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Business Development Modes on Performance in Hog Industry in China

ZHONG Wenfu

Doctor of Management

Supervisors:
PhD Álvaro Augusto da Rosa, Associate Professor,
ISCTE University Institute of Lisbon
PhD HE Zheng, Professor,
UESTC - University of Electronic Science and Technology of China

April, 2025

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I declare that this thesis does not incorporate without acknowledgment any material previously submitted for a degree or diploma in any university and that to the best of my knowledge it does not contain any material previously published or written by another person except where due reference is made in the text.

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Abstract

China's hog industry is currently facing numerous challenges, making it necessary to optimise business development modes to enhance enterprise performance. This study investigates the antecedent variables, impact mechanisms, and key paths that influence the business development modes of hog enterprises.

A mixed-methods approach combining qualitative and quantitative research was adopted. The study was conducted in two stages: In the first stage, interviews and textual analysis were employed to identify the antecedent variables influencing the business development modes of Chinese hog enterprises. In the second stage, a quantitative study based on a questionnaire survey was conducted, yielding 498 valid observations. Structural equation modelling (SEM) was employed to empirically test the relationships among the variables.

The results reveal business development in Chinese hog enterprises is driven by multiple factors. Different options in business development play different mediating role between the driving factors and enterprise performance. Thus, careful selection of business development mode may contribute to improved performance, thus validating the path of "driving factors → business development mode → enterprise performance."

Keywords: hog enterprise, business development mode, company performance, structural equation, mixed research method

JEL: M21, Q13

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Resumo

A indústria suinícola da China enfrenta atualmente inúmeros desafios, sendo, por isso, necessário otimizar a adoção de modelos de desenvolvimento empresarial para melhorar o desempenho das empresas. Este estudo estuda os fatores ex-ante que condicionam a opção de diferentes modelos de crescimento das empresas suinícolas, bem como os mecanismos que impactam o desempenho dessas mesmas empresas.

A metodologia da investigação adotada no estudo combina abordagens qualitativas e quantitativas. O estudo foi desenvolvido em duas fases: na primeira, foi a identificação dos fatores ex-ante que afetam os modos de desenvolvimento do negócio de suinicultura através de entrevistas e análise de conteúdo textual. Na segunda fase, foi realizada uma pesquisa quantitativa com base em questionário, tendo sido recolhidas 498 observações válidas. Posteriormente, recorreu-se à modelação por equações estruturais para testar empiricamente as relações entre os diversos caminhos.

Os resultados demonstram que a formação dos modelos de desenvolvimento empresarial das empresas suinícolas chinesas é influenciada por uma variedade de fatores propulsores. Verificou-se ainda que os modelos de desenvolvimento empresarial desempenham um papel mediador significativo entre os fatores propulsores e o desempenho das empresas. Assim, confirma-se a existência da relação "fatores propulsores → modelo de desenvolvimento de negócio → desempenho empresarial".

Palavras-chave: indústria suinícola, modelos de negócio, desempenho empresarial, equação estrutural, método de pesquisa misto

JEL: M21, Q13

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摘要

中国生猪产业正遭受着诸多挑战，有必要对业务发展模式予以优化，来提升企业绩效。本研究对影响生猪企业的业务模式的前因变量、影响机制以及关键路径展开探讨。

研究方法采用了质性研究和量化研究相结合的方法。研究分为 2 个阶段：第一阶段，通过访谈和文本分析识别出对中国生猪企业业务模式造成影响的前因变量。在第二阶段基于问卷调研的量化研究，筛选了 498 份有效样本，运用结构方程模型对各路径关系展开实证检验。

研究发现，中国生猪企业业务发展模式的形成会受到多元驱动因素的影响。企业业务发展模式在驱动因素和企业绩效两者之间发挥着显著中介作用，业务发展模式的提升推动了企业绩效；“驱动因素—业务模式—企业绩效”这样的路径成立。

关键词：生猪企业，业务发展模式，企业绩效，结构方程，混合研究法

JEL: M21, Q13

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Although this chapter of my academic journey has come to a close, the pursuit of knowledge knows no end. May this moment mark a new beginning, as I continue to uphold the original aspiration of "knowledge translated into action."

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致谢

百战归来读书时，回首这段边工作边求学的时光，满是挑战与成长交织的记忆，而这一切成果的取得，离不开太多人的支持与帮助。在此谨以最诚挚的谢意，献给所有陪伴我走过这段学术旅程的师长、亲人、挚友。

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求学之路虽暂告段落，但学术探索永无止境。愿以此刻为起点，继续践行“致知力行”的初心。

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List of Acronyms

RS	Resource synergy
CI	Competition index
CD	Customer demand
VE	Value creation efficiency
ER	Expansion and replication potential
LT	Long-term Adaptability
EB	Economic benefits
SR	Social Responsibility
EE	Environmental Effectiveness

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Chapter 1: Introduction

1.1 Background

China's hog industry holds a pivotal strategic position globally, being not only the world's largest producer but also the largest consumer of hog (S. W. Kim et al., 2024). Hog constitutes a core source of animal protein for the population, profoundly impacting national food security, social welfare, and the livelihoods of tens of millions of workers. However, this critical sector is facing unprecedented systemic challenges. Environmental pressures are becoming increasingly acute (Y. M. Liu & Zeng, 2024), as waste discharge from large-scale hog farming has triggered severe "Not in My Backyard" (NIMBY) effects (Zu et al., 2024). The tightening of environmental regulations has significantly increased compliance costs (Q. Q. Wang et al., 2024). Major animal diseases, especially the outbreak and endemic presence of African swine fever (Parthiban et al., 2023), have not only caused substantial direct economic losses but also reshaped the industry landscape (Tian & Cramon-Taubadel, 2020), compelling enterprises to intensify investments in biosecurity. On the market front, the highly volatile "hog cycle," coupled with persistently high feed ingredient prices, has resulted in unstable profit margins, making survival difficult for small and medium-sized producers with limited risk resilience. Additionally, tightening resource constraints, high external dependence on feed inputs, and rising supply chain risks, along with escalating consumer demands for food safety, animal welfare, product quality, and environmental transparency, have further exacerbated the industry's complexity and uncertainty (Grunert et al., 2014).

China's hog enterprises are undergoing a profound transformation of their business development modes, driven by the urgent need to overcome the efficiency bottlenecks inherent in the traditional small-scale, scattered farming mode. First, deficiencies in coordination mechanisms have significantly constrained industry development. Weak and fragmented ties between farmers and leading enterprises result in high transaction costs and the absence of effective risk-sharing mechanisms (M. Y. Wang et al., 2009). This disconnection hampers effective resource integration and prevents the realization of synergy. Second, limited technological adoption poses a major challenge. The penetration of modern technologies such as big data and smart devices remains low in traditional farming, severely

restricting precision management and disease control (Wan et al., 2024). The lack of advanced technological support leads to low production efficiency and heightened disease risks. Furthermore, fragmentation across the supply chain results in poor coordination among farming, slaughtering, and marketing segments, causing imbalances in quality control and value distribution (L. Wang & Li, 2024). This non-integrated supply chain model not only reduces overall operational efficiency but also hinders the achievement of mutually beneficial outcomes among stakeholders in the value chain.

Amid broader industrial transformation, Chinese hog enterprises are facing dual performance pressures: short-term survival and the development of long-term competitiveness. The outbreak of African swine fever (ASF) has led to a sharp increase in biosecurity costs, significantly heightening industry dependence on government regulation and training initiatives aimed at improving biosecurity awareness and disease prevention capacity (J. Q. Li et al., 2023). As a result, companies are compelled to allocate substantial resources to manage emergent risks, directly affecting their immediate profitability. Moreover, whether business development mode innovation can sustainably enhance company performance remains a critical issue requiring further investigation. While empirical studies suggest that business development mode innovation—mediated by dynamic capabilities such as technological adaptation and organizational flexibility—can significantly promote enterprise growth (Q. Xie & Li, 2025), its effectiveness is moderated by entrepreneurial orientation and institutional environments (Bryan et al., 2024). For instance, the business development mode–performance framework indicates a direct positive effect of business development mode innovation on international performance ($\beta = 0.095^{*}$) (Bryan et al., 2024). Nevertheless, in the agricultural sector, balancing environmental responsibility with economic benefits remains a persistent challenge (Bai et al., 2015). This implies that, beyond economic returns, companies must also meet environmental and social obligations—factors that inevitably increase the complexity of business development mode innovation and raise the bar for achieving long-term performance outcomes. Therefore, exploring the underlying mechanisms linking business development mode development to enterprise performance holds significant theoretical and practical relevance for the healthy and sustainable development of China's hog industry.

1.2 Research questions

In the research of business development mode, scholars have widely focused on its impact on

company performance. Afuah and Tucci (2001) pointed out that business development modes can effectively explain performance differences among companies. Amit (2007), through a study of e-commerce enterprises in the United States and Europe, found that innovative business modes significantly enhance company value. Zott and Amit (2007) further demonstrated that efficiency-oriented and innovation-oriented business development modes have distinct effects on performance—the former emphasizes cost optimization, while the latter generates greater value through differentiated competition (Amit, 2007). Additionally, Mitchell and Coles (2003) found that optimizing business development modes not only improves sales and profits but also enhances market competitiveness. Well-designed business development modes can support sustained growth and play a critical role in areas such as technological innovation and market expansion (Chesbrough, 2010; Giesen et al., 2007).

In the Chinese market, the innovation and adjustment of business development modes have become central to enterprise development in recent years. This is particularly relevant for hog enterprises, whose industry chain is long and involves multiple stages—feed supply, hog farming, slaughtering and processing, logistics and distribution, and end-market sales—with numerous stakeholders. The choice of business development mode has a particularly significant impact on company performance. As a crucial component of China's agricultural economy, hog enterprises are directly linked to food safety, household living costs, and rural economic development. In response to shifting market demands, policy interventions, increasingly stringent environmental regulations, and external shocks such as African swine fever, hog enterprises are undergoing profound changes in their business development modes. The traditional smallholder-based mode is gradually giving way to large-scale, intensive, and intelligent operations. Leading companies are enhancing competitiveness through value chain integration, digital transformation, and brand-oriented operations. With support from government policies, involvement from financial institutions, and rising consumer expectations, hog enterprises must place greater emphasis on stakeholder demands in order to optimize their business development modes, improve operational efficiency, and achieve sustainable development (Y. Xie et al., 2025).

There is a research dilemma for the research:

How to systematically analyze the antecedent factors of business development modes in Chinese hog enterprises, explore their impact on these modes, and further evaluate the comprehensive benefits of these modes across economic, social, and ecological dimensions, while coordinating the differentiated demands and potential conflicts among key stakeholders such as the government, farmers, and enterprises.

Against this backdrop, this study aims to empirically examine the role, paths, and effects of business development mode choices on company performance. The specific research questions are as follows:

A. What are the antecedent variables influencing the business development modes of hog enterprises?

B. What are the components of business development modes that affect company performance in the hog industry?

C. What are the key paths among the driving factors of business development, mediating variables, and company performance in hog enterprises?

1.3 Research objectives

This study aims to achieve a dual objectives through theoretical reconstruction and empirical innovation. For the theoretical objective, the study proposes an integrated "Drivers–Mode–Performance" framework. On the drivers, it develops a resource synergy mode that incorporates scientific research conversion efficiency to address the gap in agricultural technology collaboration; constructs market competition indicators to highlight the role of coopetition management in unlocking growth potential; and upgrades the customer demand scale by embedding supply chain transparency requirements. On the business development mode, it integrates three capabilities—value creation efficiency, expansion and replication potential, and long-term adaptability—to resolve the coordination paradox between efficiency, scale, and resilience in hog enterprises. On the company performance, a triangular evaluation system is established encompassing economic, social, and environmental benefits, aligning with the United Nations' call for agricultural responsibility. For the methods, this study develops the first quantitative toolkit for agricultural business development modes. It refines the scale of antecedents by introducing an indicator for "patent-to-application conversion rate" under the resource synergy dimension. Using mediation testing procedures, it employs structural equation modelling to verify the significance levels of key paths, with particular focus on the suppressing effect of expansion and replication potential on the relationship between market competition and social responsibility.

Specifically, the study seeks to accomplish the following core goals: on one hand, to systematically identify and empirically analyse prevailing business development modes within the industry, quantitatively assess their performance across economic, social, and environmental dimensions, and uncover the mechanisms through which these modes

influence company performance—thereby providing data-driven empirical support for hog enterprises in optimising resource allocation and formulating differentiated business strategies. On the other hand, in response to an increasingly complex market environment, the study explores how hog enterprises can proactively leverage innovative business modes to address challenges and build core competitiveness. It distills transferable innovation practices to guide industry actors in transformation and upgrading, and offers theoretical insights and actionable recommendations for policymakers seeking to improve regulatory frameworks. By accomplishing these objectives, this study aims to provide information to industrial practice and contribute meaningful strategies to the high-quality development of China's hog industry.

1.4 Research contents

Chapter one: introduction. This part presents the research context of China's hog industry, systematically reviewing five practical challenges, namely environmental protection, animal diseases, cyclical market fluctuations, resource constraints, and evolving consumer demands. It also identifies three key gaps in existing business development mode theories when applied to agricultural contexts. Based on this, an integrated framework of "drivers — three-dimensional business mode capabilities — triple bottom-line performance" is constructed. The study empirically addresses two core questions: how antecedents shape business development modes, and how these modes, in turn, affect company performance. Ultimately, this provides quantitative tools and actionable recommendations for hog enterprise transformation and policy formulation.

Chapter two: literature review, research hypotheses and models. This chapter offers a comprehensive review of relevant literature, covering business development modes, company performance, and their interrelationships. Incorporating the characteristics of hog enterprises, it summarizes the theoretical basis for business development mode selection from a stakeholder perspective. It further develops an analytical framework examining how stakeholders influence business mode choices and how these choices impact company performance, providing theoretical support for the subsequent empirical study. Finally, research hypotheses are proposed based on the literature review, and a corresponding research model is constructed.

Chapter three: research methods. This chapter introduces two research methods employed in this study. The first is a mixed-methods approach combining interviews and surveys. During this phase, the combined method is used to identify antecedents of business

development modes, clarify the components of business modes, and define company performance evaluation dimensions. The second method is quantitative research, which, building on the first study, uses questionnaire design and data collection to establish a data foundation for subsequent empirical quantitative analysis.

Chapter four: research results and analysis. This chapter summarizes the findings of Studies 1 and 2. It first presents the results of Study 1, which used interviews to identify key antecedent variables influencing the business development modes of hog enterprises. Then, it reports the quantitative empirical findings from Study 2, including data analysis and hypothesis validation. Utilizing structural equation modelling, the chapter explores the paths through which business development modes affect company performance. These results provide the basis for discussion and recommendations in subsequent chapters.

Chapter five: conclusions and outlook. This final chapter summarizes the core findings and contributions of the study, clarifying its theoretical advancement in business development mode research and its practical implications for hog enterprises. It also reflects on the study's limitations and proposes future research directions from cross-cultural and dynamic change perspectives, offering guidance for both academic inquiry and industry practice.

1.5 Research framework

Figure 1.1 exhibits the framework of the research.

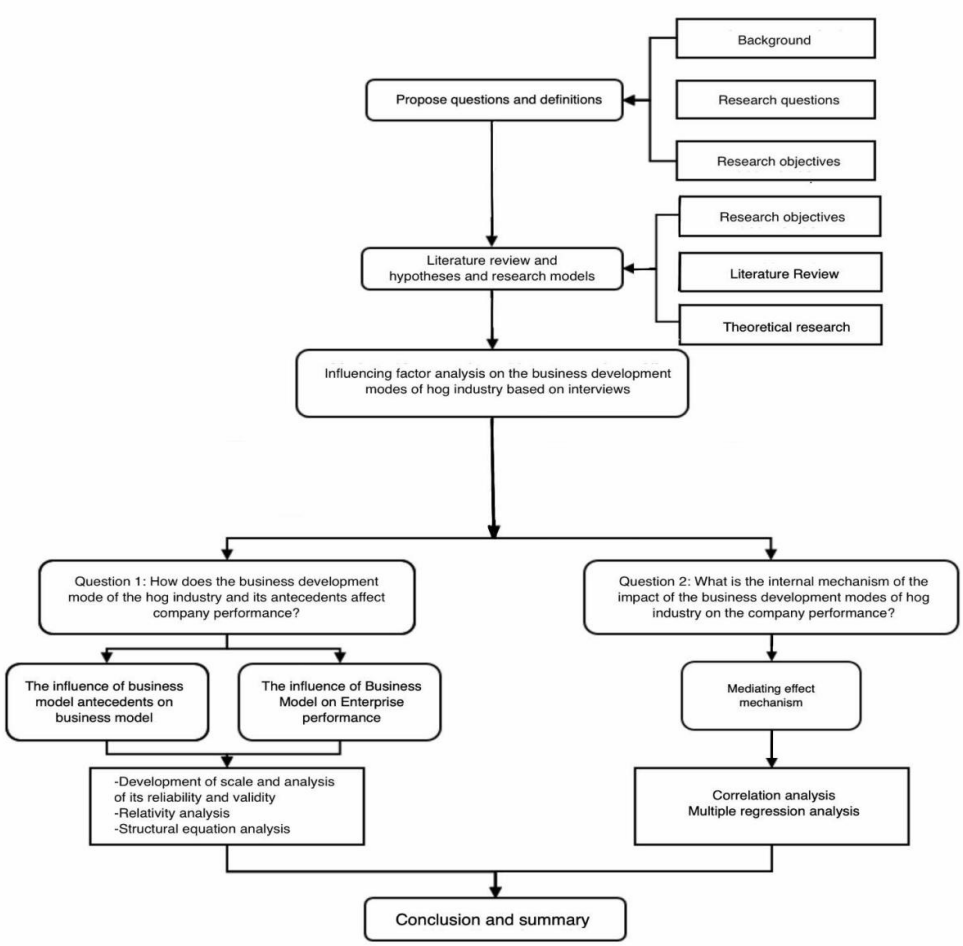

Figure 1.1 Framework of research

1.6 Research methods

This study aims to investigate in depth the relationship between business development mode evolution and company performance in Chinese hog enterprises. To this end, a combination of qualitative and quantitative research methods is employed, with interviews and questionnaires serving as tools for information collection and data analysis.

1.6.1 Qualitative method

The core of qualitative research lies in understanding the internal meaning of phenomena, behavioural motivations, and their social context, with a focus on addressing “how” and “why” questions (Luisa, 2009). The data collected are primarily descriptive texts and verbal materials, such as interview transcripts and observational notes (Ghafar, 2023). This study adopts a constructivist philosophical paradigm, which holds that reality is subjectively constructed (Afubwa & Kauka, 2023). Specifically, individual and group interviews will be

conducted to capture the authentic conditions and underlying logic of the research subjects (Surawy-Stepney et al., 2023).

This study employs semi-structured and open-ended interviews (Chong, 2022) to encourage respondents to express themselves freely and to avoid leading questions. Researchers rely heavily on active listening and contextual observation skills to capture information beyond the participants' verbal responses (Silva et al., 2006). Interview recordings are transcribed and analysed using content analysis methods, supported by software-assisted text processing. The number of interviews will follow the principle of data saturation—interviews will cease when no new themes or insights emerge. The overall qualitative interview process will adhere to interview design protocols grounded in established literature (Rouillon et al., 2018).

1.6.2 Quantitative method

Quantitative research aims to test research hypotheses by measuring relationships between variables, focusing on questions of "how much" or "how often" (Ghafar, 2023). The data are numerical, standardised, and suitable for statistical analysis (Toner & Moran, 2014). This study follows a positivist philosophical paradigm, which assumes the existence of an objective and measurable reality (Afubwa & Kauka, 2023). Structured questionnaires and statistical techniques—including correlation analysis, regression analysis, and structural equation modelling—will be employed to collect and analyse the data (Stoner et al., 2022).

The questionnaire serves as the core quantitative tool in this study. Its design will follow a standardised process, including the construction of scales (such as Likert scales) and logical skip patterns (Enakrire, 2019). A pilot test will be conducted prior to formal distribution to assess the reliability and validity of the instrument. While the questionnaire enables large-scale data collection, it also has limitations, such as self-reporting biases (e.g., social desirability effects) (Shipway et al., 2020). Questionnaire-based methods play a dominant role in mixed-methods research, with literature indicating a usage rate as high as 64% (Alkadi & Abed, 2023). In this study, the questionnaire will be used in coordination with qualitative methods. Its results will inform the selection of participants for in-depth interviews, enabling a complementary integration of quantitative data and qualitative insights. This mixed-methods design will facilitate a comprehensive and nuanced understanding of the complex relationship between business development modes and company performance in Chinese hog enterprises.

Chapter 2: Literature Review, Research Hypotheses and Research Models

2.1 Literature review

2.1.1 Research on business development modes

Business Development Modes refer to the set of strategies, methods, and paths adopted by enterprises at specific stages or under certain conditions to achieve growth, expand markets, develop new business areas, or optimise operations, and these modes are closely aligned with a company's strategic objectives, resource base, market environment, and technological development level (Sturm, 2015). The concept of business development modes originated and gained attention in business practice. Since the early 21st century, it has emerged as a growing focus of academic inquiry and has been established as a rapidly evolving research domain. This field integrates insights from strategic management, innovation management, entrepreneurship, operations, marketing, finance, cognition, and social networks (Bashir et al., 2020; Wirtz et al., 2016), and is characterised by interdisciplinary convergence, theoretical cross-fertilisation, and multiple perspectives. Research in this area primarily explores the concept, components, typologies, and its distinctions from business strategy, while also seeking to unpack the logic of value creation.

As a systematic architecture for value creation, delivery, and realisation, the selection and design of business development modes are shaped by both internal resources and external stakeholders (Attanasio et al., 2021; Yi et al., 2022; Zott & Amit, 2010). Enterprises must consider how to innovate their business development modes in ways that meet the expectations of diverse stakeholders while advancing sustainability and value creation (Freudenreich et al., 2019; Morioka et al., 2017).

From the perspective of activity systems, business development modes transcend the boundaries of a single enterprise and encompass broader networks of participants (Zott & Amit, 2010). Such activity systems enable companies to co-create value with their partners and capture a portion of that value (Zott & Amit, 2010). The design of business development modes involves content, structure, and governance elements, which collectively influence

value creation and appropriation (Zott & Amit, 2010). Value co-creation results from the collective efforts of multiple participants, including focal companies, customers, suppliers, and other stakeholders (M. Li et al., 2015). The co-creation of service value under platform-based business development modes serves as a prime example, highlighting the importance of interaction and collaboration among various actors (M. Li et al., 2015).

Timmers (1998) was the first to introduce the concept of business development modes, defining them as logical systems through which enterprises create, deliver, and capture value in the context of the internet. His research demonstrated that a clearly defined business development mode is not only a core path to gaining competitive advantage but also a critical tool for aligning internal resources with external market mechanisms. Business development modes are notably distinct from corporate strategy. Business development modes emphasise the realisation of value allocation and foster enterprise growth in resource-constrained industries through flexible organisational structures and operational mechanisms (Arzumanyan et al., 2024; Oksana, 2022). In industries with limited resources, the flexibility and adaptability of business development modes are vital to enterprise survival and growth (Dopfer et al., 2017; Sharmelly & Ray, 2021). Successful business development modes must exhibit dynamic adjustment capabilities, enabling companies to respond swiftly and optimise their structures amid evolving policy, technological, and market conditions (Bohl, 2015). These capabilities allow enterprises to seize commercial, technological, and market opportunities and adapt to change (Bohl, 2015). Businesses must continuously reassess and enhance their capabilities to adapt to and benefit from external changes.

Business development modes should be aligned with performance evaluation systems to ensure the realisation of organisational objectives and the effective implementation of strategy. Performance assessment frameworks must be systematically designed to accurately measure key outcomes of business development and to incentivise employee actions that align with business development strategies. The alignment of strategic objectives and performance indicators can significantly enhance organisational performance (Azzouz et al., 2020).

For the above studies, from foundational international theories to local practices, research on business development modes has evolved from conceptual definition and structural decomposition to performance orientation. In the context of Chinese hog enterprises, where multiple stakeholders are deeply intertwined and policy interventions are frequent, the design of business development modes is critical—not only for enterprise survival and growth but also for improving the coordination efficiency and sustainability of the entire industry chain.

Amit (2007) argues that business development modes serve not only as frameworks for

the internal integration of enterprise resources but also as coordination mechanisms linking companies to external stakeholders. He emphasises that in highly dynamic environments, companies must optimise the processes of value creation, delivery, and capture through the design of business development modes, thereby building operational structures with greater network resilience and strategic alignment. Research indicates that effective business development modes enhance the fit between enterprises and key stakeholders, ultimately improving company performance and competitiveness. Clausen and Rasmussen (2013) highlight business development mode innovation as a core mechanism for organisational adaptation and the discovery of new growth opportunities, particularly in traditional industries constrained by policy, technology, and resource limitations. Their findings suggest that enterprises can transform from "unilateral value providers" to "multilateral co-creation platforms" through the restructuring of their business development modes. This platform-based approach offers valuable insights for hog enterprises and other agricultural actors seeking to build stakeholder ecosystems. From the perspective of technological evolution, Habtay (2012) contends that business development mode innovation is not merely about adopting or replicating technologies, but involves the systemic reconfiguration of the entire industry value chain. He notes that in traditional agricultural sectors, enterprises' business development mode choices are shaped by both technological path dependence and institutional change. Studies show that upgrading business development modes by aligning stakeholder needs with appropriate technological applications can significantly enhance organisational adaptability and performance.

Osterwalder et al. (2010) proposed the widely influential "Business development mode Canvas" framework, which comprises nine key components: value proposition, customer segments, key resources, partner networks, revenue streams, among others. Their research emphasizes that business development modes are not merely reflections of internal operations but rather representations of the value exchange logic between an organization and its stakeholders. Using this systematic tool, enterprises can identify and optimize interactions with stakeholders, thereby enhancing overall performance and strategic alignment. When designing business development modes, companies must consider tensions and synergies among different stakeholders, particularly in industries highly reliant on external networks such as agriculture, where such synergies significantly affect company performance (B. Best et al., 2021; Velter et al., 2020). Social Purpose Organizations (SPOs) are innovating beyond traditional business development modes by adopting more collaborative network models that co-create social and economic value with multiple stakeholders, thus improving service

quality and increasing value (B. Best et al., 2021). The rise of platform-based business development modes has indeed reshaped how companies connect with stakeholders, with digital technologies playing a pivotal role (Jones et al., 2023). Platforms have evolved from being mere one-way value providers to becoming coordinators of value co-creation, facilitating cooperation and interaction among multiple participants through technological means (Suuronen et al., 2024). In hog enterprises, this mode is promising in disrupting traditional linear supply chains and enhancing coordination efficiency across the industry chain. This school of thought suggests that companies typically adjust their existing business development modes to form prototypes, which are then continuously optimized through planning, designing, testing, and reconfiguring in response to external environmental changes (Zott & Amit, 2010). This iterative process ensures an optimal fit between the business development mode and the market environment to foster innovation.

Business development mode innovation directly enhances company performance by optimizing resource allocation, improving operational efficiency, and strengthening market competitiveness (Gronum et al., 2016; Nunes & Pereira, 2020). For example, through innovating business development modes, companies can better adapt to market changes and thereby outperform competitors (Ma et al., 2021). Moreover, business development mode innovation can act as a mediating variable linking other factors to company performance; for instance, entrepreneurial orientation indirectly influences new product development performance through business development mode innovation (Ferreras-Méndez et al., 2021). However, some studies indicate that without effective protective mechanisms or clear strategic planning during implementation, business development mode innovation may adversely affect company growth (Ghezzi et al., 2010). Due to variations in industry contexts, timeframes, and methodologies, existing literature has yet to reach a consensus on the relationship between business development mode innovation and company performance. Furthermore, Zott and Amit (2007) categorize business development mode innovation into two types: novel and efficiency-oriented. Novel innovations emphasize introducing new market participants within transactional networks, adopting entirely new economic interaction patterns to capture latent market demand, promote new product development, and enhance competitiveness by building cooperative networks—thereby enabling companies to earn “Schumpeterian rents.” While this classification offers a more scientific perspective for studying the impact of business development mode innovation, research on the differential effects of these innovation types on company performance remains limited (Foss & Saebi, 2017).

Scholars have continuously explored the core essence, functions, structure (including components and their interrelations), classification, design, innovation, and evaluation of business development modes. Among these topics, the value perspective has garnered significant attention, with some researchers suggesting that the study of business development modes is gradually converging toward a value-oriented definition (Wirtz et al., 2016). This perspective reflects a deepened understanding of the fundamental logic underlying business development modes, emphasizing their mechanisms of value creation. Many scholars assert that the essence of business development modes lies in the logic of value creation, which not only concerns how companies create value for customers but also how they generate value for partners and other stakeholders (Casadesus & Ricart, 2011; Foss & Saebi, 2017; Mahadevan, 2000; Wirtz et al., 2016). As business development modes have become the primary framework explaining company value creation mechanisms, this field has attracted extensive scholarly attention (Zott et al., 2011).

