A Case Study on the Realization Path of Digital-Real Economy Integration in Chinese Enterprises Based on Grounded Theory

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Abstract. Based on the grounded theory and single-case study analysis method, this paper selects the case data of Yunnan Baiyao Group Co., Ltd., uses the data coding and word frequency analysis functions of Nvivo 12.0 software to process and analyze the data, and studies the integration path of digital-real economy. The results show that: (1) The evolution process of enterprise digital-real economy integration can be divided into three stages: "initial exploration, small trial and advance together"; (2) Enterprises mainly carry out digital-real economy integration from three dimensions: "top-level design-key actions-supporting forces"; (3) The process of digital-real economy integration of enterprises is a dynamic evolution process, which requires the joint participation, coordination, and assistance of all parties. The research results reveal the understanding of the implementation path of digital-real economy integration and provide inspiration and reference for guiding real enterprises to carry out digital transformation and upgrading, build digital infrastructure, and develop the deep integration of digital-real economy.

Keywords: Digital-real economy integration, Digital economy, Real economy, Case study, Grounded theory

1. Introduction

Under the wave of technological revolution and industrial change, the digital economy has become an important engine to reshape the global economic structure. Countries around the world have recognized the positive role of digital transformation and have formulated corresponding national strategies, and China is no exception. In the report of the 20th National Congress of the Communist Party of China, an important statement was made to "accelerate the development of the digital economy, promote the deep integration of the digital economy and the real economy, and build an internationally competitive digital industry cluster".

According to the "Global Digital Economy White Paper 2022", the development scale of China's digital economy has reached 45.5 trillion yuan in 2021, ranking second in the global digital economy. Among them, the scale of industrial digitization reached 37.18 trillion yuan, accounting for 81.7% of the digital economy and 32.5% of GDP. Industrial digitalization is maintaining a high growth rate and flourishing, dominating the digital economy in China. Under the dramatic impact of the COVID-19 pandemic, vigorously promoting the digital-real economy

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integration is a general trend and crucial step to accelerate economic recovery more quickly. At present, Yunnan Baiyao and many Chinese enterprises have embarked the path of digital-real economy integration, and become the main force of digital-real economy integration.

Given this, this study explores Yunnan Baiyao's digital practices based on grounded theory and single-case study analysis, focusing on the research question:

RQ. How do companies achieve digital-real economy integration? How can digital technology enable enterprises to achieve digital transformation and upgrade?

To answer these research questions, this paper deconstructs the digital transformation process of traditional physical enterprises, explores the characteristics of the digitalization process of enterprises, and summarizes the path of digital-real economy integration of enterprises.

The marginal contributions of this study are mainly reflected in two aspects. Firstly, this paper complements the specific realization path and economic consequences, enriching and deepening the theoretical studies related to the digital transformation of enterprises and the field of digital-real economy integration. It provides theoretical ideas and a new perspective for subsequent scholars to research digital-real integration and digital transformation of enterprises. Secondly, this paper can provide a basis for other latecomer enterprises to analyze the conditions and resources needed to support their digital innovation at the overall level, and provides reference values for them to formulate and implement digital strategies and promote digital transformation development.

2. Literature Review

Advanced data analysis, developed information, and enhanced knowledge of the way of working are at the core of the modern digital enterprise[1]. One category of existing research on the relationship between the digital economy and the real economy focuses on the application of digital technologies in the real economy. For example, Li et al. (2018) describe how entrepreneurs can leverage digital platforms to drive digital transformation by managing cognitive renewal, managing social capital development, building business teams, and building organizational capacity[2]. Chen et al. (2021) study the combination of factors and configuration paths that drive the digital economy based on the technology-organization-environment (TOE) framework and point out that the digital capabilities of enterprises are a necessary condition. Another category focuses on the effects of the digital economy on the real economy[3]. Grimpe et al. (2023) show that in subsidiaries with advanced digital expertise, access to new skills will reduce the chances of losing employees, i.e., digital expertise helps retain digital human capital[4]. Pan et al. (2022) examined the innovation-driven effect of the digital economy on total factor productivity (TFP) and found that the development of the digital industry is the most important innovation driver of TFP growth. It can improve the efficiency of digital reform and accelerate the structural transformation of the economy[5].

