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Sustainable Supply Chain Management of Liquor Industry in the Emerging Economy: Drivers, Practices and Capabilities

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Doctor of Management

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BUSINESS
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Abstract

This thesis investigates Sustainable Supply Chain Management (SSCM) in the Baijiu industry within an emerging-economy context, focusing on its drivers, practices, capability formation mechanisms, and performance outcomes. Drawing on Resource Orchestration Theory (ROT), the Dynamic Resource-Based View (Dynamic RBV), and Stakeholder Theory, the study examines how Baijiu enterprises respond to environmental pressures, regulatory constraints, and market transformation through dynamic management of supply chain resources.

A qualitative multiple-case study design is adopted, with three representative Chinese Baijiu enterprises selected through theoretical sampling. Data were collected from semi-structured interviews and supplemented by archival materials and sustainability reports. An abductive research logic and the Gioia methodology were employed to construct an integrated analytical framework.

The findings indicate that SSCM adoption is jointly shaped by external drivers—such as policy regulation, market conditions, and stakeholder expectations—and internal factors including strategic orientation, organizational conditions, and resource endowments. Through coordinated practices across procurement, production, and distribution, enterprises transform SSCM practices into operational supply chain capabilities via resource structuring, bundling, and leveraging. Value creation is realized at the resource leveraging stage, leading to improvements in SSCM performance across economic, environmental, and social dimensions. Digital technologies and financial services act as capability enablers by enhancing information transparency, coordination efficiency, and incentive alignment, thereby accelerating capability formation and resource leveraging.

In an industry-specific context, this study refines and extends ROT by clarifying how Baijiu enterprises in emerging economies realize SSCM value, and it offers practical insights for advancing sustainable supply chain management in resource-intensive industries.

Keywords: Sustainable supply chain management, Resource orchestration theory, Dynamic capabilities, Emerging economies, Digital technologies, Financial services
JEL: C38, C52

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Resumo

Esta tese investiga a Gestão Sustentável da Cadeia de Abastecimento (Sustainable Supply Chain Management, SSCM) na indústria de baijiu num contexto de economia emergente, com foco nos seus fatores determinantes, práticas, mecanismos de formação de capacidades e resultados de desempenho. Com base na Teoria da Orquestração de Recursos (Resource Orchestration Theory, ROT), na Visão Dinâmica Baseada em Recursos (Dynamic RBV) e na Teoria dos Stakeholders, o estudo analisa como as empresas de baihiu respondem a pressões ambientais, restrições regulatórias e transformações de mercado com a gestão dinâmica dos recursos da cadeia de abastecimento.

O estudo adota um desenho qualitativo de múltiplos casos, analisando três empresas chinesas representativas de baijiu selecionadas por amostragem teórica. Os dados foram recolhidos a partir de entrevistas semiestruturadas, complementadas por materiais de arquivo e relatórios de sustentabilidade, e analisados com base numa lógica abdutiva e na metodologia de Gioia.

Os resultados indicam que a adoção da SSCM é moldada conjuntamente por fatores externos — tais como regulamentação política, condições de mercado e expectativas das partes interessadas — e internos, incluindo orientação estratégica, condições organizacionais e dotação de recursos. As empresas implementam a SSCM com práticas coordenadas nas fases de aquisição, produção e distribuição, que são transformadas em capacidades operacionais da cadeia de abastecimento por via da estruturação, combinação e alavancagem de recursos. A criação de valor ocorre principalmente na fase de alavancagem de recursos, resultando em melhorias no desempenho económico, ambiental e social da SSCM. As tecnologias digitais e os serviços financeiros atuam como facilitadores de capacidades, ao aumentarem a transparência da informação, a eficiência da coordenação e o alinhamento de incentivos, acelerando assim a formação de capacidades e a alavancagem de recursos

Num contexto setorial específico, este estudo aperfeiçoa e amplia a Teoria da Orquestração de Recursos, esclarecendo como as empresas de baijiu em economias emergentes realizam o valor da SSCM, e oferece implicações práticas para a promoção da SSCM em indústrias intensivas em recursos.

Palavras-chave: Gestão sustentável da cadeia de abastecimento, Teoria da orquestração de

recursos, Capacidades dinâmicas, Economias emergentes, Tecnologias digitais, Serviços financeiros
JEL: C38, C52

摘要

本论文以新兴经济体背景下的白酒行业为研究对象，系统探讨可持续供应链管理（SSCM）的驱动因素、实践路径、能力形成机制及其绩效结果。研究基于资源编排理论（ROT）、动态资源基础观（Dynamic RBV）与利益相关者理论，分析白酒企业如何通过供应链资源的动态管理，应对环境压力、制度约束与市场转型。

本研究采用多案例研究方法，通过理论抽样选取三家具有代表性的中国白酒企业作为研究对象。数据来源包括半结构化访谈，并辅以企业档案资料和可持续发展报告。研究遵循溯因研究逻辑，并运用 Gioia 方法构建综合分析框架。

研究结果表明，白酒企业实施 SSCM 既受到政策监管、市场环境与利益相关者期望等外部驱动因素的共同影响，也依赖于企业内部的战略导向、组织条件与资源禀赋。企业通过采购、生产和分销环节的协同实践，在资源建构、资源捆绑与资源撬动过程中，将 SSCM 实践转化为可操作的供应链能力，并在资源利用阶段实现价值创造，从而显著提升经济、环境与社会维度的 SSCM 绩效。数字技术与金融服务在这一过程中发挥关键赋能作用，通过提升信息透明度、协调效率与激励匹配程度，放大并加速了资源能力化与资源杠杆化的过程。

在行业特定情境下，本文对资源编排理论进行了细化与延伸，深化了对新兴经济体白酒企业实现可持续供应链管理综合价值运行机制的理解，并为资源密集型产业推进可持续供应链管理提供了具有实践意义的管理启示。

关键词：可持续供应链管理，资源编排理论，动态能力，新兴经济体，数字技术，金融服务

JEL: C38, C52

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List of Abbreviations

Abbreviations	Full name
CADA	China Alcoholic Drinks Association
CSP	Community-centered Social Performance
CSR	Corporate Social Responsibility
DCV	Dynamic Capabilities View
Dynamic RBV	Dynamic Resource-Based View
DSCCs	Dynamic Supply Chain Capabilities
ESG	Environmental, Social and Governance
ESP	Employee-centered Social Performance
GSCM	Green Supply Chain Management
LCA	Life Cycle Assessment
NGOs	Non-governmental organizations
ROT	Resource Orchestration Theory
OSCM	Operations and Supply Chain Management
SC	Supply Chain
SCF	Supply Chain Finance
SCM	Supply Chain Management
SSCF	Sustainable Supply Chain Finance
SSCM	Sustainable Supply Chain Management
WOS	Web of Science

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Chapter 1: Introduction

1.1 Research background and problem

1.1.1 Research background

Baijiu originated over 2,000 years ago. As one of the world's six major distilled spirits (whisky, brandy, rum, gin, vodka, and Baijiu), it is widely consumed in China due to its brewing techniques and long history. Beyond its cultural and symbolic significance, baijiu is a core component of the traditional liquor industry and plays an important role in the national economy.

According to authoritative data released by the China Alcoholic Drinks Association (CADA) and the National Bureau of Statistics of China, in 2024, baijiu output further declined to 4.145 million kiloliters, representing a year-on-year decrease of 1.8%. Meanwhile, the sales revenue of baijiu enterprises above the designated size (i.e., industrial enterprises with annual main business revenue exceeding RMB 20 million) reached a record high of RMB 796.384 billion. However, after reaching its peak in 2022, profit growth began to slow, as illustrated by the profit growth curve in Figure 1.1.

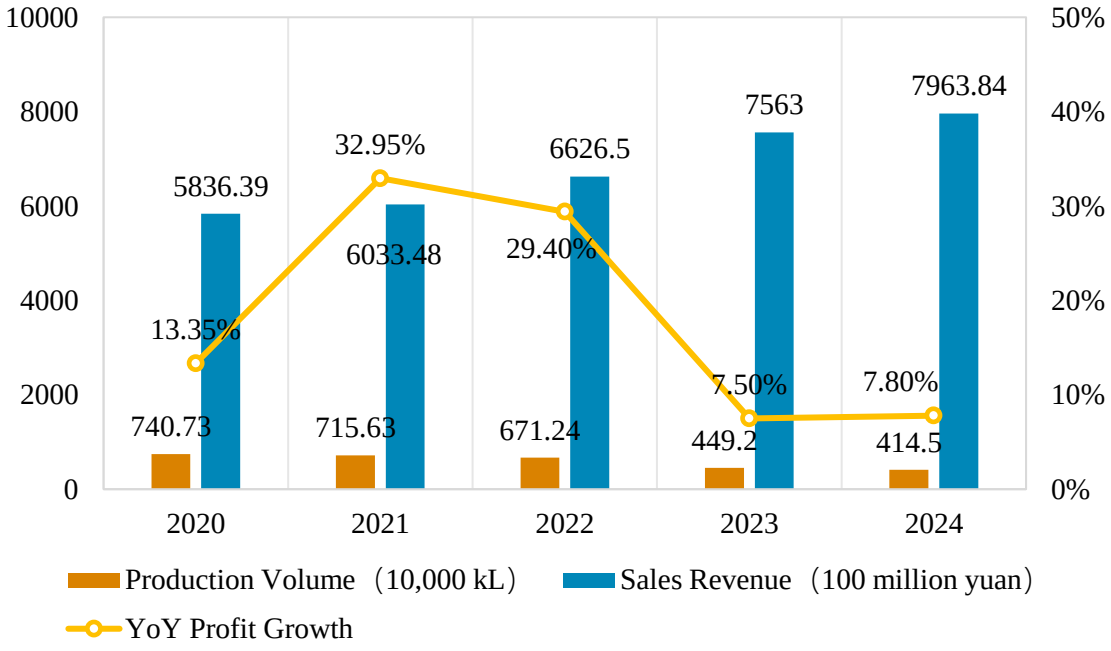


Figure 1.1 Production and sales data of above-designated-size baijiu enterprises

What factors affect the pace of development in the baijiu industry? Figure 1.2 illustrates

the structure of the baijiu supply chain, covering the three main stages of raw material procurement, production and brewing, and product distribution. These three major supply chain stages are respectively associated with the "three highs" of high pollution, high consumption, and high inventory.

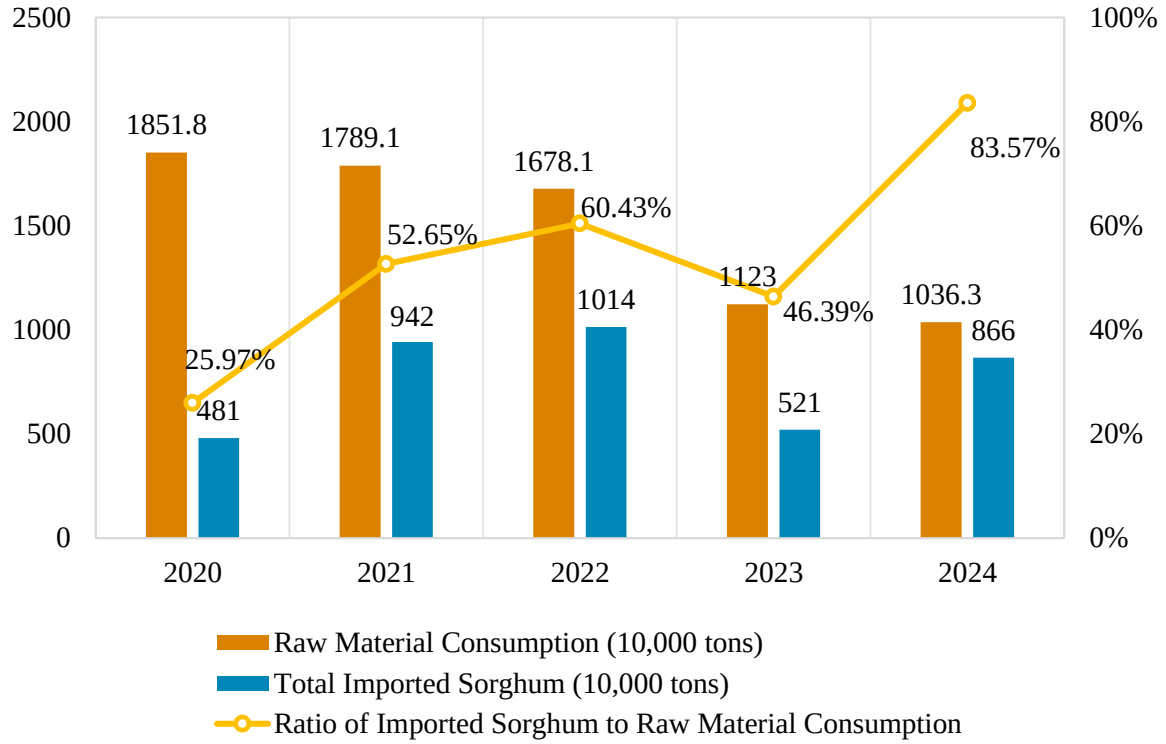


Figure 1.2 Ratio of imported sorghum to raw material consumption

"High pollution" refers to pressure on water resources and the atmosphere, as well as solid waste generated during liquor production, which are discussed in the following sections.

(1) Water pollution from liquor brewing mainly falls into two categories. Low-concentration wastewater includes cooling water generated during production and water used for cleaning brewing equipment. High-concentration wastewater mainly consists of bottom pot water, industrial wastewater from fermentation and distillation, and blind-ditch wastewater from fermentation tanks and storage facilities. Pollutant concentrations in these wastewaters often exceed China's national standards for industrial wastewater discharge.

(2) Air pollution in liquor brewing primarily originates from raw material pretreatment, boiler heating, fermentation, and material transportation, and mainly includes particulate matter, SO_2, VOCs, and NO_x. In particular, outdoor fermentation processes generate waste gas that is difficult to collect and treat effectively, causing localized air pollution within plant areas.

(3) Solid waste pollution in liquor brewing mainly involves distiller's grains, a by-product generated in large quantities and concentrated areas. If not properly treated, these residues

rapidly decay, resulting in resource waste and serious environmental pollution.

In 2022, technological transformation was mentioned as a major goal in the annual reports of seven listed baijiu enterprises: Kweichow Moutai (600519.SH), Wuliangye Yibin (000858.SH), Jiangsu King's Luck Brewery Joint-Stock (603369.SH), Shanxi Xinghuacun Fen Wine Factory (600809.SH), Shede Spirits (600702.SH), Sichuan Swellfun (600799.SZ), and Luzhou Laojiao (000568.SZ).

"High consumption" refers to the highly intensive use of grain resources in baijiu production, which poses challenges to national food security and the stability of grain supply. The Liquor Industry is a major grain-consuming sector. Based on estimates from the *2024 China Alcohol Industry Economic Report* issued by the CADA and official data on baijiu output and average grain consumption standards released by the National Bureau of Statistics, total grain consumption for liquor production reached approximately 22 million tons in 2024. Of this amount, sorghum accounted for about 65% (approximately 14.3 million tons), wheat about 20% (approximately 4.4 million tons), with additional use of rice, corn, glutinous rice, and rice husk. According to the *Announcement on 2024 Grain Output Data* released by the National Bureau of Statistics in December 2024, China's total grain output in 2024 was 706.5 million tons. This indicates that approximately 3.1% of annual grain production was used for baijiu brewing (calculated as total grain used for liquor production divided by total grain output, i.e., 22 million tons ÷ 706.5 million tons ≈ 3.1%).

The constraints on grain resources faced by baijiu enterprises have become more pronounced against the backdrop of persistently high grain import volumes. Data released by the General Administration of Customs in January 2025 show that China's total grain imports reached 158 million tons in 2024, among which sorghum ranked third. As shown in Figure 1-2, the share of imported sorghum in the total grain used for baijiu production has increased in recent years. Baijiu enterprises are therefore required to optimize grain varieties used for baijiu brewing and to develop efficiency-oriented brewing technologies without compromising product quality.

"High inventory" refers to the accumulation of finished baijiu caused by overcapacity and market prices falling below ex-factory prices. Since the COVID-19 pandemic, baijiu output has continued to decline. According to data from the CADA, annual baijiu output fell from 7.407 million kiloliters in 2020 to 4.145 million kiloliters in 2024, the lowest level in recent years and only about 30% of the 2016 peak. Figure 1.3 presents changes in the inventories of 20 A-share listed baijiu companies from 2020 to 2024. Since 2020, despite the overall decline in baijiu output, inventories have increased rather than decreased.

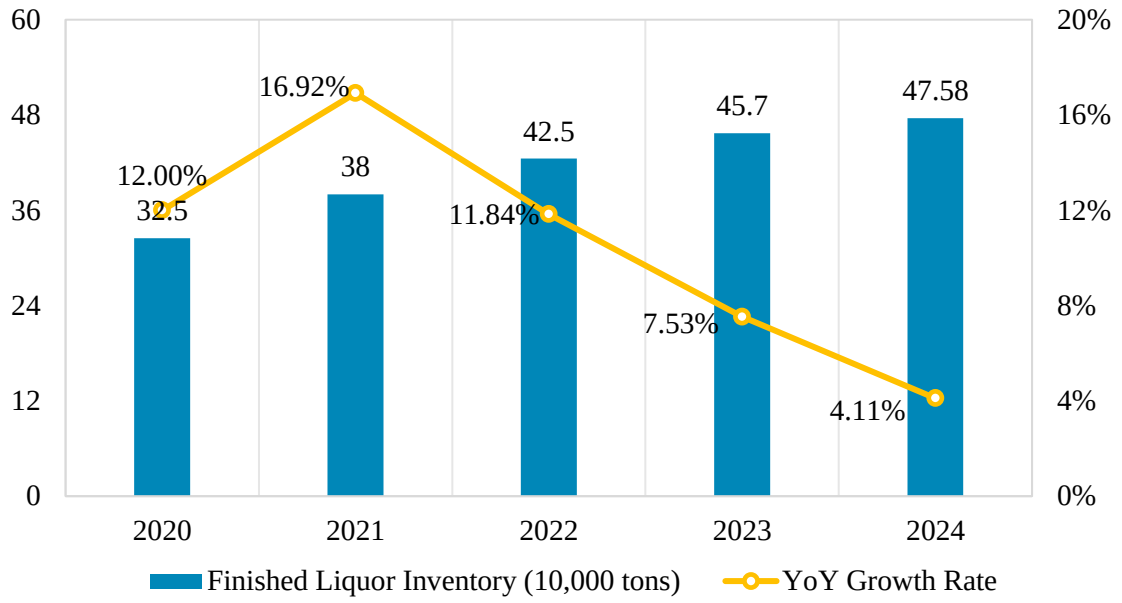


Figure 1.3 Inventory changes of A-share listed baijiu companies

Under the traditional marketing model, inventory pressure is often transferred to distributors. Following Kweichow Moutai's price increase in October 2024, market price volatility combined with persistently high inventory levels led distributors to adopt a more cautious stocking strategy. Large-scale pre-emptive stockpiling did not occur; instead, inventory reduction became the primary objective across distribution channels. Even as leading producers attempted to guide cash collection through policy adjustments, channel profit compression proved difficult to reverse, significantly undermining overall supply-chain performance. For example, China's largest baijiu distributor, Vats Liquor Chain Store Management, reported operating profit of only RMB 87.35 million in 2024, representing a year-on-year decline of more than 60% compared with 2023.

This pattern is widespread in the traditional baijiu marketing system, resulting in double marginalization for both manufacturers and distributors. It is further accompanied by high transaction costs, information distortion, and limited responsiveness to increasingly diversified consumer demand. These structural weaknesses became especially pronounced during the industry's deep adjustment phase in 2024 and have emerged as a key bottleneck constraining the sustainable development of the Liquor Industry.

1.1.2 Research problem

As an important component of the national economy, the baijiu industry not only generates considerable fiscal revenue, but also carries significant material and cultural value. Against the backdrop of the continued advancement of the "dual carbon" goals and emissions reduction

policies, expectations from government, industry associations, and consumers for the industry's green transformation and sustainable development have continued to rise. However, at the supply chain level, the Chinese baijiu industry has long faced prominent problems such as high pollution, high resource consumption, and high inventory. As a result, it is under increasingly severe real-world constraints and transformation pressures in environmental protection, resource utilization, social responsibility, and market competition, and its sustainable development challenges have become ever more pronounced.

1.2 Research motivation, objectives, and research questions

1.2.1 Research motivation

In practice, the baijiu industry has exhibited a diverging pattern of declining output, rising revenue, and slowing profit growth. In its *2022 Annual Work Report*, the CADA noted that "the long-term accumulation of internal and external problems has reached a critical point." This suggests that resolving the sustainable development challenges facing the baijiu industry has become imperative. Sustainability challenges at the industry level do not arise in isolation; rather, they represent the cumulative manifestation of firms' long-term practices in procurement, production, distribution, and upstream–downstream coordination. Specifically, high consumption reflects inefficient use of raw material resources, high pollution points to the ecological impacts of production processes and upstream and downstream activities, and high inventory reveals contradictions such as demand fluctuations, inventory build-up in distribution channels, and insufficient supply chain coordination. This indicates that answering how the baijiu industry can respond to sustainability pressures cannot remain at the level of industry phenomena, but instead requires a closer examination of focal firms and how they coordinate supply chain relationships, optimize resource allocation, and drive improvement through Sustainable Supply Chain Management (SSCM) practices. Accordingly, SSCM provides an entry point for identifying, explaining, and responding to the sustainable development challenges of the baijiu industry. This study translates industry-level sustainability pressures into firm-level SSCM issues, focusing on how firms respond to resource, environmental, and market challenges in procurement, production, distribution, and supply chain coordination.

More fundamentally, the difficulties facing the Chinese baijiu industry reflect the structural tensions confronting traditional liquor industries in emerging economies amid tightening resource constraints, stronger environmental regulation, accelerating market transformation,

and growing pressure from multiple stakeholders. On the one hand, enterprises are shaped by multiple forces, including policy and regulatory pressures, resource and environmental constraints, and shifts in market competition; on the other hand, they must manage relationships with upstream and downstream actors across the supply chain in order to balance environmental, economic, and social objectives. Against this backdrop, this study uses the Chinese baijiu industry as a representative empirical context to provide contextualized evidence for understanding SSCM in traditional liquor industries in emerging economies.

From a theoretical perspective, the existing literature remains insufficient to provide adequate guidance for the traditional liquor industry in emerging economies seeking sustainable development pathways. First, although research on SSCM has continued to grow, the empirical evidence is still drawn mainly from developed economies, while offering limited explanation of how firms in emerging economies advance SSCM practices under conditions shaped by institutional environments, resource constraints, and market transformation (Jayaram & Avittathur, 2015). Second, research on sustainability in the alcoholic beverage industry remains extremely limited. In particular, for the baijiu industry, which is characterized by strong resource dependence, significant environmental pressure, and supply chain complexity, systematic SSCM research is still lacking (Ansari & Kant, 2017). Finally, although prior studies have identified an association between SSCM practices and sustainable performance (Griffith et al., 2006; Menguc & Barker, 2005; Morgan et al., 2009), the mechanism through which practices translate into performance remains insufficiently explained (Hong et al., 2018; Siddiqi et al., 2025).

1.2.2 Research objectives

Based on the research motivations outlined above, this study further specifies the following overall objective and sub-objectives. Its overall objective is to examine, from an integrated supply chain perspective, how baijiu enterprises achieve comprehensive sustainable value through SSCM, and to reveal the underlying pathways and mechanisms. On this basis, by empirically examining Chinese baijiu enterprises, the study seeks to provide empirical evidence and practical insights for the sustainable development of the traditional liquor industry in emerging economies. To support this overall objective, this study further establishes three interrelated sub-objectives.

First, it seeks to identify and analyze the SSCM practices implemented by baijiu enterprises in procurement, production, and distribution, and to examine the internal and external factors that drive these practices, as well as the sustainable performance objectives pursued through

their implementation. This sub-objective is intended to address what practices baijiu enterprises implement, why they implement them, and what sustainable development goals they seek to achieve, thereby revealing how firms respond to multiple pressures related to resources, the environment, and the market at the supply chain level.

Second, it aims to examine how SSCM practices in baijiu enterprises support capability formation through resource structuring. Existing research suggests that the impact of SSCM practices on firm performance is often not direct, but instead operates indirectly through capability formation. However, how SSCM practices support capability formation by reshaping the resource base remains insufficiently explained in the existing literature. Resource Orchestration Theory (ROT) suggests that capability formation depends on the structuring of the resource base. On this basis, this study introduces resource structuring into the "practice–capability–performance" analytical chain, to examine how SSCM practices support capability formation by influencing the resource base and ultimately affect sustainable performance.

Third, it examines the impact of digital technologies and Supply Chain Finance (SCF) services on the sustainable development of baijiu enterprises. Existing studies indicate that digital technologies and SCF services help strengthen basic supply chain capabilities (Cheng et al., 2024; Eslami et al., 2021). Accordingly, this study incorporates them into the analytical framework in order to provide a more complete explanation of how SSCM is achieved in baijiu enterprises, and to reveal how they enable firms to progressively move toward sustainable development under specific contextual conditions.

1.2.3 Research questions

Based on the research motivations and objectives outlined above, this study further translates industry-level sustainable development problems into firm-level research questions and develops a systematic analysis around the conceptual framework presented in Figure 1.4. Specifically, it begins with the SSCM practices implemented by baijiu enterprises in key stages such as procurement, production, and distribution, focusing first on why these practices are adopted, what practices are implemented, and what performance objectives they pursue. On this basis, the thesis explains the dynamic mechanism through which baijiu enterprises gradually achieve sustainable development. It then further analyzes the role of digital technologies and financial services in the implementation and continued advancement of SSCM. Accordingly, the research objectives are specified into the following four interrelated core research questions, which together form the main analytical line of the thesis:

RQ1. What SSCM practices have been implemented by baijiu enterprises across

procurement, production, and distribution, and what internal and external factors have driven these practices?

RQ2. What are the performance objectives associated with SSCM?

RQ3. What are the dynamic development mechanisms through which baijiu enterprises achieve sustainable development?

RQ4. What impacts do digital technologies and financial services have on the long-term sustainability of baijiu enterprises?

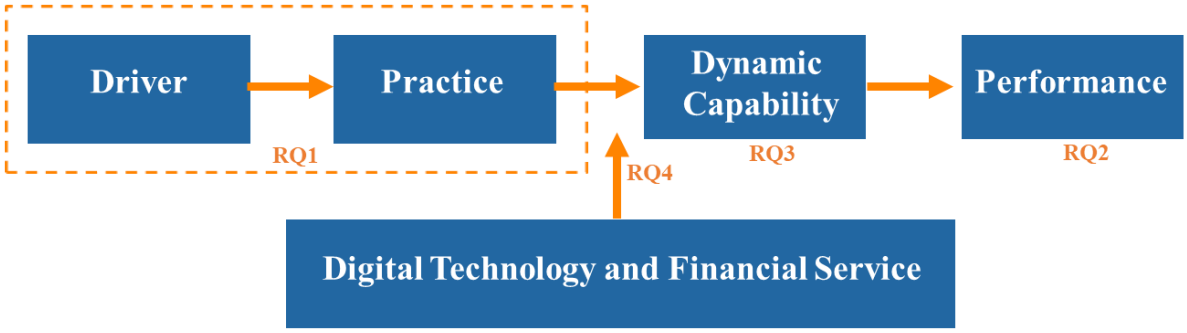


Figure 1.4 Conceptual framework and research question mapping

1.3 Theoretical positioning and rationale

This thesis adopts ROT, the Dynamic RBV, and Stakeholder Theory as its overarching analytical framework (Freeman et al., 2004; Helfat & Peteraf, 2003; Sirmon et al., 2007). The Liquor Industry is characterized by strong path dependence, stringent regulation, and deep ecological embeddedness. In advancing SSCM, Baijiu enterprises must continuously acquire, reconfigure, and optimize diverse resources. ROT and the Dynamic RBV therefore provide an appropriate foundation for examining how firms orchestrate resources through SSCM practices and develop both foundational and dynamic supply chain capabilities under uncertainty. In addition, SSCM is stakeholder-driven. Farmers and raw material suppliers, distributors and logistics providers, government regulators, financial institutions, consumers, and the public constitute core stakeholders of Baijiu enterprises. Stakeholder Theory complements ROT and Dynamic RBV by explaining how these actors shape SSCM implementation.

These three theories offer a multilayered analytical framework for examining how baijiu enterprises in emerging economies achieve coordinated economic, environmental, and social value creation through SSCM. ROT captures micro-level resource orchestration processes, the Dynamic RBV explains dynamic evolution, and Stakeholder Theory addresses multi-actor interactions. Figure 1.4 presents this framework, which not only structures the empirical investigation but also reflects the integrated application of ROT, the Dynamic RBV, and

Stakeholder Theory.

1.4 Methodological overview

This thesis adopts a multiple-case study design based on purposive sampling, rather than a full-sample analysis covering all firms in the baijiu industry. This is because, in practice, SSCM has not been widely and systematically implemented across all firms in the baijiu industry; rather, it has been undertaken primarily by a group of focal firms with pioneering characteristics, representativeness, and the capacity for sustained advancement. Compared with ordinary firms, these focal firms are better able to reflect the key tensions, response paths, and capability evolution processes involved in the industry's sustainable transformation, and are therefore more suitable research objects for examining SSCM practices in the baijiu industry. The selection of these typical cases is not intended to support statistical generalization to the overall population, but rather to reveal the underlying logic and formation process of the phenomenon under investigation through case analysis.

Three Baijiu enterprises were selected as focal cases due to their comprehensive SSCM implementation and industry representativeness. Data were collected primarily through semi-structured interviews with 30 senior managers and supply chain practitioners, supplemented by archival materials, field observations, and sustainability reports.

The analysis follows an abductive logic that iteratively integrates empirical insights with existing theoretical frameworks. The Gioia methodology is applied to structure and code the data, generating first-order concepts, second-order themes, and aggregate dimensions. Within-case analyses are conducted first, followed by cross-case comparison. On the one hand, in-depth single-case analysis places the SSCM practices of the case enterprises in specific contexts and reveals the processes through which these practices unfold, as well as their key characteristics. On the other hand, cross-case comparison identifies common patterns and key differences across different case enterprises, thereby deepening understanding of SSCM in the baijiu industry through analytical generalization.

1.5 Contribution overview

This thesis makes theoretical contributions to SSCM, ROT, and Stakeholder Theory in a specific industrial context.

First, this thesis extends the industry and contextual boundaries of SSCM research.

Drawing on a multiple-case study of Chinese baijiu enterprises, it reveals the practical logic and implementation pathways through which firms advance SSCM under resource constraints, environmental regulation, market transformation, and pressure from diverse stakeholders. In doing so, it provides contextualized empirical evidence for understanding SSCM in the traditional liquor industry in emerging economies and strengthens the explanatory power of SSCM theory in a specific industrial setting.

Second, this thesis deepens understanding of the mechanism through which SSCM generates comprehensive value. The findings show that baijiu enterprises do not achieve comprehensive sustainable value through any single practice, but rather through the dynamic process of "resource structuring–capability bundling–value leveraging." In particular, this thesis identifies and proposes resource inheriting as a mode of resource structuring, thereby extending existing ROT understanding of the resource structuring process.

Third, this thesis clarifies the roles of digital technologies and financial services in the transformation chain. The finding shows that digital technologies and financial services are not exogenous supporting conditions, but enabling factors embedded in the process through which SSCM value is realized. Meanwhile, stakeholders are not merely resource providers, but also play critical roles in rule-making, institutional diffusion, and value realization.

Beyond these theoretical contributions, this thesis also provides practical implications for the sustainable transformation of baijiu enterprises, traditional liquor firms in emerging economies, and related supply chain actors..

1.6 Structure of the thesis

The remainder of the thesis is organized as follows. Chapter 2 reviews the relevant literature, identifying the key debates, conceptual foundations, and research gaps that motivate the study. Chapter 3 outlines the research methodology, explaining the overall design and how the empirical investigation was conducted to ensure credibility and rigor. Chapters 4–6 present the single-case analyses, providing in-depth accounts of each case and the key within-case patterns, processes, and empirical insights. Chapter 7 then offers a cross-case analysis to identify similarities and differences, extract common mechanisms, and develop more generalizable explanations. Chapter 8 develops the theoretical propositions by integrating the cross-case findings with the theoretical lens adopted in this thesis. Finally, Chapter 9 concludes by summarizing the main findings, highlighting the study's contributions, and outlining practical implications and directions for future research.

Chapter 2: Literature Review

This chapter reviews and synthesizes the existing literature on SSCM, which constitutes the central research focus of this thesis (Section 2.1). The review covers the theoretical evolution of SSCM, its core conceptual definitions, and its key dimensions, including drivers, practices, capabilities, and firm performance. It also examines how prior studies conceptualize and measure these dimensions, as well as how the relationships among the main constructs are evaluated in the literature.

Section 2.1 further pays particular attention to factors influencing the implementation of SSCM, with a specific focus on digital technologies and financial services. In addition, this chapter provides a focused review of SSCM in the liquor industry within emerging economies (Section 2.2), highlighting theoretical extensions and contextual innovations in both emerging-economy settings and the alcoholic beverages industry. Finally, Section 2.3 outlines the main theoretical frameworks that underpin the development of this thesis.

2.1 Sustainable supply chain management

2.1.1 Sustainability and triple bottom line

The concept of sustainability dates back to the eighteenth century (Geissdoerfer et al., 2017). Brundtland (1987) defined sustainable development as meeting present needs without compromising the ability of future generations to meet their own. In organizational contexts, corporate sustainability refers to firms' capacity to satisfy the needs of diverse stakeholders over time while recognizing the interdependence among firms, supply chains, the natural environment, and society (Dyllick & Hockerts, 2002; Paulraj, 2011).

Sustainability thinking has evolved from compliance-oriented environmental regulation in the 1960s to more strategic and integrated approaches since the 1980s, with sustainability increasingly embedded in corporate values and supply chain management research (Giunipero et al., 2012; Menon & Menon, 1997; Vermeulen & Seuring, 2009). From the 1990s onward, scholars highlighted "green marketing" and the potential competitive benefits of environmental initiatives, and by the 2000s sustainability became a holistic objective in SCM, covering issues such as waste management, packaging, compliance, and green purchasing across the product

life cycle (Chamorro et al., 2009; Sarkis, 2001; A. Sharma et al., 2010).

Elkington (1997) proposed the triple bottom line (TBL), which integrates economic, environmental, and social dimensions as the foundation of sustainability (Beske & Seuring, 2014). The environmental and social bottom lines focus on ecological impacts and social responsibility, while the economic dimension covers both financial performance and broader stakeholder interests (Isil & Hernke, 2017; Lehtonen, 2004; Sheth et al., 2011) This "win–win–win" perspective has become central to business sustainability (Farooq et al., 2021). Sustainability research remains concentrated in developed countries such as the United States, Germany, and the United Kingdom, while interest in sustainable practices is expanding in developing economies (Khan et al., 2021).

