

Research on the Differences in Financial Resilience of Agricultural Enterprises from the Perspective of Industry-Education and Science Integration: A Comparative Case of Muyuan Food and Zhengbang Technology

Yajie Zhang

School of Economics and Management, Tianjin Agricultural University, Tianjin, 300384, China

ABSTRACT

Based on the perspective of integrating industry, education and science, and guided by the theory of new quality productivity in agriculture, this paper selects Muyuan Food Co., LTD. (hereinafter referred to as "Muyuan Food") and Jiangxi Zhengbang Technology Co., LTD. (hereinafter referred to as "Zhengbang Technology") as specific cases, and explores the impact of new quality productivity input on the financial resilience of enterprises. Research findings show that by integrating into the innovation ecosystem of industry, education and science, Muyuan Food has adopted a new quality productivity development path centered on R&D and intelligence, which can enhance the operational efficiency of the enterprise, strengthen cost control, and increase the enterprise's resistance to risks. Enterprises that tend to rely on traditional expansion models have insufficient integration of industry, education and science, and are more vulnerable in the face of risks. This provides evidence and reference for enterprises to deepen the integration of industry, education and science and innovate talent cultivation models.

KEYWORDS

Integration of industry; Education and science New quality productivity in agriculture Financial resilience

1 Introduction

1.1 Research Background

As the primary industry in China, agriculture has become an important force driving the development of the industry under the background of the major strategic deployment of "new quality productivity" proposed by the central government. Its core is dominated by scientific and technological innovation, and it is characterized by high quality, high technology and high efficiency. It is a revolutionary transformation that changes the mode of agricultural production, organizational form and industrial ecosystem. As one of the pillar industries of China's agriculture, the pig breeding industry has not only been severely hit by major external animal diseases in recent years, but also faced the problem of the inherent cyclical law of the "pig cycle" itself. It is worth noting that when facing major challenges, the varying degrees of integration of industry, education and science among enterprises, as well as the impact on new quality productivity through the integration of industry, education and scientific research, lead to different performances of various enterprises. Therefore, this paper selects Muyuan Food and Zhengbang Technology as the research objects, and from the perspective of the integration of industry, education and science, explores the specific manifestations and actual effects of new agricultural productivity in micro-enterprises, which is both theoretically necessary and urgently needed in reality.

1.2 Research Significance

Theoretically speaking, integrating the theory of industry-education-science integration with the specific financial performance and business results of enterprises can promote the industry to accelerate the construction and application of new quality productive forces, and enrich the system improvement and management theory construction of industry authorities and specific enterprises.

From a practical perspective, by comparing the positive and negative cases of Muyuan Food and Zhengbang Technology, it provides more agricultural enterprises with development paths and experiences for reference, as well as the promotion paths of industry-education-science in agricultural enterprises.

2 Literature Review and Theoretical basis

2.1 Integration of Industry, Education and Science

Yan X, Yang Y et al. (2024) and Gao X (2024) respectively started from the engineering materials course and the logistics management major, expounding the importance of industry-education integration in promoting the improvement of talent cultivation and the practical significance of promoting interdisciplinary cooperation and science education.

2.2 Financial Resilience

Zhengyan Yang, Wei Zhong Wang et al. (2025) hold that digital transformation can enhance the financial resilience of small and medium-sized manufacturing enterprises. Nuria Arimany-Serrat et al. (2022), based on corporate financial statements, hold that when companies encounter crises such as the COVID-19 pandemic, their financial resilience will decline.

2.3 New Quality Productivity in Agriculture

Yang Liu, Chen Wang et al. (2025) took the metallurgical industry as an example and believed that under the background of new quality productivity, the metallurgical major can strengthen students' practical skills through the integration of industry and education. Boquan Zhang et al. (2025) hold that new quality productivity is the core driving force for educational modernization and can promote the development of educational productivity.