Furthermore, researchers highlight that business development modes address not only how companies create value for external stakeholders but also their own value capture mechanisms—specifically, how the focal company benefits from its business development mode (Amit & Zott, 2001; Chesbrough, 2007; Shafer et al., 2005; Wirtz et al., 2016; Zott et al., 2011). Value creation and value capture constitute the core logic of business development modes. Additionally, scholars recognize that business development modes include the value delivery components, which concerns how value is delivered to the target market through pricing, promotion, distribution, channel management, and customer interaction (Baden & Morgan, 2010; Magretta, 2002; Teece & Pisano, 1998). Therefore, the study of business development modes encompasses three core processes: value creation, value delivery, and value capture. With the deepening of value-oriented research, scholarly consensus has increasingly emphasized the systemic relationship among value creation, delivery, and capture in defining business development modes (Foss & Saebi, 2017). Moreover, the critical role of the value proposition within business development modes has been widely acknowledged and incorporated into conceptual frameworks and dimensional taxonomies (E. A. J. Johnson, 2012).

The definition of business development mode value is summarized in Table 2.1.

Table 2.1 Definition of business development mode value

Topic	Researcher	Description
Value Creation	Shafer et al. (2005)	The allocation efficiency of internal resources is the core of value creation, and the design of business development mode should be based on the demand of customers.
	M. W. Johnson et al. (2008)	Innovative business development modes enhances growth potential by redefining value boundaries.
	Baker and Nelson (2005)	The re-integration of marginal resources is of great significance to the value creation of small and medium-sized enterprises.
	Jung (2022)	Value creation comes from the customer co-creation mechanism, and the business development modes should strengthen participation and interaction.
	Singh and Pangarkar (2025)	Customer relationship quality and loyalty management are fundamental drivers of value creation.
Value Acquisition	X. Chen and Chen (2024)	Enterprises should simultaneously optimize the value creation and acquisition links to achieve competitive advantage.
	Franco et al. (2024)	The design of the revenue structure of the business development modes directly affects the ability to capture value.
	Freund et al. (2024)	Differentiated revenue allocation should be made based on the value sensitivity of the customer base.
	Ha et al. (2023)	The coupling of value acquisition and local resources in transnational expansion
Value Delivery	Magretta (2002)	The business development modes are defined as the logical story of how an enterprise tells its value creation, delivery and acquisition.
	Teece (2010)	Dynamic capabilities determine the ability of business development modes to successfully deliver and capture value.
	Baden and Morgan (2010)	The business development mode is a combination of cognitive structure and practical mechanism.
	Osterwalder et al. (2010)	Established a nine-module model, the system describes the commercial value system.
	Foss and Saebi (2017)	The innovation path of business development modes is closely related to organizational learning mechanism.
Value Proposition	Magnaghi et al. (2025)	The value proposition is the bridge between strategy and customer demands.
	M. W. Johnson et al. (2008)	Accurate delivery of value proposition is the premise of effective operation of business development mode.
	Richardson (2008)	Systematically analyzed the interactive relationship between value proposition, value structure, and value network.
	Demil and Lecocq (2010)	Value proposition is the core variable of enterprise evolution and reconstruction.
	F. Liu et al. (2024)	Social value should be integrated into the logic of value proposition in Chinese context.

How business development modes generate profit has long been a central concern in both industry and academia. Early studies often equated business development modes with “profit models” or “mechanisms by which companies generate revenue” (M. W. Johnson et al., 2008;

Osterwalder et al., 2010; Teece, 2010). Although this perspective helped rapidly attract industry attention and established the relevance of business development mode research within the field of management, reducing business development modes to mere profit-generation mechanisms presents notable limitations. This finance-centric view focuses primarily on the companies, neglecting the needs of customers and other stakeholders, as well as the strategic objectives related to long-term sustainability. Such a financially reductive interpretation risks conflating business development modes with "financial models," thereby constraining the disciplinary scope and academic contribution of the field. In reality, profit is merely one manifestation of value creation and not the sole focus of business development mode research.

With the broadening of research perspectives, the focus of business development mode studies has gradually shifted from mere profit acquisition to the processes of value creation, delivery, and capture. The underlying business philosophy has evolved from a "company-centric, profit-maximisation" orientation to a "customer- and stakeholder-oriented, value-maximisation" approach (Zott et al., 2011). As the concept originates from various disciplinary domains, inconsistencies in definitions and applications have emerged across studies, leading to conceptual ambiguity and variation in scope. This lack of clarity has not only blurred the boundaries of value-oriented business development mode research but also resulted in overlapping and fragmented frameworks, thereby impeding theoretical advancement. Some scholars even argue that the fragmented conceptual system has obscured the core value logic of business development modes, creating a disconnection between academic theory and practical application, and weakening the systematic development of the field (Foss & Saebi, 2017). Given that the central function of a business development mode is to articulate how a company creates, delivers, and captures value, the academic community has expanded this core framework to include concepts such as business development mode diversification (Ahuja & Novelli, 2016; Sohl et al., 2020), portfolios of business development modes (Sabatier et al., 2010), ambidextrous business development modes (Markides & Charitou, 2004), and multiple concurrent modes (Snihur & Tarzijan, 2018). These frameworks aim to reveal how companies employ various modes simultaneously to enhance competitiveness.

Snihur and Tarzijan (2018) argue that diversification in business development modes entails sharing resources, activities, and partners across different modes to offer distinct products or services. This multi-mode configuration raises operational complexity and demands higher organisational capabilities. Overall, business development mode research has

evolved from a focus on profit modes to value-creation modes, using diversification, portfolio, and ambidextrous frameworks to examine how companies leverage varied modes to gain competitive advantage. Schmidt et al. (2016) further emphasise that business development modes should not merely be regarded as frameworks for value realisation, but as institutional structures that govern company–stakeholder interactions. Their findings highlight that the effectiveness of a business development mode depends on its capacity to build stable trust and cooperation mechanisms among diverse stakeholders—especially in resource-constrained industries, where such structural coordination is critical to operational efficiency and market responsiveness.

2.1.2 Research on company performance

The relationship between business development modes and company performance has long been a focal point for both academics and practitioners. Existing studies hold that the optimisation and innovation of business development modes can significantly enhance company performance. Some study has noted that business development mode innovation can substantially improve key financial indicators such as sales revenue, profit, and cash flow (Mitchell & Coles, 2003). Business development modes not only support companies in exploring new markets but also help consolidate and expand competitive advantages in existing ones, thereby enabling greater value creation. Zott and Amit (2008) have further revealed that a high degree of alignment between a company's business development mode and its competitive strategy has a significantly positive impact on profitability.

Empirical studies examine the impact of business development modes on company performance from three perspectives: (1) the classification of business development modes and their respective effects on performance; (2) the relationship between specific business development mode themes and company performance; and (3) how individual components of a business development mode influence performance outcomes.

Afuah (2003) argues that company performance depends not merely on the possession of resources, but more importantly on how those resources are leveraged through the business development mode to efficiently meet market demand. His findings suggest that performance levels often hinge on a company's dynamic capacity to reconfigure value creation paths—an iterative process that must be embedded in ongoing stakeholder engagement and feedback. Other researchers highlight that different types of business development modes yield varying levels of value creation and performance outcomes. Empirical studies across multiple industries indicate that customer-integrated and platform-based collaborative modes are more

likely to generate superior financial performance and market responsiveness (Weill et al., 2005). Casadesus and Ricart (2011) propose that the business development mode serves as the bridge between strategic logic and performance outcomes. They stress that the effectiveness of a business development mode is profoundly shaped by the external institutional environment and the structure of stakeholder relationships. Their research shows that companies capable of establishing stable and mutually beneficial external collaboration networks tend to realise stronger performance-enhancing effects from their business development modes.

Visnjic et al. (2016) emphasise the unique advantages of service-oriented business development modes in enhancing company performance. Their study shows that when companies integrate customers, suppliers, and other key stakeholders into a co-creation service chain, they not only improve agility but also boost operational performance and sustainability outcomes. Large-scale quantitative studies further confirm a significant positive correlation between well-structured, efficiently executed, and highly collaborative business development mode designs and company performance (Amit, 2007). These studies stress that the key to performance improvement lies in the company's ability to integrate diverse stakeholders into a value co-creation network. From a consumer sovereignty perspective, Wikström et al. (2009) argue that company performance increasingly depends on how well a company can achieve deep customer engagement through its business development mode. Their findings suggest that customer-driven value co-creation platforms are more likely to translate into sustained performance advantages. Some scholars contend that performance measurement systems must align with the intrinsic logic of the business development mode; otherwise, resource misallocation and execution bias may occur. They advocate for a multidimensional performance evaluation framework based on value dimensions, operational metrics, and external stakeholder relationships to accurately reflect the real contribution of business development modes to company performance (Morris et al., 2013). An empirical analysis of 376 Italian SMEs between 2000 and 2010 supports this view, demonstrating that adjustments in business development modes can significantly improve company performance (Cucculelli & Bettinelli, 2015).

In examining the relationship between business development mode themes and company performance, researchers have found that the degree of alignment between a company's core market strategy and its business development mode plays a critical role in performance outcomes (Amit, 2007; Pati et al., 2018; Zott & Amit, 2008). Studies indicate that companies with higher alignment between their business development modes and market strategies tend

to achieve better performance. This suggests that business development modes serve not only as vehicles for value creation but also as important sources of competitive advantage (Zott & Amit, 2008). Overall, existing research shows that the choice, adjustment, and optimisation of business development modes have a profound impact on company performance. However, due to the complexity of industry conditions, market environments, and internal company factors, conclusions across studies still vary. Zott and Amit (2008) were the first to apply the concept of themes to business development mode research and they developed a thematic business development mode scale and used statistical empirical methods to explore the relationship between thematic modes and performance. They argue that business development mode themes are context-dependent, and only certain thematic modes significantly enhance performance. Drawing on a sample of start-ups listed in Europe and the US between 1996 and 2000, they found that such companies often face greater environmental uncertainty than mature enterprises. To overcome this adversity, start-ups either pursue innovation in operational methods (adopting a "novelty-centred mode") or seek improved efficiency (adopting an "efficiency-centred mode)".

Some scholars have proposed the theory of "first-mover advantage," arguing that companies entering a market early and establishing an advantageous business development mode along with a core relational network can achieve a significant lead in resource acquisition, brand recognition, and customer retention (Lieberman & Montgomery, 1988). Their research suggests that early capability in constructing a business development mode directly shapes a company's performance foundation in dynamic competitive environments—especially in industries heavily reliant on relational capital, where this advantage is even more pronounced. Amit and Zott (2001) further emphasise that performance improvement depends not only on resource endowment, but more crucially on the company's ability to effectively combine resources and systematically realise value through its business development mode. Their study identifies four mediating variables—synergy, lock-in, novelty, and efficiency—as key connectors between business development modes and performance outcomes. In stakeholder-rich environments, designing performance-oriented business development modes should revolve around these four dimensions.

From a value-driven perspective, scholars have analysed the logical relationship between business development modes and company performance. They argue that the selected mode plays a decisive role in resource integration, building synergies, and enhancing operational efficiency. Their findings show that if companies can achieve efficient stakeholder collaboration and value co-creation through their business development modes, they can not

only improve strategic alignment but also significantly enhance both financial and market performance. These studies highlight that business development modes serve as structural carriers for strategy implementation and function as key intermediaries for performance optimisation. Moreover, research indicates that novelty-centred business development modes are more beneficial for start-ups, while mature enterprises are more likely to benefit from efficiency-centred modes (Pati et al., 2018; Zott & Amit, 2002).

In examining the relationship between business development mode components and company performance, scholars have explored both the components of business development mode and its role as a moderating variable (Hargadon & Douglas, 2001; Patzelt et al., 2008). However, most quantitative research on business development modes relies on survey-based methods, which are often constrained by questionnaire design, data objectivity, and response completeness—factors that limit both research quality and real-world applicability. Some studies have noted the internal tensions among different types of business development modes, emphasising that a company's ability to manage these tensions is crucial to performance. In environments where multiple stakeholders coexist, business development modes lacking clear boundaries and strategic alignment may weaken organisational coherence and market execution, ultimately undermining overall performance (Markides & Sosa, 2013). Effective integration of business development modes not only optimises resource allocation but also strengthens a company's adaptability across diverse stakeholder groups. From a service-dominant logic perspective, Visnjic et al. (2013) highlight the importance of customer participation and partner collaboration in linking business development mode to company performance. Their findings show that frequent interactions with key stakeholders—such as customers, suppliers, and platform providers—enhance service quality and customer loyalty, thereby supporting sustained performance improvement. At its core, the service-driven business development mode revolves around continuous value co-creation and trust building among stakeholders (Visnjic et al., 2013). Zott and Amit (2008) further argue that BDM design must balance novelty and network effects to improve performance. In highly interactive business ecosystems, companies should embed various stakeholders into value networks and design business development modes with collaborative advantages and flexible structures, enabling resource sharing, risk mitigation, and performance gains. These findings suggest that company performance reflects not only internal capabilities but also their role in the business network and the quality of stakeholder interactions. Coff (1999) posits that a focal company's ability to capture value is influenced by factors such as stakeholders' switching and substitution costs, the company's control over information, and the likelihood

of stakeholder coalitions.

Amit (2007) asserts that performance fundamentally derives from a company's capacity to activate the collaborative potential of diverse stakeholders. According to this view, business development modes function not merely as transaction structures but as systemic mechanisms linking companies to their environments. Resource Dependence Theory also underscores the significance of stakeholder-controlled resources in shaping company performance (Pfeffer & Salancik, 2003). Companies must strategically establish dependent yet cooperative relationships with key resource providers—such as governments, suppliers, and distributors—to secure sustained access and mitigate uncertainty (Pfeffer & Salancik, 2003). Amit (2007) further identifies business development mode as a crucial link between strategy and performance outcomes. Unlike product- or service-centric approaches, systematic business development modes are better suited to dynamic environments, enhancing co-creation with stakeholders and aligning financial, strategic, and social performance. In contrast, efficiency-centred business development modes focus on improving transaction efficiency by optimising resource allocation, standardising processes, sharing information, and reducing transaction costs and uncertainty (Bohl, 2015). Studies show that both efficiency- and innovation-driven business development modes have significant effects on company performance (Brettel et al., 2012).

Pohle and Chapman (2006) argue that the essence of company performance lies in whether the business development mode can drive continuous value innovation and the reconfiguration of organisational capabilities. Zott et al. (2011) emphasise that business development mode serves not only as a value creation mechanism but also as a key mediating variable for performance outcomes. From a technology commercialisation perspective, Chesbrough and Rosenbloom (2002) propose that business development mode acts as a bridge between technological potential and market performance. Research has shown that performance improvement is not derived from a single factor, but rather depends on the optimisation of business development mode across multiple dimensions—novelty, lock-in, complementarity, and efficiency (Amit & Zott, 2001). Building on this, Priem et al. (2018) introduce a "value co-creation–performance nexus" perspective, highlighting that in multi-sided markets and industrial platforms, enterprises must engage stakeholders through collaborative mechanisms to extend performance outcomes. They argue that the greater the interactivity and stakeholder participation in the business development mode, the higher the collective value contribution and overall performance return. Amit (2007), in a series of studies, repeatedly underscores the role of business development mode as a strategic

execution system. Particularly in complex market environments, companies should reconstruct their relational logic with external systems to optimise performance.

Business development mode innovation is fundamentally a unique logic of value creation and capture that holds significant potential to enhance company performance. However, to realise this potential in practice, companies must provide adequate support and strategic implementation to make the mode difficult for competitors to imitate (George & Bock, 2011; Mezger, 2014). Whether companies can achieve profit growth and long-term development through business development mode innovation (Salmerón et al., 2025) hinges on their ability to fully exploit the latent value embedded in the innovation process. Nonetheless, some scholars caution that business development mode innovation—though containing great potential—does not necessarily guarantee superior performance, as it merely introduces new ways for companies and stakeholders to transact (Amit, 2007; Pati et al., 2018).

Despite substantial research on the relationship between business development mode innovation and company performance, several gaps remain. Notably, context-specific studies are still lacking, particularly regarding moderating variables such as national culture and company type. This gap limits the theoretical understanding of the efficacy of business development mode innovation on performance and constrains the development of practical guidance for companies seeking to implement such innovations.

2.1.3 Research on business development modes of Chinese hog enterprises

2.1.3.1 The characteristics of mainstream business development modes in China's hog industry

China's hog farming industry exhibits a diversified landscape of mainstream business development modes, among which the vertically integrated business development mode has demonstrated distinct advantages in the aftermath of the African swine fever (ASF) outbreak. Twelve publicly listed hog companies in China have adopted full-industry-chain control strategies by incorporating feed production (backward integration) and slaughtering and processing (forward integration) into their operational systems. This approach has proven effective in stabilising supply chains and reducing transaction costs (G. Wang et al., 2023). Empirical studies indicate that such integration significantly accelerated the recovery of production capacity, although the recovery rate remains to be quantified (Xu, 2025). It is noteworthy that contract-based vertical integration, despite providing short-term protection for farmers through a "fixed return plus guaranteed minimum purchase price" risk-sharing

mechanism, exhibits relatively low resilience to market volatility and may lead to supply chain disruptions during periods of extreme price fluctuations (M. Y. Wang et al., 2009).

In recent years, the "company + farmer" cooperation business development mode has emerged as another significant development path and has been widely adopted in countries such as China and Ghana. Under this business development mode, leading enterprises are providing inputs such as breeding stock and feed, as well as technical support, while farmers focus on the daily management of the rearing process (Ulvenblad et al., 2018). Although this division of labour is theoretically conducive to achieving economies of scale, empirical evidence reveals substantial inefficiencies in technology transmission. A persistently high farmer default rate has become a major bottleneck restricting the business development mode's thrive (M. Y. Wang et al., 2009). To address this challenge, scholars have proposed strengthening knowledge management (KM) systems to enhance smallholder farmers' capacity to absorb technology, with particular emphasis on overcoming the "last-mile" barriers to technology adoption (Trujillo-Diaz et al., 2019).

With technological advancements and industrial upgrading in the hog sector, technology-intensive modes represent a key direction for industry transformation. Empirical studies in Ukraine have confirmed that the application of Internet of Things (IoT) monitoring systems in slaughterhouses effectively reduces biosafety risks, while the adoption of blockchain technology significantly enhances the credibility of traceability information (Fadillah & Indrawan, 2020). Smart hog farms, equipped with automated feeding systems and environmental control devices, have been shown through simulation data to reduce labour costs by approximately 20% (Fesenko et al., 2024). However, the high upfront investment costs pose a significant barrier to adoption for small- and medium-scale producers, with this threshold effect particularly pronounced in developing countries (Monastyrskiy et al., 2021).

At present, innovation-driven mechanisms play a crucial role in the transformation of the hog farming industry. Supply chain innovation (SCI), through the restructuring of value networks, has given rise to various new business development modes, with breakthroughs in manure valorisation technology being among the most notable. This technology converts traditional waste into construction materials or energy products, thereby advancing circular economy practices (Monastyrskiy et al., 2021). Studies indicate that the reuse of solid waste, such as calcium slag, not only mitigates environmental pollution but also generates considerable economic value (Centobelli et al., 2020). Nonetheless, the implementation of sustainability-oriented innovations faces significant bottlenecks, with high environmental governance costs constituting a major constraint. It is estimated that the treatment of hog

manure typically accounts for 15%–30% of total operational costs, underscoring the necessity of policy subsidies (Comin et al., 2019). Technological compatibility issues also warrant attention. A typical example is the low feed conversion efficiency faced by hog producers in India: although insect-based protein feed is technically feasible, limited consumer acceptance has hindered its large-scale adoption (Saatkamp et al., 2022).

The recent surge in digital empowerment has offered new paths for industrial upgrading. A case study from Malaysia demonstrates that the integrated application of digital marketing and supply chain risk management systems can significantly enhance industry resilience (Muhammad et al., 2021). However, the digitalisation process in developing countries still faces major challenges. Some studies indicate that digital penetration rates generally remain below 40%, and although this figure lacks precise quantification, it is sufficient to reflect the existence of a significant digital divide (Teixeira & Tavares-Lehmann, 2021).

2.1.3.2 Evaluation of business development modes in China's hog industry

To comprehensively assess and guide industry development, the construction of effective evaluation modes is essential. A six-dimensional maturity-based evaluation framework, which categorises enterprise development into six stages from survival to innovation breakthroughs and maps them to key indicators such as value chain integration and carbon intensity, has proven effective in Slovak agricultural enterprises (Micieta et al., 2021). Nevertheless, the current evaluation systems reveal a significant gap in sustainability quantification. Existing assessments primarily emphasise economic dimensions such as cost-benefit ratios, but often lack integrated environmental and social indicators—for example, the carbon footprint per unit of hog or the impact on community health (Strapchuk, 2023; Süß et al., 2021). In the United States, hog survival rate (ranging from 60% to 85%) has become a core sustainability metric within the industry (Flohr et al., 2024), yet a globally unified standard has not yet been established. Looking ahead, future research on hog enterprises should focus on policy adaptability and interdisciplinary integration. The African swine fever outbreak exposed serious delays in policy response, underscoring the urgent need for the development of outbreak-responsive business development modes to enhance industry resilience (G. Wang et al., 2023; Xu, 2025). Simultaneously, the integration of circular economy principles and digital twin technologies to optimise resource flow modelling will be a crucial direction for improving industry efficiency and sustainability (Centobelli et al., 2020; Donner & de Vries, 2023).

Since pork is a primary source of nutrition in China, the development modes of hog

businesses are of special significance. An objective evaluation requires considering both industry characteristics and the external environment. Based on existing literature, this study evaluates business development modes in the hog industry from three dimensions: value creation, expansion and replicability, and long-term adaptability. These not only assess short-term performance but also reflect future survival and growth under uncertainty.

(1) Value creation

Value creation is the core of business development, referring to the ability to generate economic, social, and environmental value for stakeholders (shareholders, farmers, consumers, and society) through resource use and innovation. For hog enterprises, it involves improving production chains, product quality, and economic efficiency.

The value creation modes of Chinese hog enterprises usually cover feed supply, breeding, processing, and sales. Domestically, hog farming operates in three forms: loose cooperation between companies and farmers, close cooperation, and large-scale automated industrial production (X. M. Yang, 2010). The loose mode, or the "company + farmer" approach, involves companies providing feed, piglets, and medicines to scattered farms, with farmers raising hogs on their own conditions and selling them afterward. This mode reduces company risk but offers little incentive to farmers, generating limited value. The close cooperation mode provides stronger support, such as breed selection and disease prevention, thus improving production efficiency. The large-scale automated mode creates the greatest value through intensive production, raising efficiency and profitability. Scholars have further noted that the hog industry faces new challenges in the internet era, where value creation has shifted from an industrial economy logic to a network-based economy logic (Zheng et al., 2018). Through internet-enabled value innovation, enterprises can expand spatial use and enhance social utility, thereby improving economic returns. For instance, applying IoT technologies can enhance product traceability and meet differentiated consumer demands. Moreover, value creation is seen as arising from adaptive and creative human behaviour, requiring comopanies to adjust supply according to market price changes to balance social demand and reduce risks such as disease outbreaks (Zhao & Dong, 2011).

(2) Expansion and replicability

Expansion and replicability refer to a company's ability to quickly spread successful business practices to new markets or regions, encompassing scale, standardization, and resource integration. For hog companies, this dimension relates to industry-wide expansion, risk diversification, and development mode generalizability. Some scholars advocate large-scale automated industrial modes as the most replicable, achievable through standardized

machinery and processes without reliance on farmers (L. Y. Wang, 2007). Others argue that loose, decentralized cooperation is more flexible but lacks replicability, as coordination and scaling are difficult with multiple partners (L. Y. Wang, 2007). In the internet era, further reorganizing the industry through network platforms—such as using IoT to enhance the entire hog supply chain—can accelerate value-space expansion and promote replicable modes. For example, Wen's Group has expanded its "company + farmer" mode nationwide using digital platforms, increasing market share (Zheng et al., 2018). Expansion and replicability also involve the ability to adapt existing resources, explore the unknown, and enhance entrepreneurial and innovation capabilities.

(3) Long-term adaptability

Long-term adaptability concerns a company's capacity to sustain operations and growth under external changes, such as policy, market, or environmental shifts, through learning and adjustment. For pork producers, it reflects resilience to disease outbreaks, price fluctuations, and evolving consumer trends.

Long-term adaptability requires companies to maintain an ongoing awareness of innovation and change, with a core focus on "adaptive behavior" and "logical creative behavior," meaning continuous adjustments to achieve value growth. In the hog industry, this entails responding promptly to market supply and demand, such as using real-time data to predict changes and adjust production scale to avoid surplus or shortage. Scholars have proposed a three-stage mode of corporate sustainability: from the first stage (routine business development) to the third stage (sustainable business development), which emphasizes attention to the external environment and meeting stakeholder needs. This requires hog companies to address environmental and consumer challenges innovatively, for example, by developing green, antibiotic-free farming technologies (Jabłoński & Jabłoński, 2016) or improving infrastructure and IoT capabilities to support production (Zheng et al., 2018). Some researchers note that the principles of adaptability resemble self-optimizing algorithms studied in nature, chemistry, and biology, where dynamic threshold adjustments achieve goals (Fang & Jin, 2012), providing a conceptual basis for agricultural technology innovation, such as data-driven prediction of feeding strategies.

Therefore, the evaluation of business development modes in Chinese hog companies can be based on three dimensions, covering short-, medium-, and long-term performance: (1) value creation, reflecting the economic and social value generated by a company; (2) expansion and replicability, indicating whether the mode can be successfully applied to other regions, fields, or industries, contributing to environmental, stakeholder, and social value; and

(3) long-term adaptability, assessing whether the business mode can survive and thrive under uncertainty, adapt to environmental changes, optimize resource allocation, and sustain growth. These dimensions are interrelated yet distinct and, when combined with the characteristics and needs of Chinese hog companies, can guide sustainable and rapid development, aligning with the "Internet+" and green economy trends as new drivers (Jabłoński & Jabłoński, 2016; Smit et al., 2002; Zheng et al., 2018).

2.1.4 Impact of business development mode on company performance

In complex and dynamic market environments, the core challenge for enterprises lies in continuously creating value and realising its economic transformation, ultimately reflected in superior company performance (Dayioglu & Kusku, 2022; Tao & Chen, 2011). Corporate performance, as a key indicator of business outcomes, encompasses economic, social, and environmental benefits (Hana & Houari, 2021).

2.1.4.1 Impact of the value creation of china's hog business development modes on corporate performance

(1) Impact of value creation on economic performance

The critical bridge connecting strategic goals with final performance results is the business development mode a company adopts—especially its effectiveness in value creation—which constitutes a profound internal driver of economic performance. Value creation efficiency is not an abstract concept; it is embodied in how companies design, organise, and execute core activities with lower input costs, faster response times, better resource utilisation, and higher customer satisfaction, thereby transforming inputs such as capital, raw materials, technology, and human resources into market-attractive products or services and generating economic surplus. The degree of this efficiency directly determines a company's competitive position and the amount of its economic returns.

A highly efficient business development mode first contributes to a significant reduction in operational costs. By streamlining and optimising each link in the value chain—such as through lean production, agile supply chain management, automation technologies, or platform-based operations—companies can eliminate waste, reduce redundancies, and enhance economies of scale, thus achieving cost savings across procurement, production, logistics, marketing, sales, and after-sales services (Piprani et al., 2024). These cost reductions directly translate into improved profit margins, as greater efficiency at constant revenue levels allows for higher profitability.

Secondly, value creation efficiency shapes revenue generation capabilities. An efficient mode enables companies to more accurately anticipate market trends and customer needs, and to deliver tailored products or services at speed (Manjunath et al., 2024). Shorter R&D cycles, quicker market response, and faster delivery strengthen a company's ability to capture market opportunities, secure premium pricing, and build customer loyalty (Itani et al., 2024). Operational efficiency also enhances capacity utilisation and service quality, which underpins sales growth and market share consolidation. By offering superior, faster, or more distinctive value at lower cost, companies strengthen their competitive edge and unlock revenue growth potential.

Moreover, value creation efficiency reflects a company's core capability in resource allocation. It determines whether limited resources—such as funding, talent, and technology—are directed toward the most value-generating areas. An efficient business development mode acts as a precise navigation system, guiding resources to high-yield and high-innovation activities while avoiding waste in low-impact or non-strategic functions. For instance, leveraging data analytics to target high-value customer segments and optimise marketing investment, applying modular design to enhance R&D resource reuse, or empowering employees to improve workforce productivity (Guo et al., 2021). Such efficient resource allocation not only improves immediate input-output ratios but also lays a solid foundation for sustainable profit growth through continuous optimisation and innovation.

Furthermore, in volatile environments, value creation efficiency becomes a source of hard-to-imitate competitive advantage. Once a company establishes a tightly integrated, high-efficiency value creation system, it gains resilience against market fluctuations and agility to seize emerging opportunities. Efficiency-driven cost advantages and rapid iteration capabilities form high entry barriers (Queiroz et al., 2024). While competitors may replicate individual products or technologies, it is exceedingly difficult to emulate an entire coherent business system with its embedded organisational knowledge, procedural synergy, and cultural DNA. This efficiency-based advantage is durable and supports sustained profitability, enabling companies to withstand price competition and strengthen overall financial performance. The pursuit of value creation efficiency does not exist in isolation; it must remain closely aligned with the core of customer value. Efficiency improvements that fail to translate into value enhancements perceptible and worth paying for from the customer's perspective will yield diminished or even counterproductive economic returns.