2.1.2 The evolution of research on SSCM

Since the early 1980s, the supply chain concept has become central to both research and practice. R. K. Oliver and Webber (1982) describe a supply chain as a network of upstream and downstream organizations that create value by delivering products and services to end consumers, highlighting multi-actor participation, vertical linkages, diverse activities, and value creation. Closely related, supply chain management (SCM) has developed into a prominent field (Laengle et al., 2017). Early definitions emphasize operational control: SCM involves planning, implementing, and controlling supply chain operations to meet customer requirements efficiently, covering material and inventory flows from origin to consumption (R. K. Oliver & Webber, 1982). Later work extends SCM to a strategic and integrative view. (Mentzer et al., 2001) conceptualize SCM as the coordination of key business processes from end users to original suppliers to generate value for customers and other stakeholders, reflecting increasing complexity in actors, flows, and objectives.

This thesis adopts the focal company perspective (Seuring & Müller, 2008) Focal firms typically coordinate the supply chain, maintain direct contact with customers, and design core products or services, making this perspective particularly relevant for brand-owning companies that face pressures from consumers, Non-governmental organizations (NGOs), and the media (Andersen & Skjoett-Larsen, 2009). Accordingly, focal companies are often expected to address social and environmental issues across their supply chains (Seuring & Müller, 2008). They also undertake key activities such as product development, network reconfiguration, manufacturing, internal logistics, outsourcing, sourcing and procurement, supplier evaluation and development, as well as downstream functions including customer relationship

management, marketing, and transportation (Mentzer et al., 2001). While supply chains exist regardless of management, SCM refers to their deliberate coordination (Mentzer et al., 2001).

In recent years, globalization, volatile demand, resource depletion, market complexity, and rising waste and pollution have challenged traditional supply chain approaches, making internal efficiency improvements alone insufficient for sustaining competitiveness (Ansari & Kant, 2017; Roy et al., 2018). Against this backdrop, SCM research has expanded, and SSCM has become a salient stream. Since 2004, SSCM has received growing attention as sustainability is increasingly embedded into SCM (Ashby et al., 2012; Khan et al., 2021; Rebs et al., 2019). The field has produced extensive empirical studies and reviews, with outlets such as the *Journal of Cleaner Production* playing a leading role (Carter & Washispack, 2018; Zou et al., 2017). Related concepts include Green Supply Chain Management (GSCM), reverse logistics, closed-loop supply chains, and circular supply chains (Ahi & Searcy, 2013; Farooque et al., 2019; Govindan et al., 2015).

SSCM overlaps with GSCM but is broader. GSCM emphasizes integrating environmental considerations into supply chain activities such as design, procurement, production, distribution, and end-of-life management (Srivastava, 2007). Ahi and Searcy (2013) further show that SSCM extends GSCM by incorporating social and economic dimensions alongside environmental concerns. Overall, SSCM represents the integration of sustainability's three pillars into supply chain management and is defined as balancing economic, environmental, and social performance in supply chain activities (Ansari & Kant, 2017; Beske & Seuring, 2014). However, SSCM is challenging because it requires firms to move beyond purely financial objectives toward broader responsibilities to society and the environment (Zak, 2015).

2.1.3 The definition of SSCM

There is no universally accepted definition of SSCM, and the concept remains broadly interpreted (Lehtonen, 2004). Nevertheless, existing studies generally conceptualize SSCM as an approach that advances long-term sustainable development by integrating social, environmental, and economic considerations (Ahi & Searcy, 2013; Carter & Rogers, 2008; Seuring & Müller, 2008). Accordingly, this study adopts an inclusive definition that incorporates all three dimensions, using Ahi and Searcy's definition as the primary analytical reference, consistent with the triple-bottom-line perspective emphasized by Carter and Rogers (2008) and Seuring and Müller (2008). Table 2.1 illustrates the key emphasis of SSCM.

Table 2.1 Key emphasis of SSCM

No.	Key emphasis	Author
1	Emphasizes the integration of environmental considerations across supply chain activities, covering product design, material sourcing, manufacturing, distribution to consumers, and end-of-life product management.	Srivastava (2007)
2	Highlights the transparent and strategic coordination of interorganizational business processes to simultaneously pursue social, environmental, and economic objectives and enhance long-term firm and supply chain performance.	Carter and Rogers (2008)
3	Focuses on the coordinated management of material, information, and capital flows, together with inter-firm collaboration, to address economic, environmental, and social expectations associated with the triple bottom line (TBL).	Seuring and Müller (2008)
4	Stresses the role of supply chain policies, actions, and relationships in responding to environmental and social concerns throughout the entire lifecycle of products and services.	Haake and Seuring (2009)
5	Centers on managing supply chain operations and resources to balance profitability objectives with the reduction of environmental impacts and the enhancement of social well-being.	Hassini et al. (2012)
6	Views SSCM as the voluntary integration of economic, environmental, and social considerations into coordinated supply chains and inter-organizational systems to improve stakeholder satisfaction and organizational competitiveness over time.	Ahi and Searcy (2013)
7	Emphasizes the design of coordinated supply chains that incorporate voluntary TBL integration to manage acquisition, production, and distribution activities while strengthening profitability, resilience, and competitiveness.	Ahi and Searcy (2015)
8	Conceptualizes SSCM as the planning, execution, and control of value creation processes through the integrated consideration of economic, ecological, and social dimensions to enhance long-term performance.	Stindt (2017)
9	Describes SSCM as complex network systems involving diverse entities that manage product flows and returns from suppliers to customers while accounting for social, environmental, and economic impacts.	Barbosa-Póvoa et al. (2018)
10	Distinguishes SSCM as a broader construct encompassing three sustainability dimensions, in contrast to GSCM, which primarily emphasizes environmental and economic aspects.	Qorri et al. (2021)
11	Emphasizes the strategic integration of economic, environmental, and social sustainability into interorganizational supply chain processes to enhance long-term performance, competitiveness, and stakeholder value.	Castillo-Pérez et al. (2025)

2.1.3.1 SSCM and Corporate Social Responsibility (CSR)

Initiatives related to corporate sustainability are closely linked to CSR. Carroll (1979) conceptualized CSR as a framework reflecting societal expectations of business across economic, legal, ethical, and discretionary domains, later formalized in the corporate social performance model and the CSR Pyramid (Carroll, 1991). Corporate sustainability and CSR substantially overlap and are often used interchangeably in practice, though scholars debate their equivalence (Van Marrewijk, 2003).

Research on SSCM and CSR can be broadly grouped into two streams: one rooted in supply chain management (e.g., purchasing, supply management, and logistics) and the other in business ethics (Quarshie et al., 2016). SSCM research mainly examines how sustainability considerations are embedded in managerial decision-making within firms and across supplier relationships, focusing on supply chain practices, supplier management, environmental impacts, performance, and outcomes (Quarshie et al., 2016). By contrast, the business ethics stream places greater emphasis on responsible conduct and ethical dilemmas, and tends to focus more on supplier auditing, collaboration with nontraditional partners, and the development of codes, policies, and standards (Quarshie et al., 2016).

2.1.3.2 SSCM and Environmental, Social and Governance (ESG)

The European Banking Authority (2021) defines ESG as an analytical framework that integrates environmental, social, and governance considerations into investment decision-making. ESG is closely associated with responsible investment, which embeds ESG factors into investment decisions (Wagstaf & Belsom, 2021). As a non-financial evaluation tool, ESG is widely used by investors to assess firms' environmental, social, and governance practices and performance, as well as the related financial prospects (T. T. Li et al., 2021).

From a managerial perspective, firms integrate ESG into performance management to enhance financial outcomes and sustainability performance. Empirical evidence also suggests that stronger ESG performance supports the development of GSCM capabilities and facilitates the coordinated pursuit of economic, environmental, and social outcomes (Hua, 2022).

2.1.4 Drivers of SSCM

The adoption of sustainable supply chain practices is influenced by both external and internal forces, including regulators, local communities, investors, consumers, suppliers, and employees (Hassini et al., 2012). In SSCM research, drivers are commonly defined as factors that stimulate

or enable firms to engage in sustainability-related initiatives across supply chain activities (Saeed et al., 2017). Prior studies have used terms such as pressures, triggers, enablers, and facilitators to describe these influences, often without clear conceptual boundaries (Caniato et al., 2012; Köksal et al., 2017; Marculetiu et al., 2023). These drivers affect supply chain decisions to varying degrees (Saeed & Kersten, 2019). However, research on SSCM drivers remains fragmented across industries (Wittstruck & Teuteberg, 2011).

2.1.4.1 External drivers

C. C. Hsu et al. (2013) draw on institutional theory to explain how SSCM drivers shape firms' sustainability-related decisions. Firms' engagement in SSCM is influenced by three types of institutional pressures—**coercive**, **mimetic**, and **normative** (Dimaggio & Powell, 1983; C. C. Hsu et al., 2013; C. Oliver, 1997), which are widely regarded as key external drivers in both developed and emerging economies (Zhu & Sarkis, 2004).

Coercive pressures stem mainly from government regulations, industrial policies, powerful buyers' compliance requirements, and public or media scrutiny, often encouraging the adoption of environmental management practices (Ashford & Hall, 2011; Darnall et al., 2008; Glover et al., 2014; Huq & Stevenson, 2020; King & Lenox, 2001; Silvestre, 2015). Mimetic pressures arise under uncertainty, leading firms to imitate leading competitors' practices such as eco-design, green information systems, and sustainability certifications to enhance legitimacy and enable knowledge transfer (Khan & Qianli, 2017; Meehan & Bryde, 2011; Zhang et al., 2021). Normative pressures originate from industry associations, NGOs, communities, and consumers that shape social expectations through advocacy, guidelines, and collaborative initiatives, pushing firms beyond minimum compliance and strengthening legitimacy (Aboelmaged, 2018; Dubey et al., 2015; Misopoulos et al., 2018; Panda et al., 2020; Raj et al., 2020).

Empirical evidence suggests that the relative strength of these pressures differs across institutional contexts: coercive and normative pressures are typically stronger in developed economies, whereas mimetic pressures are more salient in developing economies (Silvestre, 2015; Zhu & Sarkis, 2007). However, in highly regulated and socially visible industries such as food and beverages, coercive and normative pressures often dominate even in developing contexts (Glover et al., 2014; Silvestre, 2015).

2.1.4.2 Internal drivers

Internal drivers refer to intra-organizational forces that shape the adoption and continued implementation of SSCM, mainly including corporate strategy, organizational culture, and the

firm's resource base (Schrettle et al., 2014). Corporate strategy aligns internal resources with external sustainability demands and becomes a key guide for supply chain decisions when top management recognizes sustainability's benefits (Blome et al., 2014; Giunipero et al., 2012; Saeed & Kersten, 2019; Schrettle et al., 2014). A cost-reduction strategy may also serve as a key driver of SSCM, as firms can reduce energy, water, and material consumption through sustainable initiatives (Walker et al., 2008).

Organizational culture is another driver, as sustainability transitions often require cultural change and embedding sustainability principles into daily decision-making (Harris & Crane, 2002; D. Marshall et al., 2015). Employees play an essential role, and training investments are often needed to diffuse sustainability values and support SSCM practices (Khan & Qianli, 2017; Sarkis et al., 2010).

A firm's resource base further enables SSCM by providing resources and capabilities that sustain competitive advantage (Barney, 1991; Helfat & Peteraf, 2003; Teece et al., 1997). Specialized assets (e.g., technical expertise and proprietary technologies), together with knowledge management capabilities and sustainability-oriented information systems, strengthen firms' capacity for long-term SSCM implementation (P. S. Huang & Shih, 2009; Lichtenthaler & Lichtenthaler, 2009; Melville, 2010). Table 2.2 summarizes SSCM drivers.

Table 2.2 Drivers of SSCM

Driver type	Driver	Key characteristics	Representative literature
External drivers	Coercive pressures	Formal regulatory requirements and policy constraints imposed by government agencies or dominant actors within the supply chain..	Regulatory policies (Ashford & Hall, 2011; King & Lenox, 2001); Compliance requirements imposed by powerful buyers or suppliers (Glover et al., 2014; Huq & Stevenson, 2020)
	Mimetic pressures	Arise when organizations imitate the sustainability practices of leading or successful firms within the same institutional or competitive context.	Green information systems and eco-design (Khan & Qianli, 2017); Green procurement (Meehan & Bryde, 2011); Effective inventory management (Zhang et al., 2021)
	Normative pressures	Stem from shared professional norms, industry standards, and stakeholder expectations within a given organizational field.	Cooperation with customers (Panda et al., 2020); expectations from stakeholders (Aboelmaged, 2018)
Internal drivers	Corporate strategy	Reflect the extent to which sustainability considerations are embedded into strategic planning and managerial decision-making processes.	Sustainability transition goals (Singh et al., 2025); Top management commitment (Blome et al., 2014); Cost reduction (Walker et al., 2008); Operational and economic performance improvements (Schrettle et al.,

		2014)
Organizational culture	Encompass organizational values, beliefs, and routines that underpin ecological responsiveness.	Cultural change (Harris & Crane, 2002); Sustainability orientation (D. Marshall et al., 2015); Corporate social responsibility (Mutti et al., 2012); Innovativeness (Gualandris & Kalchschmidt, 2014); Moral motives (Paulraj et al., 2017); Employee Motivation (Khan & Qianli, 2017)
Adequate resources	Include both tangible and intangible resources that support the effective implementation of SSCM.	Physical capital resources (Barney, 1991); Knowledge management capacity (Lichtenthaler & Lichtenthaler, 2009); Sustainability-oriented information systems (Melville, 2010)

2.1.5 SSCM practices

Enhancing supply chain sustainability while maintaining competitive advantage has become a key concern under growing environmental and social pressures, and prior studies suggest that adopting SSCM practices can address this challenge. In the supply chain management literature, SSCM practices are viewed as mechanisms for embedding sustainability into operations and achieving coordinated economic, environmental, and social outcomes (Carter & Rogers, 2008). Over the past decade, research on SSCM practices has expanded across industries and countries (Glover et al., 2014; P. Jia, Diabat, et al., 2015; Raut et al., 2017; Zailani et al., 2012). These practices are inherently adaptive, requiring continuous refinement in response to regulatory change, market dynamics, and evolving stakeholder expectations (Morali & Searcy, 2013).

2.1.5.1 SSCM practices and activities

Existing studies have investigated SSCM practices through analyses across various industries and national contexts (Ahi & Searcy, 2013; Seuring & Müller, 2008). For instance, Morali and Searcy (2013) examine Canadian industries and identify practical challenges in SSCM implementation. In emerging markets, sustainability has become increasingly salient, and manufacturers have incorporated practices such as eco-design and green procurement in response to environmental pressures (Tseng & Chiu, 2013). Survey evidence from Malaysian manufacturing firms shows that environmental purchasing and sustainable packaging are positively associated with sustainable supply chain performance (Zailani et al., 2012).

Empirical research also highlights that SSCM practices vary across sectors. Studies have examined SSCM implementation in the Indian oil and gas industry (Raut et al., 2017),

sustainable-material supplier selection in fashion (P. Jia, Govindan, et al., 2015), CSR integration in IKEA's global supply chain (Andersen & Skjoett-Larsen, 2009), and institutional drivers in the food industry (Glover et al., 2014). Collectively, these works illustrate how SSCM is operationalized in different supply chain settings and inform managerial efforts to advance sustainability initiatives.

SSCM practices aim to enhance sustainability by addressing the triple bottom line—environmental, social, and economic outcomes (Morali & Searcy, 2013; Paulraj et al., 2017). Through these practices, firms seek to improve environmental performance, uphold social and ethical standards, and support long-term economic development, thereby strengthening competitive advantage (Asante-Darko & Osei, 2023; Markman & Krause, 2016). Despite growing attention, managers often struggle to implement effective SSCM strategies (Wittstruck & Teuteberg, 2011), and limited understanding remains regarding how firms in emerging economies integrate SSCM into their supply chains, underscoring the need for organizational-level strategies to support SSCM adoption (Ryan et al., 2012; Silvestre, 2015).

2.1.5.2 Categorization of sustainable supply chain practices

The question of which practices are commonly applied in SSCM has been widely discussed (Zhu & Sarkis, 2006). Scholars have examined SSCM practice classifications through literature-based qualitative analyses. From a dynamic capabilities perspective, Beske (2012) proposes four categories: **supply chain continuity**, **collaboration**, **risk management**, and **proactive innovation**. Supply chain continuity emphasizes long-term partnerships with upstream and downstream actors; collaboration highlights information sharing, technological integration, and joint goal-setting; risk management focuses on proactively addressing environmental, social, and economic risks; proactive innovation stresses product and process innovation to meet future sustainability requirements. This framework underscores the dynamic nature of SSCM practices, in which firms continuously reconfigure relationships and capabilities to achieve triple bottom line outcomes (Beske, 2012).

Supply chain continuity involves establishing stable and enduring relationships through partner development and careful partner selection (Beske, 2012). Sustained interaction builds trust as a foundation for long-term collaboration (Gold et al., 2010). Buyers may enhance stability through long-term contracts, supplier development, and pricing mechanisms that support relational continuity, thereby improving information access, ensuring availability, and mitigating supply risks (Pagell & Wu, 2009). Strong partnerships also facilitate product lifecycle management benefits and reinforce asset specificity within supply chains (Ashby et

al., 2012; Ziggers & Trienekens, 1999). Partner selection is critical because environmental performance is shaped by the practices of participating firms (C. Wu & Barnes, 2016).

Collaboration, the second category, links structural relationships to operational processes (Beske et al., 2014). It becomes particularly salient when supply chains pursue economic, environmental, and social objectives across the product life cycle (Gold et al., 2010). Key elements include joint development, technological integration, and enhanced communication through transparent information sharing and frequent interaction, which align goals, reduce uncertainty, and enable coordinated action (Barratt, 2004; Vachon & Klassen, 2008). Effective collaboration can be directed upstream or downstream and strengthens shared sustainability commitments and overall SSCM performance (Power, 2005).

Risk management refers to actively identifying and mitigating risk sources (Beske, 2012). External pressures and incentives may trigger focal firms' responses, while managers also seek to mitigate social risks and enhance performance (Klassen & Vereecke, 2012; Seuring & Müller, 2008). Typical practices include green purchasing and sustainable packaging (Tsoulfas & Pappis, 2006; Zailani et al., 2012), setting environmental goals, monitoring progress, and evaluating suppliers (Handfield et al., 2005; Koplin et al., 2007). The adoption of standards and certification schemes further enhances the legitimacy of social and environmental practices (Mueller et al., 2009).

Proactivity reflects a forward-looking orientation emphasizing stakeholder engagement and innovation (Beske et al., 2014; Hall & Matos, 2010). Firms involve stakeholders to mobilize external knowledge and collaborative capabilities and may pursue radical innovation to reshape products, processes, or business models under intense pressures (Pagell & Wu, 2009; Seuring & Müller, 2008). Life-Cycle Assessment (LCA) help anticipate cradle-to-end impacts and support closed-loop supply chain development and sustainability-oriented product design (Matos & Hall, 2007; Seuring, 2011).

An alternative classification highlights collaborative activities. Building on Seuring and Müller (2008), focal firms coordinate internally and with upstream and downstream partners. Upstream practices emphasize suppliers' environmental and social responsibilities and may extend across multiple tiers, whereas downstream practices focus on interactions and translating sustainability into marketable value propositions (Pullman et al., 2010).

SSCM practices also provide pathways for resource optimization in dynamic environments. Green procurement, sustainable partner selection, cleaner production technologies, and green packaging support resource acquisition and accumulation, while LCA identifies low-value or non-compliant processes and improves resource utilization efficiency (Seuring, 2011; Tsoulfas

& Pappis, 2006). In tradition-based industries, inheriting and revitalizing craftsmanship and tacit knowledge can support sustainable development (Shafi et al., 2022), providing grounding for subsequent ROT-based analysis.

Despite growing research, there is still no consensus on SSCM practice frameworks or operationalization, and evidence remains limited in emerging economies and industry-specific contexts such as the liquor industry (Hong et al., 2018; F. Jia et al., 2018; Sánchez-Flores et al., 2020). Existing studies also focus more on short-term firm-level practices than on long-term performance mechanisms, indicating the need for more integrated classifications and process-oriented research across industries (Beske et al., 2014; Hong et al., 2018).

2.1.5.3 Social sustainable practices

Social sustainability has become an integral dimension of supply chain management (Mani et al., 2018). Firms increasingly engage not only employees but also suppliers, communities, and broader stakeholders.

At the individual level, practices such as sustainability-oriented training and incentives promote responsible behavior and employee well-being (Daily & Huang, 2001; Starik & Rands, 1995). Cleaner technologies and resource-efficient processes can improve working conditions, while occupational health and safety remains a core concern (Dubey et al., 2017; Klassen & Vereecke, 2012; Shanmugasundar et al., 2021).

At the inter-organizational level, social sustainability emphasizes supplier relationships through incentives, supplier education, and knowledge sharing to reduce risks and build capabilities (Goodman, 2000; Rao & Holt, 2005). At the community and societal levels, it is closely linked to ethical conduct and responsible procurement that considers social impacts while sustaining value creation (Fernando et al., 2022). Overall, social sustainability encompasses internal actions (e.g., improving working conditions and training) and external contributions (e.g., supporting communities and future welfare), enabling sustainable value creation across supply chain stages (Morais & Barbieri, 2022; Pullman et al., 2010).

Table 2.3 summarizes an integrated framework that combines the four categories of SSCM practices identified by Beske (2012) with the internal–upstream–downstream structure proposed by Seuring and Müller (2008). In this revised composition, socially sustainable supply chain practices are incorporated alongside the economic and environmental dimensions, thereby offering a more comprehensive representation of SSCM activities.

Table 2.3 List of SSCM practices

Practice	Core focus	Position in SC	Representative literature
Supply chain continuity			
Long term relationships	Establishing stable and enduring relationships with supply chain partners to support continuity and reliability.	Upstream / Downstream	Gold et al. (2010), Pagell and Wu (2009)
Partner Development	Strengthening partners' capabilities and performance through long-term collaborative development efforts.	Upstream / Downstream	Ziggers and Trienekens (1999), Ashby et al. (2012)
Partner selection	Evaluating and selecting partners based on environmental and sustainability-related criteria.	Upstream / Downstream	Seuring and Müller (2008), C. Wu and Barnes (2016)
Collaboration			
Joint development	Collaborative development of technologies, processes, or products to enhance sustainability outcomes.	Upstream / Downstream	Vachon and Klassen (2008), Castillo-Pérez et al. (2025)
Logistical integration	Coordinating logistics activities to reduce environmental impacts associated with material flows.	Upstream / Downstream	Vachon and Klassen (2008), Power (2005)
Enhanced communication	Improving transparency and information exchange to support coordination and SSCM effectiveness.	Upstream / Downstream	Barratt (2004)
Risk management			
Pressure group management	Managing social and environmental risks arising from stakeholder pressures and regulatory expectations.	Internal / Upstream / Downstream	Seuring and Müller (2008), Klassen and Vereecke (2012)
Environmental purchasing	Incorporating environmental criteria into purchasing decisions for raw materials and inputs.	Upstream	Zailani et al. (2012), Handfield et al. (2005)
Green packaging	Reducing environmental impacts through the use of sustainable and renewable packaging materials.	Upstream	Tsoulfas and Pappis (2006), Zailani et al. (2012)
Individual monitoring	Monitoring suppliers' compliance with sustainability-related requirements.	Upstream	Koplin et al. (2007), Handfield et al. (2005)
Standards and Certifications	Applying recognized standards and certification schemes to legitimize environmental and social practices.	Upstream	Mueller et al. (2009); P. Jia, Govindan, et al. (2015)
Pro-activity			
Innovation	Proactive innovation aimed at aligning products and processes with evolving sustainability expectations.	Internal / Upstream / Downstream	Matos and Hall (2007), Khalid et al. (2015).
Stakeholder management	Engaging stakeholders to leverage external knowledge and manage sustainability-related pressures.	Internal / Upstream / Downstream	Seuring and Müller (2008), Pagell and Wu (2009)
Life-cycle assessment	Assessing environmental impacts across the full product life cycle to support sustainable decision-making.	Internal / Upstream / Downstream	Seuring (2011), Matos and Hall (2007)
Society Category Environmental	Enhancing sustainability awareness	Internal /	Starik and Rands

awareness training	among employees and supply chain partners.	Upstream / Downstream	(1995), Rao and Holt (2005)
Incentive and reward systems	Aligning incentive structures with sustainability-related objectives.	Internal / Upstream / Downstream	Daily and Huang (2001), Goodman (2000)
Worker safety and human rights	Ensuring compliance with labor standards, health, safety, and human rights requirements.	Internal / Upstream	Klassen and Vereecke (2012), Shanmugasundar et al. (2021)
Cleaner production technologies	Reducing waste and pollution through cleaner and more resource-efficient production processes.	Internal / Upstream	Dubey et al. (2017), Seuring and Müller (2008)

Source: Beske et al. (2014)

2.1.6 Performance of SSCM

As sustainability considerations gain prominence in an evolving global economic environment, organizations have increasingly turned their attention to evaluating the outcomes of their sustainability-related initiatives. In this context, organizational performance can be understood as the degree to which firms deploy and coordinate their resources in pursuit of strategic objectives (Richard et al., 2009). Reflecting its central role in explaining firm behavior and outcomes, the concept of firm performance has become a core focus within the management and strategy literature (Gentry & Shen, 2010).

2.1.6.1 Three dimensions of SSCM performance

Sustainability performance is a multidimensional construct that reflects the outcomes of firms' sustainability-related efforts across different domains (Das, 2018). In line with prior SSCM research, this study conceptualizes SSCM performance along three interrelated dimensions—**environmental, social, and economic**—which together capture the key sustainability outcomes within supply chains.

(1) Environmental performance

In the context of increasing regulatory, competitive, and societal pressures, environmental performance has become a critical component of overall organizational performance (Zhu & Sarkis, 2004). Environmental performance refers to the extent to which firms manage natural resources efficiently and reduce adverse environmental impacts associated with their operations, thereby supporting both ecological objectives and business performance (Jacobs et al., 2010). Common indicators of environmental performance include reductions in hazardous waste and energy consumption, lower frequencies of environmental incidents, and decreased emissions of solid, liquid, and air pollutants (Green et al., 2012; Zailani et al., 2012).

(2) Social performance

Measuring social performance is inherently challenging due to the complexity of social behaviors (Yang, 2013). In SSCM research, social performance is often conceptualized as comprising two components: Community-centered Social Performance (CSP) and Employee-centered Social Performance (ESP) (Das, 2018; Wood, 1991; Yang, 2013). CSP emphasizes social commitment, organizational legitimacy, and relationships with external stakeholders such as governments and NGOs. CSP indicators often include improvements in social reputation, expanded employment and business opportunities for local communities, and progress in education and public health (Mani, Gunasekaran, et al., 2016). ESP focuses on employee well-being, including health and safety, fair compensation, and improved living and working conditions that support development (Mani, Agarwal, et al., 2016; Qorri et al., 2021). Firms are also required to comply with national and international regulations related to labor standards and human rights (Székely & Knirsch, 2005).

(3) Economic performance

Economic performance mainly relates to operational, market, and financial outcomes (Das, 2018). Operational performance refers to efficiency improvements and cost reduction along the supply chain. A sustainable supply chain should lower costs and increase efficiency without compromising environmental or social outcomes (Pagell & Shevchenko, 2014). It is often linked to lower production costs and reduced expenses related to materials, energy use, and waste disposal (Esfahbodi et al., 2016; Zhu et al., 2008). Market performance reflects a firm's competitiveness relative to rivals and can be assessed through indicators such as market share growth and revenue growth (Hervani et al., 2005; Rao et al., 2009). Financial performance is typically captured by accounting-based measures including profitability, return on investment, sales growth, and return on sales (ROS) (Richard et al., 2009). Table 2.4 summarizes the key subconstructs of sustainability performance.

Table 2.4 Subconstructs for sustainability performance

Construct	Definition	Related literature
Environmental performance	Outcomes related to resource efficiency and pollution control.	Zhu and Sarkis (2004)
Pollution control	Reduction of environmental pollution and emissions.	Zailani et al. (2012), Green et al. (2012)
Resource efficiency	Efficient use of materials, energy, and waste reduction.	Jacobs et al. (2010)
Social performance	Outcomes related to employee and community well-being.	Wood (1991), Das (2018), Yang (2013)
Employee-oriented outcomes	Human rights protection, equity, and employee well-being.	Székely and Knirsch (2005), Mani, Agarwal, et al. (2016), Qorri et al. (2021)

Community-centred social performance	Improvements in community development and social welfare.	Carroll (1979); Wood (1991), Mani, Gunasekaran, et al. (2016)
Economic performance	Outcomes related to financial, market, and operational performance.	Das (2018), Pagell and Shevchenko (2014)
Operational Performance	Cost efficiency, quality, delivery reliability, flexibility, and resilience.	Zhu et al. (2008), Esfahbodi et al. (2016), Štreimikienė et al. (2025)
Market Performance	Market-oriented outcomes such as sales growth and market expansion.	Rao et al. (2009), Hervani et al. (2005)
Financial performance	Profitability-related outcomes.	Richard et al. (2009)

2.1.6.2 SSCM practices and enterprise performance

Prior research has explored the relationship between the adoption of SSCM practices and organizational performance outcomes. Empirical studies indicate that SSCM practices are associated with improvements in firm performance, including environmental, operational, and economic outcomes (Green et al., 2012; Vachon & Klassen, 2006; Zailani et al., 2012). The specific effects of SSCM practices on economic and environmental performance have received comparatively less systematic attention (Zhu et al., 2007).

An alternative view is offered by Bowen et al. (2001), who suggest that sustainability practices may not generate immediate gains in profitability or sales performance because of the substantial upfront investments they require. Nevertheless, such practices can contribute to superior long-term performance by strengthening firms' capabilities for managing environmental risks and fostering continuous environmental and social improvement (Zhu & Sarkis, 2004) . Overall, empirical findings on the relationship between SSCM practices and sustainability performance remain inconsistent, and the explanatory power of SSCM practices regarding long-term performance mechanisms remains limited. This indicates the need for further empirical research to clarify these relationships.

2.1.7 Capabilities in SSCM

Gold et al. (2010) argue that, in order to respond to stakeholder demands and the challenges of sustainable development, firms and their supply chains need to develop and deploy specific organizational capabilities. From a traditional perspective, capabilities are often viewed as relatively stable once established and difficult for competitors to replicate over extended periods, thereby supporting sustained competitiveness (Helfat & Peteraf, 2003).

However, both ROT and the Dynamic Capabilities View (DCV) emphasize that firms should not rely solely on individual resources or static capabilities. Instead, they must enhance

their ability to respond to external changes by strategically integrating, coordinating, and reconfiguring resources in dynamic environments (Helfat & Peteraf, 2003; Sirmon et al., 2011). Only when supply chains develop new or renewed capabilities can they meet evolving market demands and improve long-term sustainability performance (Hong et al., 2018), providing a robust theoretical foundation for analyzing SSCM in dynamic contexts (Defee & Fugate, 2010).

2.1.7.1 Supply chain capabilities

Supply chain capability describes a firm's capacity to collaborate with supply chain partners in ways that improve information visibility, real-time responsiveness, and overall operational effectiveness throughout the supply chain (Ning & Yao, 2023). Within SSCM, achieving sustained performance outcomes requires firms to develop both foundational capabilities and dynamic capabilities in parallel, enabling them to adapt to changing conditions over the long term (Beske, 2012; Hong et al., 2018).

Supply chain foundational capabilities describe the organizational and managerial abilities that enable firms to strategically integrate and coordinate supply chain activities, ensuring operational efficiency and superior customer value. Prior research identifies several key dimensions of such capabilities. Supply chain reliability and risk-control capabilities emphasize robust quality management and proactive risk mitigation (Morash et al., 1996; Scholten & Schilder, 2015). Supply chain collaboration and information-sharing capabilities stress cross-organizational communication, joint planning, and shared decision-making to enhance responsiveness and efficiency (Cao & Zhang, 2011; Scholten & Schilder, 2015). Supply chain visibility capabilities improve monitoring accuracy and decision quality through transparent processes and real-time information flows (Ivanov, 2021). Supply chain cost-efficiency capabilities highlight the use of advanced managerial methods and technologies to continuously reduce costs, achieve economies of scale, and sustain competitive advantage (Ketchen & Hult, 2007; Morash et al., 1996).

Building on dynamic capabilities theory, scholars have conceptualized Dynamic Supply Chain Capabilities (DSCCs) as capabilities that enable supply chains to sense changes, learn, integrate knowledge, and reconfigure resources. Defee and Fugate (2010) further emphasize that DSCCs are distributed across multiple supply chain members rather than residing solely within a focal firm, facilitating the renewal of operational capabilities throughout the supply chain. More recent studies highlight that dynamic capabilities are essential micro-foundations of supply chain resilience and responsiveness (Leinonen et al., 2023). From a dynamic capabilities perspective, a firm's capability is fundamentally reflected in its ability to integrate,

reconfigure, and renew internal and external resources and competences (Hong et al., 2018).

Overall, foundational capabilities constitute the structural basis upon which dynamic capabilities are developed, while dynamic capabilities—through processes of sensing, learning, integration, and reconfiguration—further reinforce and reshape foundational capabilities. This forms a hierarchical progression of "foundational capabilities → dynamic capabilities → performance" (Hong et al., 2018).

2.1.7.2 Dynamic capabilities in SSCM

Research on dynamic capabilities in the context of SSCM remains relatively limited (Hong et al., 2018). Beske (2012) was among the earliest to apply the dynamic capabilities perspective to sustainable supply chains, emphasizing that supply chains function as complex systems that must manage internal interdependencies while adapting to changing environmental conditions. Among the existing contributions, the framework proposed by Beske (2012) is one of the most comprehensive and provides the analytical foundation for this thesis. This framework distinguishes five interrelated sub-capabilities: supply chain re-conceptualization, knowledge management, co-evolution, reflexive supply chain control, and supply chain partner development, which are summarized in Table 2.5. Rather than operating independently, these sub-capabilities jointly contribute to firms' competitive advantage through their synergistic interaction (Beske et al., 2014).