3 Research Design

3.1 Case Selection

This article selects Muyuan Food and Zhengbang Technology as the research and comparison objects for the following reasons: First, industry homogeneity. Both Muyuan Food and Zhengbang Technology mainly engage in pig breeding. At the initial stage of the research, the two companies were basically at the same scale in terms of assets, operating income, etc. Facing similar domestic and international competition, industry policies, product markets and other environments, the research became more comparable. Second, heterogeneity of outcomes. When the two enterprises choose different paths in the fields of industry, education and science, and their development processes and current situations are different, the key factors leading to the different results can be more clearly demonstrated.

3.2 Analysis Framework

3.2.1 Innovation and Talent Integration

The proportion of R&D personnel to technical personnel can reflect the composition of new quality workers in an enterprise's talent structure, which is a manifestation of the integration of education and industry and a key to carrying and applying new quality productive forces. As can be seen from Table 1, the ratio of R&D personnel to technical personnel at Muyuan Foods has shown a trend of stabilizing at first and then increasing, in sharp contrast to the continuous decline of Zhengbang Technology.

Table 1 Ratio of R&D Personnel to Technical Personnel of Muyuan Food and Zhengbang Technology from 2017 to 2024 (Unit: %)^①

	2017	2018	2019	2020	2021	2022	2023	2024
Muyuan Food	2.37	2.23	1.56	1.94	3.37	4.37	5.09	4.85
Zhengbang Technology	7.39	7.91	6.31	5.99	4.97	0.98	0	0.22

Through text analysis of the annual reports of enterprises, the results are shown in Tables 2 and 3. By statistically analyzing the frequency of words such as "intelligence", "technology", "talent" and "innovation", it can be seen that the strategic focus and changes of enterprises. The word frequency of each part of Muyuan Food is basically higher than that of Zhengbang Technology, especially after 2021, the difference in word frequency has become more obvious.

Table 2 Frequency of Related Words in Zhengbang Technology's Annual Reports from 2017 to 2024

	2017	2018	2019	2020	2021	2022	2023	2024
Intelligentization	0	0	0	7	10	8	6	16
Innovation	3	3	5	6	13	10	4	6
Technology	93	67	79	102	110	60	79	92
Talent	5	12	5	39	19	4	8	10

Unit: Times

Table 3 Frequency of Related Words in Muyuan Food's Annual Reports from 2017 to 2024

	2017	2018	2019	2020	2021	2022	2023	2024
Intelligentization	3	1	6	29	26	28	32	27
Innovation	3	5	8	10	12	16	21	29
Technology	67	80	92	92	104	112	120	115
Talent	17	15	23	24	19	25	26	25

Unit: Times

3.2.2 Buffer Dimension

Choose to use the interest-bearing debt ratio instead of the asset-liability ratio to measure how much of the assets is supported by debt that requires interest payment. As can be seen from Figure 3-1, Muyuan Foods is generally stable, while the interest-bearing debt ratio of Zhengbang Technology fluctuates greatly, reaching a peak of 0.41 in 2022. The main reasons are the continuous losses in the company's performance, the reduction in the company's scale, and the significant termination of leases, which led to a nearly doubling of Zhengbang Technology's total assets. From 2022 to 2024, it continued to decline, sharply dropping from 0.41 to 0.01. The main reason was the restructuring of Zhengbang Technology, with the amount of bonds payable being 0.

The ratio of a company's cash and cash equivalents to total assets can reflect the situation of the liquidity buffer. As can be seen from Table 4, although the ratio of this part of Zhengbang Technology has risen significantly in recent years, since

2019, the amount of cash and cash equivalents of Zhengbang Technology and Muyuan Food have been continuously increasing. By 2024, the amount of cash and cash equivalents of Muyuan Food will be four times that of Zhengbang Technology, and Muyuan Food will perform even better.

