialized, refined, characteristic, and innovative" digital strategy.

2. Construction of financial flexibility evaluation index system

2.1. Connotation of financial flexibility

In terms of the definition of financial flexibility, Financial Flexibility refers to an enterprise's ability to organize its own financial resources when facing an unknown environment. At the same time, financial flexibility is an ability to respond to unexpected situations, and the financial crisis has highlighted financial flexibility. When defining financial flexibility, it is considered that financial flexibility is an enterprise's ability to obtain external funds at low cost in a short period of time [1].

In terms of the measurement of financial flexibility, the main ways to build financial flexibility include increasing the level of cash holdings within the enterprise, reducing dividend distribution, and enhancing the ability to obtain external financing [2]. In the current development status of enterprises, the financial flexibility of enterprises is also affected by the security of external financing, refinancing capacity, and the holding and creation capacity of internal cash. In addition, some scholars measure financial flexibility from three aspects: basic cash flow sources, potential cash flow sources, and financing constraint costs [3].

2.2. Establishment of the evaluation index system

According to existing literature, financial flexibility is not determined by a single factor but is a comprehensive reflection of an enterprise's capabilities in three dimensions: cash position, debt structure, and external financing environment. This paper divides financial flexibility into three dimensions: Cash Indicators, Leverage Indicators, and Financing Cost Indicators. This paper adopts the weight allocation results of Scholar Ma Chun'ai on first-level indicators and second-level indicators mentioned above. Scholar Ma processed indicators at different levels in a hierarchical manner: the Analytic Hierarchy Process (AHP) was used for first-level indicators, and the Coefficient of Variation Method was used for second-level indicators. The specific indicators constructed are shown in Table 1:

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Table 1. Weight analysis table

First-Level Indicators	Second-Level Indicators	Calculation Formula	Relationship with Financial Flexibility
Cash Indicators(Weight: 0.29)	Cash Holdings (Weight: 0.34)	(Monetary Funds + Cash Equivalents) / Total Assets	Positive Correlation
	Cash Volatility (Weight: 0.56)	Standard Deviation of Operating Cash Flow (reciprocal treatment)	Negative Correlation
	Cash Generation Capacity (Weight: 0.06)	Net Profit / Total Assets (ROA)	Positive Correlation
	Cash Surplus (Weight: 0.04)	(Monetary Funds - Debt Due Within One Year) / Total Assets	Positive Correlation
Leverage Indicators(Weight: 0.65)	Unused Debt Capacity (Weight: 0.20)	1 - Asset-Liability Ratio	Positive Correlation
	Proportion of Short-term Debt (Weight: 0.59)	Current Liabilities / Total Liabilities (1 - proportion)	Negative Correlation
	Proportion of Highly Constrained Debt (Weight: 0.21)	(Short-term Loans + Taxes Receivable) / Total Liabilities (1 - proportion)	Negative Correlation
Financing Cost Indicators(Weight: 0.06)	Z-Score (Weight: 1)	Altman Z-Score Model	Positive Correlation

3. Digital transformation of guangpu electronics

The digital transformation of Xiamen Guangpu Electronics Co., Ltd. is a typical example of the upgrading of China's traditional manufacturing industry to "intelligent manufacturing". Its transformation was not completed overnight but was a process of gradual advancement and continuous improvement, which this paper divides into three strategic phases.

3.1. Basic empowerment phase (2017-2020)

This phase was the initial stage of Guangpu's digital transformation. The core goal was to solve the problem of internal information silos, connect core business processes, and realize automatic data collection and preliminary visual presentation. The specific measure was to fully integrate core modules such as sales, procurement, production, and finance on the existing informational foundation, so as to standardize business processes.

During this phase, financial flexibility was mainly affected by the improvement of operational efficiency. More accurate inventory management reduced capital occupation (optimized cash surplus), and the improvement of production efficiency enhanced the profitability of the core business (strengthened cash generation capacity), laying a healthier operational foundation for financial flexibility.

3.2. Capability leapfrog phase (2020-2023)

After laying a solid foundation, Guangpu's transformation entered a phase of deepening and empowerment. By applying technologies such as big data and artificial intelligence, it achieved a

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leap from automation to intelligence, focusing on the in-depth optimization of core value chain links such as R&D, production, and quality, and creating unique competitive advantages.

During this phase, financial flexibility was significantly enhanced by improving core value creation capacity and risk management capacity. Higher product quality and faster response speed increased customer stickiness and market share, making operating cash flow more stable and sufficient. Supply chain collaboration optimized working capital, and better profitability also improved corporate credit, increasing borrowing capacity.