Table 2.5 The dynamic capabilities in the SSCM context

Construct	Definition	Related literature
Supply Chain Re-Conceptualization	Reframing supply chain boundaries by incorporating new and non-traditional actors to enhance adaptability and sustainability.	Pagell and Wu (2009), Siddiqi et al. (2025)
Partner Development	Strengthening partners' capabilities and performance to support competitiveness beyond the focal firm.	Seuring and Müller (2008), Siems et al. (2021)
Knowledge Management	Sharing, acquiring, and integrating knowledge across supply chain partners to improve collective understanding and learning.	Grant (1996), Defee and Fugate (2010), Hult et al. (2007)
Co-Evolving	Sharing, acquiring, and integrating knowledge across supply chain partners to improve collective understanding and learning.	Eisenhardt and Martin (2000), Pagell and Wu (2009), Defee and Fugate (2010)
Reflexive Control	Continuously assessing supply chain functionality and information to maintain adaptability under changing conditions.	Dewi et al. (2023), Siems et al. (2021), Seuring (2006)

Source: Beske et al. (2014)

(1) Supply Chain Re-Conceptualization

In dynamic environments, actors that were previously peripheral to supply chain operations may become increasingly relevant (Beske, 2012). Accordingly, the supply chain may integrate

partners not traditionally involved in operational activities, such as NGOs or local community organizations (Pagell & Wu, 2009).

(2) Partner Development

Developing supply chain partners is critical for sustaining competitiveness, as reliance on the capabilities of a single firm alone is inadequate in dynamic supply chain environments (Beske, 2012). Accordingly, partner development represents an ongoing process, although the intensity of investment required may differ across partners over time (Seuring & Müller, 2008). Well-designed partner development processes can also lower the risk of sustainability-related misconduct among suppliers (Siems et al., 2021).

(3) Knowledge Management

Knowledge management refers to firms' capacity to access, interpret, and acquire knowledge from supply chain partners (Beske, 2012). This capability encompasses activities related to sourcing new information and assessing existing knowledge within inter-organizational relationships (Defee & Fugate, 2010). Under conditions of market dynamism, knowledge inputs play a vital role in sustaining competitive advantage (Grant, 1996). When future environmental turbulence is difficult to anticipate, continuous knowledge development becomes a key success factor for firms (Hult et al., 2007).

(4) Co-Evolving

Through this capability, managers can acquire new competencies by reconnecting and strengthening webs of collaboration across different parts of the supply chain (Eisenhardt & Martin, 2000). This ability supports the creation of new and synergistic resource combinations across enterprises, as well as the renewal of operational capabilities (Defee & Fugate, 2010; Pagell & Wu, 2009).

(5) Reflexive Control

Management control refers to the process through which managers influence organizational members to implement the firm's strategies (Anthony et al., 2007). Accordingly, reflexive control involves continuously monitoring the operational status of the supply chain in dynamic environments, maintaining its adaptability, and constructively challenging partners' decisions when necessary (Seuring, 2006). It emphasizes the systematic collection and evaluation of supply chain performance information to assess whether the supply chain meets current operational requirements (Siems et al., 2021). Empirical evidence further shows that reflexive control has a positive effect on sustainable product–service capabilities (Dewi et al., 2023).

2.1.7.3 Relationship within SSCM practices, capabilities, and performance

Prior research has explored how SSCM practices shape dynamic capabilities and how these capabilities, in turn, relate to sustainable supply chain performance. Existing evidence suggests that the effect of SSCM practices on firm performance is largely indirect, operating through the development and strengthening of dynamic capabilities. Through supply chain collaboration, risk management, and proactive initiatives, firms foster the development of dynamic capabilities (Hall & Matos, 2010), which subsequently improves performance and enhances industry competitiveness (Griffith et al., 2006; Menguc & Barker, 2005). Siddiqi et al. (2025) conceptualize dynamic capabilities in the SSCM context as transformation mechanisms that convert SSCM practices into eco-innovation and environmental performance. Based on empirical evidence from Chinese manufacturing firms, Hong et al. (2018) find that SSCM practices enhance dynamic capabilities, which in turn mediate the relationship between SSCM practices and firm performance, with particularly strong effects on environmental performance.

These studies reinforce the importance of capabilities as a mediating mechanism within SSCM systems (Beske, 2012; Beske & Seuring, 2014). Within this "practices–capabilities–performance" logic, capabilities serve not only as a transmission channel but also as an amplifying mechanism linking practices to performance outcomes.

2.1.8 Determinants of supply chain capabilities

Despite strong pressure from customers and regulatory bodies, senior management often hesitates to integrate sustainability into core business operations, resulting in a low level of SSCM adoption. This reluctance is commonly attributed to unclear sustainability requirements, limited trust among supply chain partners, inadequate supply chain visibility, and insufficient professional expertise (Walker et al., 2008). Therefore, to accelerate and deepen the implementation of SSCM, research must systematically examine the factors influencing SSCM across multiple dimensions (Khan et al., 2021).

Although scholarly interest in the influence of digital technologies and financial services within sustainable supply chains is increasing, existing research remains insufficient. Prior studies have primarily examined how digital technologies strengthen foundational supply chain capabilities such as agility, collaboration, visibility, innovation, and risk management (Eslami et al., 2021; Ning & Yao, 2023). In contrast, systematic evidence remains scarce regarding how digital technologies and financial services influence dynamic supply chain capabilities across different industry contexts.

2.1.8.1 Digital technology factor

Prior research highlights inter-firm collaboration and systemic coordination as core features of SSCM (Carter & Rogers, 2008; Seuring & Müller, 2008). Digital technologies enable these features by improving coordination and information integration across supply chain partners (Stroumpoulis & Kopanaki, 2022).

Among such technologies, blockchain has gained particular attention. By enhancing transparency and data reliability, blockchain supports credible information provision and allows consumers to verify environmentally friendly production and delivery processes (De Giovanni, 2019; Romagnoli et al., 2023; Saberi et al., 2019). Another key technology is the Internet of Things (IoT), which connects devices to collect and transmit data across multiple suppliers and stakeholders within the same value chain (Bansal & Kumar, 2020; Xu et al., 2011).

Evidence suggests that digital technologies strengthen foundational supply chain capabilities, especially reliability, collaboration, cost efficiency, and visibility. Real-time analytics and blockchain systems improve firms' ability to detect and respond to risks, reinforcing supply chain reliability and risk management (Ivanov, 2021). Digital tools also facilitate collaboration and information sharing, reduce information asymmetry, and support joint decision-making (Romagnoli et al., 2023). Smart devices and ERP systems improve resource allocation and production processes, while enhanced transparency and real-time visibility enable faster adaptation and more effective managerial decisions, particularly in food and beverage supply chains facing evolving consumer demands and regulatory requirements (Ivanov, 2021; Kittipanya-Ngam & Tan, 2020; Richter & Hanf, 2021).

M. Sharma et al. (2021) note that new technologies can advance SSCM by improving financial performance and generating environmental and social benefits. However, three conditions shape implementation. First, digitalization requires a holistic supply chain perspective, as benefits depend on coordinated alignment across partners, including shared standards and consistent implementation (Birkel & Müller, 2021). Second, digital technologies alone rarely create competitive advantage because they are accessible; performance gains arise when they are combined with sustainability-oriented practices (Stroumpoulis & Kopanaki, 2022). Third, digital investments must be transformed into dynamic capabilities that enable resource reconfiguration and deployment (Teece et al., 1997; K. S. Warner & Wäger, 2019).

2.1.8.2 Financial service factor

Financial constraints are frequently identified as a major barrier to adopting sustainable practices, and limited financial support from buyers can restrict suppliers' participation in

sustainability initiatives (Akbar & Ahsan, 2021). SCF seeks to align financial flows with product and information flows to improve firm performance while reducing financial risks (Caniato et al., 2016; Hofmann, 2009). SCF typically involves buyers, suppliers, financial institutions, and technology providers, with newer actors such as fintech firms and information service companies increasingly joining SCF ecosystems (Caniato et al., 2019; Chen et al., 2021; Pfohl & Gomm, 2009).

To capture sustainability-oriented extensions of SCF, Tseng et al. (2018) introduce Sustainable Supply Chain Finance (SSCF), which is commonly defined as financial instruments and practices that facilitate trade while reducing environmental and social impacts and creating economic, environmental, and social value for supply chain stakeholders (F. Jia et al., 2020). Recent reviews highlight growing interest in integrating SCF with SSCM, showing that SSCF can support sustainable supply chain practices by providing incentives and resources for suppliers to improve sustainability performance (F. Jia et al., 2020; Medina et al., 2023; Tseng et al., 2021). In practice, buyers often collaborate with financial institutions to offer preferential financing or technical support to suppliers engaged in SSCM initiatives (Bal & Pawlicka, 2021)..

Existing studies further suggest that SCF strengthens foundational supply chain capabilities such as reliability, risk management, collaboration, and information sharing. For instance, reverse factoring can improve efficiency and support sustainable development among suppliers and retailers (Zhou et al., 2018). SCF also promotes supply chain integration and facilitates more efficient material and information flows, while risk-sharing and stable cash flows enhance financial resilience (Chen et al., 2017; F. Jia et al., 2020; Silvestre, 2015). When combined with digital technologies, SCF can ease financial pressure on SMEs, reinforce long-term buyer–supplier relationships, and improve the security and transparency of financial flows (Zhou et al., 2018). Evidence from real-world cases has further stimulated interest in linking sustainability with SCF (Gong et al., 2018; Zhan et al., 2018).

2.2 SSCM of liquor industry in the emerging economy

2.2.1 SSCM in emerging economies

The growing significance of emerging economies in supply chains, driven by the globalization of markets and operations, has attracted significant attention from both business and research communities (Rajeev et al., 2017). In the literature, the terms “emerging” and “developing” economies are used interchangeably, reflecting the absence of a universally accepted definition

of what constitutes an emerging economy (Roztocki & Weistroffer, 2011). Compared with developed countries, these economies are typically distinguished by their stage of development (Tang, 2018). Accordingly, studies on SSCM in such contexts often use the terms “emerging” and “developing” economies interchangeably when examining practices, capabilities, and performance outcomes (Sánchez-Flores et al., 2020).

According to Brandenburg et al. (2014), developing Asian countries emphasize environmental sustainability because these economies are major targets for low-cost manufacturing and outsourcing due to their cheap labor and lax environmental regulations. To remain competitive globally and meet the standards of industrialized nations, developing Asian countries are adopting green and sustainable practices (Luthra et al., 2020).

Since 2010, the volume of research on sustainable supply chains in emerging economies has increased steadily (Sánchez-Flores et al., 2020). Empirical approaches—particularly surveys and interviews—have been the most frequently adopted methods for investigating sustainable supply chains in developing-country contexts (Sánchez-Flores et al., 2020).

Research on SSCM in developing economies spans a wide range of industries. Approximately 39% of existing studies adopt a multisector perspective, while sector-specific research has focused primarily on fashion, textile, and apparel industries (11%), oil, gas, petrochemical, and power-related sectors (9%), automotive manufacturing (7%), and food industries (7%) (Sánchez-Flores et al., 2020). From a geographical perspective, India has received the greatest research attention among emerging economies (32%), followed by Brazil (14.3%), China (10.7%), and Bangladesh (8.9%) (Sánchez-Flores et al., 2020).

2.2.1.1 Drivers to SSCM in emerging economies

Research on the drivers of SSCM in emerging economies has attracted growing scholarly attention (F. Jia et al., 2018). Understanding these drivers is essential for advancing sustainability across supply chains (Moktadir et al., 2018).

Suppliers operating in developing-country contexts are typically influenced by three broad categories of drivers that motivate engagement in sustainable practices. First, normative drivers often originate from buyers and are reflected in procurement policies, supplier codes of conduct, and requirements to comply with international standards, such as ISO 14001. In some cases, buyers also demand adherence to specific industry standards, including third-party certifications (Trienekens & Zuurbier, 2008). Second, regulatory drivers arise from authorities in importing countries, which are frequently located in developed economies. For suppliers, stringent international regulations and the potential risk of trade barriers—such as sanctions

resulting from non-compliance—represent significant external pressures (Lo, 2010). Third, market-based drivers stem from competitive market environments and include firms' incentives to achieve cost reductions, market differentiation, and enhanced brand reputation, all of which contribute to competitive advantage (Park et al., 2010)

Achieving SSCM in emerging economies requires government assistance and top management leadership (F. Jia et al., 2019). Government regulations have piqued the interest of supply chain management in sustainability issues (Moktadir et al., 2018). Leadership is a reflection of the firm's values and the commitment of top management (Van Hoof & Thiell, 2015). J. Wu et al. (2018) examined factors affecting sustainable supply chains in 167 Beijing-based companies, finding that government involvement and internal management cognition directly impact SSCM practices, with internal management cognition having a particularly significant positive effect.

2.2.1.2 SSCM practices in emerging economies

Ovation in SSCM practices is widely regarded as essential for emerging economies. Empirical evidence indicates that innovation in both processes and products can enhance sustainability performance (Silva et al., 2019). When adopting Industry 4.0 technologies, advanced digital tools, and novel production methods, managers are required to integrate sustainability considerations into operational decision-making (Luthra & Mangla, 2018). In developing economies, collaboration with research and development (R&D) partners to support sustainability objectives and technological upgrading has become a key priority (Mangla et al., 2015). Recent studies also point to emerging research directions in this area, including collaboration among emerging economies, sourcing and supplier development (Sánchez-Flores et al., 2020). Overall, the adoption of sustainable supply chain practices are gaining momentum in emerging economies, although academic research on this topic remains at a relatively early stage (Sánchez-Flores et al., 2020).

2.2.1.3 SSCM performance in emerging economies

SSCM contributes to improvements in supply chain performance over time, particularly with respect to economic and social outcomes (J. Wu et al., 2018). Such benefits, however, are more likely to materialize over the long term rather than immediately (Sen, 2009).

With regard to environmental outcomes, several SSCM practices have been associated with positive environmental performance, including green logistics management, sustainable packaging, and green purchasing (Lai & Wong, 2012; Zailani et al., 2012) and green purchasing

(Zailani et al., 2012). In developing-country contexts, environmental investments are often motivated primarily by cost reduction objectives rather than environmental protection. Consequently, policymakers tend to emphasize economic cost–benefit considerations as a more effective means of encouraging SSCM adoption among firms that prioritize economic outcomes over environmental ones (F. Jia et al., 2018).

With respect to economic performance, firms in developing countries have increasingly incorporated sustainability considerations into business performance measurement systems (Prasad et al., 2016). Evidence suggests that the adoption of SSCM practices contributes to greater operational efficiency in areas such as warehousing, distribution, and logistics (Soda et al., 2015). In addition, multinational enterprises' codes of conduct can support firms in developing economies by improving operational quality and speed, which may subsequently translate into higher order volumes and revenue growth (Turker & Altuntas, 2014).

From a social performance perspective, Mani et al. (2018) examine supplier-related social issues and identify key dimensions of social sustainability in emerging economies. Their findings reveal a positive association between supply chain performance and the adoption of socially sustainable practices among suppliers.

2.2.1.4 Supply chain capabilities in emerging economies

The implementation of SSCM fosters organizational learning through the development of rare and valuable capabilities, which in turn supports innovation and performance improvement (Silvestre, 2015). By adopting SSCM practices, firms may outperform competitors in terms of environmental efficiency and social responsibility, thereby building additional organizational capabilities; for example, suppliers can be placed in a stronger position when negotiating with buyers (Gualandris et al., 2014; Huq & Stevenson, 2020).

More frequent interaction within collaborative relationships with suppliers further promotes organizational learning about the broader business context, including legal, political, and social dimensions. Such learning enhances firms' capacity to manage partner relationships and contributes to the development of higher levels of trust (Van Hoof & Thiell, 2015).

2.2.1.5 Research gap of SSCM in emerging economies

Scholarly attention to SSCM in emerging economies has developed later than the initial body of SSCM research (Sánchez-Flores et al., 2020). As many supply chain participants still lack sufficient familiarity with sustainable supply chains, further research is needed to examine additional dimensions of SSCM within developing-economy contexts (Nayak et al., 2019;

Rajeev et al., 2017).

The issue of environmental sustainability is increasingly prominent in supply chain operations in emerging economies due to the use of natural resources, the labor-intensive activities, and the logistics required to deliver manufactured goods (Jakhar et al., 2018; Martín-Gómez et al., 2019). However, a lack of empirical research has hindered our understanding of how adopting SSCM affects manufacturing enterprises' performance in emerging economies (Jayaram & Avittathur, 2015).

Social issues are frequently encountered in the manufacturing industry of emerging economies (Fernando et al., 2022). Sustainability was given less attention in the rush for effectiveness, performance, and competitiveness, leaving the human factor behind (Satyro et al., 2022).An increase in labor disputes, safety concerns, and other societal problems has been verified (Y. Liu et al., 2019). Product-related injury incidents can undermine firms' credibility, reputation, and public image (Pangarkar et al., 2022). Despite their significance, these issues remain underexplored in existing studies (Govindan et al., 2021).

2.2.2 SSCM in alcoholic beverages industry

To better understand the applicability of SSCM research, it is essential to categorize and analyze studies across different industrial sectors. As sustainable practices that are significant for one industry may not necessarily be equally influential for another.

Ansari and Kant (2017) conducted a systematics literature review of 286 publications published over fifteen years (2002-2016) in various journals. Their publications sample indicates that SSCM research is broad and not restricted to a few influential industries, making it applicable to multiple sectors, including mining, retail, energy, logistics, and more. However, there were only two research publications on SSCM in the alcoholic beverage industry within their 2002–2016 sample.

The concept of "alcoholic beverages," as adopted in this thesis, follows the definition proposed by Cavanagh and Clairmonte (2023). Fundamentally, all alcoholic beverages are produced through fermentation processes, particularly alcoholic fermentation, in which sugars are transformed into ethanol along with other minor by-products (Buglass, 2011). To develop a comprehensive understanding of SSCM within the alcoholic beverages sector, this study draws on SSCM literature related to Baijiu, liquor, wine, beverages, and soft drinks. These subsectors are emphasized primarily because of their substantial water consumption within the food and beverage industry. Water plays a critical role in industrial processing, both as a raw

input and as an essential resource in the production of goods and services (Morrison et al., 2009).

To find the related literature, the author utilized the Web of Science (WOS) database. The author combined the keywords "Sustainability," "Sustainable supply chain," and "Green supply chain" with "alcoholic beverages," "Baijiu," "Liquor," "Wine," "Beverage," and "Soft drink" in various combinations in the WOS database. Only English-language publications were analyzed, with no time limit on the publication date, and excluding working papers, technical reports, and book chapters. Articles that did not address management issues and business economics research areas were eliminated through abstract analysis. The number of articles obtained from different keyword combinations is presented in Table 2.6.

Table 2.6 The analysis about quantities of papers according to database from WOS.

Keywords		Baijiu	Liquor	Wine	Beverage	Soft drink
D1	Sustainable Supply Chain	1	0	4	2	0
D2	Green Supply Chain	0	0	1	0	0
D3	Sustainability	1	0	78	17	4

A review of the existing literature indicates that sustainability supply chain-related research in the alcoholic beverages industry remains very limited. By contrast, sustainability studies in the wine sector are comparatively more developed, offering useful implications for extending SSCM research to the broader alcoholic beverages industry.

2.2.2.1 Drivers of SSCM in alcoholic beverages industry

The alcohol sector faces numerous socio-environmental problems (Ene et al., 2013). In the wine industry, producers are required to address sustainability issues associated with greenhouse gas emissions and the intensive use of water, land, pesticides, and energy (Christ & Burritt, 2013). The high level of competition in the international wine market, coupled with the increasing awareness of consumers and policymakers regarding sustainability challenges in wine production, underscores the growing need to address these socio-environmental issues (Fiore et al., 2017). Accordingly, further research on alcoholic beverages supply chains is needed to improve understanding of how sustainable practices are adopted and evaluated in this context (Santini et al., 2013).

2.2.2.2 SSCM practices in alcoholic beverages industry

Based on a study of the wine industry, supply chain management practices can address sustainability effectively (Varsei & Polyakovskiy, 2017). Many major wine-producing nations have adopted sustainable practices, helping to anticipate regulation and address social and environmental issues (Pullman et al., 2010; Szolnoki, 2013). Prior research has classified sustainability practices in the wine industry into managerial domains, including supply chain

management, marketing, operations, and innovation management (De Steur et al., 2020). Among these domains, environmental management systems (EMS) have received attention in studies of sustainability practices within the alcoholic beverages sector (R. S. Marshall et al., 2010). Environmental practices include external factors such as water footprint (Ene et al., 2013), water recycling and reuse (Alkaya & Demirer, 2015), carbon footprint (E. Y. Wong et al., 2022), carbon intensity (Cholette & Venkat, 2009), and environmental impact (De Feo et al., 2022). Additionally, there are internal elements such as eco-design (Licciardello et al., 2015), industrial symbiosis (C. W. Hsu & Lin, 2016), reduction of herbicides and pesticides (Pullman et al., 2010), recycling and reuse of packaging (Romero-Hernández et al., 2009), and the use of renewable energy (Szolnoki, 2013). Sustainability projects, despite their higher economic costs, are essential sources of competitive advantage (Atkin et al., 2012; Pomarici et al., 2015).

2.2.2.3 SSCM performance in alcoholic beverages industry

SSCM in the alcoholic beverages industry pursues multiple objectives across economic, environmental, and social dimensions. Evidence from a case study of the wine industry in southern Portugal illustrates this multidimensional orientation (Fragoso & Figueira, 2021). From an economic perspective, wineries primarily aim to increase profits and revenues while reducing supply chain–related costs. Environmental objectives focus on lowering greenhouse gas emissions and water consumption in wineries and vineyards. Social objectives emphasize employment generation as well as the scale of supplier and facility networks within the industry (Fragoso & Figueira, 2021).

Similarly, Jiang, Mu, et al. (2020) identified 15 criteria after studying the Baijiu supply chain's performance assessment from a sustainable perspective. The top three criteria are quality, financial performance, and reliability. Jiang, Chen, et al. (2020) developed a sustainable index based on economic, environmental, and social factors and applied the methodology to a liquor company in China. The empirical case study revealed that the economic dimension was the most significant, followed by the environmental and social dimensions (Jiang, Chen, et al., 2020; Jiang, Mu, et al., 2020). This may result from the fact that many small-scale or family-owned distilleries frequently lack funding (Szolnoki, 2013).

There is a strong correlation between environmental sustainability and economic performance in the alcohol business. This may result from the fact that grapes, sorghum, wheat, and other crops are used as raw materials for alcoholic drinks, the agricultural environment directly impacts the quality of these beverages, which further affects the economic performance

of the firms. K. D. Warner (2007) illustrates that winegrape growers commonly define sustainability in operational terms, encompassing the long-term viability of agricultural enterprises, environmental quality, and product quality. Consistent with this view, firms with higher environmental performance rankings in the U.S. alcoholic beverages supply chain tend to achieve superior financial performance compared with lower-ranked counterpart (Jackson & Singh, 2015).

The research on sustainable performance in the alcoholic beverage sector is limited, especially from a social perspective. According to TBL theory, this is inconsistent with the core concept of sustainability. Future SSCM research in the alcoholic beverage industry requires an integrated perspective. Bui et al. (2022) further emphasize the role of ethics in achieving improved sustainable performance, underscoring the need to address this dimension alongside the traditional TBL framework.

2.2.2.4 Capabilities of alcoholic beverages enterprises

Drawing on Helfat and Peteraf (2003), the alcoholic beverages sector can be characterized as a dynamic business environment in which firms develop specific organizational capabilities to accomplish defined tasks through the effective use of organizational resources. Firms with a sustainability orientation therefore need to identify and cultivate internally embedded capabilities in order to sustain competitive advantage in markets that are increasingly shaped by sustainability concerns, including the alcoholic beverages industry (Annunziata et al., 2018).

From a dynamic resource-based perspective, Annunziata et al. (2018) report findings from a survey of 357 Italian wine firms, showing that organizational capabilities related to collaboration with partners and suppliers, the adoption of advanced technologies, and product innovation play an important role in the implementation of proactive socio-environmental practices and associated economic performance.

2.2.2.5 Research gap of SSCM in alcoholic beverages industry

Existing studies suggest that sustainability-related research in the alcoholic beverages industry remains limited relative to the sector’s substantial importance within food and beverage production (Costa et al., 2022). This imbalance is even more pronounced in emerging economies, where SSCM-related research on the alcoholic beverages industry is considerably scarcer than in developed countries, reflecting the broader regional distribution patterns observed in SSCM scholarship overall (Santini et al., 2013). Likewise, only a small number of studies have addressed sustainability practices and performance within the alcoholic beverages

industry (Barbosa et al., 2018; Bui et al., 2022).

2.3 Theoretical frameworks

2.3.1 Dynamic Resource-Based View & Dynamic Capabilities View

The Dynamic RBV brings together insights from the traditional Resource-Based View (RBV) and the DCV to explain how resources and capabilities evolve over time and how competitive advantage is sustained through this evolutionary process (Helfat & Peteraf, 2003).

The RBV, originally introduced by Wernerfelt (1984), posits that firm performance is fundamentally shaped by the resources a firm owns and controls. Sustained competitive advantage arises when these resources are valuable, rare, inimitable, and non-substitutable (Barney, 1991). This advantage is grounded in resource heterogeneity, referring to the unique and diverse resource bundles held by firms (Helfat & Peteraf, 2003).

Nevertheless, the traditional RBV provides only a partial explanation of competitive advantage because it does not sufficiently capture the dynamic nature of resources and capabilities (Barney et al., 2021). As market and technological conditions evolve, firms must adapt their resource bases accordingly. Dynamic RBV extends the RBV by emphasizing that firm development depends not only on existing resource endowments but also on the ongoing reconfiguration of those resources (Barney et al., 2021; Helfat & Peteraf, 2003). This perspective highlights the continuous assessment of resource fit and firms' responses to external challenges through activities such as resource acquisition, accumulation, and divestment (Helfat & Peteraf, 2003).

Building on this logic, the DCV further strengthens the theoretical foundation of Dynamic RBV. Dynamic capabilities are commonly defined as firms' abilities to integrate, build internal and external resources in response to changing environments (Eisenhardt & Martin, 2000; Teece et al., 1997). Rather than focusing solely on resource selection or accumulation, dynamic capabilities stress the renewal, transformation, and redeployment of resources, with particular emphasis on how firms rapidly reconfigure both internal and external resource bases to sustain long-term competitive advantage (Hitt et al., 2016).

Table 2.7 provides an overview of the tangible, intangible, and capability-based resources that shape firms' competitive advantages.

Table 2.7 Resource portfolio

Embodiment	Conceptual focus	Construct	Linking to business realities
Tangible resources	Observable, financially measurable assets recorded on firms' balance sheets (Galbreath, 2005).	Financial assets (Grant, 1991)	cash, accounts receivable, short-term borrowings
		Physical assets (Grant, 1991)	fixed assets, raw materials, inventory
Intangible resources	Non-physical assets that support value creation and future economic benefits (Galbreath, 2005).	Intellectual property (Diefenbach, 2006)	company name and logo, trademarks, drawings, formulas, software, copyrights, patents (Diefenbach, 2006)
		Organizational capital (Fernández et al., 2000)	norms and guidelines, databases, organizational routines, corporate culture, strategic alliances (Fernández et al., 2000)
		Relational assets (Fernández et al., 2000)	reputation, brands, customer loyalty, long-term customer relationships, distribution channels (Fernández et al., 2000)
Capability-based	Capabilities that enable firms to formulate and implement value-creating strategies (Galbreath, 2005).	Skills and capabilities (Amit & Schoemaker, 1993)	service reliability, process and product innovation, manufacturing flexibility, market responsiveness, short product development cycles (Amit & Schoemaker, 1993)

Source: Grant (1991); Galbreath (2005); Fernández et al. (2000); Amit and Schoemaker (1993)

2.3.2 Resource Orchestration Theory

ROT is widely recognized as a useful lens for explaining how firms integrate, configure, and leverage resources to achieve competitive advantage in dynamic environments (Hitt et al., 2016). Building on the RBV and the DCV, ROT incorporates insights from resource management and asset orchestration, emphasizing managers' proactive and coordinating roles in resource-related activities (Helfat et al., 2009; Sirmon et al., 2007). Chadwick et al. (2015) further describe ROT as an integration of resources, capabilities, and managerial judgment that enables firms to pursue strategic objectives through dynamic resource management.

Although RBV highlights the importance of valuable, rare, inimitable, and non-substitutable resources (Barney, 1991), it provides limited explanation of how such resources are dynamically configured and leveraged. ROT argues that competitive advantage depends not only on resource possession but also on managers' actions to orchestrate resources (Hitt, 2011; Sirmon et al., 2011). Accordingly, Sirmon et al. (2007) conceptualize resource management as a cycle of **structuring**, **bundling**, and **leveraging**, which supports resource optimization and capability development in complex environments (Chen et al., 2021; Helfat & Peteraf, 2003).

2.3.2.1 Resource structuring

Within the ROT framework, **resource structuring** refers to the formation and adjustment of a firm's resource portfolio, providing the foundation for subsequent capability development and value creation (Sirmon et al., 2007). It involves **acquiring**, **accumulating**, and **divesting resources** to ensure alignment with external environmental conditions and strategic objectives, enabling flexible adaptation under turbulence (Sirmon et al., 2007; Sirmon et al., 2011).

Acquiring emphasizes identifying and obtaining external resources, which is essential for competitive advantage (Chadwick et al., 2015; Sirmon et al., 2007). In SSCM contexts, sustainability-related resources are acquired through green purchasing, sustainable partner selection, cleaner production technologies, and environmentally friendly packaging (Handfield et al., 2005; Seuring & Müller, 2008; Zailani et al., 2012). Long-term strategic alliances and stable partner networks secure access to raw materials, technologies, and market resources, reducing uncertainty and strengthening supply chain resilience (Pagell & Wu, 2009).

Accumulating refers to strengthening and integrating existing resources over time to support sustained advantage (Sirmon et al., 2007; Sirmon et al., 2011). Firms accumulate technological and knowledge-based resources via cleaner production, energy-saving and emission-reduction initiatives (Klassen & Whybark, 1999; Zhu & Sarkis, 2004), while collaboration platforms and information-sharing mechanisms build data and knowledge resources that enhance transparency and decision-making efficiency (Seuring & Müller, 2008; Vachon & Klassen, 2008). These accumulated resources gradually embed into routines and dynamic capabilities, supporting sustainable development (Beske et al., 2014).

Divesting involves deliberately removing non-core, low-value, or environmentally and socially risky resources (Sirmon et al., 2011). In sustainable supply chains, tools such as LCA and risk-oriented SSCM approaches help identify high-impact materials or processes and support divestment, thereby reducing risks and strengthening the long-term viability of the resource base (Beske & Seuring, 2014; Matos & Hall, 2007; Seuring & Müller, 2008).

2.3.2.2 Resource bundling

Within the ROT framework, resource bundling refers to the formation of organizational capabilities through the integration of dispersed resources into more coherent configurations. Capability formation unfolds along three distinct pathways—stabilizing, enriching, and pioneering—which together convert resource inputs into higher-order capabilities (Sirmon et al., 2007; Sirmon et al., 2011).

Stabilizing focuses on the incremental refinement of existing capabilities through

improvements in organizational processes and systems, thereby enhancing their consistency, replicability, and reliability (Sirmon et al., 2011). This pathway primarily contributes to greater efficiency and robustness in firms' operational routines. Enriching involves broadening the scope of existing capabilities by integrating them with new or complementary resources. Such integration may occur through cross-functional collaboration, joint development initiatives, and knowledge-sharing activities, which support the expansion and deepening of sustainability-oriented capabilities (Beske et al., 2014). Pioneering refers to the creation of fundamentally new capabilities through innovation. By enabling firms to overcome path dependence and reconfigure their resource bases, this pathway supports strategic transformation in dynamic environments (Sirmon et al., 2011). As a result, pioneering plays a critical role in the emergence of novel sustainability-oriented practices and technologies.

In sustainable supply chain contexts, resource bundling is frequently expressed through the integration of firms' internal resources with those of supply chain partners. This integration facilitates technological innovation, improves managerial processes, and supports the development of sustainability-related capabilities, thereby giving rise to collaborative capabilities that underpin long-term SSCM performance (Beske, 2012; Gold et al., 2010).

2.3.2.3 Resource leveraging

Resource leveraging represents the final stage of ROT and focuses on how firms mobilize, coordinate, and deploy resources and capabilities to create value and achieve superior performance (Sirmon et al., 2008; Sirmon et al., 2007; Sirmon et al., 2011). From a ROT perspective, sustainable competitive advantage depends not on resource possession alone, but on firms' ability to continuously configure and optimize resources so they operate synergistically in dynamic environments (Hitt et al., 2016).

In supply chain contexts, resource leveraging involves mobilizing internal and external resources and coordinating stakeholder behaviors. These efforts can reduce environmental impacts, lower operational costs, and improve financial outcomes, thereby supporting integrated value creation across economic, environmental, and social dimensions (Asante et al., 2022; Gong et al., 2018; C. W. Wong et al., 2018). Resource leveraging comprises three subprocesses: mobilizing, coordinating, and deploying (Sirmon et al., 2008). Mobilizing refers to selecting capabilities required for competitive advantage and aligning them with market conditions (Ndofor et al., 2011). Coordinating organizes and integrates capabilities through management routines and process optimization to form coherent capability structures while reducing redundancy (Sirmon et al., 2011). Deploying emphasizes applying capabilities to

strategic initiatives to achieve sustainable performance (Chadwick et al., 2015).

These subprocesses are dynamically interconnected rather than independent; their alignment is critical for maintaining and enhancing resource value (Maritan & Peteraf, 2011). However, empirical research on resource leveraging within specific industries remains limited, and the mechanisms through which these subprocesses jointly create value have yet to be fully articulated (Chadwick et al., 2015; Hitt et al., 2016).

Table 2.8 summarizes the resource management structure proposed by Sirmon et al. (2007) and presents it alongside representative business practices.

Table 2.8 Resource orchestration processes

Components and Sub-processes		Core focus	Illustrative business practices
Structuring	Acquiring	Sourcing and accessing critical external resources required for strategic positioning.	Acquisition of commodity-like resources (e.g., equipment); acquisition of intangible resources (e.g., intellectual capital); mergers and acquisitions
	Accumulating	Strengthening and developing internal resource bases over time.	Development of tacit technical and managerial knowledge; building human capital pools; teamwork and collaboration; strategic alliances
	Divesting	Removing non-core or low-value resources to optimize the resource base.	Layoffs of human capital; divestitures of non-core businesses; asset sell-offs; spin-offs; outsourcing of functions
Bundling	Stabilizing	Incremental refinement of existing capabilities to enhance reliability and efficiency.	Employee training to maintain up-to-date knowledge and skills
	Enriching	Extending existing capabilities through combination with complementary resources.	Learning new skills; creating synergy among complementary resources via capability grafting
	Pioneering	Creation of new capabilities through experimentation and innovation.	Exploratory learning; integration of new resources with existing ones; fostering creativity and a broad knowledge base
Leveraging	Mobilizing	Identifying and configuring capabilities to exploit market opportunities.	Understanding market and customer needs; designing appropriate capability configurations
	Coordinating	Aligning and integrating mobilized capabilities to form effective configurations.	Knowledge sharing (explicit and tacit); investments in technology infrastructure; cross-functional teams coordination
	Deploying	Applying configured capabilities to strategic initiatives.	Codification of knowledge into organizational routines

Source: Sirmon et al. (2007)

It should be noted that, while retaining the original analytical framework of ROT, this study

further interprets the core attributes of the three processes—structuring, bundling, and leveraging—in light of its theoretical logic. Specifically, structuring corresponds to the formation and adjustment of the resource base and is therefore represented in this study primarily as resource structuring. The core of bundling lies in promoting capability formation through resource integration; accordingly, the subsequent discussion further highlights its capability-forming attribute. Leveraging, in turn, is reflected not only in the mobilization, coordination, and deployment of resources and capabilities, but also in the realization of value creation through these processes. On this basis, the subsequent discussion and conclusion further refine the process attributes of ROT, while retaining its basic analytical logic, in order to present its internal logic more clearly.