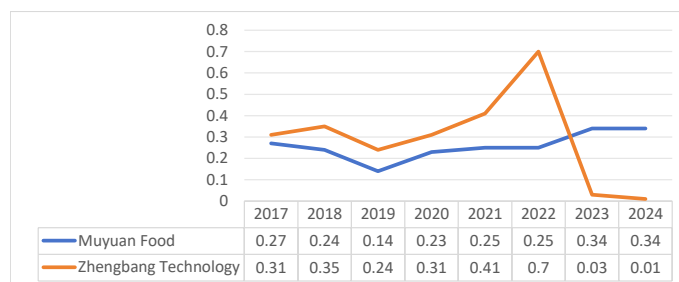


Figure 1 Interest-bearing debt ratios of Muyuan Foods and Zhengbang Technology

Table 4 Cash and Cash Equivalents Ratio of Muyuan Food and Zhengbang Technology

	2017	2018	2019	2020	2021	2022	2023	2024
Muyuan Food	0.17	0.08	0.19	0.11	0.05	0.09	0.07	0.07
Zhengbang Technology	0.08	0.05	0.08	0.20	0.04	0.01	0.13	0.17

3.2.3 Operational Dimension

In the operational dimension, the operating cost ratio and total asset turnover ratio respectively reflect the cost control and comprehensive operational efficiency of the two enterprises. The effectiveness of the integration of industry, education and science needs to be transformed into financial advantages through operational efficiency.

Muyuan Food has a significantly stronger control over costs and revenues than Zhengbang Technology. The annual report of Muyuan Food discloses that it implements automated and intelligent management, continuously improves the application level of intelligence, and optimizes the personnel training plan to further reduce enterprise costs. However, Zhengbang Technology has not made full use of technological innovation. Additionally, its revenue has shown a downward trend, which has led to this trend.

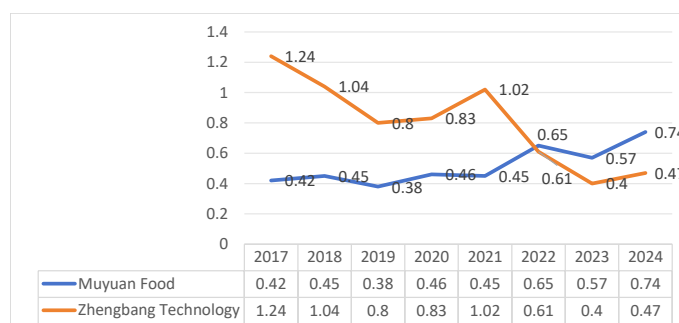


Figure 2 Total asset turnover ratios of Muyuan Food and Zhengbang Technology

3.2.4 Market and Recovery

The market and recovery dimension measures the investment of enterprises in technological innovation and the market's expectations for the future of enterprises, and is reflected by the Tobin Q value and the R&D investment dimension.

As can be seen from Table 5, the Tobin Q value of Muyuan Food is basically higher than that of Zhengbang Technology. Generally speaking, if this value remains consistently above 1, it indicates the market's recognition of the enterprise's strategic direction and innovation capabilities. This reflects that the market's future expectations for the former are higher than those for the latter, and it also supports the integration model of industry, education and science.

Table 5 Tobin Q Values of Muyuan Food and Zhengbang Technology from 2017 to 2024

	2017	2018	2019	2020	2021	2022	2023	2024
Muyuan Food	2.04	1.80	2.64	2.21	1.81	1.61	1.51	1.49
Zhengbang Technology	1.32	1.25	1.87	1.28	1.42	0.57	1.42	1.69

In terms of R&D investment, it can be seen from Figure 3 that before 2020, Zhengbang Technology's R&D investment was slightly higher than that of Muyuan Food. However, from 2020 to 2024, its R&D investment was far lower than that of the latter. During the reorganization in 2023, it even reached zero. In contrast, Muyuan Foods has seen a continuous increase in its R&D investment, demonstrating its emphasis on innovation.

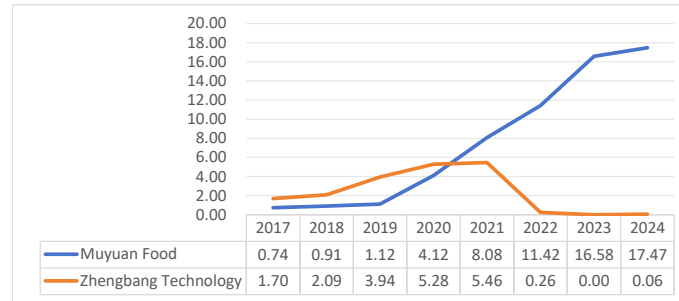


Figure 3 Research and Development Expenses of Muyuan Food and Zhengbang Technology from 2017 to 2024 (Unit: 100 million yuan)