3.3. Ecological collaboration phase (2023-present)

Currently, the digital transformation of Guangpu Electronics has entered a phase of external collaboration and business model innovation. The goal is to output internal capabilities to the outside, build an industrial ecosystem platform with itself as the core, and develop from an "enterprise that has realized digitalization" to an "enterprise with digital capabilities", ultimately achieving joint value creation and common development with customers and partners.

This phase will incorporate a diversified revenue structure, making cash flow more stable and predictable. The platform-based model may enable the enterprise to realize asset-light operation and optimize its asset structure. A strong ecological position will enable the enterprise to obtain higher valuation and lower financing costs in the capital market (significantly improving the Z-Score and reducing external financing costs), giving it more options and stronger resilience when facing any shocks.

4. Financial flexibility evaluation

This paper studies the operating conditions of Xiamen Guangpu Electronics from 2017 to 2024, and the data are all from the corresponding annual reports of Guangpu Electronics and the CSMAR Database, as shown in Table 2:

Table 2. Original data table

Year	2018	2020	2022	2024
Monetary Funds (10,000 yuan)	49,570	83,950	44,430	90,120
Total Assets (10,000 yuan)	120,800	106,900	258,800	238,950
Net Profit (10,000 yuan)	11,900	13,500	5,251	5,220
Asset-Liability Ratio	48%	21.30%	26.40%	25.98%
Proportion of Short-term Debt	34.90%	25.44%	48.31%	33.98%
Short-term Loans (10,000 yuan)	10,800	12,600	22,500	21,100
Taxes Payable (10,000 yuan)	560	989	529	406
Total Liabilities (10,000 yuan)	30,940	49,550	68,384	62,090
Z-Score (%)	8.92	6.83	4.15	4.98

Implementation Formula:

$$FFI = \sum(w_i \times x_i)$$

Among them, w_i is the weight of each indicator, and x_i is the standardized indicator value. The following financial flexibility ranking is obtained, as shown in Table 3 and Figure 1:

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Table 3. Original data table

Year	2018	2020	2022	2024
Financial Flexibility Index	0.5859	0.7102	0.5361	0.6135

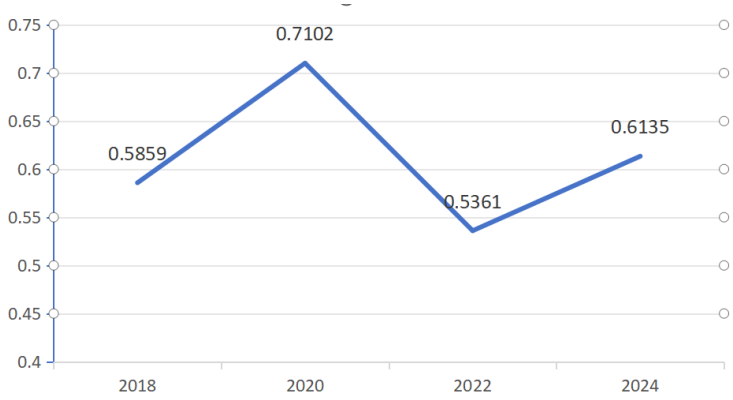

Figure 1. Original data table

It can be seen that for Guangpu Electronics from 2018 to 2019: in the early stage of digital transformation, financial flexibility increased steadily. During this period, the company promoted intelligent manufacturing and information construction, improving production efficiency and cost control capabilities. Digital transformation optimized supply chain management and production processes, enhancing operational efficiency. From 2017 to 2019, the company's operating revenue increased from 495 million yuan to 983 million yuan, and its net profit increased from 52.28 million yuan to 173 million yuan, with a significant year-on-year growth rate. The rapid growth of performance brought sufficient operating cash flow, enhancing internal financing capacity. In terms of the market, the market demand for semiconductor optical application products (such as LED lighting, ultraviolet disinfection, etc.) and FPC (Flexible Printed Circuit) was strong, and the company's core business was in an upward phase.

From 2020 to 2022, affected by the COVID-19 pandemic, global logistics was disrupted, and there were shortages and price increases of key raw materials such as chips. This had a significant impact on Guangpu Electronics, whose business involves overseas sales, and its overseas revenue failed to return to pre-pandemic levels due to issues such as shipping schedules. During this period, the company explored transformation, such as planning to invest in high-optical-power ultraviolet solid-state light source products in 2020, but the construction progress of the relevant raised-fund investment projects was slow (the investment progress of some projects was only 0.38%). In 2022, the company further crossed into the new energy track and invested in composite current collector materials. The huge investment in early R&D and production line construction for these new fields made it difficult to generate returns in the short term, leading to an increase in cash outflows and a decline in return on investment.