2.3.2.4 Dynamic feedback mechanisms in the resource orchestration process

Dynamic RBV posits that capability development is not a static or one-directional process but is accompanied by continuous dynamic feedback mechanisms (Helfat & Peteraf, 2003). When new capabilities are formed, firms reassess their resource needs and initiate a new round of resource structuring activities. This cyclical process indicates that capability development further reshapes the resource base (Helfat & Peteraf, 2003).

Meanwhile, resource leveraging is also not a static or linear process; instead, it unfolds through ongoing feedback and dynamic evolution (Helfat & Peteraf, 2003; Ketchen et al., 2014). During resource deployment, firms actively or passively identify new resource requirements and capability gaps (Ketchen et al., 2014; G. Li et al., 2022). Such feedback drives firms to re-enter the resource structuring stage, enabling re-optimization through acquiring, accumulating, or divesting resources (Helfat & Peteraf, 2003).

This feedback mechanism ensures the adaptability of resource management (Maritan & Peteraf, 2011; Ndofor et al., 2011) and reinforces the interconnections among the three stages of resource orchestration—structuring, bundling, and leveraging—transforming resource management into an ongoing system of dynamic optimization (Maritan & Peteraf, 2011; Ndofor et al., 2011). Existing research on resource orchestration feedback mechanisms remains largely conceptual, with limited examination of how these mechanisms operate in managerial practice (Chadwick et al., 2015; Maritan & Peteraf, 2011; Sirmon et al., 2011).

2.3.2.5 Application of ROT in SSCM

ROT explains how firms achieve dynamic resource management through the three stages of resource structuring, resource bundling, and resource leveraging, providing a systematic

framework for understanding resource configuration in dynamic environments. In recent years, ROT has been widely applied in research on SSCM. For example, C. Y. Wong et al. (2015) incorporated ROT into a green supply chain integration framework, demonstrating its applicability to environmental management research. Gong et al. (2018) extended ROT to the supply chain level, revealing how multinational enterprises coordinate internal and external resources to promote sustainable development. In highly regulated and resource-dependent industries, ROT helps explain how firms maintain competitive advantage and achieve green innovation under environmental uncertainty through dynamic resource structuring (Kumar et al., 2022). Asante et al. (2022) further emphasized that the successful implementation of sustainable supply chain strategies relies on the prioritization and coordinated execution of resource orchestration activities.

Empirical studies indicate that by orchestrating resources across suppliers, customers, and internal stakeholders, firms can achieve sustainable performance across economic, environmental, and social dimensions (C. W. Wong et al., 2018).

Although ROT has gained increasing attention at the theoretical level, empirical studies that examine its application within specific industry contexts and its role in sustainable supply chain value-creation processes remain relatively scarce (Asante et al., 2022; Chadwick et al., 2015; Gong et al., 2018; Hitt et al., 2016). On this basis, this study introduces ROT into the study of SSCM in Chinese baijiu enterprises, with a particular focus on how baijiu enterprises advance SSCM through resource structuring, capability bundling, and resource leveraging, and, drawing on the empirical findings in the subsequent discussion, further reveals the capability-forming attribute and value-realization orientation embedded in these processes.

2.3.3 Stakeholder theory

Stakeholder theory explains how firms engage with individuals and groups that influence, or are influenced by, organizational activities, and whose support is critical to organizational continuity and survival (Freeman, 2010; Freeman & Reed, 1983).

The stakeholder concept has been defined in multiple ways, ranging from broad and inclusive interpretations to more focused and pragmatic ones (Donaldson & Preston, 1995). Donaldson and Preston (1995) define stakeholders as individuals or groups with legitimate interests in both the procedural and substantive dimensions of corporate activity, making legitimacy a key criterion for stakeholder recognition.

Within sustainable supply chain contexts, Svensson et al. (2016) classify stakeholders into

internal and external groups. The framework identifies five categories: the focal firm (Pohlmann et al., 2020), upstream stakeholders (Busse et al., 2017), downstream stakeholders, societal stakeholders (Chkanikova, 2016), and market stakeholders (Martin et al., 2021). The first three are typically internal stakeholders, whereas the latter two are external. Siems et al. (2022) and Y. Li et al. (2024) further examine the composition of each stakeholder group. Table 2.9 summarizes these stakeholder categories together with representative business practices.

Table 2.9 Stakeholder dimension

Dimensions	Core focus	Linking to business realities
Upstream stakeholders	Enhancing sustainability improvement potential in upstream supply chain stages through participation in evaluation, monitoring, and capability development (Busse et al., 2017).	raw material producers (e.g. sorghum growers); suppliers (e.g. bottles and boxes); suppliers' suppliers (e.g. ceramic, glass, wrapping paper)
Focal company	Exercising leadership and coordination within the supply chain and exerting control over key decisions and activities (Pohlmann et al., 2020).	shareholders; top leadership (Board of Directors and Chairman); the executive board (CEO); managers (Departmental managers); employees
Downstream stakeholders	Influencing the market uptake of sustainability-certified products, with purchasing behavior constrained by consumer demand for sustainable alternatives (Chkanikova, 2016).	wholesalers; retailers; sales outlets; 3PL/third-party logistics
Market stakeholders	Shaping market requirements that products and services must address, thereby affecting firms' value creation approaches (Martin et al., 2021).	customers; end users; competitors; financial intermediaries (bank, financial company)
Societal stakeholders	Driving societal impact and social change, forming external expectations regarding firms' social responsibility and sustainability practices (Y. Li et al., 2024).	governmental; activist groups; industry associations; research institutes/universities; general public

Source: Siems et al. (2022)

2.3.3.1 The application of stakeholder theory in SSCM

Stakeholder theory is widely applied in the field of SSCM and highlights the critical role that stakeholders play in driving firms' sustainable strategies (Touboulic & Walker, 2015). Depending on their mode of engagement, stakeholders may assume different roles—such as drivers, facilitators, or inspectors—each exerting multi-level influence on the implementation of SSCM practices (Siems et al., 2022). Specifically, "drivers" initiate and lead sustainability agendas, "facilitators" provide support and assistance, and in supplier development contexts stakeholders may also act as "inspectors," strengthening their monitoring responsibilities over supply chain behaviors and performance (L. Liu et al., 2018).

Multiple stakeholder groups exert pressure on firms throughout the entire product life cycle, demanding improved ethical, social, and environmental performance (Aschehoug et al., 2012). .

Stakeholders not only hold firms accountable for their supply chain behaviors and outcomes (Parmigiani et al., 2011) but may also withdraw critical resources—directly or indirectly—if their expectations are not met (Frooman, 1999). Moreover, if external stakeholder concerns are neglected, firms may face reputational and operational risks (Silvestre, 2015). Given this dependence on stakeholder resources, firms typically strengthen stakeholder relationships to mitigate the risk of resource withdrawal (Wolf, 2014), and stakeholder pressures serve as a key driver for firms to adopt SSCM practices and develop innovative solutions to social and environmental challenges (Zhu & Sarkis, 2007). At the same time, supply chain stakeholders increasingly expect reliable information about production conditions (Pullman et al., 2009), requiring focal firms to enhance transparency on environmental and social issues across the supply chain to meet compliance and traceability requirements (New, 2010).

Drawing on stakeholder theory, firms are expected to generate value for a broad range of stakeholder groups rather than focusing solely on shareholders. This perspective requires managers to account for the expectations and interests of stakeholders who both influence, and are influenced by, organizational activities (Phillips et al., 2003; Sarkis et al., 2010). Stakeholder theory also encourages managers to reflect on two fundamental issues: the purpose of the firm and the ways in which it should engage in responsible management practices (Freeman et al., 2004). Addressing these issues helps clarify firms' value-creation logic and supports the development of relationships necessary to sustain it. Consequently, strong stakeholder integration capabilities are critical for focal firms to interpret stakeholder expectations and formulate appropriate responses (Harrison et al., 2010). Empirical research further demonstrates that enhanced stakeholder integration capabilities are associated with improved sustainability performance (Zhu & Sarkis, 2007).

Despite progress in integrating stakeholder theory into SSCM research, limited attention has been devoted to understanding how external stakeholders specifically influence the realization of sustainable supply chain performance (Parmigiani et al., 2011), indicating the need for further investigation.

2.3.3.2 Stakeholder roles in the resource orchestration process

Within the ROT framework, the successful implementation of resource leveraging strategies depends strongly on the active engagement and collaboration of both internal and external stakeholders (L. Liu et al., 2018; Touboulic et al., 2015). Through stakeholder involvement, resources and capabilities can be mobilized and extended across upstream and downstream supply chain actors, as well as throughout the broader industrial ecosystem. This expansion

facilitates the development of broader networks of collaboration and innovation, which in turn support improvements in economic, social, and environmental performance (Kumar et al., 2022; L. Liu et al., 2018).

During the subprocesses of resource leveraging, firms continually identify potential opportunities and constraints based on the salience and intensity of stakeholder demands, mobilizing resources toward areas that can generate the greatest marginal value (Siems et al., 2022; Touboulic & Walker, 2015). In the resource coordination stage, stakeholder roles have expanded from traditional functions of resource provision and strategic support to include monitoring and feedback. Through collaborative governance mechanisms, stakeholders engage in rule-setting, process optimization, and cross-organizational coordination, helping to reduce system complexity and uncertainty while improving the alignment and complementarity of resource elements (Touboulic & Walker, 2015). Stakeholder monitoring enhances compliance and transparency, while feedback mechanisms expedite deviation correction and resource reconfiguration (Siems et al., 2022).

2.3.4 Reasons for choosing these three theories

These three theories (Dynamic RBV, ROT and Stakeholders theory) have been chosen for three main reasons.

1. The liquor industry is characterized by strong resource dependence and high capital intensity. Baijiu enterprises possess valuable, scarce, inimitable, and non-substitutable resources; however, shifts in regulatory requirements, market demand, and competitive conditions require them to continuously integrate, develop, and reconfigure internal and external capabilities in order to respond to a rapidly changing environment. This entails not only configuring and leveraging existing resources to sustain competitive advantage, but also acquiring and accumulating new resources and enhancing their value through effective resource management. Accordingly, the Dynamic RBV offers a theoretical lens for understanding how Baijiu enterprises build and sustain competitive advantage over time, while ROT provides a structured framework for analyzing their resource management activities.

2. The liquor industry involves a wide range of stakeholders. These include internal stakeholders and managers who make organizational decisions; government authorities responsible for setting standards, rules, and regulations; upstream suppliers, such as raw material providers supplying crops like sorghum and packaging material suppliers providing bottles and boxes; downstream actors including distributors, retailers, and logistics companies;

and society at large, which generates market demand and comprises the final consumers of alcoholic products. Given the diversity of stakeholder groups involved, stakeholder theory provides an appropriate analytical lens for examining how different stakeholders influence supply chain sustainability.

3. These three theories proved to be an appropriate perspective to study environmental management within supply chains, and can also be extended to the supply chain level, all applied to the study of supply chains, operations management and SSCM. The ROT that underpins the research has also been applied to the study of the alcoholic beverage industry. Despite the progress made in related research, there are still issues that need to be understood.

2.4 Summary

Existing research has examined the effects of SSCM practices on sustainability performance and dynamic capabilities, while a separate stream of studies has focused on how dynamic capabilities influence sustainability performance. Nevertheless, empirical understanding of the dynamic mechanisms through which SSCM practices shape sustainability performance in evolving business environments remains limited, indicating the need for further empirical investigation.

The development and integration of supply chains and their sustainable practices is a growing trend in emerging economies. These economies are adopting green and sustainable technologies to improve global competitiveness, driven by the increasing interconnectedness of economies, their active participation in international trade, and the rising importance of emerging economies in supply chains. Since 2010, there has been an increase in publications related to sustainable supply chains in emerging economies. However, current studies fail to adequately address SSCM issues in these regions.

Sustainable practices that are significant in one industry do not necessarily exert the same impact in other industries. Therefore, SSCM research is inherently broad and should not be confined to a few influential sectors. Given the growing attention to SSCM issues in the alcoholic beverages industry and the relative scarcity of existing literature in this area, there is a unique opportunity to generate meaningful and up-to-date insights for the field.

The application of digital technologies and financial services can strengthen foundational supply chain capabilities. Digital technologies promote SSCM by enhancing financial performance, reducing negative environmental impacts, and generating positive social outcomes. SSCF solutions provide incentives and support for the effective implementation of

SSCM practices. However, existing research in this area remains fragmented, and there is still limited systematic understanding of how digital technologies and supply chain finance jointly influence the achievement of firms' sustainability objectives, indicating the need for further empirical investigation. Table 2.10 summarizes the core content of the existing literature reviewed in this chapter and highlights the main limitations of current research.

This thesis systematically addresses the above research deficiencies through an empirical study of sustainable supply chains in the alcoholic beverages industry within emerging economies. Specifically, it aims to develop an integrated understanding of the relative importance of SSCM drivers, the adoption processes of SSCM practices, and the mechanisms underlying the realization of sustainable performance in the alcoholic beverages industry. It further seeks to reveal the dynamic evolutionary mechanisms through which baijiu enterprises achieve integrated SSCM performance, and to analyze the role of digital technologies and SCF services in this process.

Table 2.10 Summary of related literature

Research focus	Research topics	Key insights	Research gaps
SSCM	The evolution of SSCM	SSCM has become a significant research area in SCM literature. Scholars connect sustainability concepts with SCM from various perspectives and with diverse terminology. When supply chain management equally considers the economy, environment, and society—it is referred to as SSCM.	1. Managers frequently face difficulties in identifying and evaluating effective strategies for the successful implementation of SSCM practices. 2. Existing studies have separately examined the effects of SSCM practices on dynamic capabilities and the relationship between dynamic capabilities and sustainable supply chain performance. However, empirical research directly investigating how SSCM practices influence SSCM performance remains limited, highlighting the need for further empirical inquiry. 3. Digital technology and financial services are increasingly used in business practices, but there is not enough clarity on how these two factors affect the achievement of business sustainability goals, and more empirical research is necessary.
	Drivers of SSCM	Drivers of SSCM refer to factors that motivate or exert pressure on organizations to adopt sustainability initiatives across the supply chain. These drivers are commonly grouped into external and internal categories and differ in the extent to which they shape supply chain decision-making.	
	SSCM Practices	SSCM practices are implemented to make supply chains more sustainable across all three dimensions of sustainability.	
	Performances of SSCM	Measuring performance is expected to become more complex as stakeholder expectations regarding corporations' economic, environmental, and social responsibilities continue to evolve. Scholars are divided on the favorable influence of SSCM practices on sustainable performance.	
	Dynamic Capabilities in SSCM	In the SSCM context, achieving sustained performance requires firms to develop both foundational supply chain capabilities and dynamic capabilities in parallel. SSCM practices can generate short-term competitive advantages while fostering the development of dynamic capabilities. In turn, dynamic capabilities exert a positive impact on firm performance..	
	Determinants of supply chain capabilities	Digital technologies can support the advancement of SSCM initiatives by improving financial outcomes, mitigating negative environmental impacts, and generating positive social effects. By enabling more accessible and cost-effective financing, supply chain finance (SCF) mechanisms help improve the financial position of vulnerable suppliers, thereby reinforcing the social and economic sustainability of the supply chain as a whole.	

SSCM of Liquor Industry in the Emerging Economy	SSCM In Emerging Economies	Emerging economies are adopting green and sustainable practices. Achieving SSCM in emerging economies requires government assistance and top management leadership. Innovation in sustainable supply chain practices is needed in emerging economies. Collaboration with research and development (R&D) actors to advance sustainability objectives and technological upgrading has therefore become a priority. Nevertheless, in many emerging economies, environmental investments are still primarily motivated by operational cost reduction rather than by environmental protection objectives.	1. Although emerging economies are placing increasing emphasis on sustainable development, the limited availability of empirical research constrains our understanding of how enterprises implement SSCM practices in emerging economy contexts and how SSCM influences the performance of manufacturing firms. 2. This issue is particularly salient in the alcoholic beverages industry. Under the combined pressures of government regulation and market competition, firms in this sector are increasingly prioritizing SSCM practices and strategies and urgently require systematic theoretical guidance. However, the existing body of sustainability-related research in the alcoholic beverages industry remains extremely limited, providing insufficient guidance for industry practitioners and highlighting the need for further SSCM research in this sector.
	SSCM In Alcoholic Beverages Industry	Evidence from the wine industry indicates that the alcoholic beverages sector faces significant socio-environmental challenges, while supply chain management practices offer effective means of addressing sustainability concerns. The SSCM of the alcoholic beverages industry involves multiple objectives; empirical evidence from a case study of a liquor enterprise in China shows that economic objectives are most prominent, followed by environmental and social objectives. Moreover, the alcoholic beverages sector operates in a dynamic business context in which firms develop specific organizational capabilities to carry out defined tasks through the use of organizational resources.	

Chapter 3: Research Methodology

This chapter outlines the research methodology adopted to address the research questions introduced in Chapter 1. It elaborates on the research philosophy, methodology selection, the case study approach, data collection and analysis procedures, the methodological rigor of the study, and relevant ethical considerations.

3.1 Research philosophies

Business and management research commonly rests on three philosophical assumptions: ontology, epistemology, and axiology. Ontology concerns the nature of reality, typically framed through objectivism (reality exists independently of research) and subjectivism (social reality is constructed through individuals' perceptions and actions) (Holden & Lynch, 2004; Saunders et al., 2023). Epistemology examines how knowledge is generated and validated (Myers, 2019). Axiology highlights how researchers' values and ethical concerns may shape research decisions, such as prioritizing SSCM due to its perceived social, environmental, and economic benefits (Saunders et al., 2023).

3.1.1 Research philosophical framework

Following Saunders et al. (2023), this study considers positivism, interpretivism, and pragmatism, and adopts pragmatism as its guiding philosophy. Positivism emphasizes objective observation, hypothesis testing, and generalizable laws (Weber, 2004). Interpretivism views social reality as context-dependent and meaning-driven, focusing on how actors interpret situations within specific settings (Saunders et al., 2023). Pragmatism integrates theoretical rigor with practical relevance by addressing real-world problems and generating actionable solutions through engagement with key informants (Corley & Gioia, 2011; Pratt, 2007; Watson, 2011). Accordingly, this thesis uses theory to explain how baijiu enterprises can develop sustainable supply chains, while prioritizing implementable SSCM solutions informed by multiple stakeholders, including suppliers, resellers, distributors, and consumers.

3.1.2 Theory development: Overview and approach

3.1.2.1 Essential characteristics of a theory

Theory building is fundamental to ensuring scientific rigor and advancing scholarly knowledge. Bacharach (1989) conceptualizes theory as a set of relationships among constructs that are observed or approximated in the empirical world. Within operations management research, theory development requires a coherent framework of conceptual relationships and should be specified through four core elements: clear definitions, an explicit domain, articulated linkages, and testable predictions (Wacker, 2008). Sutton and Staw (1995) contend that activities such as citing prior studies, presenting empirical data, listing variables, or formulating hypotheses alone do not constitute theory. Instead, explicit criteria are necessary to evaluate the robustness of a theoretical contribution.

Bacharach (1989) outlines two overarching evaluation criteria: "falsifiability" and "utility." A theory must be testable, quantifiable, and have a scalable scope in terms of variables, structures, and relationships. Table 3.1 outlines the attributes of a theory according to the framework established by Wacker (2008).

Table 3.1 Essential characteristics of a theory

Property	Essential characteristics	Objective
Definitions	- Incorporates well-established theoretical concepts while avoiding an excessive focus on ambiguous or undefined ideas. - Provides clear and precise explanations. - Demonstrates originality and distinctiveness in its approach.	Provides a comprehensive explanation of the components and interrelationships of concepts, making it amenable to empirical testing and validation.
Domain	- Generalizable: Broadly applicable across different contexts. - Abstract: Not confined by time or space.	
Relationships	Investigates the possibilities and implications of both established and emerging phenomena.	

Source: Wacker (2008)

The significance of theoretical contributions is further emphasized by Whetten (1989). In his seminal paper, he delineates four fundamental components that define contributions to theory. The "What" dimension specifies the substantive elements that constitute a theory, such as variables, constructs, and concepts, with an emphasis on completeness and parsimony. The "How" dimension focuses on how these elements are connected, typically represented through schematic forms such as box-and-arrow models (Whetten, 1989). The more in-depth "Why" dimension seeks to explain the underlying reasons for the occurrence of these phenomena or factors, offering a coherent and substantiated model. Additionally, theoretical contributions should consider the "Who, Where, and When" dimensions, addressing a broader range of

temporal and contextual factors to enhance the theoretical foundation for generalization (Whetten, 1989).

3.1.2.2 Theoretical development approach

To ensure a clear theoretical contribution, methodological alignment must be carefully maintained, to ensure coherence among various elements of the study, such as research components, questions, previous studies, design, and theoretical developments (Edmondson & Mcmanus, 2007).

Three primary methods of theory development are widely recognized: deductive, inductive, and abductive reasoning. Deductive reasoning typically begins with an established theoretical framework or concept, followed by empirical data collection to confirm existing conceptions or hypotheses (Fisher & Aguinis, 2017). This approach is typically associated with strict scientific rigor, drawing on explicit and predictive causal logics to assess ideas in a structured and systematic way.

By contrast, inductive reasoning adopts a bottom-up logic, beginning with empirical observation and data collection, followed by the identification of patterns and the gradual construction of theoretical explanations (Ketokivi & Choi, 2014). From an inductivist perspective, causal relationships alone cannot fully account for social reality, as human actions and interpretations are central to understanding it. Accordingly, this approach is inherently interpretive, highlighting values, intentions, attitudes, and beliefs that shape human behavior (Gioia & Pitre, 1990).

This thesis adopts an abductive approach to theory development, which combines elements of both deductive and inductive reasoning (Fisher & Aguinis, 2017). The objective is to infer the most plausible explanation or theoretical account based on empirical observations. Abduction follows a systematic and iterative research logic, typically starting from an existing or provisional theoretical framework. The analysis moves back and forth between empirical evidence and theoretical reasoning, allowing the framework to be continuously adjusted and refined.

Such an iterative process may lead to either the extension or the modification of the original theoretical framework (Dubois & Gadde, 2002). Put differently, abductive reasoning begins with an initial theoretical lens and progressively enriches it through empirical inquiry, enabling researchers to explore phenomena, detect emerging patterns and themes, and further develop or refine theory (Seuring et al., 2020). A comparative overview of these three theory-building approaches is presented in Table 3.2.

Table 3.2 The comparisons of theory-building methods

	Deductive	Inductive	Abductive
Orientation	Progresses from general principles to specific cases	Moves from specific observations toward broader generalizations	Proceeds from observed phenomena to the most plausible explanations
Reasoning logic	Hypotheses are derived from theory and tested empirically	Patterns and insights emerge from empirical observations	Theory and data are iteratively combined to refine explanations within context
Evaluation criterion	Logical consistency	Empirical credibility	Explanatory plausibility

Source: Ketokivi and Choi (2014); Sætre and Van De Ven (2021)

The abductive method is ideal as it promotes active interaction between theoretical perspectives and empirical findings. The adoption of SSCM in liquor firms is influenced by a variety of key factors, including drivers, practices, performance metrics, and SSCM capabilities. Certain theoretical frameworks offer valuable insights into the dynamic mechanisms underlying SSCM development. These frameworks establish a strong foundation for subsequent data analysis, which can then be conducted deductively. After gathering and analyzing data, new theoretical frameworks may emerge, or existing theories may be modified to fit the specific context through an inductive approach.

During data analysis, initial concepts are identified through open coding and subsequently consolidated into higher-level aggregate dimensions (Gioia et al., 2013). New constructs and themes are developed inductively through data collection and coding, enabling both the generation of novel theoretical insights and the refinement of existing theoretical frameworks. This process corresponds to the "theory elaboration" approach, which starts from an established theoretical foundation and incrementally refines it through empirical observations (Fisher & Aguinis, 2017). These emergent themes are then systematically connected to established analytical frameworks via the case study methodology adopted in this research.

3.2 The selection of methodology

This thesis adopts a qualitative research design to gain an in-depth understanding of the research subject. As noted by Voss et al. (2002), exploratory research is particularly useful for posing broad questions and uncovering deeper insights. The study begins with an open-ended inquiry and employs an exploratory methodology to identify the driving factors, and performance targets of SSCM, as well as the dynamic mechanisms through which liquor companies use to achieve SSCM. The following subsection introduces the case study approach that underpins this research.

Considering the trade-offs among different research strategies, this thesis adopts a case study approach as its principal research method. According to Yin (2009) , case study research is characterized by two core elements: *scope* and *features*. The case study examines a modern phenomenon within its natural setting with regard to its "scope". The methodology related to "features" (1) addresses situations where the number of relevant variables exceeds the available data points, (2) relies on established theoretical propositions to inform the research design, and (3) evidence is triangulated through multiple data sources (Yin, 2009).

The selection of the case study approach is motivated by its distinctive methodological strengths. Voss et al. (2002) emphasize that case studies are especially effective for addressing "how" and "why" questions in depth. Accordingly, this study employs a case study approach to examine how SSCM practices are implemented and why SSCM is adopted, drawing on detailed empirical analysis.

3.2.1 Procedure of case study

Building on Eisenhardt's foundational 1989 paper on the case study approach, several subsequent guides have employed the case study method in business research. Two key papers outline case study procedures: one from the general management perspective (Eisenhardt, 1989), and another from the Operations and Supply Chain Management (OSCM) perspective (Voss et al., 2002).

As noted by Voss et al. (2002), effective case study design depends on a close correspondence between research objectives and methodological choices. They highlight that key factors, established theoretical constructs, and plausible relationships should be identified prior to specifying the detailed case study design.

A single-case design allows for particularly deep investigation, especially in longitudinal research settings (Voss et al., 2002). However, multi-case designs are often considered more robust due to their capacity to support comparative analysis (Stuart et al., 2002). After collecting data from various cases using predefined methods, the next step involves organizing the data and developing a theoretical framework through analysis. The findings are then compared with existing research to highlight both similarities and differences.

3.2.2 Theory development of case study

One central rationale for employing case studies lies in their strong potential to advance theory. As noted by Barratt et al. (2011) , the case study method is compatible with both inductive and

deductive research logics. When applied inductively, case studies emphasize theory generation. Barratt et al. (2011) therefore support inductive designs that seek to uncover gaps in existing knowledge and to undertake exploratory inquiry aimed at theoretical development. By contrast, theory testing—typically associated with the traditional deductive approach involving hypothesis formulation—can incorporate context-specific idiosyncrasies, as discussed by Voss et al. (2002).

In this study, an approach known as "theory elaboration" is adopted, balancing theory development and validation. The objective is not to validate pre-existing theories, but to apply established theoretical foundations to guide deeper investigation within a specific empirical framework (Fisher & Aguinis, 2017).

The research uses industry examples to explore the dynamic mechanisms underlying the implementation of SSCM in baijiu enterprises within emerging markets, which are illustrated through a conceptual framework. This thesis leverages established theoretical foundations, particularly the ROT, and contributes to existing literature through detailed case studies and a conceptual framework.

3.3 Data collection and analysis

3.3.1 The selection of cases

Case selection in this study is primarily driven by the need to address the research questions. As Yin (2009) notes, case study research is particularly well suited to examining contemporary phenomena in real-world contexts. By focusing on specific firms, researchers can gain deeper insights and contextual details that clarify adoption behaviors (addressing "why") and enhance their understanding of the operational processes involved in implementing SSCM (addressing "how").

This thesis adopts a purposive sampling approach for selecting case enterprises. Unlike probability-based sampling methods used in survey research, purposive sampling is based on explicit selection criteria aligned with the research purpose. Rather than seeking statistical representativeness, purposive sampling emphasizes the relevance and suitability of cases for addressing the research objectives and answering "how" and "why" questions in complex organizational contexts. Patton (2014) explains that purposive sampling aims to deliberately select information-rich cases that provide in-depth insight into the phenomenon under investigation. Yin (2009) further emphasizes that case selection should be guided by their

relevance to the research questions and their ability to provide insight into key organizational phenomena. strategically selected cases—such as typical, critical, or information-rich cases—enable researchers to generate meaningful insights and support analytical generalization Flyvbjerg (2004). In the context of SSCM, purposive sampling allows the selection of case enterprises that demonstrate relevant practices, resource configurations, and organizational responses to sustainability challenges.

Following the guidance of Patton (2014) and Yin (2009), this thesis applies clear case selection criteria to ensure that the selected enterprises are highly relevant to the research questions, possess established supply chain systems, and have actively implemented SSCM practices. This purposive sampling strategy enhances construct validity and supports analytical generalization, consistent with case study rigor criteria proposed by Gibbert and Ruigrok (2010). Case selection is primarily based on identifying genuine SSCM practices that are either currently in progress or have been effectively implemented. To substantiate this, four criteria must be met: Firstly, the project must publicly commit to sustainability, with access to diverse data sources, and several participants must confirm that SSCM has been properly implemented or is subject to ongoing enhancement. Secondly, since this study focuses on the liquor industry, the selected cases must be representative of the industry, including the most typical fragrance types of Chinese liquor. Thirdly, as SSCM is primarily driven by core enterprises, the selected cases must involve a focal company within the liquor industry. Fourthly, since liquor production is heavily influenced by external policies, ensuring consistency in policy variables is crucial for comparing the SSCM practices adopted by different cases. Contextual consistency is widely regarded as a key principle in multi-case research, as institutional or policy variations may distort the interpretation of cross-case findings (Ketokivi & Choi, 2014; Yin, 2009).

In this thesis, a multiple-case study design is adopted because it enables more fine-grained comparisons and strengthens the robustness of replication-based findings (Stuart et al., 2002). Analyzing multiple cases also facilitates a richer understanding of relationships among constructs, which is critical for rigorous theory development (Eisenhardt & Graebner, 2007). According to Voss et al. (2002) applying replication logic typically requires a minimum sample dimension of three cases. The overall procedure for case selection is presented in Figure 3.1.

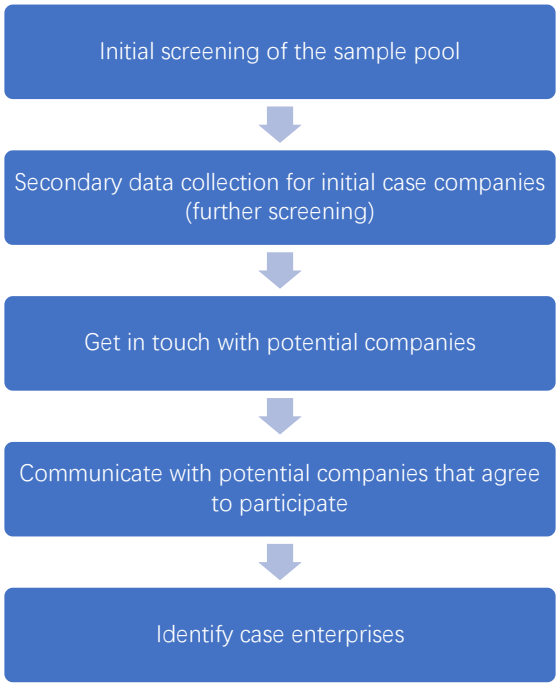


Figure 3.1 Case selection process

Recent annual statistics on the distribution of liquor production across Chinese provinces were reviewed. According to the 2024 data released by the CADA, Sichuan Province leads the nation in liquor production, generating 1.367 million kiloliters, which accounts for 33% of the total national output. Shanxi Province and Guizhou Province rank second and third, with production volumes of 338,200 kiloliters and 304,400 kiloliters, respectively, representing 8.2% and 7.3% of the total. Additionally, the CADA has provided data on the market shares of different liquor aromas in China for 2024. Strong-aroma liquor holds approximately 45% of the market share, sauce-aroma liquor accounts for around 29%, light-aroma liquor represents about 18%, while other aroma types make up roughly 8% of the market. Given the production volumes across provinces and the market share of aroma types, selecting Sichuan Province and its leading baijiu enterprises as the case study is highly representative.

Initially, six leading enterprises were selected based on the established criteria. This step was intended to familiarize the researcher with each case and to refine the interview strategy. Among these companies, three had begun to focus on sustainable development, but no clear evidence has been found in public records indicating whether they have systematically implemented sustainable supply chain practices. Consequently, attention was directed toward three other companies that had formally disclosed their commitment to sustainability strategies through their annual reports and official communications. A comprehensive research plan was developed to outline the study's objectives, engage with potential case companies, and secure confirmations from the three selected cases.

As summarized in Table 3.3, these three case enterprises serve as representative examples of SSCM. As a listed company, Alpha has published an annual social responsibility report since 2006, while Gamma has published both a social responsibility report and a sustainable development report since 2008. In 2017, during a customer communication meeting, the chairman of Beta first introduced the core strategy of sustainable development for the first time. Since then, the company has increasingly emphasized sustainable development and implemented SSCM practices. Each of these three enterprises has an annual revenue exceeding 20 billion yuan, ranking them first to third in Sichuan Province. This makes them representative of the industry as leading baijiu enterprises in both Sichuan Province and the entire country. The products of these three enterprises fall within two major aroma categories in the liquor industry: strong aroma and sauce aroma, which are the most representative consumed and produced aromas of Chinese liquor.

Table 3.3 The basic information of case

	Alpha	Beta	Gamma
Date of Establishment	1995	2007	1998
Sustainability Start Date	2006	2017	2008
Number of Employees	1288	401	1873
Industry	Core enterprise of liquor	Core enterprise of liquor	Core enterprise of liquor
Revenue (RMB)	30 billion	22 billion	83.2 billion
Headquarters and Main Business	China	China	China
Product Type	Strong aroma	Savory aroma	Strong aroma
Business Ownership	Joint-stock limited company (listed)	Limited liability company (foreign joint venture)	Joint-stock limited company (listed)

Note: Revenue was accessed from the 2023 Annual Report of the listed companies and from Enterprise Search on https://www.qcc.com.