4 Comparative Analysis Of Cases

4.1 Innovation and Talent Integration

The word frequency statistics of the annual report text show that the word frequency of Muyuan Food related to "innovation" and "talent" is not only high but also has significantly increased. For example, the word frequency of "intelligentization" has risen from 3 times in 2017 to 32 times in 2024, and the word frequency of "talent" is also twice that of Zhengbang Technology. The differences between these texts confirm that Muyuan Food is an active promoter of the integration of industry, education and science, while Zhengbang Technology's participation is obviously insufficient. Muyuan Food's demand for and absorption of R&D talents have been continuously increasing to meet the needs of the company's technology-driven strategic positioning. However, Zhengbang Technology's emphasis on innovation and talent has shown a decreasing trend, which has also led to the result of its reorganization.

4.2 Buffer Dimension

The financial data shows that the two enterprises have completely different risk-resistance capabilities. Muyuan Food is relatively cautious in controlling financial risks. The annual report also mentioned "driving development by improving the quality of operation rather than merely relying on financial leverage." However, Zhengbang Technology's interest-bearing debt ratio fluctuates sharply, and its financial risk is relatively high. When the overall market environment deteriorates, this high-debt structure will become a burden.

This difference in financial buffers is closely related to technological progress and the perception of talents. Muyuan Food is positioned as a company driven by technological innovation. This positioning requires a more stable financial structure to ensure the sustainability of the enterprise's development. In contrast, Zhengbang Technology has placed more of its strategic focus on traditional scale expansion and paid insufficient attention to technological innovation, which has led to its slightly weaker ability to resist financial risks.

4.3 Operational Dimension

The effectiveness in operation serves as a test of the results of innovation investment. Meanwhile, the total asset turnover rate of Muyuan Food has steadily increased, while that of Zhengbang Technology has shown a downward trend. Moreover, in 2022, Muyuan Food achieved a reversal. This further proves that Muyuan Food's investment in integrated technology and management has enhanced the efficiency of asset utilization, while Zhengbang Technology's extensive expansion has led to a continuous decline in asset operation efficiency.

Muyuan Food's cost control is no accident. Both technology and talent play a significant role. In terms of technology, the company is committed to promoting the construction of "intelligentization" and "digitalization", and designing an integrated industrial chain covering production, processing and breeding, which continuously optimizes the management of each link, gradually improves efficiency and continuously reduces costs, keeping each link under control. In terms of talent, the proportion of technical personnel is at a relatively high level. We attract outstanding talents from universities, integrate industry, education and science, integrate knowledge from different fields, establish a scientific training system and training plan, build a younger and more professional team, improve the quality of personnel, and support the development of the enterprise. This indicates the synergy between technology and talent, reflecting the in-depth application of new-quality workers and new-quality labor materials. However, Zhengbang Technology's weak discussion on technology and core talents also reflects its failure to complete the upgrade from traditional elements to intelligent transformation.

4.4 Market and Recovery

The differences in R&D investment directly reflect the depth of the connection between enterprises and the scientific research ecosystem. Muyuan Food not only actively conducts internal research and development, but also jointly builds R&D platforms with universities and research institutions. While promoting the integration of industry, education and science, it also continuously injects fresh blood into the development of the enterprise, ensuring the cutting-edge and practical nature of its technological research and development. However, Zhengbang Technology's research and

development activities failed to effectively leverage external scientific research forces to enhance its own competitiveness.

To sum up, Muyuan Foods continuously promotes technological innovation and utilizes intelligent means to cover the entire chain including breeding, nutrition, and processing. At the same time, actively carry out industry-university-research cooperation with universities, obtain multiple patent technologies. Thereby enhancing operational efficiency and achieving stronger financial resilience. In terms of talent structure, the annual report of Muyuan Food Co., Ltd. disclosed that the proportion of its technical personnel has remained at a relatively high level for many years, which is in line with its technical model and indicates the demand for new quality workers. However, the employee structure of Zhengbang Technology is more inclined towards production and sales. Especially in the stage dominated by digitalization and intelligence, this undoubtedly puts it at a disadvantage.