From 2022 to 2024, financial flexibility climbed slowly. In response to previous setbacks, the company deepened the digital transformation process and built a full industrial chain closed loop of "optical integrated sensor packaging and testing - intelligent sensor modules - intelligent terminal products - scenario solutions". This strategy of focusing on the core business helped improve resource utilization efficiency and core competitiveness. At the same time, the company strengthened vertical supply chain integration, optimized the allocation of supply chain resources

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globally, and used hedging tools to lock in material costs to cope with the risk of raw material price fluctuations.

5. Digital transformation of guangpu electronics

5.1. Strengthening technological innovation and talent cultivation

First, build an industry-university-research collaborative innovation platform to promote the industrial application of technological achievements. Government departments need to play a bridging role, guide high-quality SMEs to establish long-term cooperation mechanisms with universities and research institutes, and jointly carry out technological research and product development. By jointly building carriers such as joint laboratories and industrial technology research institutes, accelerate the transformation of scientific research achievements into productive forces, help enterprises quickly absorb cutting-edge technological achievements, and enhance the technological market competitiveness of products. Second, promote the talent-driven enterprise development project to build a high-quality technical team. SMEs should focus on talent echelon construction, carry out order-based training cooperation with vocational colleges and technical colleges, and customize skill training courses and career development paths for employees [4]. At the same time, introduce top technical talents, such as academic leaders and technical experts, and drive the improvement of the overall team capability through methods such as joint project research and technical consultation. In addition, it is necessary to establish a scientific talent incentive system and adopt diversified incentive models such as equity distribution and performance bonuses to stabilize core talents and stimulate innovation vitality. Finally, cultivate an innovative cultural ecosystem and build an open learning system. Enterprises should create an innovative atmosphere that encourages exploration and tolerates mistakes, and stimulate employees' creativity by establishing innovation incubation funds and organizing innovation competitions. At the same time, strengthen international technological exchanges and regional cooperation, establish an industry dynamic monitoring mechanism, and continuously improve R&D efficiency and market insight through knowledge sharing and experience learning to ensure the continuous iteration and upgrading of technological innovation.

Through digital transformation and upgrading, on the one hand, enterprises can carry out digital, networked, and intelligent upgrading and innovation of production equipment, production links, and business processes, collect, extract, analyze, and apply data, and improve the professional level of business. On the other hand, with the help of global data analysis platforms and systems, enterprises can realize safety early warning of equipment and real-time insight into production lines through data analysis, and comprehensively monitor the stability and health status of production equipment and production systems. With data-driven production management and digital business processes, enterprises can effectively reduce costs, improve management and production efficiency, help SMEs focus on core businesses, accelerate the process of new product R&D, and enhance professional competitiveness. Second, the application of big data helps enterprises complete customer segmentation, deeply understand and analyze customer needs, and improve the refinement of service provision; with the integration of digital technology, by building digital collaboration platforms and mobile portals, enterprises can realize comprehensive digital management of people, finance, materials, and affairs, significantly improve management efficiency and collaboration effectiveness, and achieve data-driven refined management [5]; the application of technical means such as artificial intelligence and automation gradually replaces heavy manual labor, liberates labor productivity, and improves the production efficiency of enterprises; the deployment of industrial

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Internet and Internet of Things technologies enables enterprises to real-time monitor and obtain various data in the production process, laying a solid foundation for refined production management. Finally, the widespread application of digital technology and digital platforms allows consumers to participate in the new product design process more conveniently, realizing data-driven and user-oriented product R&D. The application of digital technology in procurement, production, design, and other links promotes the interconnection of upstream and downstream enterprises in the supply chain, accelerates the cross-organizational flow of knowledge, data, technology, and resources, and provides more opportunities for SMEs to carry out product innovation, business model innovation, and technological innovation. At the same time, the in-depth integration of digital technology and the real economy promotes the transformation and upgrading of traditional production operations and service formats, empowers the development of advanced manufacturing and modern service industries, accelerates industrial digitalization, extends to the mid-to-high end of the value chain, and continuously enhances market competitiveness.

5.2. Industrial chain integration and resource sharing

First, carry out combing and diagnosis of the industrial chain to clarify the direction of integration. The government can work with industry associations to jointly conduct industrial chain research activities, identify key links and areas with shortcomings, and provide industrial chain maps and relevant suggestions for supply chain optimization for specialized, refined, characteristic, and innovative SMEs. With the help of data analysis, enterprises can be assisted in accurately identifying their position in the industrial chain, clarifying potential partners, and promoting effective connection between upstream and downstream enterprises.