3.3.2 The collection of data

This thesis draws on both primary and secondary sources of data. Semi-structured interviews constitute the principal data source, as they combine structural guidance with sufficient flexibility. In alignment with the exploratory nature of this research, these interviews are essential for understanding the background and contextual factors (Qu & Dumay, 2011) and are consistent with the abductive reasoning employed in theory development.

Semi-structured interviews are highly interactive and in-depth, ensuring there are no rigid protocols that could unintentionally introduce bias into either the interviewer’s approach or the participants' responses. To address this issue, Eisenhardt and Graebner (2007) advocate the use of multiple informants to obtain varied perspectives on the focal phenomena. Consequently,

this study conducted interviews with key participants in SSCM, who were considered the most representative sources of information for the cases.

An interview guide was developed for this study (see Annex B). The interview protocol was not developed in a single step, but was gradually refined on the basis of the research questions, the literature review, and preliminary analysis of background materials. First, the research questions provided the overall direction for the interview protocol, ensuring that the interview content would focus on the core issues of SSCM in baijiu enterprises, including its drivers, practices, comprehensive performance, and dynamic evolutionary process. Second, based on the literature review, key concepts were identified such as resource orchestration, the role of stakeholders, and digital technologies and financial services, and usedto formulate the initial interview themes. Third, prior to the formal interviews, the annual reports, corporate social responsibility reports, sustainability reports, official website materials, and relevant news coverage of the case enterprises were systematically collected and reviewed in order to understand their background, strategic priorities, and supply chain characteristics, and the interview questions were then adjusted to fit the specific context. On this basis, the interview questions were organized using a "funnel model" (Voss et al., 2002), beginning with broad open-ended questions, such as the overall profile of the baijiu supply chain, corporate sustainability strategies, and then gradually moving to more specific questions, such as the concrete measures adopted to implement SSCM, the use of digital technologies and financial services, and their impacts on sustainable development. The resulting interview protocol not only ensured comparability across cases, but also left room for flexible follow-up questions tailored to different corporate contexts and respondent roles.

On the basis of the gradual development of the interview protocol, this study further determined the respondent selection criteria and interview arrangements. A total of 30 individuals from the three case enterprises were interviewed. Respondents were selected through a purposive strategy based on explicit criteria, following the principles of information richness and role relevance. This approach is consistent with established qualitative case study practice and accords with the requirement to engage with key informants directly involved in SSCM decision-making and implementation processes (Eisenhardt & Graebner, 2007; Yin, 2009). First, priority was given to individuals directly involved in SSCM decision-making, execution, or supporting activities, in order to ensure that they could provide first-hand information highly relevant to the research topic. Second, to comprehensively capture the formation and implementation of SSCM in baijiu enterprises, respondents covered the strategic decision-making level, the operational execution level, and the support level, spanning key

functional areas such as procurement, production, distribution, quality management, environmental management, technical services, and financial services. Third, this study sought to maintain an appropriate balance across organizational levels and departments so as to identify, from multiple perspectives, the formation logic, implementation process, and effects of the same practice. Through this targeted respondent selection strategy, the study was able to reconstruct the actual operation of SSCM in the case enterprises more comprehensively and to enhance the possibility of cross-validating different sources of evidence.

The interviews were conducted in stages. In the preliminary stage, the author developed an initial understanding of the basic situation of the case enterprises, their supply chain structures, and their sustainability strategies on the basis of publicly available materials. After contact had been established with the enterprises, appropriate departments and interviewees were further confirmed. In the formal interview stage, the research relied mainly on face-to-face in-depth interviews and group interviews to collect core information on SSCM. As data collection progressed, the author conducted additional online follow-up interviews in light of questions and information gaps identified in the preliminary analysis, in order to verify key facts, supplement details, and clarify differences in understanding across respondents.

All interviews were conducted between October and November 2024, primarily in Chinese. In total, 24 interviews were carried out, including 14 individual face-to-face interviews, 4 group interviews, and 6 online interviews. The average duration of the individual face-to-face interviews was approximately 60 minutes. In the Gamma case, given the relatively large number of relevant interviewees and the fact that SSCM practices involved multiple interrelated functional departments, group interviews were adopted. This approach not only improved the feasibility of interview scheduling, but also made it possible to observe shared understandings across departments within the same context and to cross-check how different functional units understood the same practice. Each group consisted of two to three participants: interviews with two participants lasted about 90 minutes, while those with three participants lasted about 120 minutes. Each online interview lasted about 30 minutes. Detailed notes were taken for every interview, and audio recordings were made with the informed consent of all participants.

In addition to the formal interviews, the author deepened understanding of the case context through site visits, photographic records, and other supplementary interactions. Supporting materials included company annual reports, relevant internal documents, reliable third-party assessments, and media reports, which provided timely, relevant, and contextual supplementary information for the study (Adams et al., 2017). With the consent of the enterprises, the author systematically documented and archived materials collected during site visits and internal

documents. By combining interviews, field observations, and secondary materials from multiple sources, this study continuously employed triangulation, expanded the temporal and substantive coverage of the data, and enhanced the credibility and interpretive validity of the findings (Gibbert et al., 2008). Data collection continued until data sufficiency was judged primarily on the basis of two criteria: first, a high degree of thematic repetition had emerged across different respondents; and second, newly collected data no longer generated substantively new insights (Eisenhardt, 1989). Detailed information on the data collection procedures is presented in Table A3.1 in the Annex. All sources of information are also identified therein, including reports and interviewees.

3.3.3 Data analysis

This study adopts the data structuring process of the Gioia methodology (Gioia et al., 2013) as the main analytical line and combines it with thematic analysis (Braun & Clarke, 2006) during data organization and concept development. This method provides a transparent and structured process for organizing data, enabling concepts, themes, and theoretical explanations to be gradually derived from rich empirical materials while preserving respondents' original expressions. Compared with grounded theory, which emphasizes theoretical sampling and theory generation through constant comparison, the Gioia methodology is better suited to the research design of this study, which is based on multiple cases, guided by pre-existing research questions, and oriented toward theory development.

Specifically, the early stage of analysis was mainly inductive, seeking to stay close to the case materials in identifying the drivers, practices, comprehensive performance, and the roles of digital technologies and financial services in SSCM in baijiu enterprises. In the later stage, deductive reasoning was incorporated to compare and interpret the emerging themes in relation to ROT, Stakeholder Theory, and the SSCM literature. The analytical process was iterative, characterized by continuous movement back and forth among raw materials, emerging concepts, and theoretical insights, with repeated refinement and correction throughout (Pratt, 2007).

In the Gioia methodology, data analysis typically proceeds through a gradual process of abstraction from initial coding to first-order concepts, second-order themes, and aggregate dimensions, moving continuously from respondents' original expressions toward researcher-led theoretical generalization.

In the first stage, all interview recordings were transcribed and manually checked against interview notes, field observation records, and secondary materials to ensure thorough

familiarity with the data. The transcripts, together with supplementary materials from the three cases, were systematically organized into a unified database for analysis. In total, approximately 1,590 minutes of interview recordings were collected and, together with supplementary materials from the three cases, generated about 730 pages of qualitative text.

In the second stage, initial coding of the organized textual materials was conducted. Initial coding refers to the foundational coding generated through the preliminary identification and labeling of data segments relevant to the research themes in the raw materials, while remaining as close as possible to respondents' original expressions and the specific context of practice. At this stage, particular attention was given to the concrete SSCM practices implemented by baijiu enterprises in procurement, production, and distribution, the internal and external drivers of these practices, the manifestations of comprehensive performance, and the impacts of digital technologies and financial services on sustainable development. This stage was mainly inductive and aimed to preserve, as far as possible, the original meanings embedded in the empirical materials.

In the third stage, initial codes with similar meanings, repeated occurrence, or common orientation were compared, grouped, and refined in order to form first-order concepts. First-order concepts are analytical units derived from the organization of multiple open codes and remain relatively close to respondents' language and experiential content. This process placed particular emphasis on terms, expressions, and event descriptions repeatedly used by respondents so as to maintain a close connection between the analysis and the raw data. The first-order concepts were then further refined and systematically categorized to develop more explanatory second-order themes. Second-order themes represent a higher level of abstraction produced by the author through cross-data comparison and are intended to reveal the underlying relationships among different practices, behaviors, and phenomena.

In the fourth stage, during the development of second-order themes, the case materials were placed in continuous dialogue with the theoretical framework adopted in this study (Fisher & Aguinis, 2017) , thereby identifying higher-level aggregate dimensions. Aggregate dimensions represent a further integration of multiple second-order themes and constitute the core theoretical categories of the study, on the basis of which the dynamic evolutionary process of SSCM in baijiu enterprises could be explained. Through this analysis, key processes were gradually identified such as resource structuring, capability bundling, and value leveraging, as well as their interrelationships.

After completing within-case coding and theme development, the data structures developed from the three cases at the cross-case level were further integrated in order to identify their

commonalities, differences, and potential relationships, and on this basis constructed an integrated cross-case data structure. Specifically, the first-order concepts, second-order themes, and aggregate dimensions identified in each case were compared in order to identify their commonalities, differences, and potential linkages across cases, and on this basis developed an integrated cross-case data structure. Based on this process, the theoretical framework shown in Figure A3.1 was ultimately developed in accordance with the data-structuring logic of the Gioia methodology. On the left side of the figure are the initial codes that remain close to respondents' original expressions; in the middle are the first-order concepts and second-order themes derived by the author; and on the right are the higher-level aggregate dimensions. In this way, Figure A3.1 in the Annex systematically demonstrates how this study moved from raw materials, through gradual abstraction and dialogue with theory, to an overall explanatory framework for the dynamic evolutionary mechanism of SSCM in baijiu enterprises.

3.3.4 Case analysis

This study conducts case research by combining within-case analysis and cross-case analysis. As Miles (2014) point out, within-case analysis focuses on describing, explaining, and clarifying the internal logic and developmental process of a single case within a clearly defined context, whereas cross-case analysis focuses on identifying common patterns across different cases, explaining key differences, and providing a basis for subsequent theoretical explanation and proposition development.

First, this study conducts within-case analysis. The purpose of within-case analysis is to embed the coding results within the specific context of each enterprise and to systematically describe and explain the internal logic and developmental process of each individual case. By incorporating firm background, developmental history, and supply chain characteristics, a relatively complete narrative analysis is developed for each case, thereby revealing the specific pathways, contextual characteristics, and underlying logic through which the case enterprises advance SSCM in particular contexts. This also lays the foundation for subsequent cross-case comparison and mechanism development.

After completing the within-case analysis, this study further conducts cross-case analysis. The objective of this study is not only to describe SSCM practices in individual baijiu enterprises, but also to identify the common mechanisms through which baijiu enterprises achieve comprehensive sustainable value across multiple cases, and to provide more explanatory empirical evidence for SSCM research on the liquor industry in emerging

economies. As Eisenhardt (1989) emphasizes, cross-case analysis helps overcome the limitations of a single case by identifying recurring patterns and key differences across multiple cases. Based on the results of the preceding data-structure analysis, the cross-case analysis mainly revolves around the identified core themes, that is, comparing the performance of the three case enterprises under the same analytical dimensions. Specifically, the initial codes, first-order concepts, and second-order themes are systematically compared across the three cases to examine their distribution and manifestations in different cases, thereby identifying cross-case commonalities and explaining the sources of differences.

In terms of cross-case comparison, this study adopts the method of pattern matching (Barratt et al., 2011), that is, identifying recurring empirical patterns across different cases and comparing the observed results with theoretical expectations in order to enhance the credibility and logical consistency of the explanations. Through this process, this study is able not only to assess the explanatory power of existing theories in the SSCM context of the baijiu industry, but also to derive new insights from cross-case commonalities and differences, thereby laying the foundation for the subsequent discussion chapter in which empirical findings are compared with existing theories, propositions are developed, and the theoretical framework is constructed.

3.4 Rigor of case study methodology

Gibbert and Ruigrok (2010) identify four core criteria for ensuring methodological rigor in case study research: internal validity, construct validity, external validity, and reliability. Internal validity concerns the sound establishment of causal relationships throughout the research process and is often referred to as logical validity (Mccutcheon & Meredith, 1993). Construct validity focuses on whether appropriate operational indicators are used to capture the concepts under investigation (Yin, 2009) , which requires clear construct definitions and consistent alignment with the underlying theoretical framework (Mccutcheon & Meredith, 1993).

External validity addresses the degree to which study findings can be transferred across different contexts or populations. Mccutcheon and Meredith (1993) argue that case studies typically rely on replication logic to support such transferability, rather than the statistical generalization approaches commonly associated with survey-based research.

Reliability, finally, reflects the extent to which a study can be replicated with stable and consistent outcomes (Gibbert et al., 2008). Reliability can be strengthened through a transparent and well-documented case study process, as well as by systematically organizing empirical materials into an integrated database. The overarching aim of ensuring reliability is to reduce

bias and error across all stages of the research. Accordingly, this study adheres strictly to the credibility criteria summarized in Table 3.4 to maintain a robust chain of evidence.

Table 3.4 The credibility standards summary

	Research Process			
Standards	Research Design	Case selection	Data collection	Data analysis
Internal validity	Pattern-matching to connect SSCM practices with resource orchestration processes	Tailored case study protocols aligned with research objectives	Evidence drawn from multiple knowledgeable informants (e.g., Deputy General Manager; Directors of Supply Chain and Information Management)	Systematic note-taking and transcription; iterative coding procedures to limit researcher bias
Construct validity	Use of diversified data sources and repeated data collection rounds	Case selection guided by theoretical sampling logic	Data gathered from key internal and external stakeholders	Cross-source triangulation; abductive coding approach
External validity	Multiple-case design covering Baijiu enterprises with different aroma types	Case replication logic across comparable cases	Supplementary interviews with SMEs facing similar sustainability challenges	Analytic generalization via abductive reasoning
Reliability	Development of customized case protocols across SSCM participants	Adhere to a rigorous case selection criterion	Consistent application of explicit case selection criteria	Thematic analysis supported by a transparent chain of evidence

3.5 Chapter summary

This chapter systematically explains the research design of this thesis, including its philosophical framework, theory development approach, case study method, data collection procedures, data analysis pathway, and measures to ensure rigor. Grounded in pragmatism and abductive reasoning, the study adopts a multiple-case design and selects representative baijiu enterprises through purposive sampling. Data were collected through semi-structured interviews, field observation, and multiple types of secondary materials, forming a multi-source evidence base. Data analysis followed the Gioia methodology, combined with thematic analysis to derive key concepts, core themes, and aggregate dimensions. Within-case analysis was used to reveal the internal logic of SSCM in different enterprises, while cross-case comparison identified common patterns and key differences. This chapter provides the methodological basis for the subsequent research and lays the analytical foundation for the within-case analyses in Chapters 4–6 and the cross-case comparison in Chapter 7.

Chapter 4: Within-Case Analysis - Alpha

Based on the data analysis, this chapter takes Alpha as the focal case and conducts a contextualized analysis of its SSCM. The purpose of the within-case analysis is not to provide a general description of the enterprise, but to situate the research questions within a specific organizational context and, by considering the firm's background, development trajectory, and supply chain characteristics, to reveal the internal logic and key features of how the case enterprise advances SSCM. Together with the within-case analyses in Chapters 5 and 6, this chapter provides the empirical foundation for the cross-case comparison in Chapter 7.

In line with the research objectives and questions proposed in Chapter 1, and based on the overall data structure developed from the analysis, this chapter is organized around the following core dimensions: drivers, SSCM practices, comprehensive value, the roles of digital technologies and financial services, and resource structuring, bundling, and leveraging. These dimensions correspond directly to the research questions of why SSCM is implemented, what practices are implemented, what value is achieved, and what factors affect sustainable development, while also reflecting the core themes that repeatedly emerged during coding. Among them, SSCM practices form the central analytical thread of this chapter, as they are not only a key component of the research questions, but also an important process linking driving factors and resource structuring. On this basis, this chapter not only analyzes the specific practices implemented by Alpha, but also examines how these practices support resource integration and capability formation by reshaping the resource base, and how they influence its sustainable development process.

4.1 Background information

Founded in 1956 and headquartered in Sichuan Province, Alpha is a state-owned Baijiu producer listed on the Shenzhen Stock Exchange since 1994. In response to market fluctuations and intensified competition—especially the impact of the 2001 consumption tax reform on its low-price strategy—Alpha gradually incorporated sustainability into its strategic planning. Since issuing its first CSR report in 2006, the company has advanced SSCM across economic, environmental, and social dimensions. Its progress is reflected in three initiatives: collaborating with suppliers to promote automated and intelligent production, enhancing coordination and

risk management through digital technologies, and building a blockchain-based financing platform to strengthen SCF.

4.2 Drivers of SSCM

This section analyzes the drivers of Alpha's SSCM. Externally, policy regulations, market volatility, and industry competition shape SSCM adoption; internally, strategic orientation, organizational culture, and resource advantages support continuous improvement.

4.2.1 External drivers

Coercive pressures from policies and regulations

China's 2012 "Eight-point Regulations" sharply reduced Baijiu sales by limiting official spending, followed by stricter rules on quality, safety, environmental protection, and taxation. According to the 2023 CSR Report (A11), "*Alpha submitted 13 quarterly pollutant discharge reports, 5 annual reports, and conducted 609 self-monitoring activities.*" These regulatory pressures pushed the company to embed sustainability and compliance into its supply chain and long-term strategy.

Coercive pressures from market demand changes

Macroeconomic shifts, evolving consumer preferences, and sociocultural trends create demand volatility. Alpha's 1993 expansion into low-priced products failed to match consumption upgrading, and the 2001 tax reform further reduced margins. These uncertainties forced adjustments in product mix and production planning. As noted in Alpha's written response (A12), "*Unpredictable market demand significantly increases supply chain uncertainty.*"

Mimetic pressures from industry competition

Alpha's written response (A12) states: "*Staying competitive requires keeping pace with the times and leading industry development.*" With intensifying competition and structural adjustment, firms must improve management efficiency and green supply chain capabilities.

Normative pressures from stakeholders

Rising CSR and ESG expectations require Alpha to meet financial goals while addressing environmental and social demands. The 2024 CSR Report (A13) notes: "*Enterprises actively engage stakeholders, improving communication and addressing demands and oversight,*" promoting more professional and compliant supply chain management.

4.2.2 Internal drivers

Drivers from corporate strategy

According to Alpha's 15th Five-Year Plan (2026–2030), sustainability goals across economic, social, and environmental dimensions are embedded in strategic decisions. As stated in its written response (A12), the firm aims to "*build a green supply chain and provide green products and services.*" To achieve this, Alpha strengthens management of raw materials, packaging, production, and logistics, advances digital transformation, and develops intelligent factories and ecological parks, forming the core internal drivers of SSCM.

Drivers from organizational culture

Alpha's culture "*Nature and People Brewing Together, Coexisting Harmoniously*"—emphasizes respect for nature, technology, and stakeholders (A1). This cultural orientation prioritizes environmental and social responsibility across the supply chain. Employee training and CSR initiatives reinforce these values and embed sustainability in the organization.

Drivers from resource advantages

Alpha benefits from unique local brewing resources, including century-old fermentation pits and well water, which provide competitive advantages. Through scientific management and technological innovation, the company preserves and enhances the sustainable use of these resources. As noted in its written response (A12), "*One of our core strengths lies in seven irreplicable key resources. Policy adjustments have enabled us to fully leverage these resource advantages and secure a stronger position within the evolving ecosystem of the liquor industry*."

4.3 SSCM practices

This section introduces Alpha's SSCM practices in five areas: supply chain continuity, supply chain collaboration, risk management, pro-activity, and stakeholder management.

4.3.1 Supply chain continuity

As a core enterprise, Alpha must secure stable raw and packaging materials and maintain reliable distributor channels. Long-term supplier relationships are therefore critical for SSCM, strengthening adaptability to external disruptions (Sætre & Van De Ven, 2021). Key practices include long-term collaboration, partner selection, and mutual development.

Long-term relationships with suppliers

Long-term cooperation with organic grain suppliers stabilizes raw material supply, while

strategic partnerships with packaging suppliers ensure priority access during peak demand. As noted by the Brewing Deputy General Manager (A2), "*high-grade organic sorghum, though costly, improves product quality and farmers' income.*" The Packaging Procurement Deputy General Manager (A4) added that "*stable orders increase supplier profitability and secure priority allocation during shortages.*" These partnerships enhance supplier capability, generate mutual benefits, and reinforce supply-chain stability.

Partner selection based on environmental criteria

Alpha evaluates suppliers not only on financial and delivery capabilities but also on environmental performance. As noted by the Packaging Procurement Deputy General Manager (A4), "*more than 40 packaging firms meeting sustainability standards have entered Alpha's industrial park and comply with strict environmental requirements monitored by the park committee.*"

Distributor partner development

Alpha adopts a strategy of "Supporting, Assisting, Protecting, and Enriching distributors" to deepen partnerships and encourage market expansion. As stated in the 2023 CSR Report (A11), "*the company promotes manufacturer–dealer integration and customer service systems to build a mutually beneficial community.*"

4.3.2 Supply chain collaboration

Collaboration is a key SSCM practice for achieving economic, environmental, and social outcomes (Gold et al., 2010). Alpha has built both tangible and intangible foundations for collaborative supply chain management through joint development, technology and logistics integration, and strengthened communication with partners.

Joint development

Alpha developed a brewing ecological park and intelligent packaging center—the industry's first "Lighthouse Factory"—using automated and intelligent equipment co-developed with suppliers and technology partners, strengthening its technological leadership. As the Brewing Deputy General Manager (A2) stated: "*we proposed the concepts, and suppliers executed them during automation upgrades.*"

Technological integration

By incorporating partners into the "Lighthouse Factory," Alpha promotes technology integration, shared facilities, and data interconnectivity, reducing waste and improving supply chain precision. As written in A12: "*the digital ecosystem links upstream and downstream*

partners to achieve data interconnectivity and a digitally integrated production system."

Enhanced communication

According to Alpha's written response (A12), Alpha built a collaborative supplier management platform that visualizes procurement data and enables real-time information sharing, improving procurement and inventory management. The company also provides regular supplier training and quality improvement activities.

Logistics integration

As production expanded, Alpha worked with third-party logistics providers to build an efficient distribution system that enhances responsiveness and reduces logistics costs. A12 notes that "*third-party logistics expanded into procurement, production, and sales, forming an integrated logistics system.*"

4.3.3 Risk management

Risk management aims to proactively identify and mitigate risks (Beske, 2012). Effective mechanisms help Alpha address environmental, social, and market risks, enabling it to respond to uncertainties and support long-term supply chain sustainability (Beske et al., 2014).

Standards and certifications

Alpha enforces strict environmental standards on suppliers, especially packaging firms. As A4 noted: "*Through contractual obligations and supervision by the industrial park management committee, Alpha ensures production processes meet environmental requirements, reducing environmental risks.*"

Pressure group management

Policy, market, and environmental pressures can create instability (Seuring & Müller, 2008). Alpha mitigates these through a comprehensive risk control system covering legal, financial, and environmental risks. The 2023 CSR Report (A11) states: "*the company strengthens risk control through systematic audits and improved intellectual property protection.*"

Environmental purchasing

Alpha prioritizes organic raw materials to support green production. As A1 noted: "*this reduces pesticide and fertilizer use, improves the environment, and increases farmers' income.*"

Green packaging

According to the 2023 CSR Report (A11): "*The company uses biodegradable and recyclable materials to reduce single-use plastics by about 50 million units annually*," lowering environmental impact and strengthening its sustainability image.

Life cycle assessment

New technologies introduce uncertainties, and quality issues at any stage impact final products. A9 noted this challenge. Alpha developed an internal control system covering upstream suppliers and downstream customers to ensure life-cycle quality. A12 explains this system spans development, production, supply chain, marketing, and customer service.

4.3.4 Pro-activity

Pro-activity is a key SSCM characteristic (Beske et al., 2014). It requires companies to continuously optimize processes, technologies, and resource use to enhance economic, environmental, and social performance.

Employ clean production technologies

To meet national environmental requirements, Alpha formed an energy management team and adopted clean production technologies. As A2 explained, the company "*built a wastewater treatment station, introduced pipeline transport to reduce emissions, and upgraded sealing technology to enhance safety and environmental performance*."

Green brewing innovation

A2 noted that "*the National Solid-state Brewing Engineering Technology Research Center supports Alpha's innovation.*" Alpha advances green brewing through industry–university–research collaboration with more than 30 institutions to develop intelligent and eco-friendly technologies (A11). Since 2018, it has also led the Liquor Industry's first enterprise-led National Key R&D Project.

Environmental awareness training

According to the 2023 CSR Report (A11), Alpha regularly conducts ESG training to enhance employees' environmental awareness and social responsibility, encouraging their participation in environmental initiatives and supporting corporate sustainability goals.

4.3.5 Stakeholder management

Strengthen stakeholder engagement and collaborative communication

Alpha collaborates with suppliers, distributors, customers, and communities through information sharing, joint decision-making, and problem-solving. It refines communication mechanisms to address stakeholder needs, while regular dialogues, training, and transparent ESG disclosure enhance interaction and recognition (A11). These actions reflect Alpha's proactive stakeholder engagement in its sustainable supply chain.

Develop online channels to strengthen consumer relationships

To deepen consumer relationships, Alpha reformed its marketing system, expanded online marketing, and launched a membership mall (A7). The 2024 CSR Report notes that the company also organizes interactive brand activities to build long-term consumer loyalty.

4.4 Resource structuring

Alpha's SSCM practices enabled it to acquire and accumulate resources, including stable raw materials, supply chain alliances, capabilities, technological assets, and member-based resources. While maintaining traditional brewing techniques, Alpha also divested overdeveloped products and channels to optimize its supply chain structure. Consistent with ROT (Sirmon et al., 2007), these actions constitute Alpha's resource structuring.

4.4.1 Acquiring

Resource acquisition involves obtaining external resources—through alliances, procurement, or other means—to fill gaps in support of corporate development (Sirmon et al., 2011).

Acquire organic raw materials and strategic alliances

To ensure supply stability, Alpha secures organic raw materials through long-term contracts with farmers and forms strategic alliances with packaging suppliers and distributors through partner selection and development (A2). These alliances strengthen supply chain stability and support collaborative growth.

4.4.2 Accumulating

Resource accumulation strengthens resource uniqueness through internal development (Sirmon et al., 2011). Alpha accumulates organizational, technological, and member-based resources through collaboration, risk management, and pro-activity practices.

Accumulate organizational resources for supply chain collaboration

Supply chain collaboration enhances performance through information sharing and resource integration (Doganay & Ergun, 2017). Alpha's supplier management platform improves communication, inventory control, and logistics, while "joint development" and "technological integration" link partners to the "Lighthouse Factory" to enable data interconnectivity (A7).

Accumulate organizational resources for supply chain risk management

Alpha has established a unified internal control system for upstream and downstream partners and implemented environmental risk prevention mechanisms. It also set energy and waste management standards and improved procurement and packaging inspection criteria, consolidating resources for risk management (A9).

Accumulate patents and technological resources

Alpha increases R&D investment, cultivates innovation talent, and accumulates patents and technological resources through industry–university–research collaboration. The 2023 annual report notes that Alpha holds 527 patents and has institutions to support commercialization.

Accumulate member-based resources

Alpha expands member-based resources through membership systems, online channels, and brand activities (A7).

Accumulate a sustainability-oriented corporate culture

Alpha cultivates a sustainability-oriented corporate culture through environmental training and quality improvement activities that help employees internalize environmental and social responsibility and strengthen organizational cohesion (A11).

Accumulate stakeholder trust and support

Through sustained stakeholder engagement, Alpha builds relational resources. Long-term partnerships with suppliers and distributors have shifted from transactional to collaborative, marked by mutual trust and stable commitment, supporting efficient information exchange and coordinated responses to uncertainties (A4).

4.4.3 Divesting

Resource divestment involves proactively removing inefficient or non-strategic resources to optimize allocation and refocus on core areas. It may include asset sales, project termination, or exiting non-core businesses (Sirmon et al., 2011).

Divest overdeveloped products and channels

A1 noted that "*excessive reliance on distribution channels and government-related consumption once led to overdeveloped products and blurred differentiation.*" During supply chain optimization, Alpha divested such misaligned products and channels and restructured its marketing system, expanding the direct sales team to strengthen market execution (A12).

Exit non-core businesses

According to A1, Alpha's 2015 restructuring refocused the company on its core liquor business. The listed entity exited non-core operations to direct resources fully toward core

activities.

4.4.4 Inheriting

Resource inheriting refers to internally acquiring and integrating existing resources—such as organizational memory and accumulated knowledge—to ensure continuity and reuse rather than reconstruction. Although not explicitly part of ROT, similar ideas appear in organizational learning and knowledge management research (Argote & Miron-Spektor, 2011; Maritan & Peteraf, 2011).

Strengthen cultural inheritance and shared sustainability values

Alpha embeds its philosophy of "Nature and People Brewing Together, Coexisting Harmoniously" into supply chain and production activities, reinforcing commitments to environmental protection and social responsibility (A11).

Integrate modern technology with traditional craftsmanship

Alpha integrates traditional brewing techniques and century-old cellar resources with modern technology and intelligent manufacturing, improving product quality and aligning traditional craftsmanship with technological innovation (A2).

4.5 Resource bundling

Building on its resource base, Alpha integrates accumulated resources into stabilizing, enriching, and pioneering capabilities (Sirmon et al., 2007; Sirmon et al., 2011). It bundles digital technologies—including intelligent equipment and information systems—to enhance resource integration and applies SCF to support financially weaker suppliers and improve supply chain sustainability.

4.5.1 Capabilities from bundling digital technologies

According to A7, Alpha's digital bundling reflects strategic proactivity. During the 13th and 14th Five-Year Plans, Alpha advanced digital transformation, moved operations online, accumulated data assets, extended digital tools to partners, and built an enterprise big data platform. Bundling digital technologies has strengthened quality control, collaboration, and analytical capabilities across the supply chain.

Stabilize supply chain quality through digital technologies

Alpha uses digital systems in operations, warehousing, logistics, and consumer

management to ensure traceability and transparency, aligning sales and production to stabilize quality control. As A11 notes, the company "*advances digital and intelligent transformation to strengthen quality control.*"

Enrich supply chain collaboration by breaking data silos

A unified digital system integrating production, supply chain, R&D, marketing, and finance reduces data silos and improves coordination (A7). Digital tools extended to partners enable real-time order and inventory sharing.

Enrich supply chain efficiency through bundling digital elements

Through its ecological park and "Lighthouse Factory," Alpha digitizes brewing processes. Digital upgrades in raw material processing, brewing, and packaging enhance efficiency and quality. As A2 noted, "*automated grain-mixing reduced a 20-minute process to 90 seconds.*"

Pioneer data-driven decision-making through data value realization

Extensive end-to-end data resources support Alpha's transition from experience-based to data-driven management. Managers use real-time operational, sales, channel, and membership data to understand trends and adjust strategies (A11; A7).

4.5.2 Capabilities from bundling financial services

Firms in resource-intensive industries often face capital constraints affecting supply chain stability (Gelsomino et al., 2016; Wuttke et al., 2013). By bundling financial services and using a platform-based model, Alpha eases partners' financial pressure and improves collaboration and financial information sharing.

Stabilize manufacturer – distributor relationships through pledge guarantees

A8 noted that Alpha invested early in financial institutions and leverages its credit advantages to provide low-cost financing, pledge supervision, and guarantees, reducing capital turnover pressure, financing costs, and risks while strengthening long-term partnerships.

Enrich information sharing through financing platforms

The Deputy General Manager of the Wealth Management and Operations Center (A6) noted: "*The financing platform provides low-cost, efficient financing for upstream and downstream partners,*" integrating firms' funding needs with financial institutions' information and enhancing financial transparency.

Pioneer supplier financing capabilities through service extension

According to the company's written response (A12), Alpha introduces new financial institutions and products, develops trade-data-based financing solutions, and extends the

platform to second-tier distributors and end customers to offer standardized financing services that meet diverse needs.

Pioneer financial risk-control capabilities through emerging technologies

Alpha incorporates blockchain, digital RMB, and smart contracts into its SCF system, improving risk control and strengthening supply chain collaboration (A12).

4.6 Resource leveraging

Resource leveraging refers to managing and utilizing resources and capabilities to create competitive advantage (Sirmon et al., 2007). This section examines how Alpha mobilizes, coordinates, and deploys resources to generate SSCM value at the firm, supply chain, and industry levels.

4.6.1 Mobilizing

Resource mobilization refers to activating resources from a static state to support strategic actions or operational activities, enabling rapid implementation of strategic objectives (Sirmon et al., 2011).

External resource mobilization

Alpha mobilizes supplier resources based on strategic needs. For example, after introducing automated production lines, the firm required suppliers to upgrade automation and testing equipment to ensure stable and efficient operations (A4).

Internal resources mobilization

Alpha mobilizes internal resources by establishing dedicated units—such as the Environmental Management Department and Digital Development Center—to support strategic initiatives (A7). It also enhances employee engagement through open communication, welfare systems, and long-term incentives (A12), and strengthens quality management by creating specialized roles and certifications (A9).

4.6.2 Coordination

Resource coordination refers to integrating and synchronizing capabilities to prevent conflict and redundancy, thereby ensuring efficient supply chain operations (Sirmon et al., 2011).

Share explicit and tacit SSCM knowledge

Alpha provides environmental training on recycling and green packaging to help employees

and suppliers adopt eco-friendly technologies and improve resource efficiency (A10).

Establish SSCM-linked measurement and reward systems

Alpha conducts annual supplier evaluations based on delivery, quality, price, and other indicators. Suppliers meeting SSCM requirements receive more orders, while underperforming firms may be downgraded or removed (A4).

Extend SSCM standards across the supply chain

Alpha designs digital scenarios for key upstream and downstream processes and promotes unified digital management systems aligned with sustainability goals. As a result, suppliers have shifted from passive acceptance to active SSCM implementation (A12).

Reconstruct SSCM collaboration networks and management frameworks

Through data analysis and system optimization, Alpha built a platform integrating front- and back-end operations. Headquarters now supports frontline sales, forming an SSCM system centered on financial control and performance evaluation. As A1 noted, "*the company shifted from a top-down structure to a customer-oriented, responsive model.*"

4.6.3 Deploying

Resource deployment refers to allocating capabilities specifically to strategic or operational tasks to achieve intended objectives (Sirmon et al., 2011).

Embed knowledge into organizational routines

Alpha embeds SSCM knowledge into daily operations and promotes internal knowledge sharing. It also provides distributors with market analysis data to strengthen their managerial capabilities (A8).

Promote experience sharing and technical exchanges across industries

Alpha participates in experience exchange and technical cooperation within and beyond its industry, promoting mutual learning and capability sharing among multiple parties (A2).