5 Suggestion

5.1 Building Courses that Integrate Industry and Education

Agricultural and forestry colleges and universities should establish a curriculum setting and adjustment mechanism that corresponds to the development needs of new agricultural productivity. In terms of course content, real cases and technological updates from specific enterprises can be incorporated into the textbooks. At the level of course structure, a professional model can be incorporated into the basic general education mode to promote project-based teaching, enabling students to master knowledge and enhance their abilities by solving specific problems. In addition, the curriculum design should not remain unchanged. Institutions of higher learning should establish a feedback mechanism for course quality, regularly inviting experts to conduct course evaluations to ensure that the courses are updated in line with the actual development of the industry.

5.2 To Strengthen the Practice Teaching Mode

Agricultural and forestry colleges and universities should improve the practical platform of "on-campus training + off-campus practice", arrange off-campus practice mentors for students, and truly enhance students' practical abilities. On campus, the training center is constantly being upgraded to simulate the real environment within enterprises, providing a natural transition for practical experience in enterprises and avoiding the disconnection between theory and practice. Outside the campus, we jointly build exemplary practice bases with corresponding enterprises, provide on-the-job internship opportunities, increase communication between students and off-campus mentors, incorporate the evaluation opinions of off-campus mentors into students' grades, and enhance students' emphasis on practical courses.

5.3 To Promote the Reform of the Scientific Research Mechanism

Agricultural and forestry colleges and universities should establish a scientific research and innovation system oriented towards achievements. In terms of scientific research project initiation, it is necessary to regularly or irregularly collect technical and other difficult problems from enterprises, or set up a platform for communication between enterprises and institutions of higher learning, so that the innovative project initiation can be more closely related to the actual needs of enterprises, and establish a scientific research breakthrough model of "enterprise + institution". At the same time, a scientific rating system for scientific research projects should be established. Enterprise leaders can be invited to participate in project evaluations, and contents such as the industrial application of technological achievements can be included, with results as the orientation. In addition, we should improve the mechanism for the transformation of scientific and technological achievements.

About the Author

Yajie Zhang, female, Han ethnicity, from Jining, Shandong Province. Currently a master's student at the School of Economics and Management, Tianjin Agricultural University, majoring in Accounting for the class of 2024. Research interests: Financial Accounting.

References

- [1] Yan X ,Yang Y ,Liu T , et al. Construction and application of engineering materials curriculum system under the combination of "production and education + science and education"[J].Curriculum and Teaching Methodology,2024,7(9).
- [2] Gao X . Research on the Training Strategy of Logistics Management Innovation Talents Driven by the Integration of Industry, Education, Science and Innovation under the Background of New Business[J].New Explorations in Education and Teaching,2024,2(3).
- [3] Yang Z ,Wang Z W ,Wang Z , et al. Enhancing financial resilience in manufacturing SMEs: A q-rung picture fuzzy set-based decision framework for digital transformation adoption[J].Applied Soft Computing,2025,184(PB):113819-113819.
- [4] Arimany-Serrat N ,Farreras-Noguer À M ,Coenders G . Financial resilience of Spanish wineries during the COVID-19 lockdown[J].International Journal of Wine Business Research,2023,35(2):346-364.
- [5] Liu Y ,Wang C ,Chen Z . Cultivation of Highly Skilled Talents at the Bachelor degree of Vocational Education in Major Iron and Steel Metallurgy --Exploration Under the Background of New-Quality Productive Forces From the Perspective of Industry-Education Integration and School-Enterprise Cooperation[J].International Journal of Educational Teaching and Research,2025,1(3).
- [6] Zhang B ,Zhang L ,Song Z . Research on New Quality Productive Forces in Education[J].Open Journal of Social Sciences,2025,13(09):632-642.
- [7] Gao Q ,Feng Z ,Li K . Research on the Impact of Marine New Quality Productive Forces on Marine Economic Resilience: A Case Study of 11 Coastal Provinces and Cities in China[J].Sustainability,2025,17(10):4457-4457.