The essence of an efficient business development mode lies in accurately identifying the core value propositions of target customers and constructing a value delivery path that fulfils

those propositions with maximum efficiency (Mishra, 2015). This implies that the efficiency optimisation must be highly consistent with the company's customer value proposition. For instance, customers seeking optimal cost-performance ratios require efficiency improvements focused on cost control, whereas those prioritising personalised experiences demand efficiency manifested through flexible production and rapid customisation. When value creation efficiency is perfectly aligned with the realisation of customer value, enterprises not only gain market access but do so at a lower cost—naturally enhancing economic performance. Thus, the value creation efficiency embedded in a business development mode essentially represents a systemic capability that tightly couples strategic choices, operational execution, and market needs. It functions as both the "engine" of a company's economic performance—driving profit generation and growth—and the "stabiliser"—ensuring the sustainability of earnings through the establishment of competitive barriers and optimised resource allocation. To assess company performance solely through economic indicators without considering the efficiency of value creation embedded in the business development mode is akin to evaluating a living organism by its external appearance while ignoring the vitality of its internal circulatory system.

(2) Impact of value creation on the social benefits of enterprises.

Within the broader landscape of company performance assessment, economic performance remains foundational. However, social performance—representing a company's contribution to societal well-being—is gaining importance as a critical evaluative dimension. A company's business development mode, especially its core value creation efficiency, not only shapes economic returns but also exerts a powerful and often multiplicative influence on its social outcomes. Value creation efficiency is not merely an internal metric of operational improvement; at its core, it reflects how effectively an enterprise uses social resources to meet societal needs or solve social problems (Donaldson, 2023; Qiang et al., 2025). When such efficiency is directed beyond narrow profit motives and embedded with societal value considerations, the business development mode becomes a driver of positive social impact.

A high-efficiency value creation process means generating greater-scale, higher-quality, or more inclusive social outputs per unit of social resource input—or achieving the same social outcomes with lower resource consumption and reduced negative externalities.

First, enhanced value creation efficiency amplifies a company's capacity and reach in addressing societal issues. Many companies operate in domains that are inherently tied to social challenges—such as affordable financial services, accessible healthcare, quality education, sustainable energy, or food security. When these companies employ process

optimisation, technological innovation, platform modes, or lean management to significantly improve delivery efficiency, it enables them to serve broader populations—especially marginalised or low-income groups previously underserved by conventional modes. Efficiency improvements lower service barriers, making formerly expensive solutions more accessible and enhancing overall social inclusivity. For example, a financial inclusion institution that reduces operational costs through digitalisation and streamlined workflows can extend microcredit services to remote rural communities while maintaining financial sustainability. This empowers more micro-enterprises and individual entrepreneurs, contributing substantially to regional economic development and poverty alleviation—far surpassing the impact of less efficient modes. Such scale-driven effects, rooted in efficiency, are central to expanding both the breadth and depth of social performance.

Secondly, an efficient value creation mode can significantly reduce the negative externalities that business operations impose on the environment and local communities—an essential dimension of social performance. Resource depletion and environmental degradation are often closely tied to inefficiencies. An inefficient production process typically entails higher energy consumption, greater material waste, increased pollutant emissions, and longer transportation distances. In contrast, efforts to enhance value creation efficiency—such as applying circular economy principles, adopting clean production technologies, optimising logistics networks, and improving energy efficiency—directly reduce the ecological footprint of business activities (X. Chen & Chen, 2024; Cui et al., 2023). These improvements translate into lower resource consumption, less waste generation, and reduced carbon emissions per unit of output. This not only aligns with societal expectations for sustainable development but also tangibly improves the environmental quality of both the company's immediate surroundings and broader regions, thereby benefiting the health and well-being of community residents. For instance, manufacturing companies that implement lean production and green manufacturing technologies to enhance material and energy efficiency not only reduce costs but also significantly cut industrial waste and greenhouse gas emissions. Such environmental performance is a core manifestation of their social contribution.

Moreover, value creation efficiency profoundly shapes the development of human capital and the cultivation of social relations within and beyond the company—both key sources of social value. Efficient business development modes typically rely on optimised organisational structures, streamlined process design, effective knowledge management, and advanced technological enablement (Angelshaug et al., 2025). This does not inherently result in the "exploitation" of workers. Rather, it can eliminate unproductive labour, provide better tools

and training, and empower employees with greater autonomy. As employees operate within a smoother, more efficient system—with fewer redundancies and frustrations—they experience enhanced job performance, accelerated skill development, stronger senses of purpose, and improved occupational health and safety. At the same time, efficient value chain collaboration fosters more equitable, transparent, and sustainable partnerships, raising the overall capability and compliance standards across the business ecosystem (Ramanathan et al., 2024). Such respect for, empowerment of, and investment in people—as well as the proactive shaping of collaborative networks—constitute vital social contributions, enhancing labour market quality and fostering the growth of social capital. Efficiency-driven innovation itself can become a catalyst for broader societal advancement. In their pursuit of ever-higher value creation efficiency, companies often generate breakthrough technologies, products, service modes, or management methods (Menter et al., 2023; L. Wang et al., 2023). These innovations, while initially aimed at resolving company-level inefficiencies, frequently produce spillover effects that benefit society at large. High-efficiency modes compel enterprises to constantly seek better solutions, a process that inherently nurtures potential approaches to broader societal challenges. When the outcomes of efficiency-driven innovation are shared with the public in open or affordable ways, the resulting social value extends far beyond the boundaries of the company itself.

(3) Impact of value creation on environmental performance

In today's context of escalating global ecological crises and a broad consensus on sustainable development, the evaluation of company performance has moved far beyond mere financial metrics. Environmental performance has emerged as a critical dimension for assessing a company's long-term viability, its fulfilment of social responsibilities, and its potential for future value creation. At the heart of this lies the enterprise's business development mode—particularly the value creation efficiency it embodies—which shares a deep and increasingly interdependent relationship with environmental outcomes. An efficient value creation process is not merely about generating more economic output from fewer inputs; it also entails achieving superior environmental performance with a lower ecological footprint. This kind of efficiency represents a more concentrated, intelligent, and responsible use of natural resources and environmental carrying capacity. It directly drives significant improvements in a company's environmental impact and forms the bedrock of competitive advantage in the green, low-carbon transition era.

The most direct and visible contribution of value creation efficiency to environmental performance lies in its ability to systematically reduce resource consumption and pollutant

emissions. Traditional inefficient production modes are often characterised by high energy use, high material consumption, and high emissions—key contributors to environmental degradation (Antonakakis et al., 2017). In contrast, business development modes that pursue value creation efficiency inherently demand comprehensive optimisation and innovation in production processes, technological methods, logistics systems, and managerial practices. By adopting advanced energy-saving technologies and equipment or improving energy management systems, companies can significantly reduce energy use and associated greenhouse gas emissions without compromising—indeed, often while increasing—output levels (Zhu, 2011). Cleaner production techniques and alternative raw materials can reduce the generation and release of hazardous substances at the source. Efficient supply chain and logistics management can minimise fuel consumption and vehicle emissions in transportation (Ribeiro de Oliveira et al., 2023). Each of these efficiency-driven improvements directly contributes to resource conservation and environmental load reduction. Their cumulative impact is reflected in a marked reduction of the enterprise's carbon, water, and material footprints—core indicators of environmental performance that capture the declining ecological cost per unit of economic value created. Moreover, enhanced value creation efficiency provides a strong foundation for companies to proactively address environmental regulations and market pressures, lowering the cost of environmental risk and reinforcing the stability and sustainability of their environmental performance (Huang et al., 2023). Globally tightening environmental regulations are making inefficient, high-pollution production methods increasingly costly and risky. Efficiency, therefore, is not just a performance booster—it is a risk mitigator and a strategic imperative for environmental compliance and long-term competitiveness.

A high-efficiency business development mode, inherently embedded with mechanisms for resource conservation and pollution prevention, is better positioned to adapt to, and even anticipate, regulatory requirements—thus avoiding hefty fines, production shutdowns, corrective actions, or reputational damage. At the same time, consumers, investors, and supply chain partners are increasingly attentive to companies' environmental performance. Green consumption, responsible investment, and green supply chain management have become mainstream trends. Enterprises with efficient and environmentally friendly operations are better equipped to meet customers' green preferences and to capture market premiums (Y. Peng et al., 2024; L. P. Wang et al., 2024). They are also more likely to attract ESG-focused investors, reduce financing costs (Cao et al., 2024; Qian, 2024), and gain entry into core supply chains with stringent environmental standards for suppliers. This market-driven "green

premium" and "risk avoidance" in turn generate economic incentives for continuous investment in efficiency improvements and environmental innovation, forming a positive cycle of sustained environmental performance enhancement.

Efficient enterprises are more capable and willing to invest in environmental technology R&D, clean production transformation, and environmental management system certification, further reinforcing their environmental advantages. Ultimately, integrating environmental benefits deeply into the optimisation of value creation efficiency represents a strategic shift from end-of-pipe treatment to source prevention and process control—an essential path to achieving fundamental and systemic improvements in environmental performance. The traditional mode of "pollute first, clean up later" is not only costly but also yields limited results. In contrast, a high-efficiency value creation mode requires incorporating environmental impact as a core variable from the outset of design and production. Through process reengineering, technological innovation, and managerial optimisation, environmental principles and efficiency logic are embedded in every stage of value creation, aiming to reduce or eliminate pollutant generation at the source. This environmental efficiency, intrinsic to the business development mode, is far more effective, enduring, and cost-efficient than externally imposed control measures. It blurs the traditional boundary between economic production and environmental protection, transforming environmental responsibility from a cost centre into a driver of innovation, efficiency, and new value creation. When an enterprise can generate equal or even greater economic value with less resource consumption, lower pollutant emissions, and more efficient recycling, it achieves the true integration of economic and environmental benefits and its business development mode becomes tangible proof of sustainability performance.

In an era where humanity faces severe ecological constraints, pursuing a business development mode that deeply integrates value creation efficiency with environmental benefits is no longer merely a matter of reputation or compliance—it is vital to long-term survival, sustainable operations, and making a substantive contribution to building a future where humanity and nature coexist harmoniously (Griffiths et al., 2004; Ping et al., 2023). This marks a profound evolution in enterprise performance evaluation systems, with environmental benefits becoming an indispensable core metric of true value-creation capability.

2.1.4.2 Impact of the expansion and replicability of China's hog business development modes on company performance

(1) Impact of expansion and replicable potential on economic performance

In a rapidly evolving market environment, the core driver of sustained growth and superior performance lies not only in the meticulous refinement of existing operations, but also in the extent to which a business development mode possesses strong expansion and replication potential. This potential refers to the ability of a proven business development mode, operational system, core capability, or value proposition to be efficiently, cost-effectively, and with relatively low risk transplanted, expanded, or adapted to new markets, customer segments, product lines, or application scenarios. It is not merely a matter of intent to scale, but is rooted in the intrinsic features of the business development mode — its degree of standardisation, modular design, systematic support, brand influence, and adaptability to external environmental differences.

When a company's business development mode exhibits exceptional expansion and replication potential, it becomes a powerful engine for exponential growth in economic returns, significantly influencing revenue trajectories, cost structure optimisation, profitability enhancement, and ultimately, long-term value creation. The most direct and significant contribution of replicability to economic performance is its ability to rapidly accelerate revenue growth and diversify income sources. A highly replicable business development mode enables the company to avoid building entirely new development modes from scratch when entering new markets or launching new services (Dehkordi et al., 2024; Perätalo et al., 2023; Ribeiro de Oliveira et al., 2023). By replicating core components, the business can swiftly establish its presence in target regions or sectors. This "copy–paste–optimise" capability shortens market entry cycles, reduces the uncertainty of new business incubation, and allows companies to capture dispersed market opportunities at significantly lower costs and risks compared to developing entirely new modes. For example, successful chain retailers, restaurants, or hotel brands rely on highly standardised store designs, service workflows, training systems, and supply chain management to rapidly open new locations worldwide, swiftly converting brand value and operational efficiency into scaled revenue. Similarly, enterprises with strong platform-based modes or SaaS (Software-as-a-Service) products derive value from the expansion and replication potential of their underlying architecture, enabling them to accommodate massive numbers of new customers or enter new sectors at minimal marginal cost, thereby achieving explosive revenue growth (Arjun et al.,

2024; Power & Weinman, 2018). This mode-driven expansion breaks the linear constraints of traditional growth paradigms and unlocks near-infinite income growth potential.

At a deeper level, expansion and replication potential serve as a core lever for achieving economies of scale, optimising cost structures, and enhancing overall profitability. Replication is not mere repetition but is grounded in standardisation, process orientation, and systematisation. When a company replicates its successful mode across multiple locations or domains, fixed costs are spread across a broader revenue base, significantly reducing the average fixed cost per unit of product or service (Linden, 2016; Panazan et al., 2021). Simultaneously, large-scale operations confer stronger bargaining power in sourcing raw materials, acquiring key resources, and negotiating logistics services, thereby lowering variable costs (De Vries et al., 2023; Ho, 2021). Moreover, experience, best practices, and knowledge assets accumulated during replication can be captured, refined, and disseminated through centralised knowledge management systems, continuously improving operational efficiency while reducing trial-and-error costs and learning curves. These cost advantages, derived from scale and knowledge reuse, translate directly into higher gross margins and operating profit margins.

In addition, strong expansion and replication potential build formidable competitive barriers and sustainable advantages, ensuring stable and growing long-term economic returns (Mwawasi, 2022). First, companies that successfully replicate and establish themselves in multiple key markets early on can create scale-based entry barriers, deterring latecomers with the burden of high initial investments and market education costs. Second, the expansive networks formed during replication generate powerful network effects—the more customers, the greater the platform's value, attracting more customers and complementary service providers and creating a self-reinforcing growth cycle, which in itself constitutes a significant competitive barrier (Van Alstyne & Parker, 2017). Third, efficient replication relies on a complex operational system, organisational capabilities, and corporate culture, often encompassing tacit knowledge that is difficult for competitors to imitate in the short term. Furthermore, companies with high replicability can flexibly allocate resources, reinvesting profits and experience gained in one market into the next growth opportunity, thus establishing a continuous cycle of innovation that strengthens and extends their market leadership (Buyukbalci et al., 2024; Xavier et al., 2024). This systemic advantage, rooted in replicability, enables companies to stay ahead of competition, capture excess returns, and withstand market volatility and economic cycles, delivering more stable and predictable long-term returns for shareholders.

Ultimately, the expansion and replication potential of a business development mode are pivotal to transforming isolated success into systemic success and are foundational to non-linear economic growth. It transcends accidental victories tied to a single product or market and constructs a "growth engine" capable of continuously generating economic value. When a business development mode is designed from the outset with replicability as a core principle—and when resources are invested to build the critical capabilities needed for replication—it lays the groundwork for explosive future growth. This potential allows the company to continuously convert market opportunities into tangible economic returns at lower marginal costs, higher speed, and with greater success.

(2) Impact of expansion and replicable potential on social performance

When a company's business development mode is meticulously designed so that its core value proposition, operational system, and service delivery mechanism possess strong expansion and replication potential, its impact transcends mere economic profit and deeply permeates the social sphere, driving significant enhancement and large-scale release of corporate social benefits. This potential refers to a validated business mode that addresses specific social needs or creates positive social impact, which can be efficiently, standardisedly, and adaptively transplanted, expanded, or adapted to broader geographic areas, larger beneficiary populations, or more diverse social issues. It is not merely a tool for scaling business but a mechanism that transforms localized social solutions into inclusive social change, primarily by lowering the marginal cost and entry barriers of social value creation through replicability, thereby enabling exponential diffusion of positive social impact into areas traditionally difficult to reach. The most direct contribution of expansion and replication potential to social benefits lies in its ability to rapidly expand the coverage and inclusiveness of solutions addressing social problems. Many socially valuable enterprises originate with the business mode tailored to specific communities or target groups.

If such mode is unique and difficult to replicate, their social impact remains limited (Kuklytė & Vveinhardt, 2017). However, a development mode with high replicability can overcome geographic and resource constraints by standardising core processes, modularising key components, and establishing robust knowledge transfer and support systems (Diogo et al., 2023). For example, a sustainable agriculture mode successfully validated in a poverty-stricken area, utilising local resources, once distilled into replicable technological packages, management methods, and market linkage mechanisms, can be rapidly disseminated to other regions with similar conditions, empowering thousands of smallholder farmers to improve livelihoods, ensure food security, and foster community economic development. This scale

enabled by efficient replication greatly accelerates the resolution of social problems, maximizing the social return on limited innovations. Furthermore, replicable business mode systematically lower the barriers to accessing high-quality social services or products, promoting social equity and inclusion (Bozaykut-Buk & Titiz, 2021; Sugahara et al., 2021). Many socially valuable products or services remain inaccessible to low-income populations or remote residents due to high initial R&D costs, complex localisation, or lack of efficient delivery networks. Development odes designed with expansion and replication potential in mind focus on cost structure reduction, simplification of operational processes, utilisation of scalable technological platforms, and establishment of sustainable operational mechanisms (Fayad et al., 2005; Godwin et al., 2024). This renders previously costly solutions affordable or enables scarce resources to reach marginalized populations more effectively. The cost reduction and increased accessibility driven by replicability serve as crucial forces for breaking unequal social resource distribution and promoting equal opportunity.

Moreover, a social value creation mode centred on expansion and replication potential can itself stimulate broader social innovation and entrepreneurial spirit, forming a virtuous cycle. A validated and easily replicable social solution serves as a compelling demonstration and “lighthouse,” inspiring more social entrepreneurs, community leaders, and even business innovators to engage in secondary innovation or localised application. A standardised framework offers a reliable foundation and reduces trial-and-error costs, allowing innovators to focus on adapting to local needs and addressing emerging challenges (Coetzee, 2001). As successful replication cases continue to emerge, they further validate the development mode’s universality and effectiveness, attracting more resources into the domain and fostering an innovation ecosystem aimed at solving specific social problems. Meanwhile, the large volumes of data and practical experience accumulated during replication provide valuable input for continuous iteration and optimisation of the mode, enabling it to respond to evolving social needs with greater precision and efficiency. This diffusion of social innovation, driven by replicability, becomes a powerful engine for social progress. In sum, the expansion and replication potential of a business development mode substantially enhance the depth and breadth of a company’s capacity to address social challenges. By reducing the marginal cost of creating social value, improving inclusivity, facilitating resource integration and collaboration, and stimulating widespread innovation, such modes enable social benefits to be realised at scale, in a systematic and sustainable manner. When replicability is treated as an intrinsic element of the social value creation mode—rather than merely a tool for expansion—the enterprise gains a powerful lever for driving lasting and far-reaching social

transformation. In the face of increasingly complex and urgent global social challenges, cultivating and deploying business development modes with high expansion and replication potential is not only a path to improving corporate social performance, but also a strategic imperative for pooling collective strength and accelerating the construction of a more just, inclusive, and sustainable future. This scaling of social impact driven by business development mode design marks a fundamental evolution in the role of the enterprise—from a "creator of social value" to a "catalyst of social transformation."

(3) Impact of Expansion and Replicable Potential on Environmental Performance

In recent years, with the deepening of the global sustainable development agenda and the strengthening of corporate environmental responsibility, both academia and industry have increasingly focused on how core attributes of business development modes drive substantive improvements in corporate environmental performance. Among these, the relationship between expansion and replication potential of business development modes and environmental benefits has emerged as a key area of research. Studies indicate that business development modes with high expansion and replication potential can profoundly influence environmental performance through multiple mechanisms, often exhibiting multiplier effects (Song et al., 2024). Early research laid the foundation for a strategic perspective on sustainability, emphasising that companies should go beyond compliance and regard environmental challenges as opportunities for innovation and value creation—highlighting the importance of replicable and scalable solutions (Pofoura et al., 2020).

One key finding is that highly scalable business development modes significantly accelerate the large-scale adoption of environmentally friendly practices and technologies, thereby reducing environmental footprints at the systemic level. Standardisation and modularity form the basis of replicability; when environmental technologies or circular economy practices are embedded in highly standardised and modular business development modes, the cost and complexity of deployment are greatly reduced (Y. M. Li et al., 2024). Similarly, for platform-based companies, the core value lies in network effects that match supply and demand and in scalability with low marginal cost. Such development modes inherently possess strong replicability, enabling rapid scaling of resource-saving and idle-capacity-reducing concepts, influencing the behaviour of millions of customers in a short time. The cumulative environmental benefits of this approach far exceed those achievable by individual companies. Literature suggests that this replication-driven scaling effect is a critical lever in addressing global environmental challenges such as climate change and resource depletion (Lin et al., 2008).

Furthermore, research has explored how expansion and replication potential drives continuous improvement in environmental performance and reduces unit costs of environmental improvement through economies of scale and knowledge spillovers (L. Li & Zhu, 2024). As environmentally friendly practices or technologies are disseminated across multiple sites and units through replication, significant economies of scale emerge (Chege & Wang, 2020). Enhanced bargaining power in the bulk procurement of eco-friendly materials or equipment, and the allocation of fixed environmental investments across broader operations, reduce the environmental input cost per unit of output (Petersen et al., 2020).

More importantly, replication is itself a powerful mechanism for learning-by-doing and knowledge accumulation. Localised implementation across units generates experience, data, and best practices that can be captured, refined, and rapidly disseminated via internal knowledge management systems. This organisational learning loop accelerates iterative optimisation of environmental practices, lowers the learning curve for subsequent replication units, and facilitates the identification and scaling of cost-effective environmental solutions across the network.

Additionally, studies underscore the distinctive advantages of scalable business development modes in advancing circular economy principles and building closed-loop ecosystems (Geissdoerfer et al., 2020). The circular economy, which seeks to shift from a linear “take–make–dispose” model to a “design–use–regenerate” system, relies heavily on scalable and replicable business development modes. Research shows those modes designed with product recovery, remanufacturing, and material regeneration in mind have expansion and replication potential that directly determines the size and efficiency of the circular chain (Babbitt et al., 2021). Standardised designs facilitate disassembly and refurbishment, modular components allow for easy replacement and reuse, and the replicability of robust reverse logistics networks is essential for efficiently retrieving end-of-life products. When such closed-loop development modes are successfully replicated across multiple regions, sufficient flows of used products can be aggregated to support scaled, specialised remanufacturing centres or material recovery facilities, significantly improving resource efficiency and alleviating pressure on virgin resource extraction. Research also finds that platform-based modes possess inherent replicability advantages in promoting idle resource sharing and extending product lifespans, with network effects exponentially amplifying gains in resource utilisation efficiency (Ding et al., 2020).

In summary, existing literature clearly identifies the expansion and replication potential of business development modes as a critical strategic lever for enhancing corporate

environmental performance. By accelerating the large-scale adoption of environmentally friendly practices, enabling economies of scale and knowledge spillovers in environmental improvements, and facilitating the construction of circular economy systems, expansion and replication potential provides strong momentum for enterprises to systematically reduce environmental footprints and improve resource efficiency on a broader scale. However, fully realising its potential requires a deep understanding of and respect for local contexts, rigorous performance assurance mechanisms, and the ability to balance replication with innovation. Future research may further explore how digital technologies can enable more intelligent, transparent, and adaptive replication of environmental modes, as well as the collaborative mechanisms and governance challenges involved in leveraging replicability across complex value chains and inter-organisational networks. Grasping and managing the expansion and replication potential of business development modes is essential for enterprises to transition from isolated environmental improvements to systemic ecological value creation.

2.1.4.2 Impact of the long-term adaptability of china's hog business development modes on company performance

(1) Impact of Long-term Adaptability on Economic Performance

In today's business landscape—marked by increasing environmental volatility, technological disruption, and competitive complexity—corporate survival and development of China's hog enterprises are becoming increasingly dependent on the long-term adaptability embedded within their business development modes (Theuvsen, 2013). This adaptability refers to the development mode's capacity to perceive external changes, effectively integrate and reconfigure internal and external resources, and continuously adjust and evolve to maintain competitiveness and create long-term value (Dopfer et al., 2017; Lozova et al., 2024; Tamar Begdarashvili, 2022). It goes beyond static efficiency optimisation or short-term growth replication, focusing instead on the mode's resilience and vitality over time. A central consensus is that a business development mode with high long-term adaptability constitutes a key strategic asset, enabling companies to navigate economic cycles, withstand external shocks, seize emerging opportunities, and ultimately achieve superior and sustainable economic performance.

Dynamic capabilities theory offers a foundational framework for understanding such adaptability. It posits that a company's competitive advantage derives from its ability to build, integrate, and reconfigure internal and external resources to respond to rapid environmental changes—an ability defined as a higher-order capability (Teece & Pisano, 1998, 2003). As the

logic underpinning a company's resource allocation and value creation, the business development mode of China's hog enterprises is the concrete manifestation of organisational dynamic capabilities at the mode level. Studies show that companies with highly adaptive business development modes exhibit stronger environmental sensing capacities and can identify early signals of technological disruptions or market shifts (Nady et al., 2014; X. Zhang et al., 2010).

More importantly, they are able to quickly translate these insights into strategic responses at the mode level—such as adjusting value propositions, reconfiguring value chains, redefining profit logic, or innovating customer engagement methods. This proactive, forward-looking business development mode evolution allows companies to capture growth opportunities ahead of competitors (Jegan et al., 2023) or to swiftly find paths to survival and recovery in times of crisis, thus maintaining or even enhancing their long-term economic outcomes—reflected in higher revenue growth rates, more stable profit margins, and stronger risk resilience (Onyshchenko & Sizova, 2024).

Organisational learning and knowledge management are widely regarded as core micro-level mechanisms that support the long-term adaptability of business development modes and directly affect economic performance. March's seminal distinction between exploration and exploitation learning argues that long-term success requires companies to strike a balance between developing existing capabilities and exploring new opportunities (Devins & Kähr, 2010). Highly adaptive business development modes naturally foster ambidextrous learning. On one hand, they reduce the risks and costs of exploring new knowledge and testing new directions through structured processes and open architectures (J. Kim et al., 2025). On the other hand, they establish efficient mechanisms for knowledge integration and transformation, enabling companies to quickly internalise insights gained through exploration and apply them to optimise existing operations, thereby improving both efficiency and effectiveness. Existing studies show that this continuous learning cycle significantly enhances companies' innovation output and operational efficiency, directly translating into improved economic performance (Shah et al., 2025). Moreover, adaptive business development modes are typically embedded with robust knowledge management systems and cross-functional collaboration mechanisms, facilitating the codification of tacit knowledge and its cross-boundary flow. This accelerates the organisation's collective understanding and responsiveness to complex environmental changes, reducing decision-making errors and economic losses caused by information lags or organisational silos (Meirina et al., 2004; Zaoui et al., 2025).

The contribution of long-term adaptability to economic performance is also evident in

risk management and resilience building. In highly uncertain environments, companies face unprecedented “unknown unknowns.” Traditional rigid business development modes are often fragile—shocks to a single node can trigger systemic failure. By contrast, business development modes with strong long-term adaptability are typically designed with resilience principles such as redundancy, modularity, diversification, and rapid reconfiguration (Ramesh, 2023; Timus & Ulinici, 2024). For instance, modular design allows localised failures without disrupting the whole system and enables rapid replacement of faulty components; diversified revenue sources or customer portfolios buffer against volatility in a single market; flexible resource access reduces dependency on specific assets. Studies show that when crises occur, companies with adaptive business development modes can activate contingency plans, reallocate resources, and shift operational modes more quickly, thereby minimising economic losses. Such companies also tend to recover faster and may even capitalise on structural changes brought about by the crisis to rebound, exhibiting significantly lower volatility in long-term economic performance than less adaptive counterparts (Tuhai, 2024). This resilience ensures financial sustainability, stabilises investor confidence, reduces capital costs, and is critical to long-term shareholder value creation.

In sum, the existing literature clearly establishes long-term adaptability of business development modes as a core strategic determinant of sustained economic performance. By enabling companies to anticipate and respond to environmental disruption, drive continuous learning and knowledge transformation, build organisational resilience, and maintain lasting customer relevance and value delivery, adaptive business development modes provide a powerful engine for navigating uncertainty, capturing new growth opportunities, and achieving sustainable, superior financial outcomes.

(2) Impact of Long-term Adaptability on Social Performance

Against the backdrop of growing public awareness of sustainability and rising, increasingly complex social expectations, the social dimension of corporate performance has become a key indicator of a company’s long-term value and legitimacy. In recent years, academia has paid increasing attention to how the essential characteristics of business development modes systematically shape corporate social performance. Among these, long-term adaptability has been theoretically and empirically demonstrated as a core driver for achieving outstanding, lasting, and scalable social impact (Hou, 2024). This form of adaptability goes beyond short-term CSR projects or public relations efforts; it embeds responsiveness to social needs into the DNA and evolutionary logic of the business development mode, making it a sustained engine for shared value creation. The literature

draws from an integrated perspective of institutional theory and stakeholder theory. Institutional theory posits that organisations must align with prevailing societal norms and institutional environments to maintain legitimacy (Swaminathan & Wade, 2018).