Participate in setting industry standards

Alpha contributes to industry standards on carbon emissions and quality control by applying its experience in emission reduction and resource management. Through policy advocacy and collaboration with government and industry associations, it helps standardize sustainable development practices (A11).

4.7 SSCM performance

Alpha successfully achieves multi-dimensional value through SSCM by acquiring and

accumulating strategic resources in the resource structuring stage, integrating these resources into strategic capabilities in the resource bundling stage, and fully leveraging these capabilities in the resource leveraging stage.

4.7.1 SSCM environmental performance

Improve resource efficiency

Alpha has improved resource efficiency through SSCM. In 2023, renewable energy use reached 2.91%, water reuse rose to 72.36%, and total water savings increased by 11.85%. Two products also obtained lifecycle carbon footprint certifications, strengthening environmental performance (A11).

Strengthen environmental pollution control

Alpha strengthened pollution control in 2023, reducing greenhouse gas emissions by 16.82%. Solid waste utilization reached 97.99%, and biogas use replaced 450,000 cubic meters of natural gas (A12).

4.7.2 SSCM social performance

Driving local economic development

Alpha contributed 63% of the fiscal revenue for its local city and invested in multiple public projects, significantly promoting regional economic development (A1).

Rural revitalization through industrial support

In response to the rural revitalization strategy, Alpha supports poverty alleviation by investing in infrastructure, industrial development, education, and charitable projects in underdeveloped counties (A1).

Fund public welfare initiatives

In 2023, Alpha held 134 volunteer activities with over 1,000 participants and 1,200 service hours. It also supports education in impoverished areas and promotes responsible drinking habits (A11).

Provide safe working environment and equal development opportunities

Alpha is committed to providing employees with a safe and healthy work environment, fair salaries, and comprehensive benefits, enhancing overall employee satisfaction. Through occupational health management, regular training, and career development planning, the company ensures fair opportunities for employee advancement (A12).

4.7.3 SSCM economic performance

Financial performance improvements

In 2023, Alpha's revenue grew by 21.71% and profit by 30.29%. The company maintained a high dividend payout rate and has distributed RMB 35.353 billion in dividends since its 1994 listing (A12).

Market share leadership

Innovation and brand building have strengthened Alpha's industry leadership. In 2023, its two core brands achieved record sales (A11).

Enhanced operational efficiency

Digital and intelligent transformation enables Alpha to manage real-time order and inventory information and achieve efficient production–sales coordination (A7).

4.8 Case summary

Alpha's SSCM is shaped by both external factors—policies, market dynamics, and stakeholder expectations—and internal factors such as strategic orientation, organizational culture, and resource advantages. This chapter analyzes its representative practices, key strategies, and major outcomes. In procurement, Alpha builds long-term partnerships and applies strict environmental standards to ensure supply continuity and sustainable resource provision. In distribution, it integrates manufacturers and distributors, promotes digital transformation, and uses data-driven approaches to improve efficiency and customer service, while also developing a SCF platform to ease distributors' capital constraints. In production, Alpha emphasizes digital transformation and process reengineering, collaborates with partners on environmentally friendly technologies, and advances initiatives such as the "Lighthouse Factory" and an enterprise-level big data platform. Table A4.1 summarizes Alpha's open codes.

Despite these efforts, Alpha still faces three main SSCM challenges. First, green transformation is costly: organic sorghum is significantly more expensive than conventional sorghum, raising corporate costs despite improving quality and farmers' income. Second, limited vertical integration increases risks in upstream control and supply stability, as the firm relies mainly on external partners for raw and packaging materials. Third, stakeholder co-governance remains underdeveloped; although communication and disclosure have improved, suppliers, distributors, and communities are not yet fully involved in decision-making. Table A4.2 in the Annex summarizes Alpha's open codes.

Chapter 5: Within-Case Analysis - Beta

This chapter takes Beta as the focal case and conducts a contextualized within-case analysis of its SSCM. As in the previous chapter, it is organized around the dimensions of drivers, SSCM practices, comprehensive performance, the roles of digital technologies and financial services, and resource structuring, bundling, and leveraging. It highlights the internal logic and key features of Beta's SSCM under its corporate background, development trajectory, and supply chain characteristics, thereby enriching understanding of SSCM implementation pathways in baijiu enterprises and providing an empirical basis for the cross-case comparison in Chapter 7.

5.1 Background information

Beta, located in Sichuan Province, is a well-known baijiu enterprise. After restructuring in 2002–2007, it leveraged the Chishui River environment and regional baijiu culture to develop into a modern private producer of premium and mass-market sauce-aroma baijiu. Since 2017, Beta has pursued a sustainability strategy focused on ecological protection, social responsibility, and economic performance. This strategy has three features: establishing upstream packaging subsidiaries to ease supply constraints, strengthening consumer engagement through the Manor Membership Platform, and adopting differentiated digitalization by maintaining stability in core brewing while rapidly digitalizing non-core areas to create industry benchmarks.

5.2 Drivers of SSCM

This section examines the internal and external factors driving Beta's adoption of SSCM. External drivers include structural adjustments triggered by changing market demand and growing risks of industry homogenization. Internally, Beta is motivated by its strategic orientation, organizational culture, and unique natural resource advantages.

5.2.1 External drivers

Coercive pressures from market demand changes

Since 2023, China's Liquor Industry has undergone structural adjustment, with market

contraction, declining demand, and weakening preference for premium products. As high-end expansion is no longer viable, competition for limited market share has intensified. In this context, Beta must strengthen its market position through differentiated sustainability strategies to counter shrinking demand.

Imetic pressures from industry competition

Since 2023, China's Liquor Industry has entered structural adjustment, with competition shifting from marketing to brewing techniques, storage technologies, capacity expansion, and product innovation. By 2030, the market is expected to contract further, dominated by leading firms. In response, Beta introduced its "Century Brand" strategy, leveraging natural resources and strengthening production capabilities to support SSCM. As Deputy General Manager (B1) observed: "*Competition among large baijiu enterprises is becoming increasingly comprehensive and intense.*"

Normative pressures from stakeholders

Beta enhances its sustainability practices by actively integrating stakeholder feedback. Each year, it allocates incentive funds to reward constructive suggestions, fostering cooperation and continuous improvement. As Deputy General Manager (B1) noted: "*We allocate 80 million yuan to reward valuable suggestions from external stakeholders every year*."

5.2.2 Internal drivers

Drivers from corporate strategy

Beta adopts a long-term strategy that prioritizes sustainability over short-term gains. According to its introduction, the "Century Brand" strategy and the 2023 "351 Project" (B8) outlines phased revenue targets of 30, 50, and 100 billion yuan to be realized sequentially over the next decade. Guided by the principle of "fast production, fast storage, and slow sales," the strategy stabilizes inventories and builds a controllable supply chain. Under the chairman's leadership, triple bottom line principles embed sustainability across procurement, facility construction, packaging, warehousing, and transportation.

Drivers from organizational culture

According to B9, Beta's corporate culture—centered on integrity, respect for nature, scientific rigor, and brewing excellence—closely aligns with sustainability principles. Core values such as customer orientation, value creation, inclusive branding, and quality-of-life enhancement are embedded throughout supply chain activities, with ecological conservation deeply integrated into the culture.

Drivers from resource advantages

Located in the "Golden Valley" along the Chishui River, the company benefits from a favorable climate, abundant water resources, and natural storage caves, making it a core sauce-aroma Baijiu production area. As the Deputy General Manager (B1) noted, "*this 50-kilometer region supports annual production of 100,000 tons, and losing these ecological resources would severely constrain production.*" Therefore, environmental protection and sustainable resource use are considered vital to the company's survival.

5.3 SSCM practices

This section outlines Beta's SSCM practices aimed at strengthening and optimizing its supply chain structure while collaborating with partners to balance economic performance, environmental sustainability, and social responsibility.

5.3.1 Supply chain continuity

Supply chain continuity is essential for maintaining core operations amid external challenges (Christopher & Peck, 2004). Beta therefore focuses on building long-term collaborative relationships with direct suppliers.

Long-term relationships with raw material supply

To secure stable long-term raw material supply, Beta offers guaranteed minimum prices, annual price increases, and profit-sharing mechanisms, strengthening trust with local governments and farmers. Contract farming enhances collaboration, reduces market volatility, and improves farmers' quality awareness and contractual reliability (B3). The "government–farmer–enterprise" model yields mutual benefits: governments promote rural development, farmers secure stable income, and Beta obtains high-quality grain. Although red sorghum procurement adds about 300 million yuan annually, these initiatives reinforce long-term partnerships.

To further ensure grain quality and supply-chain stability, Beta collaborates with agricultural research institutions to develop high-yield, disease-resistant proprietary varieties and standardized cultivation protocols (B3).

Select internal partners

According to the Director of Procurement and Logistics (B3), "*Beta established strategic internal alliances by creating subsidiaries for ceramic bottles, glass bottles, and cartons.*" These subsidiaries have become leading high-tech enterprises in their fields; the ceramic bottle

subsidiary, for example, filled a domestic supply gap for premium ceramic packaging and significantly strengthened competitiveness (B4).

Distributor partner development

Beta prioritizes long-term distributor cooperation. As Deputy General Manager B1 explained: "*two principles guide sauce-aroma distribution—ensuring product quality and maintaining healthy market operations.*" Rather than overstocking distributors, Beta allows flexible ordering aligned with actual sales to reduce market risks. It selectively partners with influential regional distributors and supports them with financial resources, talent recruitment, market expansion, and differentiated products such as aged Baijiu. This benchmark-driven model promotes the development of smaller distributors, emphasizing long-term value co-creation and a mutually supportive sustainable supply chain (B6).

5.3.2 Supply chain collaboration

In advancing sustainable development, Beta emphasizes supply chain collaboration and Logistical integration to promote technological innovation through joint R&D and technological integration.

Logistics integration

According to B8, "*logistics operations have shifted from reliance on third-party providers to an internally managed system.*" As scale expanded and logistics precision became more important, Beta established its own logistics subsidiary to integrate internal logistics resources. In early 2024, its independently developed packaging and logistics center for sauce-aroma Baijiu began operating.

5.3.3 Risk management

Beta has established environmental management practices that exceed national standards through continuous improvement of its quality monitoring and traceability systems from raw materials to finished products.

Standards and certifications

Beta strengthens environmental risk control by refining internal standards that exceed national requirements (B1). It invests in advanced wastewater treatment to ensure compliance for both production and domestic wastewater. To protect the Chishui River ecosystem, treated wastewater undergoes additional natural purification before discharge. Its ceramic bottle, glass bottle, and carton factories also enforce unified, stringent environmental standards aligned with

core operations (B9).

Pressure group management

Beta manages external pressure risks by building strategic resource reserves and contingency plans that enhance regional coordination and supply chain resilience. As the Director of Procurement and Logistics (B3) explained: "*diversified grain bases across multiple regions help mitigate procurement risks arising from global supply uncertainties, such as those triggered by the Russia–Ukraine conflict.*"

Life cycle assessment

Beta implements full lifecycle quality management emphasizing source control and traceability. At the raw material stage, the "Farm as First Workshop" model provides standardized seeds and monitors cultivation to ensure quality and traceability (B8). In production and logistics, a "*one-box-one-code, one-pallet-one-code*" system enables comprehensive tracking from procurement to product delivery (B4).

5.3.4 Pro-activity

Beta enhances supply chain management and competitiveness through process innovation and clean technology adoption, accumulating valuable intellectual property assets.

Employ clean production technologies

Beta promotes ecological conservation by investing over 500 million yuan in wastewater treatment systems and reclaimed-water pipelines, jointly managed with environmental firms. As B1 noted, "*these efforts significantly enhance the sustainability performance of its supply chain.*"

Green brewing innovation

Beta advances green brewing by developing eco-friendly packaging materials and optimizing brewing and koji-making processes. According to the Director of Procurement and Logistics Center (B3), "*the Innovation and R&D Center in Luzhou improves both functionality and sustainability in packaging, while a specialized brewing research facility enhances production efficiency and product quality, reinforcing technological leadership.*"

Environmental awareness training

Beta strengthens environmental awareness by inviting experts to provide training on environmental policies and clean production. Through lectures and practical activities, employees gain applied skills and deeper ecological understanding, supporting wider engagement in sustainability initiatives (B9).

5.3.5 Stakeholder management

Beta proactively engages stakeholders in its supply chain management, encouraging external contributions to enterprise development and cultivating high-quality consumer communities through its estate membership platform.

Engage consumers through the estate platform

The company enhances consumer engagement through its upgraded Estate Membership Platform. As the Deputy General Manager of the Sales Company (B6) stated, "*the platform deepens consumer experience by involving members in production and cultural activities, fostering emotional connection.*" The company also interacts with external stakeholders through technical forums and annual conferences, enabling broader value co-creation beyond traditional Baijiu marketing.

Develop differentiated products based on consumer needs

Drawing on comprehensive consumer demand analysis, Beta continually advances product innovation and quality improvement. As the Deputy General Manager (B1) explained, "*it launched blended-aroma products combining sauce- and strong-aroma characteristics, expanded into categories such as whisky, and increased investment in aged-liquor storage to meet premium-market expectations.*" These differentiated offerings help strengthen long-term competitiveness.

5.4 Resource structuring

Beta's SSCM practices build a resource foundation for long-term development through acquiring, accumulating, divesting, and inheriting. Together, these processes strengthen its resource base and support ongoing sustainability.

5.4.1 Acquiring

Beta's resource acquisition and accumulation are embedded in its SSCM practices, meaning SSCM implementation essentially reflects a dynamic process of securing and expanding critical resources.

Acquire stable raw materials and long-term strategic alliances

Through SSCM, Beta acquires key resources—most notably stable, high-quality raw materials and strategic alliances across the supply chain. Upstream, contract-based procurement and incentive mechanisms motivate farmers, ensuring reliable raw material access and reducing

supply-chain uncertainty. The establishment of packaging subsidiaries secures ceramic, glass, and carton supplies, strengthening organizational resources (B3). Downstream, long-term distributor cooperation forms channel-based strategic alliances that enhance market stability and mitigate distribution risks (B6).

5.4.2 Accumulating

Beta systematically accumulates strategic resources through patented technological innovation, large-scale aged liquor inventory, and deployment of digital management systems.

Accumulate supply chain quality management resources

In its SSCM practices, Beta emphasizes establishing comprehensive quality standards and control mechanisms. Its environmental and ecological management systems exceed national requirements, mitigating environmental risks, while rigorous traceability systems reduce quality risks across the supply chain (B1).

Accumulate data resources

Beta accumulates data resources through real-time sensing and integration of key production information into centralized digital systems. Digital monitoring platforms support anomaly detection, process optimization, and continuous improvement, forming a strong foundation for efficiency and quality enhancement (B4).

Accumulate patents and intellectual property

The company strengthens its intellectual property base through innovation in raw materials, production efficiency, and ecological management. Collaboration with research institutes has generated proprietary sorghum varieties (B3), and advances in packaging and brewing technologies have further enhanced its environmental technology capabilities (B5).

Accumulate a sustainability-oriented corporate culture

A sustainability-oriented corporate culture is accumulated through environmental training that builds employees' knowledge and skills, embedding sustainability as a cultural resource integrated into organizational routines and quality management practices (B9).

Accumulate membership resources

Through its membership ecosystem, the company accumulates membership resources that enhance supply-chain resilience by strengthening consumer loyalty and supporting more stable demand responses (B6).

Accumulate stakeholder trust and support

Stakeholder trust becomes a relational resource through feedback and interaction with

consumers, governments, farmers, suppliers, and distributors. These long-term relationships form a strategic resource base supporting supply chain resilience and sustained competitive advantage (B2).

5.4.3 Divesting

The company optimizes resource allocation by divesting inefficient resources as it shifts from an infrastructure-focused phase to one emphasizing internal management improvement. As the Deputy General Manager (B1) noted, "*the '271' performance evaluation system removes the bottom 10 percent of performers, enabling the reallocation and upgrading of human resources.*" This divestment process strengthens talent concentration and supports organizational development.

5.4.4 Inheriting

Strengthen stakeholder identification with core corporate culture

Beta inherits and revitalizes its cultural resources by integrating traditional Baijiu culture into modern production and consumer experiences. As the Deputy General Manager of the Sales Company (B6) explained, "the establishment of Baijiu estates combines culture and brewing to offer immersive heritage experiences, creating a new model for preserving and transforming cultural resources."

Integrate modern technology to preserve traditional craftsmanship

Traditional craftsmanship is preserved and enhanced by integrating modern technologies into brewing processes. As the Deputy General Manager (B1) noted, "*collaboration with universities enables the use of big data and sensor technologies to document and manage key elements of traditional brewing, ensuring accurate transmission and gradual evolution of intangible heritage.*" Combining technological empowerment with master brewers' expertise further strengthens the continuity and upgrading of craftsmanship resources.

5.5 Resource bundling

In its SSCM practices, the company bundles digital technologies and financial services to strengthen supply-chain capabilities. Sensor-based digital monitoring supports real-time data collection and anomaly detection, providing a foundation for production standardization and improved quality control. Financial oversight and guarantee services for upstream farmers and

downstream distributors enhance their operational capabilities and reinforce overall supply-chain stability and competitiveness.

5.5.1 Capabilities from bundling digital technologies

The company places strong emphasis on digital monitoring of critical brewing data, developing real-time storage and anomaly detection systems that support production standardization and automation. It has digitized traditional brewing knowledge, introduced smart monitoring equipment, and deployed automated packaging lines, significantly improving production efficiency and quality control. Digital integration of online and offline marketing channels further strengthens analytical and market decision-making capabilities.

Given the long history of brewing traditions in China, management adopts a cautious approach to digitalizing core brewing processes, prioritizing long-term data accumulation and gradual optimization. In contrast, non-core sectors undergo rapid digital transformation, enabling subsidiary factories to become Industrial Internet demonstration sites and national high-tech enterprises with leading digitalization levels.

Through strategic digital bundling, the company stabilizes production quality and risk management, improves efficiency in inspection and packaging, and significantly enhances analytical and decision-making capabilities across marketing and distribution channels.

Stabilize supply chain quality through digital technologies

To stabilize supply-chain quality, the company addresses the Liquor Industry's reliance on experience and limited data integration by collaborating with research institutes to develop sensor technologies. Smart sensing devices are deployed in fermentation pits and production lines to monitor critical parameters in real time (B3). When anomalies occur, the system issues automatic alerts, enabling timely interventions and maintaining stable process control.

Enrich supply chain efficiency through bundling digital elements

Beta has extended digital technologies to downstream testing and packaging, introducing intelligent inspection equipment and improving automated detection precision. These digital elements allow data to be used beyond mere accumulation, enhancing product qualification rates and production efficiency and supporting higher-quality, more efficient supply chain operations (B4).

Pioneer data-driven decision-making through data value realization

According to the Director of the Procurement and Logistics Center (B3), "*the company integrates online and offline marketing channels and uses unique QR codes on products to*

enable direct consumer interaction, pioneering digital marketing practices." More accurate demand analysis has strengthened its downstream analytical and decision-making capabilities. The company has also built a big-data-driven tiered distributor management system that enables precise segmentation and coordinated channel development, allowing major distributors to support smaller regional partners and improving overall channel integration.

5.5.2 Capabilities from bundling financial services

Beta bundles differentiated financial services for upstream farmers and downstream distributors. Upstream, it supports farmers in accessing government-backed financing and accelerates capital turnover through cash payments for raw materials. Downstream, it provides financial guarantees to ease distributors' liquidity constraints. These bundled services improve financial risk control and enhance supply-chain stability.

Stabilize raw material supply through government subsidy alignment

Aligned with government policies, the company assists farmers in securing subsidies for high-standard farmland and funding for seeds, pesticides, and equipment. As noted by the Director of Procurement and Logistics (B3), these initiatives stabilize upstream raw material supply.

Stabilize manufacturer – distributor relationships through pledge guarantees

Downstream, the company offers financial guarantees that improve distributors' access to financing. This approach alleviates liquidity constraints, strengthens market expansion capabilities, reduces financial risks, and improves supply-chain stability and resilience (B1).

Enrich supply chain capital flow through cash payments

"*Combining cash payments with bank acceptance bills for raw material procurement, maintaining a 50 percent cash ratio,*" the Deputy General Manager (B1) explained. Compared with credit-based methods, this approach improves farmers' cash-flow efficiency, reduces financial pressure, and accelerates capital circulation in the upstream supply chain.

5.6 Resource leveraging

Beta emphasizes effective resource utilization beyond basic integration. It strategically mobilizes, coordinates, and deploys internal and external capabilities to achieve SSCM goals.

5.6.1 Mobilizing

To realize SSCM value, Beta proactively mobilizes external strategic partner resources and systematically activates internal organizational capabilities, aligning both to support sustainable development.

External resource mobilization

Beta strengthens its capabilities by mobilizing external strategic resources through cross-industry learning and collaboration. According to company materials (B9), "it organized environmental management personnel to visit other liquor industrial parks to enhance their environmental protection and sustainability capabilities." The Director of Procurement and Logistics (B3) added that "Beta has formed partnerships with leading art institutions—including the Academy of Arts & Design at Tsinghua University, Sichuan University Art School, Peking University Art Academy, and Jingdezhen Ceramic Institute—strengthening its cultural influence and competitive advantage." Beta also collaborates with Pernod Ricard to explore international markets.

Internal resource mobilization

Internally, the company mobilizes resources by strengthening departmental coordination and employee development. According to the Director of Procurement and Logistics (B3), "a dedicated Procurement and Logistics Center was established to oversee the entire process from raw material procurement to finished-product transportation, ensuring effective execution of strategic objectives. Through platforms such as the Action Academy, the firm cultivates second-tier talent and enhances organizational vitality." The Environmental Management Department promotes environmental awareness through advocacy and achievement exhibitions, encouraging broader employee participation in sustainability initiatives (B9).

5.6.2 Coordination

Beta emphasizes integrating and optimizing knowledge and incentive resources across the supply chain. Through differentiated training and targeted incentives, the company coordinates internal and external resources to ensure efficient resource flows aligned with strategic development objectives.

Share explicit and tacit SSCM knowledge

According to the Deputy General Manager (B1), "Beta organizes supplier conferences that provide systematic professional training for all suppliers, including its three affiliated factories, and incorporates training participation into supplier evaluation systems." Differentiated training

for ceramic, glass, and carton packaging suppliers promotes the sharing of explicit knowledge and tacit experience across the supply chain.

Establish SSCM-linked measurement and reward systems

To promote sustainable practices across the supply chain, the company has established clear evaluation and reward mechanisms. As the Deputy General Manager (B1) explained, "*each year it selects 40 natural villages of sorghum growers for financial rewards and support to encourage high-standard raw material production. Beta invests about 300 million yuan annually in these incentives to advance sustainable development across the supply chain.*"

5.6.3 Deploying

By strategically allocating resources to sustainable development goals and practices, Beta not only benefits itself but also enhances overall industry sustainability.

Standardize industry knowledge

Beta converts its innovations and management experience into standardized knowledge embedded in daily operations. In 2022, it issued the Internal Control Standards for Sauce-flavor Products, covering processes from raw material cultivation to distribution, and voluntarily accepted public supervision (B9).

Participate in setting industry standards

The Deputy General Manager (B1) mentioned: "*Beta established the Quality Research Institute to support Liquor Industry research and standard development.*" By advocating higher standards and quality orientation, it guides the industry toward more sustainable development.

5.7 SSCM performance

Through effective resource mobilization, coordination, and deployment, the company has strengthened internal collaboration and improved supply-chain efficiency and stability. This section examines the environmental, social, and economic performance outcomes of its SSCM practices.

5.7.1 SSCM environmental performance

Reduce and control environmental pollution

Beta implements environmental protection measures in its core sauce-aroma Baijiu region along the Chishui River. It has established an environmental management system across five

ecological brewing zones to secure clean water supply (B7). A dedicated wastewater treatment facility manages production wastewater and serves nearby communities, reducing pollution and improving ecological conditions (B3)

5.7.2 SSCM social performance

Driving local economic development

Leveraging its business growth, Beta promotes coordinated development across agriculture, tourism, services, and transportation in the Chishui River area, fostering local economic growth. As a regional industry leader, the company has established subsidiary factories in county areas, increasing local tax revenues and employment and significantly advancing regional economic development (B9).

Rural revitalization through industrial support

In response to the national rural revitalization strategy, Beta stabilizes farmer incomes by sourcing local agricultural products and supporting specialized industries such as eco-agriculture and tourism. This approach fosters sustainable rural economic development and provides long-term poverty alleviation solutions (B1).

Fund public welfare initiatives

The company maintains long-term commitment to public welfare, especially in education. In 2023, it partnered with nearly 200 enterprises and social organizations to support 275 disadvantaged students in completing their studies (B9).

Provide safe working environment and equal development opportunities

Beta prioritizes employee well-being by improving environments and working conditions, ensuring competitive compensation and fair promotion opportunities. Through the Action Academy, it supports talent development, career advancement, and individual growth (B1).

Advocate rational drinking and healthy lifestyles

As a leading Baijiu enterprise, Beta promotes responsible drinking and health awareness through marketing and brand communication, encouraging rational drinking habits and healthier consumer values (B8).

5.7.3 SSCM economic performance

Financial performance improvements

Through the systematic implementation of its SSCM strategy, the company has achieved steady revenue and profit growth over the past seven years and expanded its operational scale.

By 2026, revenue is projected to exceed 40 billion RMB, providing a strong financial basis for continued investment in sustainable development (B1).

Market share leadership

By optimizing its product portfolio, enhancing brand development, and strengthening cooperation with supply-chain partners, Beta has increased market share and consolidated its leading position in high-end sauce-aroma Baijiu (B1).

Enhanced operational efficiency

With the advancement of its SSCM strategy, Beta has optimized production, logistics, and warehousing operations, improving overall operational efficiency. After integrating filling and warehousing functions, inventory turnover increased substantially, reducing logistics and production costs (B4).

5.8 Case summary

Beta's SSCM is shaped by both external and internal drivers. Externally, market restructuring, intensified competition, and stakeholder expectations have reinforced its sustainable supply chain strategies. Internally, long-term strategic goals, a responsibility-oriented culture, and favorable natural resources support steady progress in sustainable supply-chain development.

This chapter highlights Beta's key SSCM practices and outcomes, as summarized in Table A5.1 in the Annex. In procurement, distributed grain bases stabilize raw material supply and reduce uncertainty, while in-house packaging subsidiaries create a more vertically integrated supply chain. In distribution, a participatory estate membership ecosystem enhances consumer engagement and long-term value co-creation, while strategic distributor selection and targeted financial support promote coordinated channel growth. In production, Beta stabilizes process quality and risk control while improving efficiency in inspection and packaging.

Nonetheless, several limitations persist. First, packaging supply remains heavily dependent on internal subsidiaries, increasing single-sourcing risks and limiting external competition. Second, digital adoption is conservative, focusing on production monitoring, process optimization, and consumer engagement, leaving gaps in broader supply-chain digital collaboration. Third, the supply-chain finance model is largely one-directional, offering support mainly to downstream distributors, with limited inclusion of upstream suppliers. A more comprehensive green finance and risk-sharing mechanism for both upstream and downstream partners has yet to be established. Table A5.2 shows the open codes summary of Beta.

Chapter 6: Within-Case Analysis – Gamma

This chapter presents a contextualized within-case analysis of Gamma, the third case enterprise. Guided by the research objectives, research questions, and the overall data structure developed through data analysis, it reveals the specific SSCM practices and internal logic through which Gamma advances SSCM. Building on the previous two chapters, it adds more complete case evidence and provides a fuller basis for the cross-case comparison in Chapter 7. SSCM practices remain the central analytical thread, as they are not only a core variable in the research questions, but also an important process linking drivers, changes in the resource base, capability formation, and performance realization.

6.1 Background information

Gamma, formed in 1959 through the merger of several Yibin distilleries, is a leading producer of strong-aroma baijiu. Since 2008, it has incorporated CSR disclosures into its annual reports, affirming its commitment to sustainability. In alignment with China's dual-carbon targets, Gamma integrated low-carbon development into its strategic framework and introduced the "zero-carbon baijiu enterprise" concept.

Gamma's sustainability strategy has three components. First, it established a specialized subsidiary for grain and packaging procurement to stabilize supply and reduce single-supplier risk. Second, it created a Risk Control Committee and implemented a multi-level supplier evaluation and risk-management system. Third, Gamma leverages internal and external resources to improve logistics efficiency and provide supply-chain financial services through group subsidiaries and external institutions.

6.2 Drivers of SSCM

Gamma's SSCM practices are shaped by external and internal drivers. Externally, policy regulations, industry competition, and stakeholder expectations compel stronger environmental protection and compliance. Internally, strategic orientation, organizational culture, and resource advantages drive the advancement of SSCM initiatives.

6.2.1 External drivers

Coercive pressures from policies and regulations

China's tightening environmental regulations and stricter discharge permit requirements push Gamma to upgrade its environmental facilities and pollution-control systems. According to the 2023 CSR Report (C14), the company received no administrative penalties related to environmental issues.

Coercive pressures from market demand changes

Growing consumer attention to sustainability and authenticity drives Gamma to adjust procurement, packaging, and marketing practices. As noted by the Supervisor of the Material Procurement Center (C3), "*The company strictly prohibits unsubstantiated claims, abandoning vague expressions on packaging materials such as ten-year-aged liquor*."

Mimetic pressures from industry competition

As baijiu industry growth has slowed and competition has shifted to a zero-sum contest over existing demand, requirements for standardized and compliant supply chain management have intensified (C16). In response, Gamma has enhanced transparency by continuously publishing its Social Responsibility Report and pioneering an English ESG Report. As the Supervisor of the Material Procurement Center (C3) noted, "*ESG used to be only a small section in the annual report, but it is now published as a standalone report*".

Normative pressures from stakeholders

Stakeholder expectations—especially regarding environmental protection—strongly influence Gamma's SSCM practices. To meet governmental requirements, suppliers in high-risk activities have increased investment in environmental facilities. Gamma collaborates with environmentally capable suppliers to strengthen upstream–downstream cooperation (C3)..

6.2.2 Internal drivers

Drivers from corporate strategy

Gamma adopts "ecology first, green development" as its long-term strategy, aligning with China's dual-carbon goals and promoting the "zero-carbon baijiu enterprise" initiative (C14). Guided by this strategy, Gamma advances a five-pillar approach—ecology, quality, culture, digitalization, and transparency—to pursue sustainable development through economic, green, and inclusive progress," noted the Manager of Strategic Development (C1).

Drivers from organizational culture

Gamma embeds a culture of "green, low-carbon, and balanced development" into its

management practices. The 2023 CSR Report (C14) highlights the company's efforts to strengthen cultural identity and collective action, integrating ecological values into organizational norms and daily operations.

Drivers from resource advantages

"*Situated in the ecologically important upper Yangtze River region, Gamma benefits from unique natural resources, including nationally protected fermentation pits and leading brewing techniques,*" noted the Manager of Strategic Development (C1). These ecological and technical assets strengthen the company's environmental responsibility and motivation for sustainability.

6.3 SSCM practices

This section outlines Gamma's SSCM initiatives, including establishing long-term grain supply bases, integrating internal resources, and diversifying external suppliers to ensure supply chain continuity. Gamma collaborates with research institutions to advance technological innovation and enhances risk management through rigorous ESG standards and lifecycle assessments, while promoting clean production technologies and sustainable packaging.

6.3.1 Supply chain continuity

Long-term relationships with dedicated grain bases

C2 explained: "*Gamma ensures stable grain supply by establishing 1.323 million mu of dedicated grain bases through a* "*leading enterprise + research institutes + cooperatives + production bases + farmers*" *model. Its subsidiaries sign order-based contracts, offer high-quality seeds and organic cultivation support, and purchase raw grain at premium prices.*" To reduce risks, Gamma cooperates with grain groups and expands cross-regional supply channels.

Partner selection of internal and external packaging

Gamma ensures packaging stability through controlled subsidiaries while reducing single-supplier risk by diversifying external partners (C7). It maintains strict qualification and ESG standards, partnering with 217 suppliers by 2023.

Distributor partner development

Gamma develops distributor partnerships through an approach of "selecting, supporting, optimizing, and benefiting" distributors (C16). It hosts the "12·18 Co-creation and Shared Development Conference" to enhance alignment and benefit sharing, and has established sales subsidiaries to improve channel flexibility and support diverse product categories.

6.3.2 Supply chain collaboration

Joint development

As noted in the 2023 CSR Report (C14), "*Gamma leverages the 'Green Design Platform for Pure-Grain Solid-State Fermentation Baijiu' to collaborate with upstream and downstream partners, research institutes, and technical service providers to advance brewing and environmental process innovation, especially the high-quality brewing grains.*"

Logistics integration

"*Gamma enhances logistics efficiency by forming an integrated logistics network with its wholly owned logistics subsidiary,*" the Deputy General Manager of Gamma's Logistics Company (C10) gave a detailed introduction. Through warehouse optimization, standardized operations, and the use of new-energy vehicles and multimodal transport, the company reduces costs and energy consumption. The logistics subsidiary also provides collateral management services for distributor inventory financing.

Technological integration

In 2018, Gamma launched an ERP project integrating production, blending, packaging, sales, and finance across 16 subsidiaries to improve supply chain management and decision-making. As C6 noted: "*the ERP system strengthened process integration, improved production–sales coordination, and enhanced internal management efficiency*."

Enhanced communication

Gamma strengthens communication with upstream and downstream partners through both online and offline channels. Offline, it regularly meets with suppliers and distributors to align goals and standards, and expands its "three stores, one restaurant" retail model to enhance interaction (C16). Online, Gamma operates a comprehensive membership system to improve market forecasting, inventory management, and production planning (C6).

6.3.3 Risk management

Supplier ESG entry standards

Gamma strengthens risk management by revising supplier entry criteria to include ESG performance. Suppliers must provide quality certifications, ESG assessments, and food safety documents. As the Supervisor of the Material Procurement Center (C3) noted, "*the company also requires proof of employee social insurance.*"

Individual supplier risk monitoring

Gamma monitors supplier risks through quality assurance agreements that define

qualification rates and delivery punctuality. It evaluates contract compliance, product quality, and environmental performance, and uses big-data tools to track supplier plans, production, and inventory in real time. Quarterly inspections help identify and address issues (C1).

Pressure group management

The 2023 CSR Report (C14) details how Gamma addresses internal and external pressures. Externally, it supports market rectification campaigns and operates authentication service stations to curb counterfeiting. Internally, Gamma reinforces control through standardized processes, tiered supplier assessments with regular monitoring, and a risk prevention committee centered on internal audits.