While research addressing the integration of the digital-real economy has been extensively explored by scholars, most of the studies have focused on the macro level, i.e., the mutual integration of the digital economy with a particular industry. For example, Huang et al. (2021) explored four digital tactical dimensions for traditional retailers to implement overall organizational digitalization: physical resource orchestration, human resource orchestration,

organizational structure orchestration, and ecological relationship orchestration, and distinguished two digital competitive strategies: conservative strategy and offensive strategy[6]. Pousttchi and Dehnert (2018) explored the impact of the digital transformation of retail banks on consumer decisions[7]. Yang et al. (2021) summarized the factors influencing the transformation and upgrading of the manufacturing industry into five aspects: development trend and willingness, ability, environment , resources to transform and upgrade[8].

In summary, by combing the current research related to the digital economy and the real economy, it can be found that previous scholars mainly focus on the connotation, conceptual framework, level of digitalization or integration in a certain region or industry, and the impact of real economy and the digital economy. This has laid a deep theoretical foundation for this paper. However, the existing studies seem to ignore the consideration of the digital-real economy integration at the micro level and there is less attention paid to the specific implementation path of micro-enterprises. Therefore, it is necessary to study the integration path of the digital-real economy of micro-entities from a more focused and comprehensive perspective, which also leaves room for the research in this paper to dig and analyze deeper.

3. Research Design

3.1 Research Methodology

The case study method can describe and analyze the process of digital-real economy integration in depth according to the real-life situation of enterprises and to construct and generalize new theories by extracting and refining the potential laws behind the complex phenomenon. The development of digital-real economy integration in enterprises is a dynamic, changing, and evolving process, and the case study method has a deeper interpretive power in answering the research questions of "why" and "how" [9].

3.2 Case Selection

Yunnan Baiyao Group is a well-known Chinese brand and one of the early adopters of digital transformation in the industry, recognized as one of the most innovative and among the first batch of national innovative enterprises. Its digital transformation development project won the 2022 IDC China "Annual Future Enterprise Award ", and can give full play to its role as a model and leader, has a high impact on the digital transformation and upgrading of SMEs in Yunnan Province and even the whole of China. This study follows the theoretical sampling principle,

By sorting through the collected information, this paper divides Yunnan Baiyao's digital-real economy integration journey into the following three main stages (Figure 1.): (1) Initial Exploration (before 2015); (2) Small Trial (2015-2019); (3) Advance Together (2020-present). Yunnan Baiyao has achieved fruitful practical results in various fields such as intelligent R&D, intelligent management, intelligent manufacturing, intelligent logistics, etc. throughout the process of digital-real economy integration, which provides sufficient evidence for this paper.

3.3 Data Collection

The information and data for this study were collected through search engines such as Baidu, the official website, apps and WeChat official account of Yunnan Baiyao, media reports, etc.

And searching for "digitalization", "5G", "technology", "intelligence", and other keywords were used to capture the data. To improve the validity of the data and conduct a more accurate analysis, duplicate, irrelevant, and invalid information in the data were eliminated. The initial information was finally compiled into total of 415 pages, with more than 290,000 words.