Stakeholder theory asserts that companies must manage relationships with key stakeholders to ensure continuity (Z. M. Peng & Hua, 2007). Studies show that business development modes with high long-term adaptability can sensitively perceive changes in institutional environments and stakeholder expectations (Feld & Hoffmann, 2014). This sensing ability enables companies to proactively adjust their business development modes—by reshaping supply chains to ensure fair labour practices, redesigning products to eliminate discriminatory bias or improve accessibility, reforming employment policies to enhance employee well-being, or adjusting investment strategies to engage more actively in community development. Such proactive, mode-embedded adjustments far surpass passive compliance or post-crisis remediation, consistently strengthening social legitimacy, building deep trust, and mitigating reputation risks, public backlash, or regulatory penalties—thereby establishing a foundation for stable social value delivery. For instance, in response to increasing global demands for supply chain transparency, adaptive companies can systematically implement traceable and auditable responsible sourcing systems, fully integrated into their core operations rather than as superficial gestures (Hasan & Habib, 2023; Kraft et al., 2023).

Dynamic capabilities theory is also central in explaining the mechanisms of long-term adaptability in the social domain. Applied in this context, the framework highlights the need for specific “social dynamic capabilities” to continuously generate social value (Bhardwaj et al., 2022; De Silva et al., 2021). Business development modes with strong long-term adaptability embody such capabilities, demonstrating ongoing capacities for social learning and innovation. These modes incorporate structured mechanisms to collect and interpret information on social needs and the effectiveness of potential solutions. More importantly, they are capable of translating learning into action—optimising the efficacy and efficiency of social interventions through agile iteration, modular design, and resource reconfiguration. Research indicates that for mission-driven enterprises, long-term adaptability determines whether they can evolve from initially inefficient solutions into mature, scalable, and sustainable engines of social value creation (Bruder, 2020; H. L. Yang et al., 2024). This learning-driven mode evolution ensures that social interventions keep pace with the increasing complexity of societal problems, preventing obsolescence and enabling continual enhancement of social impact in both depth and scope.

Another key contribution of long-term adaptability to enhancing social impact lies in its coupling effect between organisational resilience and community resilience. Social disruptions can severely impact both community well-being and business operations. Business development modes with high adaptability embed resilience principles—such as redundancy, flexibility, modularity, and collaborative networks—into their design. This enables companies not only to maintain the delivery of essential social functions during crises, but also to proactively support community resilience (Hamann et al., 2019; Rattanasaeng & Sukhotu, 2024). Empirical observations show that such companies are more capable of swiftly redirecting resources to areas of urgent community need, while their operational modes absorb shocks more effectively, avoiding socially harmful actions such as mass layoffs or withdrawal from communities. This capacity to continue fulfilling social responsibilities—and even strengthen social contributions—in times of adversity significantly enhances corporate social capital and long-term reputation. The social impact of such actions is particularly salient and far-reaching during crises (Tian & Cramon-Taubadel, 2020). Over the long term, the very act of building resilience constitutes a critical social benefit, as it enhances a community's capacity to cope with future shocks.

In conclusion, existing literature provides compelling evidence that the long-term adaptability of business development modes is a core strategic lever for achieving outstanding, durable, and scalable social impact. By enabling companies to proactively respond to evolving social expectations and institutional changes, driving continuous social learning and innovation, fostering mutual resilience between enterprises and communities, and catalysing inclusive growth and systemic transformation, long-term adaptability serves as a powerful dynamic engine for social value creation. Understanding and leveraging the long-term social adaptability of business development modes is thus essential for companies seeking to shift from passive recipients of social value demands to active, sustainable creators of shared value.

(3) Impact of long-term adaptability on environmental performance

In the face of escalating global ecological crises and the accelerating green transition, corporate environmental performance has become a core dimension for evaluating a company's long-term viability, social licence to operate, and future value creation potential. Scholars have increasingly recognised that static environmental management strategies or isolated environmental initiatives are insufficient to cope with rapidly evolving ecological pressures (Raha et al., 2024). Consequently, academic attention has shifted towards the long-term adaptability embedded within business development modes of China's hog enterprises as

a key strategic attribute driving sustained, systemic environmental outcomes. This form of adaptability emphasises embedding environmental resilience into the very logic and evolutionary design of business development modes, positioning it as a dynamic engine for responding to ecological challenges and seizing green opportunities. The theoretical foundation of this perspective is rooted in the extended application of dynamic capabilities theory within sustainability research. The central view holds that, in conditions of high uncertainty and rapid change, companies derive competitive advantage from their capacity to build, integrate, and reconfigure resources in response to environmental shifts (Denrell & Powell, 2016; W. J. Sun et al., 2024).

The long-term adaptability of a business development mode of China's hog enterprises represents the materialisation of this higher-order "environmental dynamic capability" at the business development mode level. Studies show that environmentally adaptive business development modes exhibit superior environmental scanning and anticipatory responsiveness (Jiang & Zhang, 2008; Yu et al., 2019). These modes systematically monitor ecological trends, technological breakthroughs, regulatory developments, and evolving stakeholder expectations (Du et al., 2025). More importantly, they swiftly translate such insights into substantive mode-level transformations—redefining value propositions, restructuring value chains, innovating profit logics, or altering resource utilisation approaches. This proactive and forward-looking mode evolution enables companies to gain first-mover advantage in green markets, pre-empt environmental compliance risks and carbon costs, and reduce dependence on scarce resources, thereby achieving sustained improvements in environmental performance alongside potential economic returns—a dual win for environment and economy (Ha et al., 2023; Y. Y. Wang et al., 2022).

Ongoing organisational learning, knowledge generation, and technological innovation are widely recognised as the core micro-level mechanisms supporting the environmental adaptability of business development modes. The classic framework of exploratory and exploitative learning is highly relevant here. Environmentally adaptive modes promote ambidextrous learning: on one hand, through structured mechanisms that facilitate the exploration of breakthrough environmental technologies, disruptive circular economy modes, or novel solutions to environmental challenges (Donner & de Vries, 2021; Nußholz, 2018); on the other hand, through efficient internal knowledge management systems and cross-functional collaboration platforms, they rapidly integrate learnings, best practices, and lessons from failure into the optimisation of existing operations, supply chain management, and product design, thereby enhancing resource efficiency and reducing pollution (Vachon &

Klassen, 2008; Yan et al., 2006). Empirical evidence indicates that this learning-based continuous improvement loop significantly accelerates the absorption and application of environmental technologies, lowers the unit cost of environmental upgrades, and fosters the development of more competitive green products and services. Adaptive business development modes also tend to be more open, actively establishing collaborative networks with external knowledge sources to accelerate access to cutting-edge environmental knowledge and technologies, shorten learning curves, and jointly address complex ecological challenges (Sahoo et al., 2022).

A further critical contribution of long-term adaptability to environmental performance lies in its role in building ecological resilience and reducing exposure to environmental risks. Environmental disturbances are becoming increasingly frequent and severe, posing escalating threats to both business operations and surrounding ecosystems. Traditional, rigid linear business development modes often exhibit high ecological vulnerability. In contrast, business development modes characterised by long-term environmental adaptability typically incorporate principles of resilience into their design (Christodoulou et al., 2024). When environmental crises occur, highly adaptive companies can rapidly activate contingency plans, reallocate resources, and even transform challenges into opportunities—thereby significantly reducing the likelihood and severity of environmental incidents while preserving or even enhancing their environmental reputation. This resilience constitutes a form of environmental benefit in itself—mitigating sudden, destructive impacts of corporate activities on ecosystems (Eichholz et al., 2024; Marsat et al., 2022).

In conclusion, the existing literature firmly establishes long-term adaptability of business development modes as a core strategic lever for achieving outstanding, enduring, and systemic environmental outcomes. By enabling companies to anticipate and respond to ecological and regulatory shifts, driving continuous environmental learning and technological innovation, embedding ecological resilience, and progressively facilitating deep transitions toward a circular economy, long-term adaptability provides a powerful dynamic engine for sustained improvement in environmental performance, reduction of ecological footprints, and contribution to broader ecosystem health in volatile contexts. Understanding and harnessing the long-term environmental adaptability of business development modes is thus essential for companies seeking to move beyond passive compliance and become proactive creators of ecological value and agents of systemic transformation.

2.2 Hypotheses for the research

2.2.1 Impact of the antecedent factors on the business development modes of hog enterprises

2.2.1.1 Impact of resource synergy on the business development mode of hog enterprises

The Resource-Based View (RBV) posits that a company's core value lies in its ability to efficiently integrate internal and external resources to create market value at a cost lower than that of market transactions, thereby generating economic returns (Barney & Clark, 2007; Wernerfelt, 1984). Within this process, resource synergy plays a crucial integrative role. Resource synergy refers to the collaborative and coordinated efforts among different entities to share resources, knowledge, and information in pursuit of common, higher-value objectives. This synergy not only enhances a company's competitiveness but also drives the innovation and diversification of business development modes. According to Open Innovation view (Chesbrough & Rosenbloom, 2002), enterprises can significantly improve innovation efficiency, accelerate the development of technologies and products, and expand the scale and market impact of innovation through resource and knowledge sharing with external partners.

Resource synergy enables companies to access specialised expertise and technologies from various domains and industries. By sharing resources with partners, companies can more flexibly adapt and refine their business development modes to meet changing market demands (Buyukbalci et al., 2024; Shamsuzzoha et al., 2012). For instance, the rapid advancement of cloud computing technology is rooted in inter-organisational resource synergy, which has facilitated the transition from traditional software sales modes to subscription-based service modes. Moreover, resource synergy can reduce the cost and risk associated with business development modes. Through shared resources, companies can lower their investment and operational expenses. Resource synergy also allows for risk-sharing and joint responsibility, which helps mitigate operational risks (G. Li, 2010; Sharmelly & Ray, 2021). For example, co-marketing campaigns enable companies to jointly bear market and competitive risks, thereby improving the stability and sustainability of their business development modes. Finally, resource synergy can expand the market reach and distribution channels of a business development mode. By sharing access to distribution networks and customer bases with partners, companies can broaden their market coverage and increase product and service sales volume and market share (Frankenberger & Stam, 2020). Joint development and promotion of new products or services further extend the market potential of the business development

mode (Perks & Moxey, 2011). Through such synergy, companies can also leverage the brand reputation and market recognition of their partners to enhance the acceptance and credibility of their offerings.

In summary, resource synergy exerts a significant influence on the business development modes of hog enterprises. Therefore, this study proposes the following hypothesis:

H1: Resource synergy facilitates the improvement of business development modes in hog enterprises.

As for technology, resource synergy enables enterprises to access advanced farming technologies and management expertise, thereby enhancing production efficiency and quality (H. L. Yang, 2023). For instance, collaboration with livestock technology experts and agricultural research institutions allows companies to acquire farming techniques tailored to diverse geographical conditions and market demands. These technologies and experiences can be transferred to technical staff and farm workers through training, technical support, and joint research initiatives, thereby improving the company's technological capabilities and innovation capacity. In terms of brand development and market expansion, resource synergy facilitates the sharing of brands and marketing channels, allowing enterprises to rapidly penetrate new markets and establish sales networks. By cooperating with distribution channels and processing companies, enterprises can leverage their partners' brand reputation and market access to broaden market reach and enhance brand image and competitiveness (Y. J. Wang et al., 2018). For scale advantages, resource synergy provides economies of scale, reducing costs and improving efficiency. Collaborating with other livestock enterprises to jointly utilise production equipment and logistics resources can lower capital investment and operational costs while achieving scale efficiency. Establishing shared production bases and logistics networks can enhance production efficiency and reduce costs, thereby strengthening enterprise competitiveness. In terms of knowledge sharing and collaborative innovation, resource synergy promotes the exchange of knowledge and co-creation. Engaging in knowledge and information sharing with partners helps enterprises access the latest industry trends and market insights. Through collaborative research and innovation projects, companies can jointly develop technologies and innovative solutions with partners, thus enhancing product quality and added value (Zan et al., 2024).

Through the above paths, resource synergy can help hog companies expand their business in different markets, with higher production efficiency and quality, lower costs, and greater added value. Enterprises can actively seek cooperation opportunities with external partners for stable relations, thereby promoting value creation efficiency. Therefore, the following

hypothesis is put forward:

H1a: Resource synergy promotes the improvement of the value creation efficiency of hog enterprises.

Based on Resource Dependence Theory and the Resource-Based View, resource synergy can help hog enterprises optimize resource allocation. By establishing partnerships and sharing resources, companies can improve resource utilization efficiency, achieve economies of scale, and reduce costs, thereby enhancing their expansion and replication potential. Resource synergy also facilitates the creation of learning organizations, boosting enterprises' learning and innovation capabilities. Through collaboration and knowledge sharing with partners, companies gain access to new technologies and management experiences, continuously improving breeding techniques and management practices. Additionally, feedback and experience sharing from partners accelerate problem-solving and knowledge accumulation, increasing organizational learning efficiency and innovation capacity. Building learning organizations enables enterprises to better adapt to market changes and technological progress, further enhancing their expansion and replication potential. Furthermore, through collaboration with partners, enterprises can jointly engage in R&D and innovation activities, sharing research outcomes and intellectual property. The diversity and expertise of partners introduce new innovation ideas and technical support, driving innovation management (Talke et al., 2010). Effective innovation management helps companies continuously launch new products and services to meet market demands, improve competitiveness, and further enhance expansion and replication potential. Moreover, resource synergy cultivates dynamic capabilities, enabling enterprises to respond flexibly to market demands and environmental changes (Bodendorf & Franke, 2024). Through partnerships, companies can rapidly acquire new market information and technological trends, timely adjust production and business strategies, and improve market responsiveness (Sarkum et al., 2020). Resource synergy also supports the establishment of flexible supply chains and sales networks, adapting to market fluctuations and enhancing product competitiveness. By nurturing dynamic capabilities, enterprises can better expand and replicate their business development modes, achieving sustained growth (Y. Jin & Edmunds, 2015; Lun et al., 2016).

In summary, resource synergy can promote the expansion-replication potential of hog enterprises by optimising resource allocation, building a learning organisation, cultivating dynamic capabilities, and promoting innovative management. Therefore, the following hypothesis is put forward:

H1b: Resource synergy promotes the expansion-replication potential of hog enterprises.

Resource synergy can promote diversified resource acquisition for hog farming enterprises. It enables companies to obtain a variety of resources, including technology, capital, and market information. Collaborations with research institutions or technology providers allow joint R&D projects, leading to technological breakthroughs (Manning, 2017; Muñoz-La et al., 2021) Partnerships with banks can provide suppliers with accounts receivable financing services, alleviating their financial pressure and ensuring supply chain stability (Mezni, 2023). Cooperation with market research agencies or consulting companies helps enterprises understand market trends, competitor dynamics, and consumer demands (Karray & Sigué, 2018). Thus, by working with breeding technology experts, agricultural research institutions, and suppliers, enterprises can access diverse types of resources, reducing dependency on specific resources and increasing adaptability when facing changes and challenges. Resource synergy also fosters knowledge sharing and enhances learning capabilities. Through collaborative research and innovation projects, enterprises can jointly engage with partners in technological R&D and innovation, improving their learning and innovation capacities, thereby boosting adaptive capabilities (Arsanti et al., 2024). Moreover, resource synergy supports the establishment of flexible organizational structures and cooperative relationships. By partnering with others, companies can build flexible supply chains and cooperative networks, allowing agile adjustments according to market demands and resource changes (Chouhan et al., 2025). Partners can jointly respond to market fluctuations and risk challenges, explore new development opportunities, and achieve shared resource optimization. Finally, resource synergy helps enterprises diversify and share risks. Through collaboration, companies can collectively bear risks and share losses in the face of market volatility, natural disasters, and other uncertainties (Chouhan et al., 2025; G. Li et al., 2015; Ramezani & Camarinha-Matos, 2020). Partners can conduct joint risk analysis and management, develop coordinated risk response strategies, and enhance enterprises' resilience and long-term adaptability.

In summary, resource synergy promotes the enhancement of long-term adaptability in hog enterprises through mechanisms such as diversified resource acquisition, knowledge sharing and learning capabilities, flexible organizational structures and collaborative relationships, as well as risk diversification and joint risk-bearing. This, in turn, improves the enterprises' flexibility, learning capacity, and risk resilience, enabling them to better respond to market changes and challenges and achieve sustainable development. Therefore, this study proposes the following hypothesis:

H1c: Resource synergy promotes the long-term adaptability of hog enterprises.

2.2.1.2 Impact of market competition on business development mode hog enterprises

Competition is a regular feature of the business environment, and Porter argues in his strategic management theory that the state of competition within an industry depends on the strength and posture of the supply and demand parties in the market, including the number of suppliers, the extent of differentiation between products, product substitutability, competitors' strategies, and barriers to enter the market. The interaction of these factors affects the bargaining power of enterprises in transactions. Competition pushes the continuous innovation and optimisation of enterprises to adapt to market demand and gain a competitive advantage. According to the Resource Based View, competition motivates enterprises to optimise their business development modes through continuous integration and allocation of resources. In a fully competitive market environment, enterprises need to constantly seek new resources and capabilities to meet consumer needs and distinguish them from other competitors. This acquisition and integration of resources drives the innovation and evolution of business development modes (Divya & Zhu, 2024; Ferreira et al., 2020). Enterprises gain a competitive advantage by continuously optimising their business development modes to improve the efficiency and effectiveness of resource allocation. Innovation theory believes that competition is one of the main driving forces of innovation. Competition compels enterprises to seek differentiation and uniqueness and to offer unique value propositions through innovative business development modes. Through innovative business development modes, enterprises can redefine the value chain, change market positioning, or optimise operation mode, to gain competitive advantages (Demil & Lecocq, 2010; Thornton, 2024; To et al., 2020). In addition, the theory of dynamic capabilities believes that enterprises in a competitive environment need to have the ability to adapt to changes. Market competition brings continuous changes in market demand and the external environment, requiring enterprises to possess flexibility and agility to promptly adjust and improve their business development modes in response to such changes (Abdelilah et al., 2018; Csiszárik-Kocsir & Varga, 2024; Orlova et al., 2024). The positive impact of competition on business development modes lies in its ability to stimulate the dynamic capabilities of enterprises.

Therefore, the following hypothesis is put forward:

H2: Market competition improves the business development mode of hog enterprises.

First, market competition compels hog enterprises to pay greater attention to the effective allocation and management of resources. In order to gain a competitive edge, companies must allocate and utilise limited resources—such as land, feed, and labour—more efficiently.

Competition drives enterprises to pursue optimised resource allocation strategies and enhance production processes and supply chain management, thereby improving resource use efficiency and reducing costs (Mellat-Parast & E. Spillan, 2014). Second, market competition raises the bar for operational efficiency and managerial capabilities in hog enterprises. It pushes companies to refine production workflows, improve management practices, and enhance employee skills and competencies, ultimately leading to improved operational and managerial performance (Handoyo et al., 2023). Furthermore, market competition drives hog enterprises to seek innovation and technological advancement in order to enhance productivity and product quality. Competitive pressure encourages companies to invest more in research and development, accelerating technological progress and operational efficiency. Finally, market competition compels hog enterprises to pursue market share growth and increased sales revenue. By expanding market share, companies can achieve economies of scale, reduce costs, and enhance profitability and value creation efficiency (Ji et al., 2023; Primario et al., 2024; Schimmenti et al., 2025).

To summarize, market competition plays an important role in improving the value-creation efficiency of hog enterprises. Competition stimulates innovation and technological progress, optimises resource allocation and management, improves operational efficiency and management, expands market share, and increases sales revenue. These paths of action jointly promote the improvement of the value creation efficiency of hog enterprises, so the following hypothesis is put forward:

H2a: Market competition promotes the improvement of the value-creation efficiency of hog enterprises.

Market competition drives hog enterprises to continuously pursue scale expansion to achieve economies of scale. In a highly competitive market, companies must expand their operations to spread fixed costs, reduce unit production costs, and gain more favourable conditions in procurement, sales, and logistics (Linden, 2016). By scaling up, enterprises can enhance efficiency and lower costs, thereby increasing their potential for replication. Market competition also compels hog enterprises to prioritise brand building and reputation development. In competitive markets, companies must deliver high-quality products and excellent services to establish a strong brand image and earn a positive reputation. A well-established brand and reputation enhance market visibility and competitiveness (Gupta et al., 2020), attracting more consumers and business partners (Rodney et al., 2010). At the same time, strong brand equity and credibility provide favourable conditions for business replication and expansion. Establishing supply chains and partnerships: Competition forces

hog enterprises to build stable supply chains and collaborative partnerships to support replication potential. These relationships allow enterprises to expand and replicate operations more rapidly and reliably. Standardisation of technology and process optimisation: Market competition pushes hog enterprises to implement technical standardisation and optimise operational processes to enhance expansion and replication potential. In highly competitive environments, unified technical standards and streamlined processes ensure consistency and reproducibility in production. Such standardisation reduces operational risk, improves efficiency, and facilitates consistent and stable outcomes during expansion.

To summarize, market competition plays an important role in improving the expansion-replication potential of hog enterprises. Competition drives enterprises to pursue the benefits of scale economy, build brands and reputation, establish supply chains and partnerships, standardise technology, and streamline processes. Together, these paths of action promote the improvement of the replication potential of hog enterprises, so that they can better expand and replicate their business in the competition. Therefore, the following hypothesis is put forward:

H2b: Market competition promotes the expansion-replication potential of hog enterprises.

Market competition urges hog enterprises to continuously innovate and make technological advances to match changes and challenges in the market. In the competitive market, enterprises need to continuously explore new techniques, management methods, and processes to drive productivity, reduce costs, and improve product quality (Khugaeva, 2024). Continuous innovation and technological advances allow companies to adapt to changes in the market in the long run. Market competition motivates hog enterprises to flexibly adjust their product portfolio to meet changes in market demand. Consumer demand and preferences may change, and enterprises need to adjust their product portfolio promptly and launch new products accordingly. Flexible product portfolios allow companies to adapt to changes in the marketplace, meet consumer needs, and improve long-term adaptability. Market competition is pushing hog enterprises to establish flexible supply chains and partnerships to respond to changes in the market. In the competitive market, enterprises need to forge flexible cooperative relationships with feed suppliers, veterinary suppliers, and sales channels, to ensure the flexibility of raw material supply and product sales. Establishing flexible supply chains and partnerships allows enterprises to make timely adjustments to supply and sales, adapt to changes in the marketplace, and improve long-term adaptability. Competition in the market leads hog enterprises to strengthen market monitoring and information acquisition to keep abreast of changes and trends in the market. In a competitive market, enterprises need to pay close attention to market dynamics and collect and analyse market data and information

to make accurate decisions and adjustments. With enhanced market monitoring and access to information, enterprises are better able to grasp changes in the market, make adjustments accordingly, and improve long-term adaptability.

In summary, market competition is important for the long-term adaptation of hog enterprises. Competition stimulates innovation and technological advances, prompting enterprises to flexibly adjust their product portfolios, build agile supply chains and partnerships, and enhance market monitoring and access to information. Together, these paths of action promote the long-term adaptability of hog enterprises, so that they can better adapt to changes in the market, so the following hypothesis is put forward:

H2c: Market competition promotes the long-term adaptability of hog enterprises.

2.2.1.3 Impact of customer demand on the business development modes of hog enterprises

The theory of microeconomics considers demand and supply as two aspects of the market, and whether the goods provided by the enterprise in the market can satisfy the demand of customers is the prerequisite for its market value and economic benefits. As the social and economic progress, the customer's demand is also rising, showing the trend of diversification and personalization.

Changes in customer demand have led to new products replacing the original ones, and new customer value replacing the original customer value. Business development modes will inevitably be adjusted and changed. Innovation economics emphasises the impact of customer demand on corporate innovation and business development modes. According to innovation economics, the innovation activities of enterprises should start from the demands of customers to create products and services with unique value through understanding and meeting their needs. Hog enterprises can also use this theory to innovate and improve their business development modes by gaining a deeper understanding of consumer needs and preferences (Keiningham et al., 2020). The market-oriented theory suggests that enterprises should be oriented to market demand and continuously adjust their business development modes through interaction with and learning from the market. Hog enterprises can actively interact with consumers through a market-oriented approach to understand the trends in market demand, make timely adjustments to products, supply chain, and marketing strategies, and enhance the adaptability and competitiveness of their business development modes. In practice, changes in customer demand have had a significant impact on the enhancement of business development modes of hog enterprises. As consumers focus more on food safety and

quality, demand for hog products with special requirements such as green, organic, and antibiotic-free has increased. Hog enterprises are required to adjust methods, improve feed formulations, and strengthen disease prevention and control accordingly to provide products that meet consumers' expectations. In addition, as greater demands are made by consumers for food traceability, hog enterprises also need to strengthen their information technology and establish a reliable traceability system.

In conclusion, customer demand is of great importance for the improvement of business development modes of hog enterprises. Innovation economics and Market-oriented Theory provide the theoretical basis for this view, so the following hypothesis is put forward:

H3: Customer demand improves the business development modes of hog enterprises.

Regarding products, the diversity of customer demand has led hog companies to engage in product positioning and differentiation. Through an in-depth understanding of customer demand and market trends, enterprises can adjust product positioning, develop products with differentiated features to meet the needs of different customer groups, and then improve the market competitiveness of the products to achieve higher sales and profit margins, thus enhancing the value creation efficiency of the enterprise. On the technology level, changes and enhancements in customer demand have driven technological innovation and production efficiency improvement in hog enterprises. Enterprises need to introduce advanced techniques, management methods, and production processes to meet customer demand for product quality, safety, and environmental friendliness. These technological innovations and productivity enhancements can help companies reduce costs, improve output and quality, and increase the efficiency of their value creation. In terms of supply chain optimisation and resource utilisation efficiency, changes in customer demand and personalised requirements have pushed hog enterprises to optimise their supply chains and improve resource utilisation efficiency. Enterprises need to build close cooperative relationships with suppliers of breeding raw materials, feed producers, and veterinary suppliers, to optimise the collaborative effect of the supply chain and the efficiency of resource utilisation. With an optimised supply chain and improved resource utilisation efficiency, enterprises can reduce costs, increase productivity, and achieve higher value creation efficiency. On the market side, changing customer demands require hog enterprises to maintain market orientation and continuous improvement. Enterprises need to keep following the market dynamics, customer feedback, and competitors' moves to adjust product strategy, market positioning, and marketing strategy in time (Serkutan & Shklyaruk, 2024). Through continuous improvement and market orientation, they can better satisfy customers' demands and improve the market

competitiveness of their products and the value creation efficiency (Hendarwan, 2023).

To summarize, customer demand plays an important role in improving the value-creation efficiency of hog enterprises. Through product positioning and differentiation, technological innovation, production efficiency enhancement, supply chain optimisation, and resource utilisation efficiency enhancement, as well as market orientation and continuous improvement, enterprises can better satisfy customer demand and improve the market competitiveness of the product and the value creation efficiency of the enterprise, so the following hypothesis is put forward:

H3a: Customer demand promotes the improvement of the value creation efficiency of hog enterprises.

Through a thorough understanding of customer demands and market trends, enterprises can develop products and services that are suited to the needs of customers. With the expansion of market demand, enterprises can broaden the scope of their product sales and market share and establish close cooperative relationships with suppliers of breeding raw materials, feed producers, and veterinary drug suppliers to jointly meet the needs of customers. Through resource integration and partnerships, enterprises can scale up their supply chain networks and production, and when they develop products and services that meet customer demands, they can standardise and replicate the relevant technical details and production processes. This reduces the cost and risk of developing new projects and accelerates the replication and expansion of the company in different regions and markets. In addition, the fulfilment of customer demands, and word-of-mouth effects can help hog enterprises build their brand image and reputation (Shi et al., 2016). When a company can provide products and services that meet the expectations of customers and are recognised by them, the brand value and awareness will be enhanced. A strong brand and good reputation can attract more customers and support the company's expansion by replication in different regions and markets (Rather et al., 2023; X. Sun et al., 2024; J. Xie et al., 2024).

To summarize, customer demand plays an important role in improving the expansion-replication potential of hog enterprises. Through market demand expansion, brand building and word-of-mouth effects, resource integration and partnerships, as well as technology standardisation and process replication, enterprises can expand in different regions and markets with higher potential for duplication, so the following hypothesis is put forward:

H3b: Customer demand promotes the expansion-replication potential of hog enterprises.

The changes and trends of customer demands can help hog enterprises to have market insights and trend forecasts. Through profound comprehension of customer demands and

awareness of market dynamics, enterprises can promptly adjust their product strategies, market positioning, and business development modes to adapt. Accurate market insights and forecasts can help organisations remain adaptive to market challenges over time. On the one hand, enterprises can introduce advanced farming technologies, management methods, and digital tools to improve production efficiency and product quality and to meet customers' requirements for product safety and environmental friendliness. Technological innovation and digital transformation can provide enterprises with a greater ability to adapt themselves to changes in market demand and trends. On the other hand, enterprises can establish close cooperative relationships with suppliers of breeding raw materials, feed producers, and veterinary drug suppliers to jointly respond to changes. Flexible supply chains and partnerships can help organisations quickly adjust production and supply for greater adaptability (Um, 2017). In addition, changes and enhancements in customer demands have prompted hog farming companies to engage in organisational learning and talent development. Enterprises can establish learning organisations, encourage employees to learn and innovate, and continuously improve the organisation's adaptability and innovation. At the same time, businesses need to nurture talents with market insights, technological capabilities, and leadership to cope with market changes and potential challenges (Cappelli & Keller, 2014).