Environmental purchasing

Gamma incorporates environmental requirements into supplier management, requiring compliance with green procurement standards and the adoption of eco-friendly technologies. The Deputy Director of the Energy and Environmental Protection Management Department (C11) illustrated: "*the company encourages suppliers to use sustainable materials and innovative processes to reduce pollution.*"

Green packaging

Gamma advances green and low-carbon packaging through explicit standards requiring suppliers to use eco-friendly materials and recycle packaging waste, thereby reducing resource consumption (C3).

Life cycle assessment

Gamma implements full lifecycle quality management "from seed to sip," ensuring strict control and traceability across the supply chain aiming for "zero incidents" (C12). Supported by a comprehensive food safety system and advanced monitoring technologies, the company continuously optimizes production processes and clarifies quality responsibilities at each stage.

6.3.4 Pro-activity

Green brewing innovation

Gamma advances green brewing innovation by collaborating with universities to develop analytical models and data platforms that improve yield and production efficiency. The company has established seven national-level innovation platforms and strengthened intellectual property management to support sustained technological leadership (C1).

Employ clean production technologies

Gamma adopts clean production technologies by integrating traditional craftsmanship with

automation and digitalization to reduce energy use and enable 24-hour monitoring. As the Deputy Director of the Information Management Center (C5) explained, "*the wastewater treatment system uses materials and multi-layer filtration to meet discharge standards.*"

Environmental awareness training

Gamma emphasizes environmental awareness training for employees and suppliers. Through its Education and Training Center, the company provides training and communicates environmental requirements through notifications and supplier conferences (C3).

6.3.5 Stakeholder management

Improve disclosure transparency

Gamma has enhanced disclosure transparency by independently issuing ESG reports since 2022. The 2024 CSR Report (C1) noted that "*the company was among the first in the industry to publish English-language annual and ESG reports in 2019, responding to growing demand from international investors and the public.*"

Establishing lasting relationships with stakeholders

Gamma continually enhances its comprehensive membership system to maintain close and sustained engagement with stakeholders, particularly consumers (C16). In response to local government and community needs, Gamma is actively promoting the designation of its industrial park as a national tourist attraction, integrating ecological preservation, cultural experiences, and industrial tourism.

Innovate products to meet diverse stakeholder needs

Gamma innovates products to meet diverse stakeholder needs. C3 noted: "*The innovation center's 35 R&D staff partner create culturally inspired products.*" The company also develops product lines for younger consumers and co-develops culturally innovative products with distributors and suppliers.

6.4 Resource structuring

Gamma structures its resources for sustainable development through SSCM practices. It acquires external resources and accumulates internal ones, divests inefficient resources to refocus on core businesses, and inherits cultural assets to support brand building and product innovation. Details are shown in Table A6.1 in the Annex.

6.4.1 Acquiring

Acquire high-quality grains and establish strategic alliances

Through SSCM, Gamma secures grain resources and strategic alliances with suppliers and distributors. Large grain bases and long-term cooperation with enterprises, research institutions, and farmers ensure stable supply. Subsidiaries, diversified suppliers, strict distributor selection, and logistics partnerships strengthen procurement reliability, channel effectiveness, coordination, and competitiveness.

6.4.2 Accumulating

Accumulate organizational resources for supply chain collaboration

Gamma accumulates collaborative resources through joint development, logistics integration, and stakeholder engagement. Its "Green Design Platform" links research institutions and partners to advance innovation. ERP deployment supports data sharing and coordination, while collaboration with the logistics subsidiary builds an integrated network. Communication with distributors, retailers, and consumers enhances responsiveness (C6).

Accumulate organizational resources for risk and quality management

Through SSCM practices, Gamma develops resources for risk and quality management. Its quality system spans procurement to final sales, with strict food safety controls and full-process traceability (C13). A graded supplier evaluation system and structured risk monitoring further strengthen supply chain stability and efficiency (C3)..

Accumulate patents and technological resources

Gamma promotes process innovation and accumulates patents (C4). The adoption of clean production technologies reduces energy use and emissions, strengthening its intellectual property portfolio in environmental technologies (C14).

Accumulate member-based resources

Gamma strengthens member-based resources through long-term stakeholder engagement, building customer trust that supports product innovation and market expansion (C6).

Accumulate a sustainability-oriented corporate culture

Gamma has transformed its sustainability values into organizational routines through long-term practices, embedding ecological and low-carbon principles across departments and strengthening internal cohesion (C14).

Accumulate stakeholder trust and support

Through years of transparent disclosure, dialogue, and collaborative initiatives with

suppliers, distributors, government agencies, and consumers, Gamma has gradually transformed its network of stakeholder relationships into a valuable relational resource (C16).

6.4.3 Divesting

Divest low-contribution channels, distributors, and products

Gamma improves market responsiveness by divesting low-contribution distributors and products. As the Executive Deputy Director of the Strong-Aroma Liquor Company (C9) noted, it flattens channels in mature markets while making cautious, cost-controlled adjustments in less developed regions. Gamma is shifting from large distributors to smaller local partners and reallocating resources to premium and leading brands.

Focus resources on core businesses and key functions

Gamma concentrates resources on core businesses by streamlining its organizational structure and consolidating key functions. The company established a centralized Materials Procurement Center in 2018 to improve efficiency and cut packaging, office supply, and IT procurement costs. It also created a strong-aroma liquor subsidiary to unify operations and strengthen brand management, and merged its marketing and anti-counterfeiting teams. (C1).

6.4.4 Inheriting

Integrate cultural research into brand promotion

Gamma integrates cultural research into brand promotion by preserving and innovating its cultural resources. As noted in the Strategic Development Department's written response (C16): "*we established three cultural platforms—the Cultural Research Institute, the Poetry and Liquor Culture Center, and the Knowledge Promotion Base.*"

Drive baijiu cultural development through technological innovation

As the Assistant Director of the Technology Research Center (C4) recalled, "*Gamma advances baijiu culture by using modern technologies to reinterpret traditional brewing techniques and support contemporary cultural transformation.*" The company also draws on traditional heritage to develop culturally distinctive products.

6.5 Resource bundling

As a listed firm facing supply chain complexity and financial pressure, Gamma combines digital technologies with financial services to strengthen operational resilience. ERP, intelligent

logistics, and analytics enhance integration and coordination, while group credit and external finance improve liquidity, risk control, and innovation.

6.5.1 Capabilities from bundling digital technologies

Gamma adopts an incremental digital bundling strategy of "local advancement followed by integrated coordination." It first implements digital quality management, intelligent logistics, and ERP systems, then consolidates them into a unified data-analytics platform. The digital transformation roadmap launched in 2023 further accelerates supply-chain digitalization.

Stabilize supply chain quality through digital technologies

Gamma stabilizes supply chain quality through a comprehensive digital quality management system covering grain processing, brewing, packaging, warehousing, and distribution. Its smart logistics platform integrates big data, AI, and IoT for real-time interaction and scheduling. Data-driven coordination aligns production and logistics, while a unified internal control and quality system further reinforces supply chain reliability (C14).

Enrich supply chain collaboration by breaking data silos

By refining ERP systems across production, procurement, and sales, Gamma strengthens decision-making. Additionally, "*office systems, communication tools, and knowledge platforms enable information sharing and coordination among departments and subsidiaries*" the Manager of the Information Management Center (C6) explained in an interview.

Enrich supply chain efficiency through bundling digital elements

Gamma's digital transformation streamlines and standardizes business processes, reducing costs and improving operational efficiency. C14 noted that "*online recruitment and employee self-service platforms improve HR management; electronic bidding increases procurement transparency; and automated warehousing ensures accurate inventory control, reducing operating costs.*"

Pioneer data-driven decision-making through data value realization

Gamma extensively applies digital technologies to enhance supply chain analytics and decision-making capabilities. Centered on its ERP system, the company has established an integrated data management architecture that consolidates key data into a centralized decision-analysis platform, enabling multidimensional analysis and strengthening data-driven decision-making (C6). In addition, Gamma has established a dedicated Consumer Operations Management Department, which leverages data analytics and consumer profiling to improve the precision of market decisions and unlock the value of its data assets (C9).

6.5.2 Capabilities from bundling financial services

Due to long procurement and storage cycles and distributors' prepayment requirements, the liquor Industry faces significant financing pressures. Gamma addresses these challenges by integrating internal and external financial resources—leveraging group credit through its finance subsidiary and partnering with financial institution to establish efficient financing channels for both upstream suppliers and downstream distributors.

Stabilize manufacturer – distributor relationships through pledge guarantees

Gamma stabilizes manufacturer–distributor relationships by recommending distributors to banks and providing collateral guarantees and inventory monitoring services. Its logistics subsidiary manages pledge supervision to ensure and efficient financing arrangements (C9).

Enrich supply chain risk-control through internal and external financial resources.

Leveraging its strong credit profile, Gamma secures low-cost funding from the interbank market. As explained by C8: "*the company's 2020 investment in commercial bank stabilized funding channels. Through its finance platform, Gamma allocates capital to subsidiaries and suppliers facing liquidity constraints, improving supply chain financial stability.*"

Pioneer innovative banking practices through internal financial companies

Gamma's finance subsidiary acts as a bridge between the company and financial institutions, pioneering innovative supply-chain finance practices. As C8 explained in the interview, "*the subsidiary explores financial services beyond traditional banking and provides external institutions with business insights and models for innovation.*"

6.6 Resource leveraging

This section explains how Gamma creates SSCM value by mobilizing, coordinating, and deploying resources to strengthen its competitive advantage and contribute to sustainability.

6.6.1 Mobilizing

Gamma actively mobilizes internal and external resources through strategic partnerships and organizational optimization to support strategic initiatives and business operations.

External resource mobilization

"*Gamma mobilizes external resources by collaborating with partners such as Huawei, Alibaba, IBM, and SAP to advance smart retail, intelligent supply-chain management, and data analytics,*" noted the Strategic Development Department (C16). These partnerships accelerate

digital transformation and improve supply-chain efficiency

Internal resources mobilization

Gamma mobilizes internal resources through organizational restructuring that enhances cross-department collaboration. "*Under the Chairman's leadership, the company established an Environmental Management Committee and an IT Department responsible for digitalization, information, and knowledge management*," as noted by C6. It also optimizes compensation, performance systems, and talent incentives to foster innovation and corporate growth.

6.6.2 Coordination

Resource coordination is essential for achieving optimal integration and allocation of supply-chain resources. Gamma enhances collaboration across the upstream and downstream supply chain through knowledge sharing, well-structured incentive systems, and the promotion of standardized practices. These measures facilitate effective resource allocation, enabling Gamma to realize its sustainable supply-chain development goals.

Share explicit and tacit SSCM knowledge

Gamma promotes SSCM coordination by sharing environmental and low-carbon requirements with suppliers. C3 stated: "*suppliers must sign the Notification on Energy and Environmental Requirements, through which Gamma defines environmental and hygiene standards for packaging materials to ensure consistency in sustainability objectives across the supply chain*" The company communicates policies through regular supplier conferences.

Establish SSCM-linked measurement and reward systems

Gamma links supplier evaluation and incentives to sustainability performance. Suppliers are classified into four tiers—temporary, qualified, premium, and strategic—with responsibilities adjusted (C14). As C3 noted, *"assessments focus on delivery, quality, operations, and service, shaping order allocation, while strategic suppliers receive incentives."*

Extend SSCM standards across the supply chain

Gamma extends SSCM standards across its supply chain through progressive digital integration. Departmental information systems introduced in 2012 and a supply-chain management platform launched in 2016 laid the foundation for a unified ERP system in 2018 (C6). Marketing-focused digital platforms further integrate business and data systems, embedding SSCM standards throughout the supply chain.

Build a collaborative industry ecosystem

"*Gamma has built an integrated industry ecosystem centered on its core baijiu business,*

supported by modern logistics, packaging, and financial services," as noted by the Strategic Development Department (C16). This ecosystem spans upstream grain bases, midstream logistics and packaging, and downstream industrial–financial integration. These coordinated efforts create resource and capability synergies, strengthening competitiveness (C16).

6.6.3 Deploying

In advancing SSCM, Gamma emphasizes the roles of knowledge management and industry standards in industrial upgrading. The company embeds brewing research and digital expertise into organizational routines, engages in industry exchanges and standard-setting, and promotes industry advancement.

Embed knowledge into organizational routines

Gamma embeds knowledge into organizational routines by incorporating research findings—such as the released profiles of over 3,000 flavor compounds—into standardized production and quality management processes, supporting sustainable development (C14).

Promote experience sharing and technical exchanges across industries

C6 noted: "*As one of Sichuan's first Digital Transformation Promotion Centers, Gamma shares its digital transformation experience with SMEs.*" Through this dissemination, Gamma strengthens its advantage while accelerating digital advancement across the industry.

Participate in developing standards

Gamma supports sustainable development by leading industry standard-setting. It works with agricultural authorities and research institutes to develop green brewing-grain standards and, as Chair of the China Alcoholic Drinks Association's Social Responsibility Committee, helps formulate ESG disclosure and assessment guidelines (C14).

6.7 SSCM performance

The primary objective of SSCM is to harmoniously integrate environmental, social, and economic performance. This section outlines Gamma's specific performance outcomes resulting from its systematic SSCM practices.

6.7.1 SSCM environmental performance

Improve resource efficiency and waste utilization

Gamma has significantly improved environmental sustainability, particularly in resource

efficiency and waste management. By adopting advanced energy-saving technologies, it has established a energy infrastructure and increased the use of non-fossil energy sources (C11).

Strengthen environmental pollution control and ecological restoration

In pollution control, Gamma strengthens pollution control by operating a demonstration brewing line that meets green production guidelines and ensures compliant emissions. It also contributes to ecological restoration by constructing wetlands that integrate wastewater treatment with landscape functions (C11).

6.7.2 SSCM social performance

Invest development funds to support rural revitalization

Leveraging its leadership, Gamma supports rural revitalization by establishing multi-billion-yuan development funds and agricultural demonstration bases to encourage resumed cultivation, while developing agri-tourism models that generate economic and ecological value. These initiatives have generated over 300 billion yuan in industry-chain output, supported about 300,000 jobs, and delivered technical and workforce training locally (C14).

Engage in community services and educational donations

Gamma has invested nearly 3 billion yuan in public welfare initiatives benefiting around one million people. It also conducts community activities that improve resident well-being and satisfaction (C14).

Provide safe working environment and equal development opportunities

Gamma ensures a safe and equitable workplace by modernizing equipment to maintain a zero-accident record. It enhances compensation and welfare, strengthens employee-care mechanisms, protects labor rights, and promotes a diverse and inclusive culture. The company also operates a national training base to develop skilled talent (C14).

Promote responsible drinking and healthy lifestyles

Adhering to responsible marketing principles, Gamma promotes responsible drinking by prohibiting underage consumption and disseminating scientific drinking practices to encourage healthier lifestyles (C14).

6.7.3 SSCM economic performance

Financial performance improvements

Between 2020 and 2024, Gamma paid over 10 billion yuan annually in cash dividends, totaling 116 billion yuan across 24 payouts—more than 30 times its IPO proceeds. The 2024

dividend was the highest on record (C13).

Market share leadership

As a leading enterprise in the strong-aroma liquor Industry, Gamma continues to reinforce its market leadership. At the 2024 "12·18 Co-creation and Shared Development Conference," Gamma announced record sales figures and reaffirmed its dominant market share (C14).

Enhanced operational efficiency

Leveraging ERP systems and a marketing platform, Gamma enhances operational efficiency, which improves coordination across production, procurement, and sales. Electronic bidding, centralized procurement, and integrated HR systems reduce supply-chain and administrative costs (C6).

6.8 Case summary

Gamma's SSCM practices are shaped by external pressures (e.g., regulation, market dynamics, and stakeholder expectations) and internal drivers such as its "zero-carbon baijiu enterprise" vision, culture, and ecological resource endowments, sustaining SSCM momentum.

Table A6.1 in the Annex highlights Gamma's key SSCM practices. In procurement, Gamma combines holding subsidiaries with a diversified external supplier network to ensure supply stability, while using graded supplier evaluation and routine risk monitoring to improve supplier quality and environmental performance. In distribution, it promotes channel flattening and refined market operations, supported by nationwide market rectification, digital technologies, and smart retail stores that strengthen engagement with distributors and consumers. In production, Gamma adopts advanced ecological technologies and a digital quality management system to enable process visualization and 24-hour online monitoring. With ERP as its core, Gamma breaks down data silos and improves integration across the production–supply–sales chain. In addition, the group's financial platform and external financial resources help ease supply chain financing pressure and strengthen overall resilience.

However, limitations persist: digital collaboration remains internal with limited partner integration; financial services rely on group credit and bank financing with weak links to blockchain, AI, and IoT; and clean-technology initiatives such as wetland construction remain enterprise-led with limited engagement from government, research institutions, or NGOs. Table A6.2 summarizes Gamma's open codes.

Chapter 7: Cross-Case Analysis

Building on the within-case analyses, this chapter further conducts a cross-case analysis. Within-case analysis helps reveal the internal logic and implementation processes through which different enterprises advance SSCM in specific contexts. However, a single case alone makes it difficult to determine which findings reflect cross-case commonalities and which represent enterprise-specific differences. Therefore, this chapter undertakes a cross-case comparative analysis around the five core themes identified in the preceding data analysis. It seeks to derive the common characteristics of how baijiu enterprises advance SSCM from the concrete practices of the case enterprises, explain the key differences and their underlying causes, and, on this basis, generate empirically grounded findings with analytical generalization, thereby laying the foundation for the theoretical discussion in Chapter 8.

7.1 Drivers of SSCM

Case analyses identify common external and internal drivers for SSCM practices among the case enterprises (Table A7.1). Externally, stringent environmental regulations compel enterprises to enhance compliance and investment. Market shifts necessitate supply-chain adjustments to manage uncertainties. Industry competition drives continuous optimization, while stakeholders' social responsibility expectations prompt sustainable practices. Internally, enterprises align strategic goals with sustainability, social responsibility, and economic development. Cultures emphasizing gratitude, respect for nature, and environmental protection underpin supply-chain transformation. Unique natural resources and traditional craftsmanship encourage resource conservation and sustainable use.

However, notable differences exist in coercive pressures from policies and regulations. Shaped by past policy and market disruptions, Alpha emphasizes efficiency and flexibility in sourcing, production, and logistics to mitigate risks. Beta consistently exceeds regulatory standards and prioritizes a long-term sustainability vision. Gamma, as an industry leader under greater social scrutiny, sets rigorous internal and supplier standards. Its ambition to become a "zero-carbon enterprise" drives major investments in clean energy, low-carbon technologies, and eco-parks. Table A7.1 and Table A7.2 in the Annex summarize the distribution and cross-case comparison of SSCM drivers..

7.2 Resource structuring

The SSCM practices of Alpha, Beta, and Gamma follow three stages: resource structuring, bundling, and leveraging. Resource structuring encompasses acquisition, accumulation, divestment, and inheritance. This section compares resource structuring across the cases, highlighting shared patterns and key differences. Common practices—such as order-based procurement, strategic alliances, environmental training, green innovation, and stakeholder engagement—support supply security, collaboration, sustainability-oriented culture, and supply-chain competitiveness. Differences arise from variations in supply-chain structure, strategy, and resource bases, in logistics and packaging models, risk-control mechanisms, non-core resource divestment, and approaches to cultural resource inheritance and innovation.

7.2.1 Resource acquisition

Raw materials, packaging suppliers, downstream distributors, and logistics resources directly shape product quality, sales performance, and supply-chain efficiency. While all three enterprises secure key resources through long-term cooperation and strategic alliances, notable differences appear in packaging procurement and logistics strategies, reflecting varying approaches to risk control, cost management, and quality assurance.

7.2.1.1 Similarities

Order-based procurement of brewing grains ensures stable raw material supply.

Specialized grains—such as sorghum and corn—strongly influence liquor yield and quality but face volatility due to weather, policy shifts, pests, and diseases. Standardized order-based procurement reduces investment risks, management costs, and production uncertainty. Gamma and Beta build multi-region grain bases and collaborate with leading agricultural firms to diversify risks and improve supply flexibility.

Manufacturer-dealer interest communities form strategic distributor alliances.

The enterprises form long-term manufacturer–dealer alliances based on shared interests, yielding several benefits: aligned incentives that support market stability, distributors' resources that help quickly stabilize regional markets, improved efficiency through information sharing and joint inventory management, and enhanced supply-chain flexibility and responsiveness—essential for coping with seasonal and holiday-driven Baijiu demand.

Deep integration of logistics resources enhances supply chain efficiency.

Given Baijiu's high value and fragility, logistics require strict control. The enterprises adopt different approaches: Alpha collaborates broadly with third-party providers to build an integrated logistics system; Beta establishes a logistics subsidiary to enhance responsiveness through tighter information management; Gamma uses its group logistics subsidiary and smart logistics initiatives to integrate operations across production and distribution.

7.2.1.2 Differences

Differentiated selection of packaging suppliers.

Packaging materials are critical to product safety, quality, and brand image, with supply disruptions constraining peak-season production. The enterprises therefore adopt distinct strategies aligned with their resource endowments. Alpha depends on external suppliers under strict quality and environmental standards to limit in-house investment. Beta achieves vertical integration through packaging subsidiaries to meet high quality requirements. Gamma follows a dual-track approach, combining internal supply for key inputs with external sourcing to balance cost, control, and risk.

7.2.2 Resource accumulation

Resource accumulation emphasizes gradually strengthening internal resources, including risk and quality management standards, sustainable corporate culture, technological patents, stakeholder trust, and membership bases. However, significant differences exist among the cases in accumulating "organizational resources for supply chain collaboration" and "risk and quality management standards," driven by varied supply chain structures and strategic priorities.

7.2.2.1 Similarities

Environmental training to build a sustainable corporate culture.

SSCM requires a supportive corporate culture (Osei et al., 2023). All three enterprises reinforce sustainability through ecological and environmental training for employees and suppliers. Alpha embeds environmental training into ESG culture promotion; Beta raises awareness through expert seminars and on-site demonstrations; Gamma uses systematic training to align perceptions across employees and supply-chain partners.

Green brewing innovations to accumulate patents and intellectual property (IP).

Energy-efficient technological innovations and brewing process improvements enhance production efficiency and cost control while reducing environmental impact (Dubey et al.,

2017). Enhance efficiency, cost control, and environmental performance. The cases introduce pollution control, energy-efficient technologies, ecological materials, and wastewater treatment to support cleaner production. Collaboration with universities helps address R&D gaps and facilitate technological application. Alpha and Gamma have mature IP management—Alpha via a dedicated technology subsidiary and Gamma through standardized IP certification—whereas Beta lacks a clearly defined IP system.

Proactive stakeholder engagement to build trust and support.

The cases respond to expectations from suppliers, consumers, and government to improve transparency, compliance, and trust. Alpha prioritizes long-term trust building and identifies stakeholder needs through ESG materiality analyses. Beta uses innovative incentives to engage stakeholders and optimize operations. Gamma, an early adopter of CSR and ESG reporting (including English versions), addresses international investor and regulatory information needs.

Online-offline channel integration to accumulate membership resources.

To respond to shifting consumer demand and market competition, enterprises integrate online and offline membership channels. Enhanced information interaction improves responsiveness and product innovation supports diverse preferences. Alpha broadens its consumer base through branding activities and data analytics to reduce product-launch risks. Beta uses its estates as experiential platforms to deepen emotional ties and promote innovative mixed-flavor products. Gamma refines membership systems, integrates market insights from partners, and collaborates with distributors and suppliers in new product development.

7.2.2.2 Differences

Supply chain cooperation: accumulating collaborative foundation resources.

Collaborative management improves resource integration, allocation efficiency, and responsiveness while reducing transaction and information risks (Neubert et al., 2004). Information sharing and data integration form the basis for collaboration (Baah et al., 2022; Neubert et al., 2004), though approaches differ across enterprises.

Alpha emphasizes production-side collaboration through joint equipment development, lighthouse factories, and supplier platforms, with information sharing improving efficiency and quality. Gamma integrates production, supply, and sales through ERP systems, focusing on marketing-side information integration. Its intelligent stores and digital marketing enhance distributor–consumer interaction, responsiveness, and inventory accuracy. These differences reflect distinct supply-chain strategies and resource priorities. Beta's high vertical integration, particularly in packaging and ceramics, reduces its reliance on external collaboration.

Risk management: accumulating organizational resources for risk and quality management.

Given the Baijiu supply chain's complexity, failures at any stage can affect product quality and brand reputation; thus, the enterprises strengthen risk and quality management through internal controls, traceability, and environmental standards.

Gamma adopts the most comprehensive system, integrating supply-chain quality controls. It maintains a risk management committee, uses big-data monitoring, conducts ESG supplier evaluations and inspections, mandates eco-friendly packaging, and limits over-packaging. Alpha emphasizes industrial-chain integration, applying environmental requirements in procurement and packaging mainly through park-based contracts. Beta focuses on internal controls, material traceability, and standards exceeding national requirements but employs fewer ESG evaluations and real-time monitoring tools.

The differences reflect variations in supply-chain complexity and market scale, with Gamma's larger and complex network requiring more stringent risk-management practices.

7.2.3 Resource divestment

Effective divestment of non-core resources enables enterprises to focus on critical supply-chain segments, reducing costs and improving efficiency (Long et al., 2025).

7.2.3.1 Similarities

Divesting redundant organizational resources.

The cross-case comparison reveals a common pattern in resource divestment among the three enterprises: all have divested inefficient organizational structures and outdated human resources to optimize internal resource allocation. Specifically, Gamma integrated departments such as procurement and marketing to unify functions and streamline structures, thereby improving coordination and decision-making responsiveness. Beta implemented a performance-based elimination mechanism aimed at optimizing organizational structure and increasing talent density. Alpha likewise enhanced managerial efficiency and strategic focus through organizational restructuring and team reconfiguration.

7.2.3.2 Differences

Divesting low-contribution or over-dependent channels and products.

The case enterprises exhibit strategic differences in their divestment approaches, arising from variations in market environments, stages of development, resource allocation priorities,

and strategic objectives. Historically, Alpha faced high channel dependence, excessive reliance on government-related consumption, and a complex product portfolio. In response, it streamlined its product structure, reduced channel dependence risks, optimized its supply chain configuration, and even implemented the strategic divestment of non-core businesses. As market maturity increased, Gamma gradually abandoned the extensive “large-distributor model” and shifted toward cooperation with high-quality small and medium-sized distributors. At the same time, it eliminated products with unclear positioning and low value contribution to enhance channel efficiency and market precision. By contrast, Beta, benefiting from a clearly defined flagship product and a relatively concentrated channel structure, has not undertaken comparable large-scale product or channel divestments.

7.2.4 Resource inheritance

7.2.4.1 Similarities

The inheritance and innovation of cultural resources contribute to supply-chain development by enhancing competitiveness, consumer recognition, and craftsmanship-based innovation. All three enterprises promote cultural inheritance through internal development, research collaboration, and cultural marketing. Alpha emphasizes traditional Chinese liquor culture, Gamma converts cultural research into product innovation, and Beta differentiates its high-end positioning through estate-based cultural experiences. Cultural inheritance strengthens stakeholder recognition and supports supply-chain practices. Cases use digital tools to preserve traditional knowledge and integrate craftsmanship with modern technology, promoting cultural innovation. Table A7.3 and Table A7.4 in the Annex present the distribution and cross-summary of SSCM practices in the three companies.

7.3 Resource bundling

ROT emphasizes that firms bundle resources via stabilizing, enriching, and pioneering pathways to shape capabilities. In the baijiu cases, bundling digital technologies and financial services strengthens supply chain reliability, collaboration, cost performance, visibility, and financial robustness, with variation in scope and depth across cases. It also enhances dynamic capabilities, including Reflexive Control, Knowledge Management, Co-Evolving and Partner Development, and Supply Chain Re-Conceptualization.

7.3.1 Cross-case analysis of digital technology bundling

From 2021 to 2025, China promoted digital transformation in traditional industries, including Baijiu, during which the case enterprises adopted different digital technology bundling models. This section analyzes these differences and their underlying causes.

7.3.1.1 Comparison of digital technology bundling models

Digital bundling in the three enterprises follows phased development. Alpha advanced digitalization in procurement, warehousing, logistics, and finance during the 13th Five-Year Plan and achieved end-to-end integration in the 14th. Beta evolved from digital monitoring to standardized production and integrated online–offline channels, while Gamma started with ERP and gradually expanded applications across the supply chain.

However, the case enterprises adopted distinct digital bundling models (see Table A7.5 in the Annex), largely driven by differing strategic objectives. Alpha engaged consulting firms to develop a comprehensive strategy and systematically promoted supply-chain and internal digitalization. By contrast, Beta and Gamma initially lacked an overall strategy. Gamma emphasized cross-departmental integration through phased implementation, whereas Beta prioritized standardizing traditional production, progressing rapidly in non-core areas such as packaging and quality inspection and forming a hybrid deployment pattern.

Supply-chain complexity shapes these differences. Alpha, relying mainly on external suppliers, prioritizes digital tools for information sharing and efficiency. Beta's simpler structure, supported by internal packaging subsidiaries, reduces the need for digital collaboration. Gamma involves multiple departments, subsidiaries, and external suppliers, creating diverse digital applications that are later integrated into a unified strategy.

7.3.1.2 Impact of digital technology bundling on SC capabilities

Supply chain capability is an enterprise's ability to coordinate procurement, production, logistics, inventory, order fulfillment, quality control, and cost efficiency to ensure operations and competitive advantage (Mentzer et al., 2001; Morash et al., 1996). Cross-case evidence shows that digital technology bundling stabilizes, enriches, and extends these capabilities.

First, reliability is a core dimension shaping customer stability, reputation, and supply-chain resilience (Morash et al., 1996). All three firms use digital tools to strengthen risk management and quality control, but with different emphases: Alpha digitalizes the full chain from procurement to sales, Beta focuses on production monitoring and alerts in core processes, and Gamma applies end-to-end quality systems from raw material processing to distribution.

Second, collaboration enhances responsiveness and efficiency through information sharing and coordinated decisions (P. S. Huang & Shih, 2009; Singh et al., 2025). Digital tools enable data sharing and faster coordination (Scholten & Schilder, 2015). Alpha and Gamma demonstrate stronger collaboration—Alpha through extensive partner data sharing and Gamma through ERP-based cross-department integration—whereas Beta's vertical integration reduces its emphasis on collaboration development.

Third, cost efficiency is a key capability indicator (Saragih et al., 2020). Alpha improves scale and efficiency through digitalized brewing, Beta raises qualification rates via intelligent inspection in testing and packaging, and Gamma optimizes standardized processes through digital transformation scenarios to achieve cost and efficiency gains.

Finally, visibility supports planning and decision-making through data access (K. P. Huang et al., 2023; Ivanov, 2021). The cases enhance transparency and market responsiveness to varying degrees: Alpha applies analytics to guide marketing, Beta develops big-data channel management, and Gamma uses consumer profiling to improve decision accuracy. Alpha and Gamma further extend analytics to strengthen enterprise-wide data-driven decision-making. Table 7.1 summarizes the impact of digital technology bundling on SC capabilities.

Table 7.1 Impact of digital technology bundling on SC capabilities

Alpha	Beta	Gamma
Stabilizing: Digitalized end-to-end supply chain management stabilizes quality and risk control, enhancing supply chain reliability.	Stabilizing: Real-time production data monitoring and intelligent alerts stabilize production processes, enhancing supply chain reliability.	Stabilizing: A digital quality management system stabilizes quality control across the entire process from raw grain processing to distribution channels, enhancing supply chain reliability.
Enriching: Enhance supply chain collaboration through upstream and downstream data sharing. Enriching: Automate and digitalize production processes to expand production scale and enhance efficiency and quality.	Enriching: Utilize automated inspection and packaging equipment to improve product qualification rates and production efficiency. Enriching: Digitalize and standardize traditional craftsmanship experiences to enhance the quality of traditional production processes.	Enriching: Enhance supply chain responsiveness and cross-departmental collaboration through ERP systems and smart logistics platforms. Enriching: Employ digital tools such as collaborative office software, electronic bidding, and WMS warehousing to digitalize and standardize business processes, improving quality and efficiency.
Pioneering: Extend supply chain visibility, using precise data analytics to guide marketing decisions and strengthen data-driven analytical and decision-making capabilities.	Pioneering: Extend supply chain visibility, establish big data-driven channel management models, and develop consumer-oriented digital marketing initiatives.	Pioneering: Establish data management and decision-analysis platforms to extend supply chain visibility, guide precision marketing, and strengthen scientific analysis and decision-making capabilities.

7.3.1.3 Impacts of digital technology bundling on SC dynamic capabilities

Stabilizing reflexive control capability

Reflexive control capability (Beske, 2012) refers to real-time monitoring and flexible adjustment in supply-chain management, enabling firms to adapt strategies and operations to mitigate disruptions (Dewi et al., 2023; Siems et al., 2021). Across the cases, Alpha and Gamma use digital quality-control systems to monitor raw materials through sales and respond rapidly, whereas Beta relies on real-time monitoring and intelligent alerts for precise production control.

Enriching knowledge assessment capability

Knowledge assessment capability in Beske (2012) framework focuses on sharing, evaluating, and optimizing knowledge among supply-chain partners to enhance adaptability and competitive advantage. It enables firms to identify knowledge gaps and communication barriers for targeted improvement (Defee & Fugate, 2010). Explicit and tacit knowledge jointly underpin this capability (Schoenherr et al., 2014), , which depends on effective information sharing (Nagati & Rebolledo, 2013). Alpha and Gamma use digital technologies to overcome information barriers and facilitate seamless upstream–downstream knowledge exchange.

Enriching co-evolving capability

Co-evolving capability, defined by Beske (2012), refers to partners' shared development and application of resources, technologies, and methods to enhance collective competitiveness. Across the cases, digital technology bundling improves quality, reduces costs, and increases efficiency, thereby strengthening co-evolving capability. Alpha applies intelligent automation across operations; Beta digitalizes inspection and packaging to raise qualification rates; and Gamma streamlines standardized processes through digital transformation.

Pioneering reconceptualization capability

Supply chain reconceptualization capability involves redesigning structures, processes, and partnerships to enhance adaptability and sustainability in dynamic environments (Seuring & Müller, 2008). It requires innovating collaboration models and core processes to improve resource efficiency (Pagell & Wu, 2009). Through digital technology bundling, the case enterprises reshaped decision-making and marketing, positioning data as a core resource. Alpha and Gamma built data-driven systems by accumulating data, and all three firms analyze market and consumer characteristics to strengthen insight and targeted marketing.

7.3.2 Cross-case analysis of financial service bundling

Financial flows are vital to supply-chain performance. Effective financial management

strengthens collaboration and resource optimization (Hofmann, 2005), prevents disruptions from capital shortages (Wuttke et al., 2013), reduces uncertainty and payment risks (Gelsomino et al., 2016), and reinforces inter-firm trust to support resource sharing (Caniato et al., 2016). In the liquor industry, long production and aging cycles require substantial capital and advance payments. Recognizing the importance of financial flow management for supply-chain stability, the case enterprises strategically bundle financial services into practices.