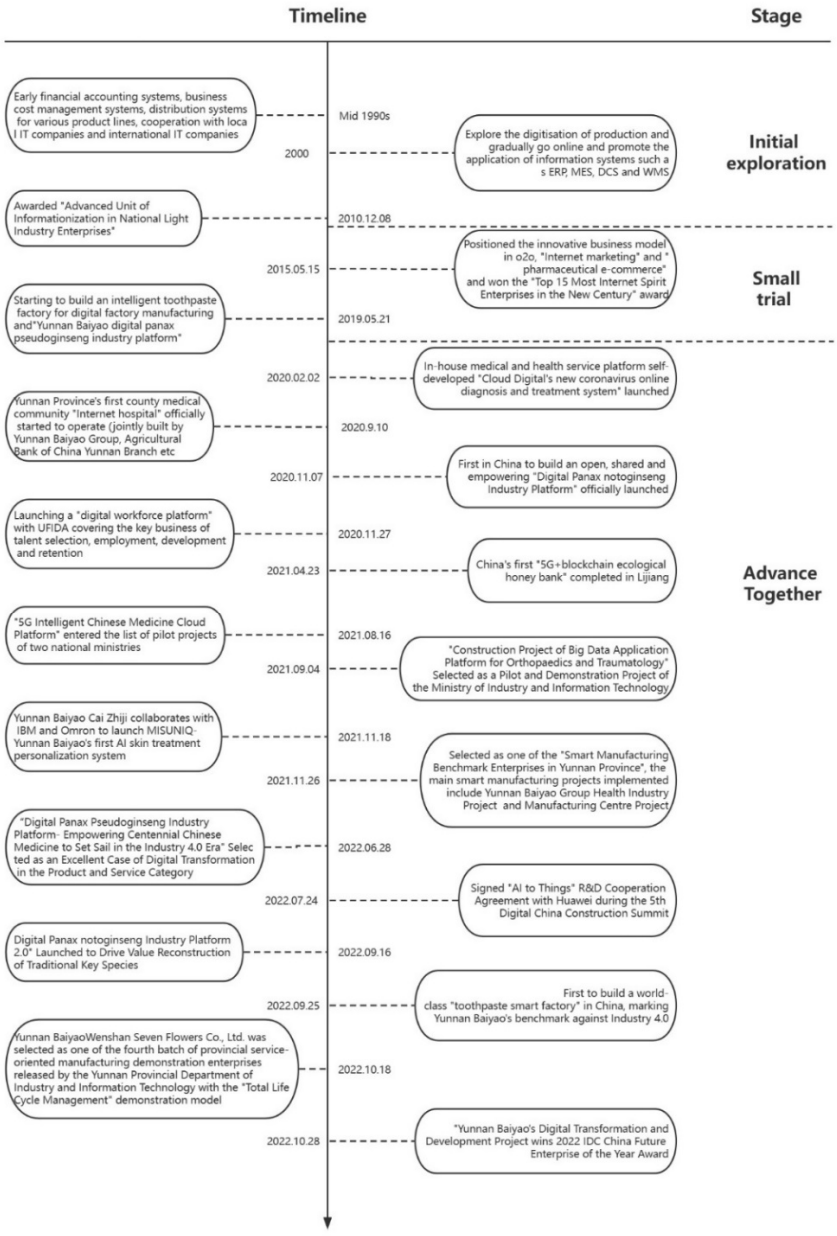

Fig. 1. Yunnan Baiyao's History of digital-real economy integration

4. Data Analysis

This paper strictly follows Strauss and Corbin's (1998) grounded theory research paths and coding rules[10], and analyzes the digital-real economy integration paths step by step with "three-level coding" including open coding, axial coding, and selective coding. The data structure shown in Figure 2 summarizes the sub-categories, main categories, and core categories that we obtained from the data analysis in part 4.

4.1 Open Coding

Open coding is “the analytical process of identifying concepts and categories and discovering their nature and dimensionality in data” [11]. Firstly, the collected secondary data were centered on open coding of the data, the primary data were parsed by defining concepts and naming the categories, and the collected qualitative data were conceptualized and abstracted layer by layer. Finally, 25 sub-categories were formed.

4.2 Axial Coding

Axial coding is defined as "the process of associating a category with its subcategories" [11]. Based on the open coding results, similar concepts are integrated, categorized, and assigned to related constructs. For example, "'endogenous growth' strategy and 'outward expansion' strategy" can be summarized as "strategic deployment"; The categories of "deepening the main business, exploring emerging businesses, and expanding digital application scenarios" can be summarized as "building a business matrix"; The "extensive application of digital technology and establish a unified database" can be summarized as "digital infrastructure building". By analogy, the 25 sub-categories are finally summarized into 10 main categories.

4.3 Selective Coding

Selective coding refers to the coding of only those data that can be associated with the core categories of sufficient importance, as determined by the researcher after the core categories have emerged. The 10 main categories formed by the upper-level coding were further categorized into three core categories, namely, "top-level design", "key actions" and "supporting forces". The results of the coding were sorted out, and the logical relationships between the categories were identified, forming the complete framework of Yunnan Baiyao's digital-real integration path.