In summary, customer demand is important for the long-term adaptation of hog enterprises. Through market insights and trend forecasting, technological innovation and digital transformation, flexible supply chains and partnerships, as well as organisational learning and talent development, enterprises can improve their long-term adaptability to changes in market demand and trends, so the following hypothesis is put forward:

H3c: Customer demand promotes the long-term adaptability of hog enterprises.

2.2.2 Impact of business development modes on the performance of hog enterprises

2.2.2.1 Impact of value creation efficiency on performance of hog enterprise

Value creation efficiency refers to the fact that an enterprise creates more value with the same or less resource investment in production. It can be achieved by raising production efficiency, reducing costs, improving product quality and innovation. According to the Resource Based View and the Organisational Resources View, value creation efficiency is considered an important part of the core competitiveness of enterprises. Efficient value creation capabilities can provide enterprises with a competitive advantage in a highly competitive market, thereby

improving enterprise performance. First, high value creation efficiency can lead to cost advantages. With higher productivity and lower costs, companies can offer products or services at lower costs, which allows more competitive prices in the market, leading to more consumer attraction, greater market share, and better performance (Akin & Altindag, 2025). Secondly, high value creation can improve product quality and customer satisfaction; by improving production efficiency and quality control, enterprises can provide higher quality products and services (Q. Wei et al., 2019), to enhance customer satisfaction and loyalty, bringing more repeat purchases and word-of-mouth reputation, which not only helps to consolidate the enterprise's position in the market but also to expand market share, increase sales and profit. In addition, high value creation efficiency can also promote innovation and continuous improvement. With improved productivity and resource utilisation efficiency, enterprises can free up more resources and time for innovative activities, which can help them develop new products, refine existing ones, and continually meet market changes. Continuous innovation and improvement keep enterprises competitive in the marketplace, increase product differentiation, and further enhance performance. Related studies have also pointed to the positive impact of value creation efficiency on company performance; for example, a study of U.S. manufacturing companies found a significant positive correlation between efficient value creation capabilities and a company's profits and market value. In addition, a study of Chinese manufacturing companies suggests that efficient value-creation capabilities can significantly improve a company's market performance and financial performance (Meng & Wang, 2023; Pan et al., 2022).

In summary, the impact of value creation efficiency on enterprise performance is positive. Efficient value creation capabilities lead to cost advantages, improved product quality, and customer satisfaction, and promote innovation and continuous improvement. These factors work together to drive competitive advantage and performance in the marketplace. Therefore, the following hypothesis is put forward:

H4: Efficiency of value creation improves the performance of hog enterprises

Regarding costs, high value creation efficiency can help hog enterprises reduce production costs; they can reduce feed waste and lower farming costs by measures such as improving the management, formula, and utilisation rate of feed; in addition, through raising the efficiency and utilisation of the livestock environment, such as improving the design of pigsties, optimising air quality and temperature control, they can lower the consumption of energy and resources, and reduce operating costs; the reduction of farming costs and operating costs can increase the profits of the enterprise, and increase the economic benefits.

With regard to production efficiency, efficient value creation efficiency can help hog enterprises improve production efficiency. Hog enterprises can improve production efficiency and labour productivity by introducing advanced technology and management methods, such as intelligent farming equipment and data analysis technology. In addition, optimising the raising process and management, such as reasonable epidemic prevention and control measures and scientific growth management, can improve the growth rate and slaughter rate of hogs, and improve the production efficiency, which can increase the output and production value, and thus improve the economic benefits. In terms of product quality, the improvement of value creation efficiency helps to improve the product quality. Hog enterprises can improve the health and quality of hogs by optimising breeding management and improving feed formulas and measures against diseases. High-quality products can receive higher market recognition and premium, increase sales price and market share, thereby increasing the economic benefits of the enterprise (R. J. Best et al., 2014). Concerning market competitiveness, with enhanced efficiency in value creation, hog enterprises can reinforce their competitiveness in the market. Efficient production and quality products can satisfy consumers' demand for quality and safety and enhance the brand image and reputation. At the same time, through lower production costs and higher production efficiency, companies can offer more competitive prices in the market to attract more consumers. Stronger market competitiveness can lead to higher sales and market share, which in turn improves the benefits of the enterprise.

In summary, the improvement of value creation efficiency has a positive impact on the economic benefits of hog enterprises. Enterprises can realise better economic benefits by reducing production costs, increasing production efficiency, improving product quality, and enhancing market competitiveness. Therefore, the following hypothesis is put forward:

H4a: Efficiency of value creation improves the economic benefits of hog enterprises.

High value creation efficiency can increase hog production and supply stability; specifically efficient production management and high-quality hog health can reduce disease incidence and mortality rates, and boost hog growth and slaughter rates, which helps to meet social demand for meat products and ensure food supply stability. The development of hog enterprises is of great significance to the development of rural areas. With higher value-creation efficiency, enterprises can increase the source of income of farmers and improve the living standard of rural residents, and the growth of enterprises can also lead to the promotion of related industrial chains, such as feeds, veterinary drugs, and breeding equipment, which can facilitate the upgrading of the rural industrial structure and diversification of the

countryside. In addition, thriving hog enterprises can create more jobs. Expansion of enterprises requires more workforce, such as breeders, feeding technicians, and veterinarians, offering local communities more employment opportunities, and contributing to the economy and social stability (Bharati et al., 2022; Mpalala et al., 2024).

In summary, the improvement of value creation efficiency has a positive impact on the social benefits of hog enterprises. It can promote the stability of the food supply, create employment opportunities, and promote rural economic development. Therefore, the following hypothesis is put forward:

H4b: Efficiency of value creation improves the social benefits of hog enterprises.

Value creation efficiency has a positive effect on improving the environmental performance of hog enterprises. On the one hand, with improved value creation efficiency, hog enterprises can utilise resources more efficiently to reduce waste and consumption of resources, which directly contributes to alleviating the pressure on natural resources. On the other hand, the hog farming process generates a large amount of waste, such as manure and wastewater, which, if not carefully discharged, are affecting the surrounding water and soil. Efficient value creation improves wastewater treatment and discharge control during farming and reduces pollution of water bodies. For example, advanced waste treatment technologies such as bio-gasification and anaerobic fermentation, as well as techniques like biological treatment and membrane separation, can effectively remove organic matter and pollutants from wastewater (Alena et al., 2021; Shankar et al., 2021). By properly utilising livestock waste as organic fertilizer or through recycling, soil quality can be improved, promoting soil conservation and sustainable use. This, in turn, helps reduce negative environmental impacts and achieve sustainable resource utilisation. Certainly: In addition, greenhouse gas emissions generated during hog farming have a certain impact on climate change (Z. Liu et al., 2013). By enhancing value creation efficiency, greenhouse gas emissions during the farming process can be reduced. Technologies such as bio-gasification and anaerobic fermentation can convert methane from waste into energy, thus reducing greenhouse gas emissions.

In summary, the improvement of value creation efficiency has a positive impact on the environmental efficiency of hog enterprises. Methods such as increasing resource utilisation efficiency, enhancing waste management and recycling practices, safeguarding water and soil quality, and mitigating greenhouse gas emissions can diminish the adverse environmental impacts of hog farming, thereby elevating its overall environmental efficiency. Therefore, the following hypothesis is put forward:

H4c: Efficiency of value creation improves the environmental efficiency of hog

enterprises.

2.2.2.2 Impact of expansion-replication potential on performance of hog enterprises

Expansion and replication potential involves an enterprise actively seeking new market opportunities and business development modes through innovation and learning to expand its business scope and market share, and it has a significant impact on enterprise performance. It can foster growth and innovation, improve the efficiency of resource utilisation, and enhance the competitiveness and risk resistance of enterprises. For production and farming enterprises, expansion-replication potential refers to hog enterprises actively seeking new market opportunities and business development modes through innovation and learning to expand their business scope and market share. Firstly, through expansion-replication potential, hog enterprises can expand the scale of farming and increase the production and sales volume of hogs, this scale expansion can realise the scale effect, on the one hand, the scale effect can reduce the cost of production and improve the profitability (Athanassiou, 2015). on the other hand, this scale effect requires enterprises to constantly innovate and learn to adapt to the new market demand and business development modes; such innovation and learning process can motivate the enterprises to constantly improve the farming technology and management methods, and increase the efficiency of production and the quality of the products. For example, the introduction of advanced breeding equipment and technology, optimisation of feed formulation, and feeding management can improve the growth rate and feed conversion rate of hogs; at the same time, expansion-replication potential can also bring new market opportunities, broaden sales channels, and increase the market share of products. This market expansion can improve the market competitiveness of the enterprise and further promote performance improvement. In addition, expansion-replication potential can reduce the risk and uncertainty of hog enterprises. By expanding in different markets and business areas, enterprises can diversify risks and reduce dependence on a single market or product, and this diversification strategy can make enterprises more risk-resistant with higher stability and performance (Ai, 2014).

To summarize, expansion-replication potential has an important impact on the performance of hog enterprises. It can promote the scale expansion-efficiency of enterprises, improve their innovation and technology, and minimise their risks and uncertainties. Therefore, the following hypothesis is put forward:

H5: Expansion and replication potential improves the performance of hog enterprises.

Expansion and replication potential have a certain impact on the economic benefits of hog

enterprises, which can be realised through the following role paths: first, expansion-replication potential can prompt hog enterprises to expand the scale of farming and increase the production and sales of hogs. With the expansion of scale, enterprises can enjoy the cost advantage brought by the scale effect (Shankar et al., 2021). Expansion and replication potential can help hog enterprises enter new markets and new businesses, broaden sales channels, and increase product market share. Through exploring new market opportunities, enterprises can expand the sales of their products and increase their sources of income. In addition, a diversified market layout also decreases the enterprise's dependence on a single market and diversifies sales risks. Second, expanding and replication potential requires companies to continuously innovate and learn to adapt to new market needs and business development modes. Second, expansion-replication potential require companies to constantly innovate and learn to adapt to new market demands and business development modes. For example, by using advanced breeding equipment, automated control systems, and precise feed formulas, enterprises can accelerate the growth and feed conversion rate and reduce costs. Such technological innovation and management optimisation can lead to higher economic benefits. Third, expansion-replication potential can help hog enterprises spread risks and lower dependence on a single market or product. Through expanding in different markets and business areas, enterprises can reduce business risks. When problems arise in one market or product, the enterprise can rely on other markets and products to maintain stable operations. This risk-spreading can improve the stability and economic efficiency of the enterprise.

In summary, expansion-replication potential help to improve the economic efficiency of hog enterprises through the effect paths of scale effect, market expansion, diversified income sources, technological innovation, and management optimisation, as well as risk diversification and risk-resistant capacity. Therefore, the following hypothesis is put forward:

H5a： Expansion and replication potential improves the economic benefits of hog enterprises

The impact of expansion-replication potential on the social responsibility of hog enterprises can be reflected in the following two aspects: firstly, regarding the supply of products, the potential can increase the output and supply capacity of hog enterprises, and the scaling up of farming enterprises and technological innovations can raise the production efficiency and product quality of hogs to meet people's demand for safe and high-quality food (Y. Xie et al., 2025). This will help ensure a healthy diet for the people by improving food supply and safety, which will have a positive impact on society. Secondly, expansion-replication potential can prompt hog enterprises to scale up and increase production and sales,

thus creating more jobs. The scaling up of farming enterprises will lead to the development of related industrial chains, such as feed, farming equipment, transportation, and sales, further promoting employment and economic development. This will generate positive social responsibility in terms of local employment and economic prosperity. expansion-replication potential can help hog enterprises in rural areas to increase production and sales revenues, which in turn will increase the source of income for rural residents. With a stable income rural residents will enjoy a better standard of living. Especially in poverty-stricken areas, the development of hog enterprises can provide employment and income for impoverished households, and promote the sustainability of rural development; furthermore, expansion-replication potential can help rural areas achieve economic restructuring and transform from traditional agricultural production to modern industrialised agriculture. The expansion of hog enterprises can promote the diversification of the rural economy, reduce farmers' dependence on traditional agriculture, and increase their income. Such a transformation will help drive economic development in rural areas and increase farmers' incomes.

In summary, expansion-replication potential improves the social responsibility of hog enterprises through actions of creating jobs, boosting economic growth, increasing rural incomes, reducing poverty, promoting the restructuring of the rural economy and the diversification of farmers' incomes, as well as improving food supply and safety. Therefore, the following hypothesis is put forward:

H5b： Expansion and replication potential improves the social responsibility of hog enterprises

Expansion and replication potential have certain impacts on the environmental efficiency of hog enterprises. First, expansion-replication potential requires enterprises to engage in scale-up and technological innovations, which presents an opportunity for enterprises to improve environmental management and reduce impacts on the environment. Through the introduction of advanced equipment and environmental control techniques, enterprises can effectively manage farm wastes, reduce ammonia and odor emissions, and control water and soil contamination. Expansion and replication potential implies the enhancement of production efficiency and resource utilisation efficiency by enterprises and the reduction of resource waste. Through optimising feed formulas, improving feeding management, and enhancing breeding environmental conditions, enterprises can reduce feed consumption and breeding waste and improve breeding efficiency. Enterprises can also explore circular economy modes, such as the use of farming waste as a resource and energy recycling, to minimise dependence on natural resources. Enterprises expanding their replication potential

can reduce GHG emissions through measures such as improved farm management, application of energy-saving facilities, emission reduction technologies, and renewable energy. In addition, expanding the potential for replication requires enterprises to focus on ecological protection and biodiversity conservation during the development. Enterprises can take measures to protect and restore ecosystems, such as protecting important ecological conditions such as water, wetlands, and forests, to maintain ecological balance. In addition, enterprises can implement eco-friendly farming modes, such as eco-cycling agriculture and eco-farming, to reduce damage to the environment and protect biodiversity (Sandu et al., 2023).

In summary, Expansion and replication potential can help improve the environmental efficiency of hog enterprises through employing environmental management and technological innovation, resource efficiency and circular economy, ecological protection and biodiversity conservation, as well as carbon emission reduction and climate change response. Therefore, the following hypothesis is put forward:

H5c: Expansion and replication potential improves the environmental efficiency of hog enterprises.

2.2.2.3 Impact of long-term adaptability on performance of hog enterprise

Long-term adaptability refers to the ability of an enterprise to flexibly adjust its strategy, organisational structure, and resource allocation in the face of changes in the external environment and achieve long-term competitive advantages. First of all, according to the Resource Based View, the resources and capabilities of an enterprise are the keys to achieving competitive advantage. Long-term adaptability enables enterprises to identify and obtain new resources promptly and adjust the allocation of existing resources to adapt to the changing market and the competitive environment. Through flexible adjustment of resource allocation, enterprises can cater better to customer needs, respond to competitive challenges, and gain sustainable competitive advantages, thus improving performance (Takala et al., 2013). For hog enterprises, long-term adaptability helps to optimise their resource allocation, which needs to rationally allocate resources such as breeding sites, feed resources, and human resources to achieve efficient production. Long-term adaptability enables enterprises to flexibly adjust resource allocation, adjust the scale of breeding, improve breeding management, and optimise feed formulas on time according to changes in market demand and competitive environment, to improve production efficiency and reduce costs. With optimised resource allocation, enterprises can improve production efficiency and thereby improve

performance. Secondly, according to the theory of organisation, long-term adaptability is conducive to building a flexible and learning organisational structure. Learning organisations can continuously acquire new knowledge and experience and transform them into core capabilities. Long-term adaptability motivates enterprises to establish an open learning mechanism to encourage employee innovation and knowledge sharing, thereby improving the organisation's learning ability and innovation capacity. Such improvement in learning and innovation ability helps enterprises adapt to the changing environment, promote continuous organisational development, and improve enterprise performance (Jiménez-Jiménez & Sanz-Valle, 2011). Long-term adaptability enhances the innovation capacity and technological advancement of hog enterprises. As market demands and consumer preferences evolve, hog enterprises must continuously innovate and adopt new technologies to improve product quality and value-added potential. Hog farming faces various risks, such as disease outbreaks, market price fluctuations, and policy changes. Long-term adaptability enables enterprises to promptly identify and respond to such risks by taking appropriate measures for adjustment and mitigation. For example, enterprises can establish robust epidemic prevention systems, strengthen farming management and monitoring, and improve disease prevention capabilities to minimise the impact of epidemic outbreaks on production (Bhatia et al., 2024; L. Zhang et al., 2024). Through effective risk management, enterprises can maintain stable production and improve performance with minimised losses.

In summary, long-term adaptability has a positive effect on improving the performance of hog enterprises. It enables enterprises to adapt to the changing market demand and competitive environment by optimising resource allocation, promoting innovation and technological progress, and improving risk response capabilities. Improve production efficiency, product quality, and market competitiveness, thereby improving performance. Therefore, the following hypothesis is put forward:

H6: Long-term adaptability improves the performance of hog enterprises

Long-term adaptability plays an important role in improving the economic efficiency of hog enterprises. Firstly, long-term adaptability enables enterprises to flexibly adjust the allocation of resources, such as farmland, feed resources, and human resources according to the changes in market demand and competitive environment.

Rational allocation of resources enables enterprises to improve productivity and reduce costs, thereby improving economic efficiency (Z. L. Liu, 2025; M. Zhang et al., 2023). Secondly, long-term adaptability calls for innovative thinking of enterprises to continuously introduce new technologies and management methods to improve efficiency and product

quality. Through innovation and technological progress, enterprises can reduce production costs, increase the added value of their products, and increase their market competitiveness, thereby improving economic efficiency (Coconete et al., 2003).

For example, the introduction of advanced breeding equipment and technology to improve breeding efficiency and environmental control; the development of new feed formulas and additives to improve the nutritional value and efficiency of feed; and the promotion of product processing and value-added enhancement can open up high-end markets. Hog enterprises face a variety of risks, such as disease outbreaks, market price fluctuations, and policy changes. Long-term adaptability empowers enterprises to identify and respond to risks in a timely manner. Through effective risk management, enterprises can maintain stable production and improve economic benefits with minimised losses. For example, establishing a sound epidemic control system to reduce the impact of disease on production; formulating flexible marketing strategies to cope with price fluctuations; following policy developments and flexibly adjusting business strategies. Finally, long-term adaptability allows companies to accommodate changing market demands and competitive environments, gaining more advantages. Through timely adjustment of product structure, cultivation of new market channels, and provision of differentiated products and services, enterprises can meet customer demand, enlarge market share, increase sales revenue, and thus improve economic benefits (Un & Cuervo-Cazurra, 2014; K. J. Wang et al., 2012).

In summary, long-term adaptability improves the economic benefits of hog enterprises through mechanisms that optimise resource allocation, innovation and technological progress, risk management, market adaptation, and competitive advantage. Therefore, the following hypothesis is put forward:

H6a: Long-term adaptability improves the economic benefits of hog enterprises.

The effects of long-term adaptability on improving social responsibility of hog enterprises are reflected in the following aspects: firstly, it enables enterprises to continuously improve farming management and technology and enhance product quality and food safety. With measures such as optimising the feeding environment, feed formulation and management, controlling diseases, and using fewer antibiotics, enterprises can produce safer and healthier products. Secondly, thriving hog enterprises can promote rural economic development and employment. Through breeding business and related services, enterprises can boost the economy of rural areas, increase farmers' income and employment, and improve the living standards of rural residents. In addition, hog enterprises can provide technical guidance and training to farmers, helping them enhance their farming techniques and management skills,

promoting the modernisation and sustainable development of rural agriculture, and further improving social responsibility. Further, the stability of hog enterprises is crucial to maintaining social stability and food supply security. A stable supply of hog products can help to maintain the social stability. At the same time, the stable development of the husbandry industry can also provide stable jobs for society, and reduce social instability, bringing further benefits of social responsibility (Phillips et al., 2016; Y. Wang & Wu, 2025).

In summary, long-term adaptability has a positive effect on improving the social responsibility of hog enterprises. It creates value and benefits for society through such means as improving product quality and food safety, promoting rural development, creating jobs, maintaining social stability, and securing the food supply. Therefore, the following hypothesis is put forward:

H6b： Long-term adaptability improves the social responsibility of hog enterprises

Long-term adaptability plays an important role in improving the environmental efficiency of hog enterprises that need to focus on environmental management and optimisation of resource use. Enterprises can take measures to reduce emissions of waste and pollutants, such as establishing manure treatment systems and utilising biogas to generate electricity. The negative impact on the environment is reduced and environmental efficiency is improved through the rational use of breeding waste, such as turning waste into organic fertilizers and bio-energy (Bhae et al., 2024; Uretski et al., 2023). Second, long-term adaptability encourages enterprises to adopt green farming and circular agriculture to mitigate pressure on the environment. Companies are encouraged to use environmentally friendly feeds and additives to curtail the use of chemicals and reduce pollutant emissions from the farming process. Circular agriculture, such as hog farming on crop fields and agro-animal symbiosis, realises the effective use of farming waste and resource recycling and reduces the pollution of soil and water (Sheer et al., 2024; Wen et al., 2024). More importantly, long-term adaptability requires enterprises to engage in environmental monitoring and technological innovation to improve environmental efficiency. Enterprises can establish a sound environmental monitoring system to regularly monitor and assess the impact of farming activities on the environment, to identify and solve environmental problems in a timely manner. At the same time, through technological innovation and the introduction of advanced farming equipment and management skills, they can improve their farming efficiency and environmental control capacity, to be greener. Finally, long-term adaptability requires stronger social responsibility by enterprises to proactively interact with the public. Enterprises can work with local communities, environmental organisations, and relevant stakeholders to promote

environmental protection and sustainable development. Through public participation and the practice of social responsibility, enterprises can enhance their environmental awareness, improve their corporate image, and boost their environmental efficiency.

In summary, long-term adaptability improves the environmental efficiency of hog enterprises through the routes of environmental management, resource use optimisation, green farming, circular agriculture, environmental monitoring, technological innovation, as well as public participation and social responsibility. Therefore, the following hypothesis is put forward:

H6c: Long-term adaptability improves the environmental efficiency of hog enterprises.

2.3 Research model

The core of this study lies in examining the following relationships: the effects of resource synergy (RS), market competition index (CI), and customer demand (CD) on the three dimensions of the business development mode of hog enterprises, as well as the impacts of these three dimensions on enterprise performance. Based on the preceding analysis, and by summarising the hypotheses concerning the antecedents of business development modes, the business development modes themselves, and their relationships with enterprise performance, this study proposes the research model shown in Figure 2.1.

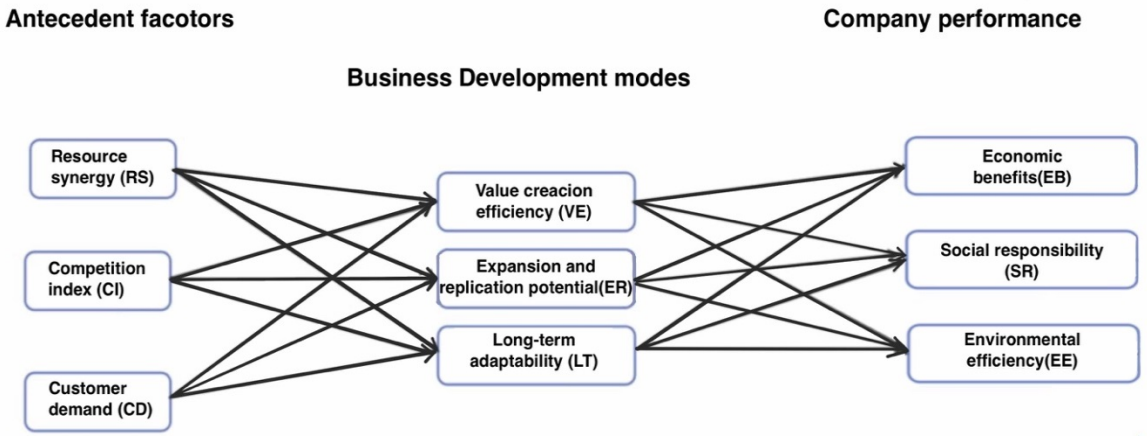

Figure 2.1 Research model

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Chapter 3: Research Method

There are two parts in the study. Study 1 employed a qualitative interview to explore the antecedents of business development modes from the perspective of stakeholders. Its objective was to clarify the key antecedent factors influencing the business development modes of hog enterprises through in-depth interviews, and to uncover the mechanisms by which policy, industry chain links, consumer demand, and technological innovation affect these modes, thereby laying a theoretical foundation and providing item design support for the subsequent quantitative study. The interviewees in Study 1 covered a diverse range of stakeholders, including government departments (policy formulation and regulation), production enterprises (farming entities), sales enterprises (distribution), slaughtering enterprises (processing), consumers (demand), and industry experts (academic perspective), ensuring comprehensiveness of views. The interviews have in-depth talks with individuals (with government/enterprise executives), groups (on industrial chain coordination issues), while some of them conducted online with cross-regional consumers, with a total of 50 sessions, each lasting 30–60 minutes. The core interview topics centred on dimensions influencing business development modes, such as: policy environment (e.g., environmental regulations like manure treatment standards, and subsidy policies promoting farming mode innovation); industrial chain coordination (e.g., upgrading of cooperative modes such as “risk sharing + premium sharing” between producers and farmers); consumer demand upgrading (e.g., traceable food safety and demand for organic hog driving supply chain transparency); and technological applications (e.g., the role of smart devices like AI-based environmental monitoring in cost control).

Study 2 adopted a quantitative questionnaire survey to investigate the influence of the antecedents on business development modes and the impact of business development modes on enterprise performance, which are empirically validated afterwards. The objective of this part is to design a structured scale based on the findings of Study 1 and existing validated scales in the literature. Using data collected via the questionnaire, Study 2 aims to test the path relationships through which resource synergy, market competition, and customer demand affect the three dimensions of business development modes (value creation efficiency, expansion and replication potential, and long-term adaptability), as well as the mechanisms by

which business development modes influence the three dimensions of enterprise performance (economic, social, and environmental).

3.1 Study 1: Interviews and questionnaires

Study 1 is a Mixed Methods Research that combines interview and questionnaire survey. Specifically, it follows a two-phase design integrating qualitative (interview-based) and quantitative (survey-based) research, with a particular focus on variable selection. In the fields of management and social sciences, this phased approach to identifying key variables is commonly referred to as an Exploratory Sequential Design (Sharma et al., 2023). The core process involves two phases:

The first phase is the qualitative, employing interview to identify potential antecedent variables influencing hog enterprises' business development modes through open-ended interviews.

The second phase is the quantitative, using survey methods to convert qualitative findings into a structured questionnaire and quantitatively screen key variables through statistical analysis (e.g., frequency analysis).

3.1.1 Phase 1: Interviews

3.1.1.1 Purposes and significance of interviews

Studying stakeholders is an important way to understand the development modes of hog enterprises. Stakeholders are the participants of each stage in the hog industrial chain, and their interests and needs directly affect the development of the industry. Therefore, interviews with stakeholders can provide insights into the business development mode of hog enterprises and its influencing factors, providing guidance for the industry.

Significance

(1) Understanding the demands and interests of stakeholders: Stakeholders play an important role in hog enterprises, and their demands and interests determine the business development mode of the industry. Interviews can help us to understand the perceptions and demands of different stakeholders on business development modes, so that the trend and direction of the industry can be better grasped.

(2) Analyse the strengths and weaknesses of the business development mode: the comments of different stakeholders on the business development mode are subjective and

limited, but multifaceted interviews can objectively assess the strengths and weaknesses of the business development mode and provide guidance for the improvement and innovation of the industry.

(3) Promoting innovation and transformation in the industry: since the demands and interests of stakeholders are constantly changing, the industry must adjust its business development modes and strategies in a timely manner to adapt. Understanding stakeholder expectations and demands through interviews can provide an important reference and support for innovation and transformation in the industry.

Purposes

(1) Understanding the impact of policy on the business development mode of hog enterprises: policy is one of the important factors affecting hog enterprises, and the formulation and implementation of policy directly affects the choice and implementation of business development modes. Therefore, understanding the impact of policies on business development modes through interviews with policy-making bodies and administrations can provide guidance for the industry.

(2) Understanding the impact of production and sales on the business development mode: production and sales are important in the industrial chain, which directly affect the implementation and effectiveness of the business development mode. Interviews with stakeholders such as producers, distributors and slaughterers to understand their views and expectations on business development modes can provide guidance for the industry.

(3) Understanding consumer influence on business development modes: Consumers are the ultimate beneficiaries and decision makers in hog enterprises, and they have a significant influence on the selection and evaluation of business development modes. Interviews with consumers to for their views and expectations of the business development mode can provide guidance for the industry.

(4) Understanding the impact of new technologies and modes on business development modes: the rapid advances in technology and information technology have profound effects on the business development modes and operations of hog enterprises. The research and interviews on new technologies and models to for their impact and application can be helpful for the industry.