Second, build industrial alliances and collaboration platforms [6]. Advocate the establishment of industrial technology innovation alliances composed of SMEs, large enterprises, research institutions, etc., to carry out cooperation around common key technologies, standard setting, market expansion, and other aspects. At the same time, build information sharing platforms and collaborative R&D platforms to promote the efficient circulation and sharing of resources such as technology, talents, and equipment, reduce the cost of enterprises conducting R&D and production independently, and enhance the competitiveness of the entire industrial chain.

Finally, promote the development of regional industrial clustering to achieve economies of scale. Local governments should plan and layout characteristic industrial parks or industrial clusters based on regional resource advantages and industrial foundations, and guide specialized, refined, characteristic, and innovative SMEs to develop in the direction of clustering. Through centralized layout and intensive development, upstream and downstream enterprises in the industrial chain can achieve agglomeration in geographical space, create a good industrial ecosystem, facilitate resource sharing, logistics collaboration, and service support, further enhance industrial supporting capabilities and comprehensive competitiveness, and promote high-quality economic development [7].

5.3. Increasing policy support and capital investment

First, improve policy supply and optimize the institutional environment. It is suggested that government departments introduce special support policies, refine the identification standards and supporting measures for specialized, refined, characteristic, and innovative enterprises, covering core areas such as tax incentives, land supply, and green channels for administrative approval, so as to effectively reduce the institutional costs of enterprises. Simultaneously promote the

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"decentralization, regulation, and services" reform, improve service efficiency through digital government platforms, build a stable, fair, and transparent market ecosystem, and fully release the innovation momentum of enterprises. Second, build a diversified financing support network and establish a national-level industrial development fund for specialized, refined, characteristic, and innovative enterprises, focusing on investing in key technological research and capacity upgrading projects. Guide financial institutions to implement differentiated credit policies, encourage commercial banks, venture capital institutions, and private equity funds to increase equity investment, and rely on the reform of the National Equities Exchange and Quotations (NEEQ) and the construction of regional equity markets to build a three-dimensional financing service system of "direct investment + credit + guarantee". Finally, establish a dynamic supervision and performance incentive mechanism, implement "negative list" management for financial funds, and ensure that resources are accurately matched to high-quality enterprises through big data monitoring. Implement the full-cycle management of "goal - implementation - evaluation", incorporate core indicators such as R&D investment intensity and patent conversion rate into the assessment system, form an "incentive-compatible" policy closed loop, and promote enterprises to transform from scale expansion to quality and efficiency improvement.

5.4. Improving the market access mechanism

First, optimize the market access mechanism to reduce access barriers. Government departments need to continuously promote the optimization of administrative license approval processes, focus on shortening the processing time of core links such as enterprise registration and project approval, and effectively reduce the institutional costs of micro, small, and medium-sized enterprises. It is suggested to promote online handling models through digital reform, establish integrated service windows, simultaneously build a standardized certification framework, compile industry compliance guidance manuals, and provide market entities with clear references for access paths. Second, build an international economic and trade exchange hub. It is suggested to organize micro, small, and medium-sized enterprises to participate in international exhibitions and industry exhibitions through methods such as government procurement of services, focusing on supporting them to display innovative achievements in professional fields. Cross-border e-commerce service centers and online marketing guidance centers can be established to help enterprises break through geographical restrictions with the help of online platforms and reach potential customer groups around the world. Finally, strengthen the international industrial collaboration network. It is suggested to create a favorable cross-border business environment for micro, small, and medium-sized enterprises by concluding regional trade agreements. Encourage enterprises to participate in cross-border industrial collaboration, and deeply integrate into the global value chain by establishing overseas R&D institutions and manufacturing bases, and forming transnational enterprise alliances. At the same time, improve the cross-border intellectual property collaboration mechanism, establish a legal support and consulting service network, provide professional support for overseas rights protection, and comprehensively improve the effectiveness of international cooperation.

6. Conclusion

Under the background of commodity market integration, the realization of high-quality development by specialized, refined, characteristic, and innovative SMEs is a key force for enhancing national competitiveness, promoting industrial upgrading, and adjusting the economic structure. Through multi-dimensional strategies such as increasing policy support and capital investment, strengthening

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technological innovation and talent cultivation, optimizing market access and international cooperation, and promoting industrial chain integration and resource sharing, not only can SMEs be helped to overcome obstacles in their growth process, but also they can be promoted to stand out in global competition, injecting lasting impetus into economic and social development. In the future, with the further connection of the capital market service chain, specialized, refined, characteristic, and innovative enterprises are expected to accelerate the formation of industrial agglomeration effects and become the core engine driving high-quality economic development.

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