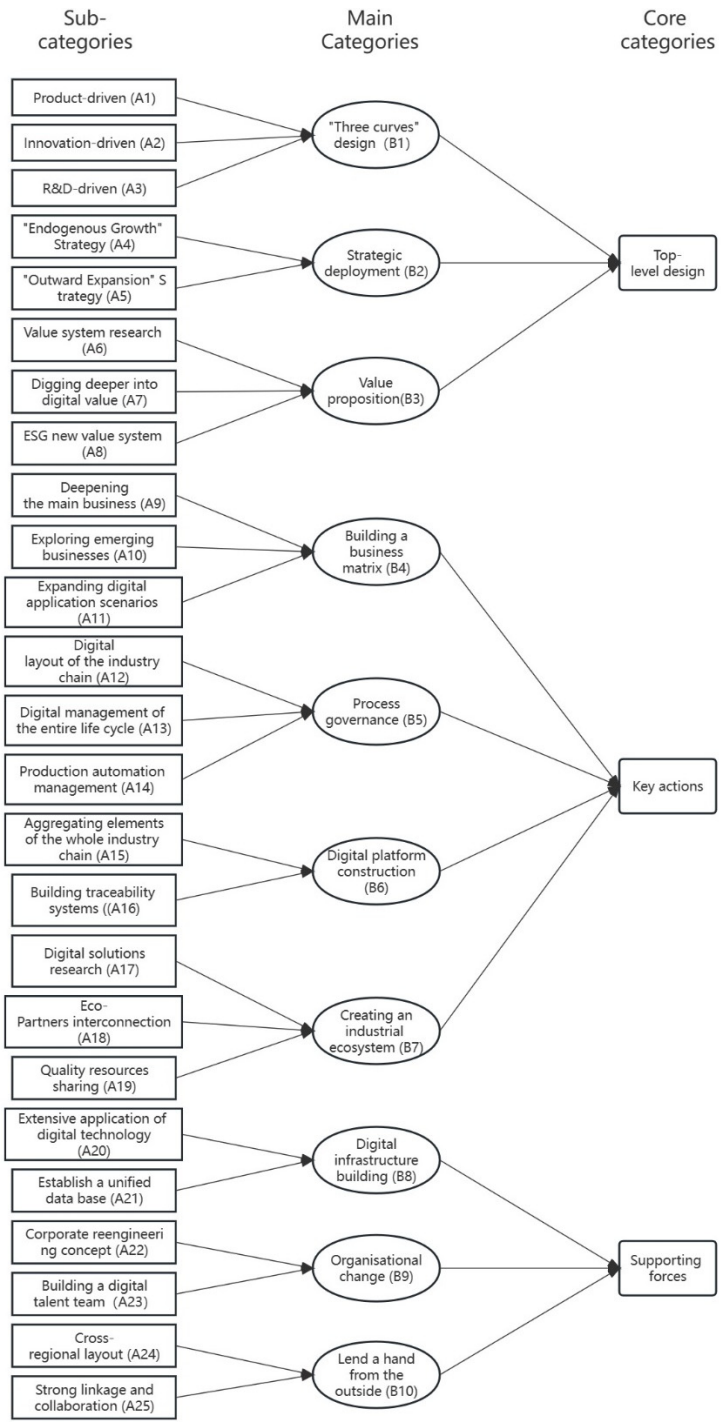

Fig. 2. Data structure

5. Discussion

5.1 “Top-level” Design

Yunnan Baiyao has officially launched digital transformation from the top level. With the goal of digitalization to support the overall development of the company, it formed a consensus and a set of effective methodologies from the board of directors to the management team, middle-level cadres, and business units. The "product-driven, innovation-driven, and R&D-driven" three curves design helping the company to clarify its functional positioning, competitive advantages, and future development path and direction. Digital strategy formulation requires consideration of four key dimensions: use of technology, changes in value creation, structural changes, and finance [12]. Yunnan Baiyao's strategic thinking has been reshaped by the current wave of digital connectivity in business, transforming it into a "two-wheeled" company with an endogenous growth strategy and an outward expansion strategy. At the same time, The digital environment has changed the behavior of business actors from focusing on their competitive advantages and maximizing their profits to creating consumer value as the ultimate goal, transforming the competitive relationship with other enterprises into a cooperative and symbiotic one. Yunnan Baiyao has always adhered to "value proposition", and has made value system research the focus of its future research, creating a value-sharing platform upstream and downstream, and actively carrying out digital transformation with user value as the guide., the company has been developing and mining digital value at a deeper level, so that the scattered single data can become data assets and data capital, and build a new value system of ESG (environmental, social, and corporate governance).

5.2 Key Actions

These key actions of the process of digital-real economy integration Yunnan Baiyao has taken have significantly improved the digital capabilities of the company, and inspired it to identify and utilize various complementary resources and capabilities within itself and the platform to respond to changes in market and user needs promptly on time.

Firstly, Yunnan Baiyao is actively exploring new businesses while cultivating its main business, further developing incremental volume based on thickening the stock, expanding digital application scenarios, and currently the many application scenarios that have achieved industrialization and intelligence. In order to help enterprises automate operations and improve operational efficiency, Yunnan Baiyao has improved its organizational process, production process, R&D process, and business process through the digital layout of the industrial chain, digital management of the whole life cycle, and production automation management so that the shortcomings of each link of the traditional industrial chain have been quickly filled and the