In summary, interviews on the impact of stakeholders on business development modes in hog enterprises are of great significance. Interviews can help to understand the demands and interests of stakeholders, analyse the strengths and weaknesses of business development modes, and drive innovation and transformation in the industry. Interviews can also serve as a

guide and support for the industry by providing insights into the impact of factors such as policy, production, distribution, consumers and new technologies on business development modes. Therefore, interviews on the impact of stakeholders on business development modes in hog enterprises have significant theoretical and practical value.

3.1.1.2 Subjects and form of interviews

The hog industry enjoys a complex industrial chain involving multiple stakeholders such as government departments, producers, marketing enterprises, slaughtering enterprises and consumers, whose demands and interests directly affect the business development modes. Therefore, during the interviews of stakeholders, it is necessary to determine the appropriate audience and format for accurate and valid data and information.

1. Subjects

Government sector: The government sector is the organisation that sets and enforces policy with a critical impact on the business development mode of hog enterprises. Government departments are responsible for formulating relevant policies and regulations, setting industry standards and norms, as well as regulating and managing the industry. Therefore, it can provide important reference and support for the industry through interviews with officials in government departments.

Producing enterprises: Producing enterprises are important links in the industrial chain, responsible for the production and breeding of hogs, which directly affects the implementation and effectiveness of the business development mode. Therefore, it is useful to interview the persons in charge of and serving as staff of the producing companies to find out their views and expectations on the business development modes, as well as the considerations on production costs and benefits, for important references for the industry.

Sales Enterprises: Sales enterprises are important links in the industrial chain, responsible for selling hogs and meat products, which directly affects the implementation and effectiveness of the business development mode. Therefore, interviewing the relevant persons in charge or serving as staff of sales enterprises to understand their views and expectations on business development modes, as well as considerations such as market demand and competitive conditions, can provide important reference for the industry.

Slaughtering enterprises: Slaughtering enterprises are important links in the industrial chain, responsible for the slaughtering and processing of hogs, which directly affects the implementation and effectiveness of the business development mode. Therefore, it is useful to interview the persons in charge of and serving as staff of the slaughtering companies to find

out their views and expectations on the business development modes, as well as the considerations on production costs and supply chain management, for important references for the industry.

Consumers: Consumers are the ultimate beneficiaries and decision makers, and they have a significant influence on the selection and evaluation of business development modes. Therefore, it is useful to interview consumers to find out their views and expectations on the business development modes, as well as the considerations on product quality and prices, for important references for the industry.

2. Form of interviews

Individual interviews: Individual interviews are a commonly used form of interview in which in-depth exchanges and discussions are held with individual stakeholders, either face-to-face or by telephone. Individual interviews can provide researchers with more in-depth and detailed information, while at the same time helping to protect the privacy and confidentiality of interviewees.

Group discussions: Group discussions are a form of collective discussion that is suitable for communication among multiple stakeholders. Group discussions can facilitate communication and cooperation among different stakeholders, as well as the identification and resolution of problems.

In summary, the object and form of stakeholder interviews on the business development mode of hog enterprises should be selected on a case-by-case basis. In selecting the subjects, the representativeness of the stakeholders should be considered; the adopted form of interview for each subject should be chosen according to the purpose of the interview and the research questions.

3.1.1.3 Interview questions and methods of implementation

The following are the questions in the interview.

1. How well do government departments support the business development mode of hog enterprises in terms of policies and regulations?

2. What is the role and impact of hog production companies in the business development mode?

3. What is the role and impact of the selling company in the business development mode?

4. What is the role and impact of slaughtering companies in the business development mode?

5. What are the demands and expectations of consumers on the business development

mode and how do they affect the business development mode?

6. What is the impact of business development modes on the sustainability of hog enterprises?

7. How do production costs and benefits affect the choice and implementation of business development modes?

With the offline and online sessions of interviews with stakeholders in hog enterprises, including both individual and group interviews, the whole process is recorded using audio and video equipment. Transcripts are then generated through speech-to-text software and manually refined to produce detailed interview summaries for further analysis.

3.1.1.4 Background of interviewees

(1) Roles of interviewees

The roles of the interviewees in this study are shown in Table 3.1.

Table 3.1 Roles of the interviewees

Stakeholder	Roles	Representativeness	Number
Governmental organs	Heads of the animal husbandry department of the Ministry of Agriculture and Rural Affairs, officials of provincial and municipal animal husbandry departments	Policy-making and regulatory entities, in charge of capacity control (such as the baseline of sows in stock) and subsidy distribution, etc., core policies	8
Hog farming company	Large-scale enterprise: person in charge of breeding; Small and medium-sized farms: family farmers, cooperative directors	Self-rearing, raising, and grazing entities, with different cost structures	10
Sales company	Hog trader, head of wholesale market, director of fresh purchasing of e-commerce platform	Influencing the circulation channels and pricing mechanisms, reflecting market behaviors such as secondary fattening, the rhythm of holding and slaughtering livestock.	9
Slaughtering and processing company	Production Director or Supply Chain Manager	Linking the production chain and consumers, focus on slaughter utilization and the premiums for processed hog.	8
Consumer	Terminal consumers	Reflecting consumer trends, and preferences changes in processed hog	10

(2) Sample size and screening

Samples quota distribution. Each category of stakeholder was represented by 8 to 10 interviewees, resulting in a total of 45 individuals. A total of 45 individual interview records and 5 group interview records were collected, amounting to 50 interviews in total. Regional coverage was ensured, including major production areas (Shandong and Henan) and major

consumption areas (Guangdong and Zhejiang).

The selection criteria were as follows: priority was given to officials from policy departments who had participated in the revision of the *Implementation Plan for Hog Production Capacity Regulation*; for production enterprises, either large-scale farms with an annual slaughter volume of over 10,000 hogs or smallholders with fewer than 500 hogs were selected; for sales enterprises, circulation entities with market pricing influence, channel control, and risk management capabilities were included, specifically those with an annual transaction volume of no less than 100,000 hogs or annual sales revenue of at least RMB 100 million; for slaughter and processing enterprises, those with stable production capacity, regulatory compliance, and demonstrable coordination needs along the industrial chain were selected, typically processors with a daily slaughter volume of no less than 500 hogs and a utilization rate of no less than 80%; for consumers, individuals who had purchased hog products in large supermarkets or shopping malls were included.

Individual interviews were kept within approximately 30 minutes, while group interviews were limited to around 60 minutes.

3.1.1.5 Analysis methods for interview data

This study employed a text analysis method to analyse the interview data. The ROST CM6 word frequency analysis software was used to process the textual data obtained from the interviews, extracting high-frequency terms to identify the antecedent variables influencing the business development modes of hog enterprises (Ye, 2025). Developed by Professor Shen Yang of Wuhan University, ROST CM6 is currently the only large-scale, free social computing platform in China designed to support research in the humanities and social sciences. The software enables a wide range of text analysis functions, including analysis for microblog, chats, multiweb, specific website, browsing record, word segmentation, word frequency statistics (including English), information traffic, and word clusters (J. C. Wang, 2023). The text analysis conducted in this study followed a progressive logic of "data preprocessing → feature extraction → pattern mining → interpretation of meaning," with each step aligned to specific phases of the research process. Table 3.2 illustrates the steps and objectives for the analysis.

Table 3.2 Steps and objectives for the analysis

Text Processing	Data treatment	Objective
Data preprocessing	Interview Transcription and Cleaning	Eliminate noise and standardize text structure
Feature extraction	Key variable coding and classification	Build quantifiable analytical units

3.1.1.6 Interview data analysis

The original data consisted of 50 in-depth interview recordings, which were transcribed verbatim into textual format, including annotations of non-verbal cues such as long pause and emotional tone. For example, when a slaughterhouse manager mentioned the "post-ASF financial gap," the annotation [anxious tone] was added; when a consumer repeatedly emphasised issues related to cold chain logistics, the annotation [repeated emphasis] was included.

Text cleaning and standardisation were conducted using Natural Language Processing (NLP) techniques: denoising involved removing filler words (e.g., "uh," "ah"), as well as redundant statements; word segmentation was performed using the Jieba library to preserve compound terms such as "customer demand"; stopword filtering removed semantically insignificant word redundancies while retaining domain-specific terms like "breeding sow inventory" and "PSY index."

3.1.2 Phase 2: Questionnaire 1

3.1.2.1 Data collection for Questionnaire 1

Building upon the findings from the first-phase interview, the second phase of the study adopted a questionnaire survey to further identify the antecedent factors influencing the business development modes of hog enterprises.

The questionnaire consists of two sections: the first section collects respondents' demographic information; the second section introduces the basic concept of business development modes and clarifies the research background, guiding respondents to select and explain the key factors influencing their choice of business development modes. The questionnaire is designed to enhance response quality and minimise errors caused by ambiguity in question interpretation. Prior to distribution, the researcher provided detailed written explanations and offered verbal briefings to ensure that respondents fully understood the purpose and context of the survey.

The questionnaire content is summarised as follows:

Introduction: An overview of the research background, highlighting the impact of business development modes on company performance and operations in hog enterprises, and the significance of participant contributions.

Basic information: questions on gender, age, educational background, job position, years of experience, and stakeholder category.

Key factor selection: respondents were asked to identify, from a list of potential factors, those they believed had a significant influence on business development modes, and to provide justifications for their choices.

This study conducted the questionnaire survey among stakeholder groups from 30 hog enterprises in Henan, Shandong, and Anhui provinces. To ensure wide coverage, the sample included not only industry participants but also 10 professors and associate professors from business schools as academic experts. The survey was conducted between September and October 2022, with 120 questionnaires distributed and 95 valid responses received, an effective response rate of 79.17%.

3.1.2.2 Data treatment for Questionnaire 1

This study further refined the collected antecedent variables of business development modes and conduct frequency statistics. The statistical method applied is as follows: if a particular keyword is selected in a questionnaire, it is counted once; the frequency is calculated by dividing the total number of occurrences by the total number of questionnaires. Word Frequency Analysis. the ROST CM6 software was used to compute word frequencies and compile a list of high-frequency terms as shown in Table 4.3.

Considering practical significance, the study will select only those factors with a statistical frequency exceeding half of the total sample as the primary variables for subsequent research and subject them to qualitative validation. Specifically, four doctoral students with relevant expertise will independently review the identified potential antecedent factors. Any factors with unclear definitions or obvious conceptual issues will be excluded or revised. The students will then assess the final set of key antecedents to determine their plausibility. This process will ultimately yield the critical antecedent variables influencing the business development modes of hog enterprises in China, serving as one of the foundations for the next phase of quantitative research.

3.2 Study 2: Quantitative research

3.2.1 Variable definition and measurement

The previous sections have defined the concepts and provided theoretical explanations for the business development mode selection and company performance of hog enterprises through interviews and a preliminary questionnaire survey. This section, drawing on existing literature and aligning with the research theme of this study, will design measurement scales for the

variables and conduct reliability and validity tests for the subsequent empirical analysis.

3.2.1.1 Antecedents for business development modes of hog enterprises

Based on the preceding analysis, the business development mode of hog enterprises is influenced by three major driving factors: resource synergy (RS), market competition (CI), and customer demand (CD). Building upon this foundation, this section constructs measurement scales for these three drivers and outlines their development and design. To ensure the stability and accuracy of the measurement tools, this study adopts scientifically rigorous measurement methods, thereby ensuring the reliability of the data and the validity of the research findings.

Currently, there is a scarcity of measurement scales for enterprise resource bases in existing studies. However, as analysed in the previous section, hog enterprises in China are entralised and competitive, while customer demand remains inelastic. Therefore, resource synergy stands out as the primary factor influencing both the selection of business development modes and the achievement of operational performance in hog enterprises. Based on the perspective of Zott and Amit (2007), the measurement of resource synergy should encompass several dimensions: the utilisation of policy resources—since an enterprise's ability to leverage policy support directly affects its development trajectory. Timely and effective use of such resources indicates an enterprise's capacity to grasp policy directions and benefit from governmental support (B. Wang et al., 2024). In the agricultural sector, trust between enterprises and farming households is vital; such trust forms the foundation for stable development and ensures access to high-quality agricultural products (Uslu et al., 2024). Stable upstream and downstream partnerships are key to a resilient supply chain. Long-term cooperation with suppliers and distributors ensures consistent raw material supply and smooth product sales, thereby reducing operational risk and enhancing profitability (J. L. Jin & Wang, 2021). Moreover, technical guidance from research institutions is essential for innovation. Collaboration with research entities enables enterprises to access the latest scientific findings and technical support, thereby boosting innovation capacity and securing competitive advantages (Madanaguli et al., 2024). Market competition is another critical factor influencing the development of business modes in hog enterprises. Scholars have measured market competitiveness through factors such as product and service differentiation capabilities, technological absorption and conversion efficiency, competitor monitoring capacity, and the level of intra-industry cooperation and synergy (Adomako et al., 2024; Bettignies et al., 2023; Obradovits & Plaickner, 2023; Zabel et al., 2023). Regarding the

measurement of customer demand, the existing literature highlights satisfaction with product and service quality as well as the extent of personalised products and services (Das et al., 2024; Raddats et al., 2024; Wu et al., 2025).

In summary, based on the preliminary design, this study has developed measurement items for the three dimensions of the antecedent variables influencing business development modes, as shown in Table 3.3.

Table 3.3 Measurement scale for antecedents of business development modes in hog enterprises

Dimensions	No.	Item	Source
Resource Synergy (RS)	RS1	The company uses policy resources in a timely and efficient manner	Amit (2007); B. Wang et al. (2024)
	RS2	Within the industry, farming households have more trust in our company.	
	RS3	The company has more stable upstream and downstream partners in the same industry.	
	RS4	The company can receive technical guidance from scientific research units in a timely manner	
Market Competition Index (CI)	CI1	The company has differentiated products or services in the same industry.	Obradovits and Plaickner (2023); Zabel et al. (2023); Adomako et al. (2024); Bettignies et al. (2023)
	CI2	The company is able to absorb innovative technologies faster than other peers.	
	CI3	The company pays attention to and is able to timely grasp the dynamics of other companies in the industry.	
	CI4	The company has sufficient business cooperation points with other similar companies.	
Customer Demand (CD)	CD1	The company is able to provide direct customers with a good visit and explanation services	Xu (2025); Raddats et al. (2024)
	CD2	The quality of our products is recognized by direct and all indirect consumers	
	CD3	Customers of our company think it is worthwhile and at ease when choosing our products	
	CD4	The company can provide customized or differentiated products according to customer requirements.	

3.2.1.2 Business development modes of hog enterprises

Based on the preceding analysis, the core of business development modes lies in companies' ability to create and deliver value across boundaries, emphasising the complete logic from value creation to value capture. A typical business development mode consists of three key components: value proposition, value creation and delivery, and value capture—with "value creation" being the most critical. The efficiency of value creation is thus a central indicator of a company's overall value-generating capacity. This can be evaluated from various perspectives, including product price reduction, operational efficiency improvement (Gillani et al., 2024), and enhancing industry circulation and transaction efficiency (Z. A. Zhang &

Chen, 2025). Existing literature suggests that the potential for scaling and replication should be assessed through indicators such as the ability to operate in different regions, the transferability of processes and methods, core competencies, and the capacity to expand business scope (Peverali & Ullrich, 2021; C. C. Yang, 2013). Scholars generally agree that long-term adaptability of a business should consider factors such as switching costs for upstream and downstream stakeholders, clearly defined benefit-sharing mechanisms, crisis management capabilities, and the company's ability to identify and resolve problems effectively (Micouleau & Robert, 2024; Norheim-Hansen & Meschi, 2020; Spreitzenbarth et al., 2024).

Drawing on these studies, as well as insights from prominent scholars in the field of business development mode research and findings from qualitative interviews conducted in this study, a measurement scale for the business development modes of hog enterprises was constructed. The scale comprises 12 items and employs a five-point Likert scale for measurement, as shown in Table 3.4.

Table 3.4 Measurement scale of business development mode of hog enterprises

Dimension	No.	Item	Source
Value creation efficiency (VE)	VE1	The operation of the company reduces the price of the products produced.	Gillani et al. (2024); Z. A. Zhang and Chen (2025)
	VE2	The operation of the company has helped to shrink circulation.	
	VE3	The operation of the company reduces information asymmetry in the industry.	
	VE4	The operation of the company improves the efficiency of transactions	
Expansion replication potential (ER)	ER1	The company can operate in different places at a lower threshold.	Peverali and Ullrich (2021); C. C. Yang (2013)
	ER2	The business management system of the company can form a methodological output.	
	ER3	The core element of the company to obtain business results is its own business ability.	
	ER4	The company can carry out other business around the core business of the industry.	
Longer adaptability (LT)	LT1	High replacement costs exist for upstream and downstream stakeholders of the company	Micouleau and Robert (2024); Norheim-Hansen and Meschi (2020); Spreitzenbarth et al. (2024)
	LT2	The company has established a clear benefit-sharing mode with stakeholders.	
	LT3	The company has sufficient plans in natural disasters and other crises.	
	LT4	The company can constantly find its own problems and effectively solve them	

3.2.1.3 Company performance of hog enterprise

This study adopts the perspective of the Triple Bottom Line (TBL) theory to construct a performance measurement framework for hog enterprises, encompassing three dimensions—

economic, social, and environmental benefits—to comprehensively reflect the enterprise's level of development under multi-dimensional goals. The scale for measuring economic performance serves as a critical tool for evaluating a company's operational status. It should cover multiple aspects to holistically assess the enterprise's competitiveness, profitability, and growth potential within the industry. According to existing literature, economic performance is typically assessed through indicators such as profitability (net profit margin), market competitiveness (market share), operational efficiency (return on capital), and financial stability (revenue and profit growth) (Tu et al., 2012; X. Wei et al., 2020). Scholars argue that social performance should include a company's fulfilment of social responsibility—particularly with regard to employee and supplier income and welfare (Ahmad & Mohamad, 2013)—as well as the company's ability to improve product quality and communicate such improvements to consumers through its CSR practices (Y. H. Li et al., 2017). As for environmental performance, the literature suggests that the scale should include multiple dimensions capable of effectively assessing a company's environmental protection and sustainability efforts. These typically measure the company's actions in pollution reduction (Agnello et al., 2021), resource management (Gu et al., 2020), and regulatory compliance (X. Y. Chen et al., 2024).

Drawing on the above scholarly work, this study constructs a more feasible and practically oriented performance evaluation system aimed at supporting the optimisation of business development modes in hog enterprises, both theoretically and operationally. In summary, 12 items were developed to measure the performance of hog enterprises—four items each for economic, social, and environmental dimensions—using a five-point Likert scale (where 1 represents "strongly disagree," 2 "disagree," 3 "neutral," 4 "agree," and 5 "strongly agree"), as shown in Table 3.5.

Table 3.5 Measurement of business development mode of hog enterprises

Dimension	No.	Item	Source
Economic Benefit (EB)	EB1	This company has a relatively high net profit margin in the industry.	Tu et al. (2012); X. Wei et al. (2020)
	EB2	This company has a faster growth in income and profit in the same industry.	
	EB3	This company has a higher capital return rate compared to other companies in the industry.	
	EB4	Compared to others in the same industry, the company is able to continue to increase its market share.	
Social Responsibility (SR)	SR1	The employees of this company have higher income locally.	Ahmad and Mohamad (2013); Y. H. Li et al. (2017)
	SR2	The cooperative farmers of this company have higher income in the local area.	

	SR3	The company's products have a higher quality	
	SR4	This company's cooperating partners have a high income and profit growth rate.	
	EE1	The pollutant treatment process in this company is better in the industry.	
	EE2	The company has a complete resource recovery and recycling system.	Agnello et al. (2021); X. Y. Chen et al. (2024); Gu et al. (2020)
Environmental Efficiency (EE)	EE3	This company uses chemical additives and other products less frequently than others in the industry.	
	EE4	This company has not been subject to environmental protection penalties.	

3.2.2 Design of Questionnaire 2

In Study 1, qualitative interviews were conducted to identify the key antecedent variables influencing the business development mode of hog enterprises—namely, resource synergy (RS), market competition (CI), and customer demand (CD). Drawing on relevant literature, measurement items are developed for the three dimensions of these antecedents. Based on existing research, scales are further adapted and refined to construct both the business development mode scale and the company performance scale for hog enterprises. On this basis, a structured quantitative questionnaire was developed.

The questionnaire consists of an introductory section that outlines the purpose and background of the survey, along with assurances regarding participant confidentiality and data protection. It then gathers demographic information from respondents, including age, gender, educational background, enterprise type, and years of work experience. The main body of the questionnaire contains three core sections: the antecedent variables scale of business development mode in hog enterprises, the business development mode scale, and the enterprise performance scale. All scales adopt a five-point Likert format, where respondents are asked to rate each item according to their own circumstances: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

3.2.3 Survey and data collection of Questionnaire 2

This study adopted a combined approach of stratified sampling and quota sampling to ensure both the representativeness and scientific rigour of the sample. Based on the regional distribution, company scales, and business development mode diversity of hog enterprises in China, the sampling was systematically stratified as follows: the surveyed sample was divided into three major geographical units—Yangtze River Basin, Central China, and the Guangdong–Guangxi region—focusing on core producing provinces such as Sichuan, Henan,

and Hunan. Data collection was conducted via the electronic platform “Wenjuanxing,” whose enterprise directory database provided a reliable basis for sample screening. A combination of targeted distribution and QR code-based responses ensured both the precision and efficiency of data collection. To enhance the quality of questionnaire returns, a two-stage follow-up mechanism was established: an initial SMS reminder was sent as the deadline approached, followed by a phone call to non-respondents one week later. This approach significantly improved the completeness and response rate of the survey. In terms of ethics and compliance, the study strictly adhered to three protective measures: respondents were provided with written informed consent prior to participation; both confidentiality agreements and anonymisation techniques were employed to safeguard sensitive information; and a data usage oversight system was implemented, restricting access to members within the research team only.

The survey was launched in August 2022 and lasted for nearly three months. A total of 800 questionnaires were distributed, and 565 were returned, resulting in a response rate of 70.6%. After rigorous screening, invalid questionnaires were excluded based on the following criteria: (1) respondents who had been employed at their current enterprise for less than one year, as they might lack sufficient understanding of the business development mode and operational status of the enterprise; (2) questionnaires with a high level of repetition or overly consistent responses were deemed invalid and removed. After excluding 67 invalid responses, a final total of 498 valid questionnaires were retained, yielding an effective response rate of 62.3%. This dataset met the basic requirements for reliability and validity analysis and provided a robust foundation for subsequent research. SPSS 27 was used for statistical analysis, and the SPSSAU statistical software platform was employed for structural equation modelling. SPSSAU, widely used among Chinese scholars, has supported numerous studies published in prestigious domestic and international journals (Baidu, 2024).

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Chapter 4: Results Analysis

4.1 Results of Study 1

4.1.1 Findings of interviews (Phase 1) of Study 1

A series of interviews are conducted to understand the impact of stakeholders on the business development modes of the hog enterprises and potential antecedent factors affecting the business development mode of Chinese hog enterprises are found.

Following conversations with staff in the management of hog enterprises in government departments, the following conclusions are formed: the government is likely to issue industry plans and policy documents to support the development of hog enterprises. These documents may include policy guidance, technical support, financial support. Tax incentives: The government may provide tax incentives for hog-raising enterprises for their thriving. Financial support: The government may offer financial support, including loans and subsidies, to hog-raising enterprises. Environmental policies: The government may formulate environmental policies to regulate the environmental behaviour of hog-raising enterprises. Market regulation: The government may tighten market regulation to crack down on illegitimate hog-raising enterprises and protect the interests of legitimate ones. In general, the government departments offer a high level of policy and regulatory support for the business development mode of hog enterprises, as hog enterprises is an important component of the national economy, with significance for national food security and the development of the rural economy.

Conversations with an executive of a hog company yielded the conclusions that hog raising companies play an important role in the entire hog industry chain, and the success of their business development mode is directly influential to the operation of the entire industry chain. The following are the roles and impacts of hog producers in the business development mode:

1. Hog producing enterprises are the starting point of the industry chain, and their production efficiency and quality affect the operation of the subsequent links. Hog producing enterprises need to improve the production efficiency and quality of hogs to meet the market demand through advanced techniques and management tools.

2. Hog producing enterprises serves as suppliers in the hog industry chain, and the hogs they produce need to be sold to slaughtering enterprises. Hog producing enterprises need to establish a stable co-operative relationship with slaughtering enterprises to ensure sales and price stability.

3. Hog producing enterprises also need to develop co-operative ties with feed enterprises, veterinary medicine makers and other relevant businesses in order to ensure stable quality and supply of feed and veterinary medicine for hogs.

4. Business development modes for hog producing enterprises also need to consider issues such as environmental protection and food safety. Hog producers need to adopt environmentally friendly techniques and management tools to ensure that the production does not pollute the environment. At the same time, hog producing companies also need to ensure that the meat products they produce meets food safety standards.

In general, hog producers play an important role in the hog industry chain, and the success of their business development mode is directly influential to the operation of the entire industry chain. Hog producing enterprises need to build stable partnerships through advanced techniques and management tools to ensure that the hog they produce meets environmental and food safety standards, so as to meet market demand and drive the hog industry.

Conversations with a sales manager of a hog sales company revealed that hog sales companies play an important role in the industrial chain, and the success of their business development mode directly affects the operation and development of the industrial chain. The following are the roles and impacts of hog sales companies in the business development mode:

1. Hog sales companies, as producers and suppliers, have a direct impact on the market supply and price of hogs. Its sales strategy and price positioning have a significant impact on the supply and demand and price of the entire market.

2. Hog sales companies act as intermediaries, connecting producers and consumers, and assume responsibility for marketing, logistics, and quality testing. Its sales channels and logistics capabilities are crucial to the marketing and distribution of hogs.

3. Hog sales companies, as brand owners, have increased the added value and market competitiveness of hogs through brand marketing and quality assurance. Its brand image and quality assurance are important for consumer trust and loyalty.

4. As technological innovators, hog sales companies improve their production efficiency and product quality through innovations in technology and management. Its innovation in

technology and management are powerful drivers for the upgrading and development of the whole industrial chain.

In conclusion, hog sales companies have multiple roles in the business development mode, and their success has a direct impact on the operation and development of the whole industrial chain. Therefore, hog sales companies need to constantly innovate and improve their competitiveness to adapt to changes in the market and demand.

Interviews with the director of a slaughter station of a hog slaughtering company yielded the following conclusions: the slaughtering company plays an important role in the business development mode, and its main influences are reflected in the following aspects:

1. Supply chain management: Slaughtering companies are an important link in the meat supply chain, responsible for transforming live animals into meat products. Through the management of the supply chain, slaughtering companies can control quality, quantity and price of meat products, to influence the supply and demand of the meat market.

2. Competition in the market: The size and technological profile of slaughtering companies influence competition in the market. Large slaughtering enterprises can reduce costs and improve competitiveness through the scale effect. Slaughtering enterprises with a high level of technology can improve product quality and safety and enhance market competitiveness.

3. Policy implications: The operations of slaughtering companies are subject to policies. Government regulation and management of slaughtering companies, as well as norms and restrictions on their business activities, will have an impact on their business development modes.

4. Social responsibility: Slaughtering companies also assume social responsibility in their business development mode. Slaughtering companies need to comply with laws and regulations to ensure product quality and safety, protect animal welfare and reduce environmental pollution, in order to meet the expectations and requirements of society.

In conclusion, slaughtering companies play an important role in the business development mode and their operations are influential in supply chain management, market competition, policy implications and social responsibility.

It is learnt from talking to several consumers buying pork in a shopping mall that the needs and expectations of consumers can have a significant impact on the business development mode. Here are some of the possible implications:

1. Price: Consumers are usually concerned about the price of raw pork. If lower prices are expected by consumers, business development modes may need to adopt more efficient

production methods to reduce costs and maintain price competitiveness.

2. Quality: Consumers are usually concerned about the quality. If consumers expect high quality, the business development mode may require the use of higher quality feed and production methods.

3. Traceability: Consumers are increasingly concerned about the traceability of hog products, which means that they want to know where it came from and how it is produced. Business development modes may need to adopt more transparent production methods for traceability.

4. Environmental protection: Consumers are increasingly concerned about the impact on environment. Business development modes may need to adopt more environmentally friendly production methods to achieve this goal.

5. Health: Consumers are increasingly concerned about the health of hog. Business development modes may need to adopt healthier production methods to meet consumers' demand for healthier.

In short, the demands and expectations of consumers for business development modes can lead to the adoption of more efficient, higher-quality, transparent, environmentally friendly and healthier production methods.

The following conclusions can be drawn from interviews with research experts in the hog industry, combined with further analyses:

Business development modes have a significant impact on the sustainability of the hog industry. Here are some of the possible implications:

1. Hog-raising modes: Business development modes can influence hog-raising modes, such as the traditional free-range mode or the modern intensive raising mode. The intensive raising mode can improve productivity and economic efficiency, but it can also lead to environmental pollution and animal welfare problems. Business development modes therefore need to consider sustainability issues such as the environment and animal welfare.

2. Marketing mode: The business development mode can influence the marketing mode, e.g. direct and indirect sales. Direct sales can increase profits and brand awareness, but they also require a greater investment in marketing. Indirect sales can reduce marketing costs, but they can also lead to poor brand awareness. The business development mode therefore needs to consider sustainability in terms of marketing costs and brand awareness.

3. Supply chain modes: Business development modes can influence supply chain modes, such as vertically integration and decentralised supply chains. Vertical integration can improve production efficiency and quality control, but it can also lead to monopoly and price

volatility. Decentralised supply chains can reduce the risk of monopoly and price volatility, but it can also lead to problems with productivity and quality control. Business development modes therefore need to consider sustainability of supply chain.

4. Technological innovation: Business development modes can facilitate technological innovation, such as digitalisation and intelligent transformation. Digitisation and intelligence transformation can improve productivity and quality control, but they also require greater investment in technology. Business development modes therefore need to consider the cost of the technology and sustainability issues.

In summary, business development modes have a significant impact on the sustainability of hog enterprises and need to consider sustainability issues in terms of the environment, animal welfare, marketing costs, brand awareness, supply chain, and technological innovation.

Interviews with the manager of internal cost management in a leading hog producing company revealed that the production costs and benefits of a hog company have a significant impact on the choice and implementation of the business development mode. Here are some of the possible implications:

1. Cost control: Hog enterprises need to control production costs to ensure their profitability. As a result, companies may choose a vertically integrated business development mode, where the entire value chain from cultivation to marketing is controlled by the company for better cost control.

2. Market demand: Hog companies need to choose a business development mode based on market demand. In case of high market demand, companies may choose to scale up and adopt the business development mode of large-scale livestock raising. In case of small market demand, companies may choose to adopt the small-scale business development mode for better cost control.

3. Technological innovation: Hog companies need to continuously innovate in technology to improve production efficiency and reduce costs. As a result, companies may choose to adopt a business development mode that is innovative in terms of technology, i.e., to improve productivity and reduce costs through continuous innovation.

4. Market positioning: Hog companies need to choose a business development mode based on market positioning. If a business is positioned at the high end of the market, the business may choose to adopt a high-quality, high-value business development mode. If a business is positioned at the lower end of the market, the company may try to employ a low-cost, low-value business development mode.

5. Policy environment: The policy environment also has an important impact on the choice and implementation of business development modes for hog enterprises. For example, the government may introduce favourable policies to encourage enterprises to adopt certain business development modes, such as eco-farming, and organic farming. Companies need to choose the right business development mode based on the policy environment.

Through the above interviews and analyses, it can be seen that the selection and implementation of business development modes in hog enterprises involves multiple stakeholders, government departments, producers, marketing companies, slaughtering companies, and consumers; factors such as supply chain management, competitive conditions, technological innovation, environmental and social responsibility, financial institutions, political and economic environments, the needs and differences between different regions and countries, and consumers' concerns and requirements for food safety all have a significant impact on the selection and implementation of business development modes. Only when the interests and needs of all parties are considered can a business development mode be developed to meet market demand and sustainable development.

Therefore, based on the aforementioned theoretical analysis and interviews, this study summarizes the factors affecting the choice of business development modes of hog enterprises. including customer demand, technological innovation, market competition, regulatory environment, capital market, supplier relationship, resource synergy, organisational architecture, entrepreneurship, company culture, organisational learning, incentives, and others, seen in Table 4.1.

Table 4.1 Potential antecedents of business development modes of enterprises

Factor	Description
Customer demand	The demands and preferences of consumers in the market for products or services, including their expectations for product characteristics, prices, quality, and services.
Technological innovation	The emergence and application of new technologies, including innovation in production, management, and marketing to improve efficiency, reduce costs, create new products or improve existing products.
Market competition	The degree of competition in the market, including competition from existing and potential competitors, as well as the impact on market share, price competition, and product differentiation.
Regulatory environment	The impact of authoritative regulations, industry standards, and regulatory policies on the business activities of enterprises, including norms on market access, product quality, labour relations, and environmental protection.
Capital market	The market environment of corporate financing and investment activities, including the stock market, bond market, bank loans and other financing channels, as well as the impact on return on investment, cost, and risk.

Factor	Description
Supplier relationship	The cooperative relationship between the enterprise and its suppliers, including interaction in supply chain management, cooperation agreements, and procurement negotiations.
Resource synergy	Including various resources owned by the enterprise, such as funds, manpower, technology, equipment, brands, and channels to support the operation and development of the enterprise
Organisational structure	The organisational relationship and division of responsibilities between various departments and positions within the enterprise, as well as the impact on decision-making, communication, and synergy.
Entrepreneurship	The spiritual qualities of entrepreneurs in terms of innovation, risk-taking, and opportunity grasping are essential to the innovation and development of enterprises.
Company culture	The cultural characteristics of the company's internal values, code of conduct, and organisational atmosphere have an important impact on employee behaviour, team cohesion, and corporate image.
Organisational learning	The acquisition, transmission, and application of knowledge and experience within the enterprise, as well as the ability to adapt to change and innovation.
Incentives	The company's internal incentives and policies for employees and managers to stimulate the motivation and creativity of individuals and teams.
Other	Other factors that may have an impact on business development modes, such as social culture, natural environment, international political and economic environment.

4.1.2 Findings of the Questionnaire 1 (Phase 2) of Study 1

4.1.2.1 Sample Description of Questionnaire 1

Table 4.2 presents the demographic statistical results of the questionnaire survey, offering insights into the demographic structure of the respondent group. According to the findings, participants included individuals of different genders, age groups, educational backgrounds, stakeholder identities, and levels of work experience.

Table 4.2 Demographic variables of respondents

Variables	Options	Proportion
Gender	Male	61.05%
	Female	38.95%
Age	18-35	12.63%
	35-50	43.16%
	50-65	30.53%
	65+	13.68%
Education	Secondary school and below	13.68%
	Senior high school/Technical Middle School	9.47%
	Associate degree	30.53%
	Bachelor's degree	27.37%
	Master and above	18.95%
Role of stakeholder	Government	10.53%
	Hog breeding company	28.42%
	Hog slaughtering company	24.21%
	Hog sales company	16.84%

Variables	Options	Proportion
	Consumer	9.47%
	Experts and scholars	10.53%
Working experience	Less than 5 years	11.58%
	5 to 10 years	24.21%
	10 to 20 years	49.47%
	More than 20 years	14.74%

The demographic breakdown from the questionnaire survey is detailed as follows:

Gender: Male participants accounted for 61.05%, while female participants made up 38.95%.

Age: Participants aged 18-35 represented 12.63%, those aged 35-50 accounted for 43.16%, individuals aged 50-65 comprised 30.53%, and those aged over 65 made up 13.68%.

Educational Background: 13.68% of participants had an education level of middle school or below, 9.47% had a high school or vocational school education, 30.53% held an associate degree, 27.37% had a bachelor's degree, and 18.95% held a master's degree or higher.

Stakeholder Roles: Government officials constituted 10.53% of the participants, 28.42% were from hog enterprises, 24.21% from hog slaughtering enterprises, 16.84% hog sales companies, 9.47% were consumers, and 10.53% were experts.

Work experience: 11.58% had less than 5 years, 24.21% 5-10 years, 49.47% 10-20 years, and 14.74% over 20 years. These results highlight the diversity of stakeholders and provide an empirical foundation for analysing business development mode selection factors.

4.1.2.2 Results of Questionnaire 1

Detailed instructions were provided before the survey to ensure understanding, helping to capture key factors influencing business development mode choices from the stakeholders' perspective.

Based on the above questionnaire survey, this study further refined the identified antecedent variables of the business development mode and conducted frequency analysis. The method adopted was to count a keyword as selected once if it was checked in a questionnaire and then calculate the frequency as the number of occurrences divided by the total number of questionnaires. Considering practical significance, elements with a frequency exceeding half of the total sample were selected as the main variables for subsequent analysis (frequency analysis shown in Table 4.3). A qualitative validation was then conducted: four doctoral candidates in relevant fields were asked to independently review the potential antecedent elements. Elements with unclear definitions or ambiguity issues were either removed or revised. Subsequently, the four researchers were asked to evaluate the key antecedents identified in this study—namely, resource synergy (RS), market competition (CI),

and customer demand (CD)—to assess their validity. The elements questioned by the researchers did not involve the three key variables, and a consensus was reached regarding identified key antecedents. Thus, the critical antecedents of the business development mode were confirmed to be resource synergy (RS), market competition (CI), and customer demand (CD).

Table 4.2 Results on the antecedent variables of business development modes of hog enterprises

Factor	Mentioned times	Frequency	Factor	Mentioned times	Frequency
Customer demand	87	91.58%	Supplier relationship	42	44.21%
Technological innovation	12	12.63%	Resource synergy	79	83.16%
Market competition	84	88.42%	Organisational structure	37	38.95%
Regulatory environment	45	47.37%	Entrepreneurship	43	45.26%
Capital market	23	24.21%	Company culture	31	32.63%
Incentives	13	13.68%	Organisational learning	22	23.16%

Note：95 copies of questionnaire.

The key antecedent variables influencing the business development mode of hog enterprises are as follows:

First, resource synergy

Resource coordination of an enterprise refers to the integration and coordination of various internal resources (including but not limited to human resources, financial resources, technical resources, and information resources) to maximise the use of resources and synergistic effects. This kind of synergy can be achieved through effective horizontal and vertical integration. Horizontal integration refers to resource sharing and synergy between different departments or businesses, while vertical integration indicates resource integration and synergy between different levels. Resource synergy can help enterprises avoid repeated input of resources, improve resource efficiency, and lower costs. For example, sharing certain infrastructure or services between different departments can reduce the replication of investment and reduce overall costs. Resource synergy facilitates the sharing of knowledge and experience between departments or businesses and promotes innovation and the incubation of new businesses. Through the integration of resources, enterprises can better integrate innovative resources and promote the development of new products and services. Resource synergy can enable more flexible resources to adapt to changes in the market. When more resources are required, the business can quickly allocate them through internal

coordination. Through resource synergy, enterprises can ensure the consistency of departments or businesses in external services and enhance the overall brand image as well as the customer experience.

Second, market competition. The market competition of an enterprise refers to the competitive forces from other competitors in the market, including competition from existing and potential competitors. This competitive pressure may be reflected in multiple aspects, such as price, products, market share, marketing strategy, and technological innovation. Under the pressure of market competition, enterprises need to continuously improve their competitiveness to gain more market share and win profitability. Market competition has prompted enterprises to think about how to stand out through product differentiation and meet the needs of different consumers. Enterprises need to find their positioning in a competitive market and offer competitive products and services. Market competition has let enterprises think about attracting more customers through price strategies while ensuring profitability. Enterprises need to balance between price and value to formulate competitive pricing strategies. Market competition has pushed enterprises to continuously carry out product innovation and technological investment to improve product quality, reduce costs, and improve production efficiency, to maintain competitiveness in the market. Market competition has encouraged enterprises to ramp up their investment in marketing and brand building for better brand awareness and reputation to attract more customers. Enterprises have to continuously optimise their internal operations and management, improve overall operating efficiency, and reduce costs to meet the challenges of market competition.

Third, customer demands. The customer demand of an enterprise refers to the needs and expectations of potential and existing customers for products or services in the market. These demands could include expectations for product characteristics, quality, price, service, and purchase experience. Understanding and meeting customer demand is the key to the success of an enterprise because it directly affects the market acceptance of products and customer satisfaction. Understanding customer demands can lead to better design and products, to ensure that products can meet market needs, with sharpened product market competitiveness. Enterprises also need to provide corresponding experiences according to customer demands to establish good customer relationships. With understood needs, enterprises can provide more personalised and customer-friendly services, and win customer satisfaction and loyalty. The demand of customers directly affects the enterprise's market positioning and strategies. Enterprises determine the target market according to customer needs, formulate corresponding marketing strategies, and ensure that products and services can meet their needs. Customer

demand also affects the pricing strategy. Enterprises determine proper pricing strategies based on customers' awareness of the value of the product and willingness to pay, to meet their needs and achieve profitability. Understanding customer demand can help enterprises conduct product innovation and continuous improvement, ensuring that products and services can continue to meet market needs and maintain competitiveness.

4.2 Results of Study 2

4.2.1 Descriptive statistics

Descriptive statistical analysis is used to provide a statistical summary of various variables within the survey population, revealing the fundamental characteristics of the sample data. The subjects of this study include the surveyed enterprises, the questionnaire respondents, and the measurement items of the variables.

The demographic results of the valid questionnaires are shown in Table 4.4.

Table 4.4 Demographic results of variables in the questionnaire

Variable	Options	Qty.	%	Variable	Options	Qty.	%
Gender	Male	369	74.1%		Hog enterprise	267	53.6%
	Female	129	25.9%				
Age	18-35 y	58	11.7%	Role of stakeholder	Slaughtering company	132	26.6%
	35-50 y	255	51.2.%				
	50-65 y	143	28.7%		Sales company	99	19.8%
	Over 65 y	42	8.4%				
Education	Junior high school and below	61	12.3%		Below 5y	70	14.1%
	Senior high school or Secondary specialized school	59	11.8%	Working experience	5-10 y	215	43.2%
	College or undergraduate	326	65.4%		10-20y	170	34.1%
	Master and above	52	10.5%		20y and more	43	8.6%

The descriptive statistical analysis of the variables across dimensions offers a clear overview of the overall characteristics and data distribution related to the antecedents of business development modes, the components of business development modes, and enterprise performance among the surveyed hog enterprises. First, as shown in Table 4.5, the descriptive statistics of business development mode antecedents indicate that the average scores for the three dimensions—Resource Synergy (RS), Competition Index (CI), and Customer Demand

(CD)—mostly range between 3.7 and 4.0, with standard deviations below 1. This suggests a high level of consistency in responses and indicates that most respondents perceive their enterprises as actively investing in and responding to resource availability, innovation, and dynamic capabilities. Notably, CD3 has the highest mean score at 4.06, reflecting that enterprises believe they can provide customised or differentiated products based on customer needs. In addition, most skewness and kurtosis values fall within reasonable ranges, suggesting that the data follow a normal distribution and are suitable for further statistical analysis. Second, as seen in Table 4.6, the component dimensions of business development modes show that the average scores for Expansion and Replication Potential (ER) are consistently high (above 3.8), with higher skewness and kurtosis, suggesting a left-skewed distribution and a strong sense of self-identification among enterprises with regard to their expansion and replication capabilities. Meanwhile, the average scores for Value Creation Efficiency (VE) and Long-term Adaptability (LT) fall between 3.6 and 4.2, indicating that most enterprises have achieved a certain level of capability in value chain integration and sustainable operations, but there remains room for further improvement. Lastly, as presented in Table 4.7, the three dimensions of enterprise performance—Economic Benefit (EB), Social Responsibility (SR), and Environmental Effectiveness (EE)—show mean scores ranging from 3.6 to 4.6, with small standard deviations and consistently negative skewness values. This suggests that most enterprises perceive their performance across all three dimensions positively. Items SR3 and EE2 exhibit the highest scores, indicating high subjective satisfaction with product quality and the presence of sound systems for resource recovery and recycling. On the other hand, EB1, EB2, and SR1 show lower mean scores, suggesting that economic profitability and local incomes for employees still need improvement. In summary, surveyed enterprises demonstrate overall strong performance across the dimensions of business development mode antecedents, structure, and outcomes. The data distribution is statistically sound and provides a solid foundation for subsequent structural equation modelling. Furthermore, the findings highlight a general emphasis among enterprises on customer-oriented innovation and environmental/social performance, while also revealing potential areas for improvement in economic returns and social responsibility initiatives.

Table **Error! No text of specified style in document.**.3 Descriptive statistics of business development mode antecedents (N=498)

Dimension	Item Code /	Mean	Standard deviation	Skewness (|SK|)		|BK|	
		Statistics	Statistics	Statistics	Standard deviation	Statistics	Standard deviation
RS	RS1	3.79	0.847	-1.286	0.109	2.392	0.218
	RS2	3.86	0.935	-0.910	0.109	0.884	0.218
	RS3	3.90	0.965	-0.930	0.109	0.722	0.218
	RS4	3.80	0.896	-0.716	0.109	0.716	0.218
CI	CI1	3.90	0.743	-0.609	0.109	0.665	0.218
	CI2	3.94	0.805	-0.686	0.109	0.882	0.218
	CI3	4.02	0.745	-0.524	0.109	0.515	0.218
	CI4	3.98	0.730	-0.502	0.109	0.636	0.218
CD	CD1	3.80	0.840	-0.483	0.109	-0.018	0.218
	CD2	3.89	0.832	-0.489	0.109	-0.108	0.218
	CD3	4.06	0.784	-0.707	0.109	0.759	0.218
	CD4	3.86	0.847	-0.548	0.109	0.135	0.218

Table **Error! No text of specified style in document.**.4 Descriptive statistics of the constituent dimensions of business development mode (N=498)

Dimension	Item Code /	Mean	Standard deviation	Skewness (|SK|)		|BK|	
		Statistics	Statistics	Statistics	Standard deviation	Statistics	Standard deviation
VE	VE1	3.65	0.730	-0.384	0.109	-0.014	0.218
	VE2	3.86	0.775	-0.293	0.109	-0.283	0.218
	VE3	3.72	0.815	-0.259	0.109	-0.278	0.218
	VE4	4.00	0.794	-0.554	0.109	0.000	0.218
ER	ER1	3.82	0.733	-0.477	0.109	0.598	0.218
	ER2	4.04	0.722	-0.421	0.109	0.002	0.218
	ER3	4.11	0.719	-0.559	0.109	0.286	0.218
	ER4	4.10	0.701	-0.498	0.109	0.258	0.218
LT	LT1	3.84	0.700	-0.268	0.109	0.023	0.218
	LT2	3.90	0.772	-0.409	0.109	-0.087	0.218
	LT3	3.89	0.798	-0.424	0.109	-0.172	0.218
	LT4	4.24	0.749	-0.916	0.109	1.147	0.218

Table **Error! No text of specified style in document.**.5 Descriptive statistics of company performance (N=498)

Dimension	Item code	Mean	Standard deviation	Skewness (|SK|)		|BK|	
		Statistics	Statistics	Statistics	Standard deviation	Statistics	Standard deviation
EB	EB1	3.72	0.734	-0.403	0.109	0.071	0.218
	EB2	3.85	0.836	-0.498	0.109	0.113	0.218
	EB3	3.91	0.780	-0.395	0.109	-0.162	0.218
	EB4	3.93	0.749	-0.434	0.109	0.220	0.218
SR	SR1	3.85	0.790	-0.422	0.109	-0.111	0.218
	SR2	3.91	0.803	-0.436	0.109	-0.073	0.218
	SR3	4.17	0.714	-0.565	0.109	0.314	0.218

Dimension	Item code	Mean	Standard deviation	Skewness (|SK|)		|BK|	
		Statistics	Statistics	Statistics	Standard deviation	Statistics	Standard deviation
EE	SR4	3.93	0.715	-0.354	0.109	0.262	0.218
	EE1	3.93	0.818	-0.727	0.109	0.652	0.218
	EE2	4.01	0.800	-0.607	0.109	0.200	0.218
	EE3	3.95	0.801	-0.496	0.109	0.135	0.218
	EE4	3.89	0.810	-0.370	0.109	-0.225	0.218

4.2.2 Reliability analysis

As shown in Table 4.8, all three dimensions of the antecedents of the business development mode (RS, CI, and CD) passed the internal consistency reliability test, with Cronbach's α coefficients of 0.815, 0.773, and 0.807 respectively. All values exceed the commonly accepted threshold of 0.7, indicating strong internal consistency across dimensions. Within the RS dimension, all items exhibit Corrected Item-Total Correlation (CITC) values above 0.62, suggesting strong correlations between individual items and the overall construct. Notably, RS4 achieves a CITC value of 0.648, indicating a particularly high contribution to the dimension. In the CI dimension, CI2 also demonstrates a strong CITC value of 0.685, reflecting high measurement stability. The CITC values within the CD dimension are relatively balanced, ranging from 0.52 to 0.56, which suggests a stable scale structure. In summary, the reliability of the measurement scales for each dimension of the business development mode antecedents meets the standards of empirical research and provides a solid measurement foundation for subsequent structural analysis of the variables.

Table **Error! No text of specified style in document.**.6 Analysis of internal consistency of antecedents of business development modes

Dimension	Item code	CITC	Deleted Alpha value	Cronbach α coefficient
RS	RS1	0.643	0.765	0.815
	RS2	0.630	0.769	
	RS3	0.621	0.774	
	RS4	0.648	0.761	
CI	CI1	0.511	0.751	0.773
	CI2	0.562	0.728	
	CI3	0.553	0.730	
	CI4	0.685	0.662	
CD	CD1	0.626	0.756	0.807
	CD2	0.542	0.796	
	CD3	0.677	0.733	
	CD4	0.650	0.744	

According to the data in Table 4.9, the three core dimensions of the business development

mode—VE (Value Creation Efficiency), ER (Expansion and Replication Potential), and LT (Long-Term Adaptability)—have Cronbach's α coefficients of 0.769, 0.741, and 0.775, respectively. All values exceed the 0.7 threshold, indicating overall desirable reliability and strong internal consistency within the scales. Within the VE dimension, the internal correlation among items is notable, with VE4 showing a CITC value of 0.627, making it the most representative item of the dimension. In the ER dimension, item ER3 registers a CITC value of 0.629, also demonstrating strong explanatory power. For the LT dimension, item LT4 has a CITC value of 0.693, indicating its representativeness. Overall, the measurement scales for each dimension of the business development mode exhibit good reliability, making them suitable for further structural model analysis.

Table **Error! No text of specified style in document.**.7 Results of internal consistency analysis of dimensions of business development modes

Dimension	Item code	CITC	Deleted Alpha value	Cronbach α
VE	VE1	0.529	0.735	0.769
	VE2	0.574	0.712	
	VE3	0.554	0.724	
	VE4	0.627	0.683	
ER	ER1	0.551	0.672	0.741
	ER2	0.489	0.707	
	ER3	0.629	0.626	
	ER4	0.469	0.717	
LT	LT1	0.480	0.769	0.775
	LT2	0.587	0.717	
	LT3	0.563	0.731	
	LT4	0.693	0.660	

Table 4.10 shows that the three dimensions of company performance—economic performance (EB), social responsibility (SR), and environmental performance (EE)—all demonstrate high internal consistency, with Cronbach's α coefficients of 0.793, 0.783, and 0.808, respectively. These values exceed the standard reliability threshold of 0.7, indicating that the scales possess good reliability across all dimensions. Among them, EB2 has the highest CITC at 0.680, suggesting it contributes most significantly to the overall measurement of economic performance. In the SR dimension, SR2 has the highest CITC at 0.688, making it a key measurement item. For the EE dimension, EE1 records the highest CITC at 0.672. Additionally, the "Deleted Alpha value" for all items do not significantly exceed the overall α values, indicating that all items are appropriately retained and do not require elimination Overall, the company performance measurement scale has a clear structure and high item quality, making it suitable for subsequent empirical modelling analysis.

Table **Error! No text of specified style in document.**.8 Internal consistency analysis results of company performance

Dimension	Item code	CITC	Deleted Alpha value	Cronbach α coefficient
EB	EB1	0.573	0.758	0.793
	EB2	0.680	0.703	
	EB3	0.608	0.741	
	EB4	0.559	0.765	
SR	SR1	0.592	0.731	0.783
	SR2	0.688	0.677	
	SR3	0.531	0.760	
	SR4	0.554	0.749	
EE	EE1	0.672	0.736	0.808
	EE2	0.665	0.740	
	EE3	0.594	0.773	
	EE4	0.568	0.786	

4.2.3 Validity analysis

Validity analysis is to determine the extent to which the measurement items in a scale reflect the truth of the constructs being measured, mainly including content validity and structural validity.

This study adopts the following measures to improve the validity:

(1) The business development mode measurement scale is compiled based on the results of the literature research and the statistical survey research (questionnaires and interviews), and company managers, experts, and scholars in the field with rich practical experience are invited to make modifications and reviews.

(2) The measurement scales of business development mode antecedents as well as business development mode dimensions and enterprise performance are all based on scales published in high-level domestic journals and widely adopted.

In order to further verify the structural validity of the scale, KMO (Kaiser-Meyer-Olkin) test, Bartlett's test of sphericity and factor analysis were used to evaluate the scale.

The Kaiser-Meyer-Olkin (KMO) measure assesses the sampling adequacy for factor analysis, with values ranging from 0 to 1. The closer the value is to 1, the more suitable the data are for factor analysis. Additionally, if Bartlett's test of sphericity reaches significance ($p < 0.05$), it indicates that the correlation matrix is not an identity matrix and is thus suitable for factor extraction. Generally, a KMO value > 0.7 and a p-value < 0.05 from Bartlett's test suggest that the data are appropriate for factor analysis. The KMO value of the scale in this study is 0.933, exceeding 0.7, and the Bartlett's test of sphericity yields an approximate chi-square of 8548.901 with 630 degrees of freedom and a significance of 0.000, which is less than 0.05. This indicates that the scale is suitable for factor analysis.

For factor analysis, Principal Component Analysis (PCA) was used as the extraction

method, with common factors selected based on eigenvalues greater than 1. Varimax rotation was employed to maximise variance among extracted components. When factor loadings exceed 0.5 and the cumulative variance explained exceeds 60%, the structural validity of the scale is considered satisfactory.

Table 4.11 presents the factor loadings for the antecedents of business development mode, showing the loading results after extracting three factors, thereby verifying the structural validity of the items. Specifically, RS1 to RS4 load highly on Factor 1, all above 0.74, with RS2 reaching 0.774, indicating a strong aggregation on Factor 1, which effectively represents the “resource synergy” dimension. From CI1 to CI4 the loads on Factor 3 are all above 0.5, and CI4 as high as 0.898, confirming that Factor 3 reflects “market competition.” From CD1 to CD4, with CD4 reaches 0.809 on Factor 2, supporting its identification as the “customer demand” factor. Cross-loadings were generally low, demonstrating good discriminant validity among the three factors, thus confirming satisfactory convergent and discriminant validity of the measurement structure and providing a solid foundation for subsequent structural equation modelling analysis.

Table **Error! No text of specified style in document.**.9 Results of internal consistency analysis of antecedents of business development mode

Item	Factor1	Factor2	Factor3
RS1	0.768	0.215	0.121
RS2	0.774	0.122	0.170
RS3	0.771	0.155	0.113
RS4	0.768	0.136	0.213
CI1	0.197	0.287	0.593
CI2	0.195	0.289	0.675
CI3	0.205	0.215	0.711
CI4	0.060	0.048	0.898
CD1	0.131	0.759	0.232
CD2	0.254	0.579	0.355
CD3	0.283	0.803	0.080
CD4	0.074	0.809	0.221

The results in Table 4.12 show that according to the criterion of eigenvalue greater than 1, a total of three common factors can be extracted from each measurement question item of business development mode dimension, and the cumulative explained variance change of the three factors is 58.769%. The factor loading coefficients of each question item in the table are greater than 0.5, and there is no cross-factor loading phenomenon among the question items, which indicates that the differentiation among the variables is good.

Table **Error! No text of specified style in document.**.10 Results of internal consistency analysis of dimensions of business development modes

Item	Factor1	Factor2	Factor3

Item	Factor1	Factor2	Factor3
VE1	0.227	0.705	0.114
VE2	0.124	0.709	0.254
VE3	0.072	0.715	0.250
VE4	0.224	0.757	0.189
ER1	0.142	0.223	0.723
ER2	0.245	0.210	0.608
ER3	0.202	0.209	0.770
ER4	0.173	0.154	0.675
LT1	0.630	0.248	0.134
LT2	0.752	0.101	0.198
LT3	0.727	0.083	0.243
LT4	0.808	0.222	0.171

The results in Table 4.13 show that according to the criterion of eigenvalue greater than 1, a total of three common factors can be extracted from each measurement question item of company performance, and the cumulative explained variance change of the three factors is 62.640%. The factor loading coefficients of each question item in the table are greater than 0.5, and there is no cross-factor loading phenomenon among the question items, which indicates that the differentiation among the variables is good.

Table **Error! No text of specified style in document.**.11 Internal consistency analysis results of enterprise performance

Item	Factor1	Factor2	Factor3
EB1	0.110	0.177	0.776
EB2	0.153	0.223	0.814
EB3	0.273	0.284	0.662
EB4	0.291	0.291	0.599
SR1	0.228	0.737	0.182
SR2	0.110	0.837	0.218
SR3	0.303	0.618	0.216
SR4	0.147	0.654	0.330
EE1	0.809	0.154	0.151
EE2	0.754	0.271	0.180
EE3	0.720	0.127	0.267
EE4	0.723	0.173	0.118

4.2.4 Verification factor analysis

To further validate the convergent and discriminant validity of the measurement scales, this study conducted confirmatory factor analysis (CFA) using LISREL 8.7 software. This study uses LISREL 8.7 software for validation factors. The model estimation adopts the Maximum Likelihood Estimation (MLE), and the evaluation indexes used include $\chi 2/df$, GFI, AGFI, NFI, and CFI.

The suggested range of values for $\chi 2/df$ in the empirical analysis is less than 3 to deliver desirable fitting effect; the values of NFI, AGFI, GFI, and CFI should be between 0 and 1,

and it is recommended to be greater than 0.9. Additionally, RMSEA and RMR are also used for the assessment. Regarding the relative fit indices RMSEA and RMR, Browne and Cudeck (1993) pointed out that when the RMSEA value is less than 0.08, the model exhibits a good fit, while Joreskog and Sorbom (1996) suggested that the model demonstrates a good fit when the RMR value is less than 0.05. Therefore, based on these indicators, the validity of the scale is strictly tested to ensure the rationality and stability of the model.