overall intelligence has been realized. What’s more, Yunnan Baiyao has built a series of open, shared, and empowered digital platforms, where it has aggregated elements of the whole industry chain, built a traceability system, realized the deep integration of medical technology with artificial intelligence and information technology. Finally, as the "builder" of the entire industrial ecosystem, Yunnan Baiyao is committed to researching digital solutions, interconnecting with ecological partners and sharing quality resources, attracting outstanding talents and enterprises to join the construction of the ecosystem, and supporting the creation of a symbiotic and co-prosperous industrial ecosystem.

5.3 Supporting Forces

The supporting force is necessary to play an important supporting role in the process of digital-real economy integration and to help and empower the enterprise to carry out digital transformation successfully. Yunnan Baiyao has widely used digital technology to build a solid digital infrastructure for the enterprise around the industrial chain, enhancing the enterprise's viability in multiple dimensions, creating Baiyao's big data moat, providing data support for industrial development. Organizational change is a key driving force for Baiyao's strategic development, and Yunnan Baiyao is brave enough to break through the past stereotypes and follow the pace of the times to promote organizational change and optimize the operational structure, and through a series of "organizational change" and "enterprise reengineering" to drive Baiyao's continuous growth and refinement and build excellent digital talent. At the same time, through cross-regional layout and strong alliance with external ecological partners, it helps enterprises achieve digital transformation by leveraging external resources and capabilities or their own rich experience and mature solutions in digitalization to make up for their shortcomings.

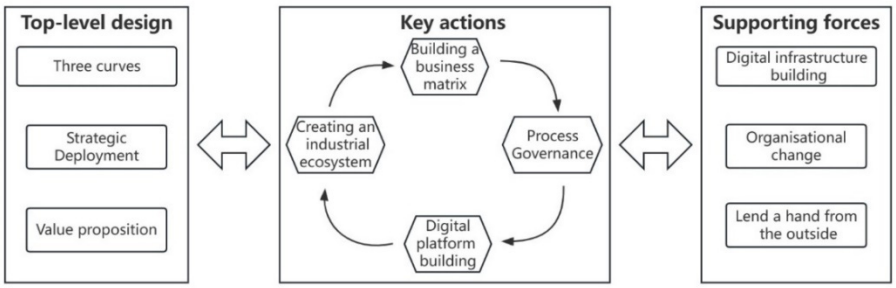

Fig. 3. Yunnan Baiyao's digital-real economy integration path

6. Conclusions and Future Research Directions

Based on Yunnan Baiyao Group's practice of digital-real economy integration, this article summarizes its specific implementation path in Figure3 , the specific findings of the study are as follows:

(1) The process of digital-real economy integration of enterprises can be divided into three stages: "initial exploration, small trial, and advance together". In the initial exploration stage, enterprises begin to form, establish, and cultivate awareness of digital-real economy integration; In the small trial stage, specific digital transformation projects are implemented to accumulate transformation experience and form a replicable model; In the advance together stage, the successful experience, and model are applied to various business and management sectors, so that all departments can jointly carry out the digital road.