Table **Error! No text of specified style in document.**.12 Fitting results of business development mode antecedent analysis

χ2	df	χ2/df	GFI	AGFI	NFI	CFI	RMSEA	RMR
100.898	42	2.402	0.969	0.942	0.961	0.976	0.053	0.024

The confirmatory factor analysis (CFA) results for the business development mode are presented in Table 4.14. The analysis shows that the χ^2/df value is 2.402, which is below the recommended threshold of 3, indicating good model fit. Additionally, the absolute fit indices—GFI (0.969), AGFI (0.942), NFI (0.961), and CFI (0.976)—all exceed the commonly accepted benchmark of 0.9, demonstrating a high level of model adequacy.

In terms of relative fit indices, the RMSEA value is 0.053, which is below 0.08, suggesting low residual error and strong model fit; the RMR value is 0.024, also below 0.05, further confirming the stability of the measurement model. Overall, these results indicate that the measurement model for the antecedents of business development mode fits the data well and is suitable for subsequent research analysis.

The results of the validation factor analysis of business development modes are shown in Table 4.15, in which the value of χ2/df is 2.241, less than 3, indicating desirable fitting. and the absolute fit indexes of GFI, AGFI, NFI, and CFI are 0.963, 0.943, 0.940 and 0.966, respectively, with the values of greater than 0.9, indicating desirable fitting for the measurement model. The relative fit index of RMSEA is 0.050, which is less than 0.08. RMR is 0.019, less than 0.05. The above results show that the business development mode measurement model fits the data well, and can be used for the next step.

Table **Error! No text of specified style in document.**.13 Fitting results of factor analysis in multiple dimensions of business development modes

χ2	df	χ2/df	GFI	AGFI	NFI	CFI	RMSEA	RMR
114.285	51	2.241	0.963	0.943	0.940	0.966	0.050	0.019

The results of the validation factor analysis of enterprise performance are shown in Table 4.16, in which the value of χ2/df is 2.423, less than 3, indicating desirable fitting. and the

absolute fit indexes of GFI, AGFI, NFI, and CFI are 0.961, 0.941, 0.946 and 0.967, respectively, with the values of greater than 0.9, indicating desirable fitting for the measurement model. The relative fit index of RMSEA is 0.054, which is less than 0.08. RMR is 0.024, less than 0.05. The above results show that the business development mode measurement model fits the data well and can be used for the next step.

Table **Error! No text of specified style in document.**.14 Fitting results of factor analysis of company performance

χ2	df	χ2/df	GFI	AGFI	NFI	CFI	RMSEA	RMR
123.581	51	2.423	0.961	0.941	0.946	0.967	0.054	0.024

4.2.5 Correlation analysis

Correlation analysis refers to an analysis method used to evaluate the degree of correlation between two or more related variables. Before performing the structural equation model (SEM) test, it is essential to test the correlation between the variables in the model. The correlation test can help to initially confirm the relationship between the variables in the model, which is the basis for the subsequent structural equation model test. Therefore, correlation analysis is important in the model inspection. The correlation analysis results of this research are shown in the following Table 4.17.

Table **Error! No text of specified style in document.**.15 Correlation analysis

Variables	RS	CI	CD	VE	ER	LT	EB	SR	EE
RS	1.000								
CI	0.463**	1.000							
CD	0.455**	0.554**	1.000						
VE	0.711**	0.517**	0.497**	1.000					
ER	0.484**	0.570**	0.723**	0.541**	1.000				
LT	0.456**	0.532**	0.474**	0.456**	0.515**	1.000			
EB	0.382**	0.544**	0.463**	0.473**	0.481**	0.480**	1.000		
SR	0.450**	0.566**	0.544**	0.529**	0.571**	0.538**	0.617**	1.000	
EE	0.469**	0.512**	0.480**	0.537**	0.518**	0.518**	0.516**	0.513**	1.000

The results of the above tests indicate that a significant correlation exists between the business development modes of hog companies and their drivers and company performance. Although the correlation provides an initial validation of the research model, reflecting the basic relationship between the variables, the exact correlation coefficients are not yet clear. Therefore, these variables are included in the structural equation model (SEM) and further validation analyses are conducted in the subsequent tests.

4.2.6 Structural equation model analysis

The structural equation model (SEM) is a statistical analysis technique used to deal with

quantitative research of multi-factor relationships. SEM uses the sample data to assess the fit of the model, and in case of poor fit, the model is evaluated and corrected to achieve the best-fit model.

Since SEM deals with latent variables, which are not directly observable, it is necessary to go through a design to transform conceptual variables into operational ones, which is validated by the measurement model.

4.2.6.1 Initial structural model analysis results

In this study, the driving factors of business development mode are exogenous variables, including resource synergy, market competition, and customer demand. Business development mode and company performance are endogenous variables, where:

The business development mode consists of three dimensions: value creation efficiency, scalability potential, and long-term adaptability.

Company performance includes economic, social, and environmental benefits, measured by their respective observed variables.

To explore the relationships among these variables, and based on the prior verification of the reliability, validity, and correlation significance of the measurement model, this study further employs AMOS 20.0 to conduct an initial structural equation model (SEM) analysis, aiming to clarify the specific path relationships among variables and to test the proposed research hypotheses.

In the initial structural model fit results, as shown in Table 4.18, the χ^2/df value is 2.707, which is below the recommended threshold of 3, indicating a relatively good model fit. The RMSEA is 0.055, below the acceptable cutoff of 0.08, and the RMR is 0.031, well below 0.05, suggesting that the model residuals are low. Therefore, the initial model fit is within an acceptable range. However, since other fit indices remain below the threshold of 0.9, further model modifications are necessary to achieve an optimal fit.

Table **Error! No text of specified style in document.**.16 Fitting results of the initial structural model

χ^2	df	χ^2/df	GFI	AGFI	NFI	CFI	RMSEA	RMR
1550.926	573	2.707	0.861	0.838	0.824	0.880	0.055	0.031

As shown in Table 4.19, in the initial structural model, the resource synergy (RS) of hog enterprises significantly affects both value creation efficiency (VE) and long-term adaptability (LT) under the business development mode, with standardized path coefficients of 0.699 and 0.221, respectively. Except for its non-significant effect on expansion and replication potential (ER), all other effects are statistically significant at the 0.001. The market competition index (CI) of hog enterprises significantly influences VE, ER, and LT, with

standardized path coefficients of 0.264, 0.281, and 0.458, respectively—all reaching the significance threshold. The customer demand (CD) variable has standardized path coefficients of 0.070, 0.749, and 0.160 for its effects on VE, ER, and LT, respectively. Among these, the effects on ER and LT are statistically significant.

Table **Error! No text of specified style in document.**.17 Path analysis for initial structure model

Hypothesis	Relation	Standardised path	Z value	Significant	Verification
H1a	VE←RS	0.699***	10.085	Yes	Supported
H1b	ER←RS	0.033	0.691	No	Not supported
H1c	LT←RS	0.221***	3.617	Yes	Supported
H2a	VE←CI	0.264***	4.321	Yes	Supported
H2b	ER←CI	0.281***	4.813	Yes	Supported
H2c	LT←CI	0.458***	5.790	Yes	Supported
H3a	VE←CD	0.070	1.197	No	Not supported
H3b	ER←CD	0.749***	9.871	Yes	Supported
H3c	LT←CD	0.160*	2.301	Yes	Supported
H4a	EB←VE	0.199**	2.710	Yes	Supported
H4b	SR←VE	0.209**	3.035	Yes	Supported
H4c	EE←VE	0.327***	4.612	Yes	Supported
H5a	EB←ER	0.305***	3.951	Yes	Supported
H5b	SR←ER	0.405***	5.431	Yes	Supported
H5c	EE←ER	0.250***	3.503	Yes	Supported
H6a	EB←LT	0.319***	4.429	Yes	Supported
H6b	SR←LT	0.309***	4.632	Yes	Supported
H6c	EE←LT	0.303***	4.556	Yes	Supported

Within the business development mode, value creation efficiency (VE) significantly affects the enterprise's economic benefit (EB), social responsibility (SR), and environmental efficiency (EE), with standardized path coefficients of 0.199, 0.209, and 0.327, respectively. Similarly, expansion and replication potential (ER) significantly influences EB, SR, and EE, with coefficients of 0.305, 0.405, and 0.250. Finally, long-term adaptability (LT) also significantly impacts EB, SR, and EE, with coefficients of 0.319, 0.309, and 0.303, respectively—all reaching statistical significance.

4.2.6.2 Modified structural modelling analysis results

Based on the results above, this study first removed the non-significant path ER ← RS from the initial structural equation model. Subsequently, adjustments to the model were made based on the modification indices (MI) and statistical suggestions regarding covariance relationships. Specifically, covariance parameters with MI values greater than 20 (or other higher thresholds) were identified, and only those modifications consistent with theoretical logic were retained. The result is seen in Table 4.20

Table **Error! No text of specified style in document.**.18 Fitting results of the optimised structural model

χ2	df	χ2/df	GFI	AGFI	NFI	CFI	RMSEA	RMR

952.146	558	1.706	0.905	0.887	0.892	0.952	0.034	0.026

The optimised model is showing in Table 4.20 a more favourable fitting with the $\chi 2$ decreasing to 952.146 and $\chi 2$/df decreasing to 1.706, showing better fitting. While ensuring that the RMSEA and RMR values are within the limits, the model has improved the GFI to more than 0.9, while AGFI, and NFI further to more than 0.8, closer to 0.9, and the CFI value has exceeded 0.9, indicating a significant improvement in the coefficients of the modified structural equation model and the validation of the research model; the modified resultant equation model is taken as the best-fit model. The path analysis for optimised structure models is shown in Table 4.21.

Table **Error! No text of specified style in document.**.19 Path analysis for optimised structure models

Hypothesis	Relation	Standardised path	Z value	Significant	Verification
H1a	VE←RS	0.715***	10.248	Yes	Supported
H1c	LT←RS	0.271***	4.276	Yes	Supported
H2a	VE←CI	0.179***	3.907	Yes	Supported
H2b	ER←CI	0.248***	5.016	Yes	Supported
H2c	LT←CI	0.290***	4.657	Yes	Supported
H3a	VE←CD	0.134*	2.580	Yes	Supported
H3b	ER←CD	0.834***	11.853	Yes	Supported
H3c	LT←CD	0.289***	4.282	Yes	Supported
H4a	EB←VE	0.194**	2.668	Yes	Supported
H4b	SR←VE	0.207**	3.090	Yes	Supported
H4c	EE←VE	0.318***	4.602	Yes	Supported
H5a	EB←ER	0.229**	3.051	Yes	Supported
H5b	SR←ER	0.314***	4.458	Yes	Supported
H5c	EE←ER	0.192**	2.802	Yes	Supported
H6a	EB←LT	0.434***	5.034	Yes	Supported
H6b	SR←LT	0.404***	5.215	Yes	Supported
H6c	EE←LT	0.379***	5.017	Yes	Supported

In summary, only 1 hypothesis failed to be significant in the model:

H1b resource synergy enhances the expansion and replication potential of hog enterprises

H1b is not supported, which may be attributed to the fact that the theoretical advantages of resource synergy—such as economies of scale and knowledge sharing—are difficult to realise in practice due to the unique characteristics of the hog industry (e.g., policy sensitivity, epidemic risks, high asset specificity) and the internal limitations of enterprises themselves (e.g., limited absorptive capacity, rigid innovation mechanisms). For instance, the hog industry frequently faces policy fluctuations (such as environmental zoning or epidemic controls) and cyclical price volatility, requiring companies to rapidly adapt their strategies. However, collaborative networks often involve multiple decision-making entities, which can

slow down responsiveness. Furthermore, synergy may trigger risks such as resource imitation or delayed environmental adaptation, and without sufficient dynamic capabilities, it is unlikely to translate into actual competitive advantages. Future research may need to focus more on "conditional synergy"—for example, synergy that aligns with an enterprise's absorptive capacity threshold or occurs during periods of policy stability—rather than assuming its universally positive effects.

4.2.7 Summary of empirical verification

This chapter firstly proposes a model of the antecedents of business development mode choice and the model of impacts of company performance of hog enterprises under the stakeholder perspective with structural equations constructed; accordingly, 18 research hypotheses are proposed and tested, of which 17 are supported and 1 is not supported. The results are shown as follows in Table 4.22.

Table **Error! No text of specified style in document.**.20 Summary of research conclusions of this chapter

No.	Hypotheses	Empirical results
H1a	Resource synergy promotes the improvement of the value creation efficiency of hog enterprises	Supported
H1b	Resource synergy promotes the expansion-replication potential of hog enterprises	Not Supported
H1c	Resource synergy promotes the long-term adaptability of hog enterprises	Supported
H2a	Market competition promotes the improvement of the value creation efficiency of hog enterprises	Supported
H2b	Market competition promotes the expansion-replication potential of hog enterprises	Supported
H2c	Market competition promotes the long-term adaptability of hog enterprises	Supported
H3a	Customer demand promotes the improvement of the value creation efficiency of hog enterprises	Supported
H3b	Customer demand promotes the expansion-replication potential of hog enterprises	Supported
H3c	Customer demand promotes the long-term adaptability of hog enterprises	Supported
H4a	Efficiency of value creation improves the economic benefits of hog enterprises	Supported
H4b	Efficiency of value creation improves the social responsibility of hog enterprises	Supported
H4c	Efficiency of value creation improves the environmental efficiency of hog enterprises	Supported
H5a	Expansion and replication potential improves the economic benefits of hog enterprises	Supported
H5b	Expansion and replication potential improves the social responsibility of hog enterprises	Supported
H5c	Expansion and replication potential improves the environmental efficiency of hog enterprises	Supported

No.	Hypotheses	Empirical results
H6a	Long-term adaptability improves the economic benefits of hog enterprises	Supported
H6b	Long-term adaptability improves the social responsibility of hog enterprises	Supported
H6c	Long-term adaptability improves the environmental efficiency of hog enterprises	Supported

Chapter 5: Discussions and Conclusions

5.1 Discussions

This study addresses three core research questions to elucidate the role, pathways, and impacts of business development mode (BDM) choices on company performance in China's hog industry. Below, we align each research question with its corresponding hypotheses and findings, integrating empirical evidence from interviews and structural equation modelling (SEM).

5.1.1 Research question A: Antecedent variables influencing business development modes

To answer Research Question A, the study first reviewed existing literature and conducted multi-stakeholder interviews with government authorities, production companies, sales companies, slaughterhouses, and consumers. Based on word frequency analysis from the questionnaire, three core antecedent variables were identified: Resource Synergy (RS), Competition Index (CI), and Customer Demand (CD). These variables formed the theoretical basis for hypotheses H1a–H3c.

5.1.2 Research question B: Mechanism through which business development mode components influence company performance in the hog industry

To address Research Question B, this study employed structural equation modelling (SEM) to empirically test how the components of business development modes influence company performance in the hog industry. Specifically, the analysis focused on the mediating role of business development modes in linking key antecedent variables to organizational performance outcomes. Through hypothesis testing, the following results were obtained:

H1, H2, and H3 were supported, confirming that resource synergy, market competition, and customer demand significantly enhance the business development modes of hog enterprises. These findings suggest that internal resource integration, external market pressures, and evolving consumer expectations are all critical drivers shaping the way hog enterprises design and implement their development strategies.

In turn, the enhancement of business development modes was found to significantly contribute to performance outcomes, as validated by H4, H5, and H6. Specifically, value creation efficiency (H4), expansion and replication potential (H5), and long-term adaptability (H6) each showed significant positive effects on corporate performance. This implies that companies which optimize their development modes are better positioned to generate economic value, scale operations, and sustain competitive advantages over time.

By integrating these findings, the study confirms that business development modes function as a pivotal mediating mechanism between environmental/organizational antecedents and company performance. The validated hypotheses collectively demonstrate that improvements in business development modes—fueled by synergy, market forces, and customer orientation—translate into superior performance through enhanced operational efficiency, scalable capabilities, and adaptability in a dynamic industry landscape.

This empirical evidence provides robust support for the proposed theoretical framework and highlights the strategic importance of aligning development modes with both internal resources and external pressures to drive sustainable growth in the hog industry.

5.1.3 Research question C: Key paths from drivers to company performance

In answering Research Question C, SEM pathway analysis revealed the critical pathways among antecedent variables, business development mode dimensions, and company performance metrics. The results validated 17 out of 18 hypotheses, clearly outlining the influence chain from drivers to performance:

Resource synergy emerged as a major internal driver that enhances value creation efficiency (H1a: supported) and long-term adaptability (H1c: supported) by enabling companies to integrate internal and external resources, share R&D costs, and adapt to uncertainties. However, hypothesis H1b is not supported, which suggests that resource synergy promotes the expansion and replication potential of hog enterprises. This contradicts the prevailing literature, which emphasises that resource synergy facilitates enterprise scale expansion. An explanation could be that the replication potential of hog enterprises is constrained by multiple factors, such as land resources, environmental regulations, and disease risks. Resource synergy alone may not be sufficient to overcome these external limitations. Moreover, expansion and replication often require significant capital investment and market expansion (Kim & Lee, 2017), while the benefits of resource synergy may be more focused on optimising existing operations rather than driving expansion

Market competition was shown to exert a significant influence on all three dimensions of

business development mode. It promotes value creation efficiency (H2a), expansion and replication potential (H2b), and long-term adaptability (H2c)—all hypotheses were supported. The findings demonstrate that competitive pressures incentivise continuous innovation, standardization of operations, and development of strategic flexibility to cope with market fluctuations and regulatory changes.

Customer demand also significantly affected the three dimensions: value creation efficiency (H3a), expansion and replication (H3b), and long-term adaptability (H3c), with all hypotheses supported. Changes in consumer preferences (e.g., antibiotic-free, eco-friendly products) push companies to innovate, segment their markets, and develop flexible responses. However, the increasing diversity of customer demand may also limit standardization across regions, posing challenges for replication.

These pathways confirm that while resource synergy is crucial for operational excellence and flexibility, the expansion and replication may depend more on external market forces and institutional constraints. Conversely, market competition and consumer-driven pressures offer strong stimuli for replicability and innovation.

Hypotheses H4a, H4b, H4c, H5a, H5b, H5c, H6a, H6b, and H6c are all supported, indicating that value creation efficiency, expansion and replication, and long-term adaptability significantly contribute to the economic, social, and environmental performance of hog enterprises. This suggests that only by continuously improving their capabilities in value creation, expansion and replication, and long-term adaptability can enterprises gain sustainable competitive advantages and achieve long-term development in a competitive market.

5.2 Conclusions

This study systematically examined how business development modes affect company performance in the hog industry, grounded in both qualitative and quantitative methods.

First, the study identified three primary antecedent variables—resource synergy, market competition, and customer demand—as key forces shaping the selection and evolution of business development modes in hog enterprises. These were derived through a combination of literature review and stakeholder interviews.

Second, the study clarified the mechanism by which these business development modes mediate the relationship between antecedent variables and performance outcomes. The study confirmed that evaluation dimensions of business development mode—value creation

efficiency, expansion and replication potential, and long-term adaptability—serve as vital conduits linking environmental and internal drivers to economic, social, and environmental performance.

Third, the study illuminated the key paths connecting antecedent drivers to performance via development modes. While resource synergy contributes to efficiency and adaptability, its influence on replication potential is limited. Conversely, market competition and customer demand positively affect all dimensions of business development, underscoring their central role in sustaining performance.

In conclusion, this study enriches the understanding of how hog enterprises in China can optimize their development modes under complex and dynamic environmental conditions. By integrating internal capabilities with external responsiveness, companies can enhance performance and build resilient, scalable, and adaptive business development modes. These insights offer both theoretical contributions and practical implications for agricultural enterprises pursuing sustainable growth.

5.3 Contributions

5.3.1 Theoretical contribution

First, the study enriches the Resource-Based View (RBV) by positioning resource synergy as a key driving variable in business development modes, thereby extending the applicability of RBV to China's hog industry. RBV holds that sustainable competitive advantage arises from the possession and integration of valuable, rare, inimitable, and non-substitutable resources (Holubčík et al., 2023). This study argues that hog enterprises must go beyond possessing individual core resources (e.g., advanced breeding technologies) and instead cultivate resource bundling capabilities through synergistic integration. This perspective aligns with (Knoll, 2008) on "cross-business synergy as a driver of sustained growth" and complements RBV by incorporating a focus on supply chain integration and interactivity.

Second, the study clarifies the competitive and process innovation path in hog enterprises through the lens of market competition. Market competition is identified as a key antecedent of business development mode, influencing enterprise performance via value creation efficiency and replication potential. While prior research in other industries has highlighted process innovation as a mediating mechanism (Noviaristanti et al., 2023), this study finds that in the context of hog enterprises, the dominant mechanism is the competitive pressure that

compels companies to enhance their value creation and expansion capacity. This contributes new empirical evidence to the diversity of innovation paths under competitive pressure and broadens our understanding of how competition drives business development modes.

Third, the study reveals a three-dimensional evaluation structure and operational mechanism of business development mode. Existing literature on sustainable business development modes often discusses dimensions such as value proposition, delivery mechanisms, and value capture, yet lacks quantitative exploration of the full "three dimensions → performance" path. This study constructs a triadic framework—value creation efficiency, expansion and replication potential, and long-term adaptability—and systematically analyses how these dimensions function differently. It further demonstrates how resource synergy, market competition, and customer demand exert influence through these mediating dimensions to ultimately affect enterprise performance. This enriches theoretical construction in business development mode research and offers a new lens for quantitative measurement.

Last but not the least, the study proposes an integrated driver–mediator–performance mechanism model. While previous literature has often examined the effect of drivers on performance from fragmented perspectives, such as RBV (Supian & Fuad, 2025), dynamic capabilities theory (Sousa & Mmadubuko, 2025), which lack a unified path framework. This research is the first to construct and empirically validate a complete path model in the hog industry: drivers (resource synergy, market competition, customer demand) → mediators (three dimensions of business development mode) → outcomes (economic, social, environmental performance). The only exception found is the insignificant path from resource synergy to replication potential, indicating that resource synergy more strongly enhances efficiency and adaptability, whereas replication capacity depends more on external markets and customer needs—thus revealing the heterogeneity of mechanisms within this triangular path.

5.3.2 Practical contribution

This study's practical contribution lies in providing actionable insights for multiple stakeholders beyond theoretical analysis of hog companies' business development modes. By mapping the "drivers—business development mode — corporate performance" pathway in a dynamic environment, the findings guide operational management, capital allocation, and strategic planning for government regulators, company managers, supply chain partners,

investors, and shareholders.

For policymakers, the study shows that external factors, such as industrial policies, disease control, and environmental regulations, shape companies' business development mode choices. Policies should move beyond subsidies and access control to fostering innovation, for example, by supporting digital transformation, technological upgrades, intensive production, integrated "company + farmer + service" models, and risk-hedging tools like hog futures. Business development modes also mediate industry performance, so policies can guide companies toward intensive, intelligent, and green operations.

For hog companies, results highlight the need to innovate business development modes in breeding and production. Beyond expansion or cost reduction, companies should focus on efficiently creating, delivering, and capturing value. As proved by the study, efficient development modes improve performance, requiring companies to consider their position in the value chain and explore approaches such as full-chain breeding, contract farming with brand marketing, and eco-circular systems integrating breeding with carbon asset development. Companies should strengthen learning, responsiveness, and digital integration. Another key implication is the need to shift focus inward—allowing customers and market demand to shape products and service models. In other words, hog farming should be consumer-oriented. Such a transformation enhances vitality and flexibility, and in cases of large-scale outbreaks like African Swine Fever, a business development mode that can quickly adapt is likely to be critical for survival.

For upstream and downstream enterprises, cooperatives, and partner farmers, it is essential to strengthen collaboration with leading companies to achieve mutual benefits. The essence of business development lies in reconstructing and reshaping value networks through stakeholder relationships. Leading or dominant farming companies can, through contracts and agreements, provide technical support to smaller farmers, enabling shared benefits while ensuring risk-sharing and collective value creation along the supply chain. For example, the contract-farming mode of "unified breeding stock, unified disease control, unified feed, and unified sales" helps ensure product quality consistency and stability, while also strengthening trading relationships and reducing transaction costs. In turn, processors and even retailers can support standardization and product traceability in farming through brand building and channel development.

Finally, this study also offers insights for financial institutions and investors. In China, investment decisions often focus on production capacity and financial indicators, with limited interest in small-scale hog farming companies that lack strategic adaptability or innovation.

Our findings show that advanced business development modes are key drivers of company performance. Therefore, investors should pay more attention to the operational characteristics and business maturity of target companies. Due diligence should consider non-financial factors such as modernization level, maturity of business development modes, industry chain integration, organizational structure, and brand development, so as to identify growth-oriented hog farming companies with advanced business development modes and implement effective investment projects. Similarly, financial institutions can design new financing channels and credit services. For example, funding can be secured by production orders, by future pork supply sources, or by the credit of companies positioned at eco-friendly nodes of the supply chain. Such supply chain finance can support companies aligned with the "new normal," helping them access capital and new technologies, while driving continuous transformation of the hog industry toward efficient, green, and circular agriculture.

In conclusion, this study contributes by offering an evidence-based decision support framework for multiple stakeholders, encouraging them to move beyond short-term interest games and work together toward building a more resilient, efficient, and sustainable ecosystem for China's hog industry. In future practice, stakeholders should strengthen collaborative governance and promote the deep integration of policy, capital, technology, and management, thereby achieving a true shift from "scale-driven growth" to a "value-driven" industrial paradigm.

5.4 Limitations

Despite this study's attempt to uncover the driving mechanisms behind the business development modes of hog enterprises through a combination of qualitative interviews and quantitative surveys, several inherent limitations remain in the research design. First, this research adopts a cross-sectional design. While such an approach is widely used in empirical studies and helps identify relationships between variables, it only captures data at a single point in time, making it difficult to draw robust causal inferences. Although efficient and cost-effective, cross-sectional studies are inherently limited in causality interpretation and are prone to recall bias, which may obscure the distinction between independent and dependent variables. Second, the study relies on self-reported data from questionnaires to measure business development modes and enterprise performance. This may introduce subjective bias from respondents, such as social desirability bias. Although the questionnaire was accompanied by detailed guidance to reduce misinterpretation, the possibility of interpretive

bias or misunderstanding in responses cannot be fully excluded, thereby reducing the precision of the measurements. Third, this study does not capture the impact of emerging artificial intelligence technologies. Since the research began in 2020, data collection and analysis relied on relatively traditional technological environments (e.g., IoT, blockchain), without considering the rapid advances after 2022 in large language models (LLMs) and generative AI. These innovations affect hog companies' business development modes in ways such as AI-driven market forecasting and disease diagnosis (e.g., agricultural ChatGPT plugins) that enhance farming efficiency, or automated interactions like AI customer service and smart contracts that improve supply chain collaboration. Future research should therefore incorporate AI technologies as critical factors.

5.5 Outlooks for future studies

Upcoming research and practice should explore these dimensions more profoundly. From international business development mode, many European and American countries have achieved technology-driven intelligent farming, green production, and whole-industry-chain integration. In comparison, China's counterpart practitioners exhibit lower digitalization levels and fragmented supply chain coordination mechanisms. Particularly among small and medium enterprises, problems of high technology costs, weak adoption willingness, and low coordination efficiency remain prominent. While some Chinese industry leaders have achieved preliminary results in IoT and blockchain applications, widespread industry adoption still requires policy and resource support.

In the future, companies should adjust strategically in accordance with market dynamics. On the one hand, as consumer demands for food safety, green products, and traceability increase, companies need to promptly adjust product structures to meet premium green consumption needs. On the other hand, digital capabilities have become crucial for companies to adapt to market changes. It is recommended to optimize operational strategies by establishing intelligent data platforms and adopting AI prediction models. Additionally, variations in consumption characteristics across different regions necessitate companies to implement regionalized and customized strategies, adapting their brand communication and product innovation to local conditions. At the global market, hog enterprises are facing increasing external pressures from stricter environmental regulations and rising resource costs. The study suggests that governments accelerate the development of national-level green certification and food traceability platforms to assist companies in expanding into green

markets. Simultaneously, efforts should be made to promote industrial clustering and vertical integration, leveraging leading companies to drive small and medium-sized farms toward standardized management and resource sharing, thereby enhancing overall industry efficiency. From the perspective of technological innovation, the evolution of business development modes in the future will heavily rely on the integral embedment of emerging technologies. The Internet of Things (IoT) and artificial intelligence will enable precision management of processes, blockchain will improve supply chain transparency, and big data will facilitate market forecasting and dynamic resource allocation. The research highlights that technological innovation not only enhances resource allocation efficiency and competitiveness but also promotes the adoption of environmentally friendly practices. However, small and medium-sized enterprises still require external support to overcome technological barriers and cost pressures. For research methods and expansion paths, the upcoming studies may incorporate cross-national comparisons, longitudinal case studies, and dynamic system modelling to better explain business development mode evolution across different industries and institutional contexts. Through developing more flexible theoretical models and practical frameworks, more studies can provide long-term support for advancing China's hog industry toward sustainable and high-quality development.

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