(2) The three dimensions of "top-level design, key actions, and supporting force" together contribute to the digital transformation of enterprises, and then successfully realize the deep integration of the digital-real economy. The top-level design uses a system theory approach from a global perspective to coordinate and plan the business and projects carried out by the

enterprise in a comprehensive manner. Then, a series of digital key actions are taken to replace the inefficient and repetitive operation, business, and management processes of the past. At the same time, the entire digital transformation process cannot be carried out without the support of internal and external forces.

(3) From the perspective of the process of digital-real economy integration, on the one hand, the process is a continuous development and dynamic evolution, enterprises need to continuously process of innovate and adjust their organization, management, and strategy according to the actual situation. On the other hand, the process of enterprise digital-real economy integration is not only its upgrade and iteration, but also includes various external participants, that is, digital-real economy integration is not an isolated one, but a process that requires the joint participation, assistance, cooperation, and synergy of all parties.

Although this study has provided a useful discussion on the process of digital-real integration and the digital transformation path of enterprises, there are still some shortcomings that future research to continue to improve. The integration of digital-real economy in China is still in the early exploration stage, and different industry types and different real enterprises have their own development characteristics and different functional positioning, which may differ in the process of digital-real economy integration. However, due to the time and conditions of the study, it may not be possible to completely overcome the lack of universality of the findings in the single case study, which can be further explored in the follow-up.

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References

[1] Bredmar, K.: Digitalisation of Enterprises Brings New Opportunities to Traditional Management Control. Business Systems Research : International Journal of the Society for Advancing Innovation and Research in Economy, 8(2), 115-125 (2017)

[2] Li, L., Su, F., Zhang, W., & Mao, J.-Y.: Digital transformation by SME entrepreneurs: A capability perspective. Information Systems Journal, 28(6), 1129–1157 (2018)

[3] Shuangying Chen, Qiyue Li, Bo Lei, Na Wang.: Configurational Analysis of the Driving Paths of Chinese Digital Economy Based on the Technology–Organization–Environment Framework[J].SAGE Open, 11(4), 1-11 (2021)

[4] Grimpe, C., Sofka, W. & Kaiser, U.: Competing for digital human capital: The retention effect of digital expertise in MNC subsidiaries. Journal of International Business Studies. 54(4), 657-685 (2023)

[5] Pan, W., Xie, T., Wang, Z., & Ma, L.: Digital economy: An innovation driver for total factor productivity. Journal of Business Research, Volume 139, 303-311 (2022)

[6] Bo, H. Q., Guang, D. Z., & Feng, J. Y.: A framework of digitalization: Insights based on resource orchestration theory for digital transformation of traditional retailers. International Journal of Management Excellence, 16(1), 2260-2271 (2021)

[7] Pousttchi, K., & Dehnert, M.: Exploring the digitalization impact on consumer decision-making in retail banking. Electronic Markets, 28(3), 265–286 (2018)

[8] Shuili, Y., Xiang, L., & Yi, Y.: Research on the Influencing Factors of Manufacturing Transformation and Upgrading Based on Grounded Theory. Journal of Physics: Conference Series, 1827(1), 012103 (2021)
[9] Yin，R. K.: Case Study Research: Design and Methods (5nd ed.) [M]. London: Sage Publications，Beverly Hills，CA., (2013)
[10] Strauss，A.L, Corbin，J. M.: Basics of Qualitative Research：Techniques and Procedures for Developing Grounded Theory[M].Los Angeles: Sage Publications，Inc, (1998)
[11] Strauss A，Corbin J M． Basics of qualitative research: Grounded theory procedures and techniques［M］． Sage Publications，Inc，(1990)
[12] Matt, C., Hess, T., & Benlian, A.: Digital Transformation Strategies. Business & Information Systems Engineering, 57(5), 339–343 (2015)