7.3.2.1 Comparison of financial service bundling models

The case enterprises share common financial-service bundling features, including leveraging credit and external finance to secure low-cost capital, supporting high-quality distributors via recommendations and pledge financing, offering diversified financing for upstream partners, and improving capital-flow efficiency. However, their specific models vary with differences in supply-chain capital needs, structures, and resource bases (Table A7.6 in the Annex).

Supply chain capital requirements shape differences among models. Alpha adopts a platform-based approach, leveraging corporate credit to integrate online and offline finance. Beta differentiates: upstream farmers need payments and subsidies, while distributors seek low-cost financing. Gamma focuses on internal affiliates and major distributors, leveraging group credit and external partnerships to secure low-cost funds, recommend distributors, and provide collateral supervision.

Secondly, differences in supply chain structures affect financial service models. Alpha's outsourced supply chain with dispersed partners relies on standardized platforms to reduce financing costs. Beta's supply chain involves dispersed upstream farmers and a tiered downstream structure, thus requiring differentiated financial services. Gamma's supply chain concentrates on internal affiliates and core distributors, leveraging centralized group resources and strategic financial planning to ensure funding stability.

Finally, differences in resource bases also influence model selection. Alpha emphasizes financial innovation and platform development, adopting blockchain and digital-currency technologies. Beta collaborates with government institutions to secure policy-based financing for farmers. Gamma invests in commercial banks to build long-term financial partnerships.

7.3.2.2 Impact of financial service bundling on SC capabilities

By bundling financial services, the case enterprises enhance supply-chain capabilities by improving collaboration, capital-flow efficiency, and financial visibility, thereby strengthening reliability, coordination, and cost-effectiveness (see Table 7.2).

Table 7.2 Impact of financial service bundling on SC capabilities

Alpha	Beta	Gamma
Stabilizing: Leverage group credit and strategic financial planning to ensure a stable, low-cost capital supply, enhancing supply chain reliability.	Stabilizing: Implement cash payments and leverage government subsidies and funding to stabilize raw material supply reliability.	Stabilizing: Integrate internal and external financial resources to ensure stable, low-cost capital supply, enhancing supply chain reliability.
Enriching: Provide pledge-based financing guarantees to qualified distributors, strengthening manufacturer-distributor relationships and supply chain collaboration. Enriching: Enhance information sharing via online financing platforms, improving capital flow efficiency and reducing administrative and transaction costs.	Enriching: Empower distributors with financial guarantees, strengthening manufacturer-distributor relationships and supply chain collaboration.	Enriching: Provide pledge-based financing guarantees to qualified distributors, strengthening manufacturer-distributor relationships and supply chain collaboration.
Pioneering: Extend supply chain financial flow visibility to ensure targeted fund utilization and enhance financial service security and compliance.		

Firstly, financial service bundling improves supply chain reliability. Beta provides policy-based financial support for upstream farmers, while Alpha and Gamma offer low-cost funding and financing guarantees to downstream distributors. These measures enhance financial stability and reduce risks associated with capital shortages and uncertainty.

Secondly, bundling financial services optimizes capital flows and enhances supply chain collaboration. Through information sharing and risk-sharing mechanisms, the enterprises build closer cooperative relationships and manage market fluctuations more effectively.

Thirdly, financial service bundling reduces costs and improves efficiency. Leveraging group credit and external financial resources allows Alpha and Gamma to obtain low-cost capital, while platform-based services and technologies such as blockchain and smart contracts streamline capital flows and reduce administrative and transaction costs.

Finally, integrating digital technologies with financial services improves financial visibility within the supply chain. Alpha's use of blockchain enables targeted fund tracking and real-time monitoring of capital flows, enhancing financial security and compliance.

7.3.2.3 Impacts of financial service bundling on SC dynamic capabilities

Enriching partner development financing capability

Partner development, as defined by Beske (2012), refers to fostering the growth of partners to enhance supply chain competitiveness and sustainability. In the Liquor Industry, distributors face substantial financial pressure due to large upfront payments and extended payback periods,

heightening capital risks. The case enterprises alleviate these risks by recommending qualified distributors to banks and providing pledge-based financing guarantees, thus enhancing distributors' financing capacities and reducing financial risks in the supply chain.

Pioneering reconceptualization capability in financial services

Supply chain reconceptualization (Beske, 2012) emphasizes redesigning processes and partnerships to achieve sustainability goals. In the Liquor Industry, services target distributors. The case enterprises reconceptualize financial services by broadening scope and innovating methods: Alpha expands partnerships via an online financing platform, introducing new institutions and products; Beta uses government subsidies to support upstream farmers; Gamma leverages its financial subsidiary to promote financial collaboration. These adjustments reflect their reconceptualization capabilities (see Table A7.7 in the Annex). Refer to Table A7.8 in the Annex for cross-summary of resource bundling.

7.4 Resource leveraging

Based on ROT, after accumulating and integrating key resources, firms move from static to dynamic resource leveraging, involving mobilizing, coordinating, and deploying resources. All three case enterprises have reached this stage, showing shared patterns and distinct approaches. Internally, mobilization converges through departmental structures and talent incentives supporting strategic execution. Externally, it varies with strategic orientation. Firms coordinate resources through knowledge sharing, incentives, and standardized processes, and deploy them by engaging in industry standard-setting to strengthen their positions in the ecosystem.

7.4.1 Resource mobilization: internal convergence and external divergence

Resource mobilization refers to the flexible use of internal and external resources to support operations, enabling rapid market responsiveness and improved resource utilization. It is a key mechanism for executing strategic initiatives (Sirmon et al., 2011).

Internally, the cases show consistent mobilization practices. First, each firm establishes dedicated functional units to strengthen strategic execution, such as Alpha's Environmental Management Department and Digital Development Center, Beta's Procurement and Logistics Center, and Gamma's Environmental Management Committee and Information Department. Second, diversified incentives and talent development programs promote employee engagement and innovation, aligning workforce values with strategic goals.

Externally, mobilization diverges across firms. Alpha focuses on mobilizing supplier

resources to enhance production efficiency and quality control through performance standards, including advanced inspection requirements. Beta mobilizes branding, marketing, and cultural resources through partnerships with art institutions and leading enterprises to strengthen differentiation and competitiveness. Gamma's 2023 digitalization strategy prioritizes collaboration with major technology and internet firms to accelerate supply-chain digitalization.

7.4.2 Resource coordination: common strategies and differentiated approaches

Resource coordination refers to institutional and procedural arrangements that maximize synergies and minimize conflict and waste (Sirmon et al., 2007). The cases share three strategies: (1) sharing explicit and tacit SSCM knowledge through supplier conferences and training to align values and practices; (2) linking performance measurement and incentives to sustainability goals to strengthen compliance and performance; and (3) embedding knowledge in organizational routines and industry exchanges—such as Beta's Quality Research Institute and Gamma's Digital Transformation Promotion Center—to build sustainability capabilities. The cases differ in two approaches: digitally extending SSCM practices across partners and restructuring ecological and organizational networks. Alpha emphasizes optimization through an inverted-triangle structure and data platform, whereas Gamma builds an ecosystem through cross-industry collaboration. This divergence reflects strategic differences: Alpha focuses on Baijiu efficiency, while Gamma's diversification extends beyond Baijiu to enhance ecosystem leadership (C1).

7.4.3 Resource deployment: significance of collaborative standards

In resource deployment, enterprises participate in industry standards, reflecting a strategic commitment to industry norms and sustainable development. Alpha promotes carbon-emission standards, Beta issued control standards for sauce-flavor products, and Gamma contributes to industry ESG standards. Such deployment enhances competitive advantage and supports industry optimization and improvement (Sirmon et al., 2011). Table A7.9 and Table A7.10 in the Annex present the distribution and cross-summary of resource leveraging.

7.5 SSCM performance

Sustainable supply-chain performance reflects how firms structure, bundle, and leverage resources. Despite different implementation paths, the cases show consistent improvements in

brand reputation, competitiveness, and the integration of social, environmental, and economic objectives. Economically, all cases achieved growth. Alpha expanded revenue and profits through brand enhancement and market-share gains; Beta showed rapid expansion with revenue growth; Gamma delivered capital-market performance with stable dividends and high returns. Environmentally, performance improved across the cases. Alpha adopted energy-efficient technologies to enhance resource efficiency; Beta emphasized ecological protection in the Chishui River basin; Gamma optimized energy structures and advanced ecological restoration. Socially, all three cases contributed to local development and welfare. Alpha strengthened government and community cooperation through fiscal contributions; Beta supported industries, employment, and taxation in less-developed areas; Gamma promoted regional stability through industrial collaboration and targeted poverty alleviation. Table A7.11 and Table A7.12 in the Annex present the distribution and cross-summary of SSCM performance.

7.6 Cross case summary

The three case enterprises demonstrate distinct SSCM trajectories shaped by differences in scale, aroma positioning, resource endowments, and governance logic. Alpha, a leading strong-aroma producer in Sichuan, follows an Efficiency–Coordination Model driven by digital platforms, contract farming, supplier collaboration, and integrated production–supply–sales systems, reflecting its reliance on external partners and balanced resource conditions. Beta, shaped by its sauce-aroma identity and estate-based ecological layout, adopts a Controllability–Culture Model characterized by high vertical integration, strong quality assurance, ecological protection, and cultural embeddedness. Gamma, the largest and most resource-rich enterprise, operates the most complex supply chain and employs a System–Ecosystem Model that features full-chain digitalization, rigorous risk governance, and a zero-carbon strategy to achieve systemwide coordination across logistics, packaging, finance, and digitalization.

Forward, SSCM development across the three enterprises is expected to deepen through the three stages of resource orchestration. In the structuring stage, firms may continue enhancing sustainable raw-material bases, multi-tier supplier development, and circular packaging systems. In the bundling stage, integration of cross-departmental and inter-firm data—supported by predictive analytics, intelligent scheduling, and digital twinning—will improve visibility, agility, and resilience. In the leveraging stage, SSCM is to expand from internal implementation to ecosystem engagement, including participation in industry standards, regional decarbonization programs, SCF platforms, and cultural value co-creation.

Chapter 8: Discussion

This chapter moves into the theoretical discussion. Through the within-case analyses and cross-case comparison of the case enterprises—Alpha, Beta, and Gamma—the previous chapters have identified the empirical findings concerning the implementation of SSCM by the case enterprises. However, empirical findings alone are still insufficient to generate a more general theoretical explanation. Therefore, building on the preceding analysis, this chapter further compares the case findings with existing theories in order to examine whether these findings support, extend, revise, or challenge current theoretical understandings, and on this basis further abstracts the empirical findings into theoretical relationships of broader significance.

The discussion is organized around four interrelated and sequential themes: (1) the key internal and external drivers of SSCM; (2) how the enterprises acquire, accumulate, divest, and inherit resources through SSCM practices; (3) how digital technologies and financial services enhance supply-chain capabilities; and (4) how the case enterprises create the comprehensive value of SSCM by mobilizing, coordinating, and configuring resources, while forming a dynamic feedback loop in resource management in the process. On the basis of the theoretical discussion of these themes, this chapter further develops the relevant propositions and constructs an theoretical framework with ROT as the primary lens, in order to reveal the logic and dynamic process through which baijiu enterprises achieve comprehensive SSCM value.

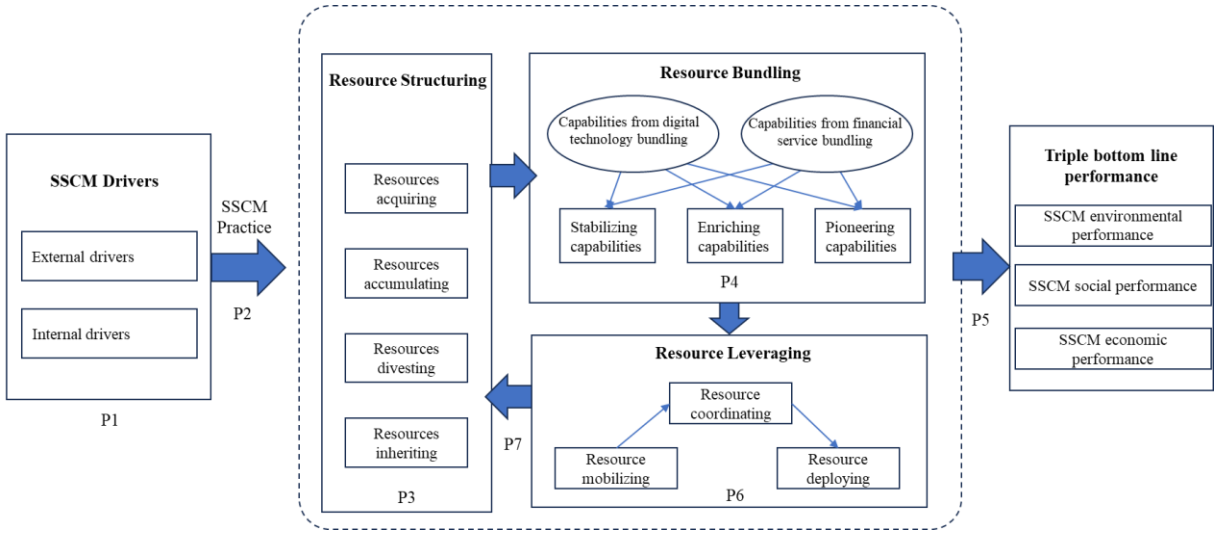


Figure 8.1 Conceptual framework for realizing SSCM value in baijiu enterprises

8.1 Discussion of SSCM drivers in case enterprises

8.1.1 Theoretical perspectives on SSCM drivers

Section 2.1.4 reviewed how SSCM literature conceptualizes internal and external drivers of sustainability-oriented practices. Prior studies (Saeed et al., 2017; Schrettle et al., 2014) distinguish external drivers—coercive, mimetic, and normative pressures—from internal drivers such as corporate strategy, organizational culture, and resource endowments (Barney, 1991; D. Marshall et al., 2015). These interacting drivers shape firms' motivation and capability to adopt SSCM across institutional and industrial contexts. Their manifestation differs by development stage: firms in developed economies face stronger coercive and normative pressures from regulations and social norms (Zhu & Sarkis, 2007), whereas firms in developing economies experience weaker institutions and greater mimetic pressure (Silvestre, 2015).

The following analysis examines how these drivers operate in the context of the Chinese baijiu industry and, on this basis, discusses how factors such as the stage of industry development, the institutional environment, and organizational culture shape the strength of their influence on SSCM in baijiu enterprises, thereby providing empirical support for Proposition 1 and its related sub-propositions.

8.1.2 Key findings on external drivers of SSCM in the case enterprises

8.1.2.1 Coercive and normative pressures as core drivers of SSCM in case enterprises

Analysis of Alpha, Beta, and Gamma shows that in the Chinese Liquor Industry, external drivers are shaped primarily by coercive and normative pressures, while mimetic pressures are limited. This contrasts with Zhu and Sarkis (2007) and Silvestre (2015), who argue that weak enforcement and institutional uncertainty in developing economies make mimetic pressures more prominent. In contrast, this thesis finds Baijiu enterprises more strongly influenced by coercive and normative pressures.

This divergence reflects the Liquor Industry's characteristics and its current transformation stage. As a traditional sector undergoing upgrading, its shift toward SSCM has been driven more by tightened regulations and rising stakeholder expectations than imitation, supporting Silvestre's (2015) argument on context-specific external drivers.

Coercive pressures stem from the industry's long-standing status as a highly regulated food sector. Recent years have seen intensified environmental enforcement—such as discharge permits, impact assessments, and emission caps—compelling firms to adjust supply-chain

strategies. Alpha's rapid adoption of green practices following the "San Gong" policy and Gamma's pollution-control upgrades illustrate such regulatory influence.

Normative pressures are also strong due to public sensitivity to food safety and growing stakeholder expectations, especially from investors. For example, Beta introduced incentive mechanisms in response to stakeholder suggestions, and Gamma issued an English ESG report to meet international investor expectations, showing how normative pressures advance SSCM implementation.

By contrast, although baijiu enterprises at times emulate leading competitors' environmental and social practices, mimetic pressures remain limited because the industry is long-established and technologically mature. In the current transformation stage, imitation does not improve competitiveness; firms' challenges arise more from compliance and social responsibility requirements than from market imitation.

In sum, the case analysis shows that the implementation of SSCM in baijiu enterprises is driven not only by external pressures, but also that the strength of different types of external drivers is moderated by the stage of industry development and the institutional environment. In the current context, where the Chinese baijiu industry is becoming more mature and faces strong transformation pressures, coercive and normative pressures are more salient than mimetic pressure. This finding not only supports Proposition 1, but also provides empirical evidence for Proposition 1a.

8.1.2.2 High internal management standards mitigate the coercive pressure on SSCM in case enterprises

Case data show that internal management standards moderate the impact of regulatory coercion on SSCM implementation. At Beta, interviews indicate that the firm applies environmental and quality standards exceeding national requirements and therefore does not perceive regulation as a primary SSCM driver. When internal standards are stricter than external regulations, new or tightened policies impose minimal compliance costs or strategic adjustment pressure and instead validate existing practices. This reflects Beta's long-term strategic orientation: sustained commitment to sustainability enables proactive adaptation to future regulatory changes and reduces pressures arising from external uncertainty.

This finding suggests that high internal management standards can, to some extent, mitigate the additional constraining effect of external coercive pressure, causing policies and regulations to function more as reinforcement of existing practices rather than as additional burdens. This conclusion further refines the joint internal–external driving relationship identified in

Proposition 1 and shows that a firm's internal management foundation influences how it perceives and responds to external institutional pressures.

8.1.3 Key findings on internal drivers of SSCM in the case enterprises

8.1.3.1 Corporate strategy and resource heterogeneity as drivers of SSCM in case enterprises

Analysis of Alpha, Beta, and Gamma shows that, beyond external drivers, internal factors—corporate strategy, organizational culture, and heterogeneous resources—play critical roles in advancing SSCM.

First, corporate strategy provides long-term direction and resource commitment for SSCM, consistent with research identifying strategy as the bridge between internal resources and external pressures (D. Marshall et al., 2015; Saeed & Kersten, 2019). Alpha embeds the vision of "walking with society, coexisting with the environment, and living in harmony with humanity" into its long-term plan, advancing lighthouse factories and eco-industrial parks. Beta's "Long-Termism" and "Centennial Brand" strategies create synergies across economic, environmental, and social goals, ensuring continuity in SSCM. Gamma's "Zero-Carbon Distillery" integrates sustainability into supply-chain management through eco-industrial park construction and clean-energy adoption.

Second, heterogeneous resources are key internal drivers, consistent with the Resource-Based View (RBV), which argues that rare and inimitable resources enable sustained advantage (Barney, 1991; Schrettle et al., 2014). Alpha draws on century-old fermentation pits and natural spring water; Beta relies on the ecological advantages of the Chishui River valley and underground storage caves; Gamma leverages ancient pit fermentation and traditional craftsmanship. These unique resources provide long-term support for effective SSCM implementation.

This suggests that corporate strategy, resource heterogeneity, and external pressures jointly constitute important drivers of SSCM implementation in baijiu enterprises, thereby further supporting Proposition 1.

8.1.3.2 Organizational culture and its role in driving SSCM

Resource endowments alone do not explain strategic responsiveness; translating resources into sustainable action requires a clear and unified cultural orientation. Prior studies show that organizational culture—through shared values and collective identification—shapes SSCM implementation by strengthening employee engagement (D. Marshall et al., 2015; Pagell & Wu,

2009). While these studies focus primarily on internal execution, they overlook culture's role in shaping responsiveness to external changes.

This thesis extends that perspective. The Baijiu cases show that cultural orientation reinforces internal execution and enhances firms' sensitivity to external changes, enabling more proactive SSCM strategies. Alpha's long-standing culture of "brewing in harmony with nature and living in harmony with humanity" unified employees' understanding of sustainability and heightened sensitivity to policy shifts, facilitating timely actions such as developing lighthouse factories and eco-industrial parks. Beta's culture of "integrity, reverence for nature, and respect for science" aligns with its "Centennial Brand" strategy, strengthening responsiveness to stakeholder expectations for environmental responsibility. Gamma's "green, low-carbon, and harmonious development" culture likewise increased sensitivity to environmental changes, supporting the "Zero-Carbon Distillery" and clean-energy initiatives.

Organizational culture not only fosters value alignment and cohesion in implementation within the firm, but also significantly enhances the firm's ability to perceive and respond to changes in the external environment, thereby encouraging firms to implement SSCM more proactively. This finding not only enriches understanding of the internal drivers of SSCM, but also provides empirical support for Proposition 1c.

8.1.4 Propositions on SSCM drivers in baijiu enterprises

Based on the above analysis, this study argues that the implementation of SSCM in baijiu enterprises is driven not only by external institutional pressures, market changes, and stakeholder expectations, but also by internal factors such as strategic orientation, organizational culture, and resource endowments. On this basis, this study proposes the following propositions related to the drivers of SSCM in baijiu enterprises:

Proposition 1: SSCM implementation in baijiu enterprises is jointly driven by internal and external factors.

External factors include policy regulation, market changes, industry competition, and stakeholder pressures; internal factors include corporate strategy, organizational culture, and resource heterogeneity.

Proposition 1a: The stage of industry development and the institutional environment moderate the strength of the influence of external drivers on SSCM implementation in baijiu enterprises. In more mature industrial contexts characterized by greater transformation pressure, coercive and normative pressures are more salient.

Proposition 1b: The higher a firm's internal management standards, the weaker the additional constraining effect of external coercive pressure.

Proposition 1c: The clearer the sustainability orientation of organizational culture, the more sensitive and responsive the firm is to changes in the external environment, and the more likely it is to implement SSCM proactively.

8.2 Discussion of SSCM practices and resource structuring

8.2.1 Theoretical perspectives on SSCM practices and resource structuring

Section 2.3 reviewed how ROT provides a theoretical framework for explaining how firms manage and configure resources in dynamic environments. Within this theory, the structuring stage—including resource acquisition, accumulation, and divestment—describes how firms continuously adjust their resource portfolios in response to environmental change (Sirmon et al., 2007; Sirmon et al., 2011). The Dynamic RBV further suggests that major changes in the external environment, such as shifts in regulatory policies, fluctuations in market demand, and technological advances, drive firms to continuously reconfigure and optimize resources in order to sustain and strengthen competitive advantage (Helfat & Peteraf, 2003).

However, the preservation, redevelopment, and modern utilization of traditional resources have rarely been discussed in the existing literature (Hitt et al., 2016; Sirmon et al., 2007). Prior studies provide indirect support for this mechanism. Pullman et al. (2010) point out that firms can develop distinctive competitive advantages by preserving and reusing traditional resources. Dubey et al. (2017) show how the interaction between traditional craftsmanship and emerging technologies drives resource innovation. Daily and Huang (2001) further reveal how organizational culture and human resource management practices facilitate the inheritance of traditional craftsmanship and knowledge. Although these studies do not explicitly propose the concept of resource inheriting, they provide strong support for its theoretical development.

On this basis, in the context of the baijiu industry, this study further examines how firms promote resource structuring through the implementation of SSCM practices, and on this basis identifies whether there exists a mode of resource structuring that goes beyond the explanatory scope of existing ROT. These theoretical perspectives lay the foundation for the following analysis and constitute the theoretical basis for Proposition 2 and Proposition 3.

8.2.2 SSCM practices in case enterprises promote resource structuring

The within-case and cross-case analyses of the three case enterprises show that internal and external drivers provide the impetus for firms to adjust their resources, but what truly sustains the ongoing process of resource structuring is the implementation of SSCM practices across procurement, production, and distribution. Through these practices, the case enterprises have developed relatively clear pathways for resource acquisition, resource accumulation, and resource divestment.

In terms of resource acquisition, firms obtain key resources by partnering with suppliers or creating internal subsidiaries to maintain supply chain continuity. Alpha secured high-quality organic materials and eco-friendly packaging; Beta formed vertically integrated subsidiaries and international alliances to acquire scarce resources; Gamma collaborated with internal and external partners for flexible access to high-quality resources.

In terms of resource accumulation, strategic resources were consolidated through collaboration, risk management, and proactive initiatives. Alpha jointly developed technology with partners and built collaborative platforms and smart production lines. Beta established environmental standards and implemented integrated supply-chain management, developing internal standards beyond national requirements. Gamma used ESG performance management and monitoring mechanisms to accumulate quality-control and risk-management resources, ensuring long-term stability.

In terms of resource divestment, risk management enabled resource optimization. Alpha used LCA to identify inefficient, high-energy configurations and divested over-reliant channels and product lines. Gamma divested redundant distributors, channels, and product lines through supply-chain risk management, concentrating resources on core operations.

8.2.3 Resource inheriting as a critical component of resource structuring

In addition to resource acquisition, accumulation, and divestment, the case analysis also finds that, in the SSCM context of the baijiu industry, resource inheriting constitutes an important mode of resource structuring. Unlike prior ROT research, which has focused mainly on the acquisition of new resources or the divestment of inefficient ones, baijiu enterprises, in advancing SSCM, also sustain and regenerate traditional resources in the course of sustainable supply chain development through the inheritance, transformation, and innovation of traditional craftsmanship, cultural assets, and historical experience.

First, digital and intelligent technologies were integrated with traditional brewing processes.

Alpha preserved century-old fermentation pits while embedding pit mud and brewing techniques into smart factories and digital eco-industrial parks. Beta digitalized traditional brewing procedures to support standardization and replication.

Second, case enterprises revitalized cultural resources in brand development and product innovation. Beta created its "Baijiu Manor" culture that integrates ecological protection, cultural experience, and business operations. Gamma built cultural research institutes and communication platforms to transform traditional culture into brand and cultural assets.

8.2.4 Propositions on SSCM practices and resource structuring in baijiu enterprises

This study further validates and enriches relevant arguments in ROT and the Dynamic RBV through an analysis of the SSCM practices and resource structuring processes of the case enterprises.

The case analysis shows that the SSCM practices implemented by baijiu enterprises across procurement, production, and distribution promote resource acquisition, accumulation, and divestment, thereby continuously reshaping their resource base. SSCM practices are not only managerial actions taken in response to internal and external drivers, but also important processes through which resource acquisition, accumulation, and divestment are advanced.

The case analysis further identifies that, in the SSCM context of the baijiu industry, resource inheriting constitutes a new mode of the resource structuring stage, thereby extending the existing understanding of the resource structuring process in ROT. Existing ROT research has not yet systematically proposed or thoroughly examined this concept. However, the case findings show that the case enterprises are able to achieve the effective inheritance and innovative development of traditional resources through specific SSCM practices, thereby enabling the continuity and regeneration of traditional resources within the supply chain.

Based on the above analysis, this study proposes the following propositions related to SSCM practices and resource structuring:

Proposition 2: Baijiu enterprises promote resource structuring through the implementation of SSCM practices.

Proposition 3: In the SSCM context of the baijiu industry, resource inheriting constitutes an important mode of resource structuring.

8.3 Digital technologies and financial services in enhancing supply chain capabilities

8.3.1 Theoretical perspectives on resource bundling

Within the framework of ROT, the bundling stage involves the integration and reconfiguration of already structured resources in order to form capabilities that support firms' strategic objectives (Sirmon et al., 2011). It should be noted that, in the case analysis stage, this study retained the "resource structuring–resource bundling–resource leveraging" analytical framework proposed by ROT in order to maintain consistency with the data structure and coding results. However, from the theoretical logic of ROT, the bundling stage does not simply refer to the general integration of existing resources. Rather, its core lies in the three bundling pathways of stabilizing, enriching, and pioneering, through which firms further transform the structured resource base into capabilities that support organizational action and supply chain collaboration (Sirmon et al., 2007; Sirmon et al., 2011). The empirical findings on SSCM in baijiu enterprises confirm this capability formation process. Accordingly, in the subsequent discussion, this study further conceptualizes the bundling stage as capability bundling in order to more clearly reveal its capability-forming attribute.

As noted in the literature review in Chapter 2, digital technologies and financial services not only enhance foundational supply chain capabilities, but also promote the formation of dynamic capabilities (F. Jia et al., 2020; M. Sharma et al., 2021). These dynamic capabilities mediate the relationship between SSCM practices and firm performance, especially environmental performance (Beske, 2012; Beske & Seuring, 2014; Hong et al., 2018). On this basis, the following analysis examines how baijiu enterprises strategically bundle digital technologies and financial services to strengthen their foundational supply chain capabilities and dynamic capabilities, thereby providing an empirical basis for Proposition 4.

8.3.2 Key findings on the improvement of foundational supply chain capabilities in the case enterprises

8.3.2.1 The impact of digital technology bundling on the foundational supply chain capabilities

The bundling of digital technologies significantly enhances foundational supply chain capabilities. The case analysis shows that the case enterprises accumulated a large amount of

data and technological resources during the resource structuring stage, but these resources remained relatively fragmented. Through the strategic bundling of digital technologies, such as ERP systems, intelligent production monitoring, and smart logistics platforms, these resources are integrated, thereby significantly strengthening foundational supply chain capabilities.

First, supply chain reliability and risk control capability are enhanced. Beta transformed its previously accumulated production experience into a standardized real-time control system through intelligent production monitoring and real-time data analysis platforms, thereby significantly improving production stability and early risk warning capability.

Second, supply chain collaboration and information-sharing capability are enhanced. By means of ERP systems and smart logistics platforms, Gamma integrated previously fragmented logistics and inventory information, achieving a higher level of information transparency and interaction efficiency across supply chain stages, and thereby effectively promoting cross-departmental and cross-stage collaboration.

Third, supply chain visibility and decision-making capability are enhanced. Alpha built a real-time data monitoring and analysis platform that enabled real-time information sharing and in-depth analysis across all stages of the supply chain.

Finally, supply chain cost efficiency is enhanced. All three case enterprises achieved production process standardization, precise logistics management, and inventory optimization through the bundling of digital technologies, thereby improving brewing efficiency, reducing inventory redundancy, and significantly lowering management costs.

8.3.2.2 The impact of financial services bundling on the foundational supply chain capabilities

Case analysis shows that bundling financial services improves supply-chain reliability, collaboration efficiency, and cost efficiency, and—with digital technologies—enhances financial transparency and risk management.

First, reliability improved. Beta provided policy-oriented financial support to upstream farmers, reducing capital risks in production. Alpha and Gamma secured downstream financial stability through low-cost financing and guarantee mechanisms, strengthening overall supply-chain soundness. Second, collaboration increased. Gamma’s internal finance company integrated capital supply and demand, improving cash-flow coordination. Alpha used its financial platform to connect suppliers, distributors, and financial institutions, optimizing capital flows and promoting cross-chain collaboration. Third, cost efficiency improved. Gamma combined group credit with external financing to reduce overall financing costs. Alpha adopted

blockchain and smart contracts to accelerate capital turnover and reduce transaction costs. Finally, digital–financial integration increased transparency and compliance. Alpha used blockchain to earmark and monitor funds in real time, enhancing the security of supply-chain finance and strengthening risk-management capability.

8.3.3 Key findings on the improvement of dynamic supply chain capabilities in the case enterprises

8.3.3.1 The impact of digital technology bundling on the dynamic supply chain capabilities

Data analysis shows that bundling digital technologies with financial services not only enhances foundational supply-chain capabilities but also drives systemic changes in dynamic capabilities, enabling firms to shift from traditional to more adaptive supply-chain models and sustain competitiveness under volatility.

First, digital bundling strengthened dynamic supply-chain capabilities. For reflexive control, Alpha and Gamma used digital platforms for end-to-end monitoring and feedback, improving responsiveness to external change. For knowledge assessment, both firms used digital platforms to support information sharing and knowledge integration across partners, enhancing learning and adaptability. For co-evolving, all three enterprises applied digital tools to optimize production processes and collaboration, improving efficiency and joint development with partners. For reconceptualization, Alpha and Gamma used data analytics to support decision-making and innovate marketing models, achieving more precise market alignment and sustainability outcomes.

8.3.3.2 The impact of finance-servive bundling on the dynamic supply chain capabilities

Second, financial-service bundling reinforced reconceptualization and partner-development capabilities. Beta’s cash-payment model reconfigured financial flows, stabilizing cash circulation and supporting upstream supplier development, extending reconceptualization in financial terms. Gamma’s internal finance company integrated financial resources to strengthen partners’ capital access and coordination ability, improving partner development.

Third, the deep integration of digital technologies and financial services further strengthened co-evolving capabilities. For example, Alpha’s financial service platform combined financial instruments with digital technologies to ensure the earmarked use and real-time monitoring of funds, while simultaneously facilitating the integration of information, material, and financial flows. This synergy promoted the dynamic evolution of the supply chain as a whole.

8.3.4 Proposition on digital–financial bundling, and supply chain capabilities in baijiu enterprises

ROT posits that in the bundling stage, firms integrate and reconfigure structured resources to develop capabilities that support strategic objectives (Chadwick et al., 2015). Case analysis shows that bundling digital technologies with financial services enables firms to integrate fragmented resources accumulated during structuring, strengthening foundational capabilities—collaboration, information sharing, reliability, and risk management—and enhancing dynamic capabilities such as reconceptualization, knowledge assessment, partner development, co-evolving, and reflexive control. These dimensions align with Beske's (2012) dynamic capability framework. The findings validate ROT's stabilizing, enriching, and pioneering paths and specify how digital–financial bundling shapes capability development.

Based on the above analysis, this thesis proposes the following proposition:

Proposition 4: Baijiu enterprises enhance foundational supply chain capabilities and dynamic capabilities by bundling digital technologies and financial services.

8.4 Discussion on achieving SSCM performance through resource leveraging

8.4.1 Theoretical perspectives on resource leveraging

Section 2.3 of this thesis reviewed how ROT defines resource leveraging as a process through which firms mobilize, coordinate, and deploy resources in order to create strategic value and enhance performance (Hitt et al., 2016; Sirmon et al., 2007). The empirical findings of this study show that, in the SSCM context of baijiu enterprises, effective resource leveraging can promote the achievement of economic, environmental, and social sustainability performance, thereby enhancing the comprehensive value of SSCM. On this basis, this study further conceptualizes resource leveraging as **value leveraging** in the subsequent discussion, in order to present more clearly the value-realization orientation embedded in the leveraging stage.

Resource leveraging is not a static or unidirectional process, but a dynamic mechanism characterized by continuous feedback (Helfat & Peteraf, 2003; Ketchen et al., 2014; G. Li et al., 2022; Sirmon et al., 2011). By continuously monitoring and evaluating the outcomes of resource leveraging, firms can identify new resource needs and feed this information back into the resource structuring stage, thereby forming an evolving cycle of resource management (Maritan & Peteraf, 2011; Ndofor et al., 2011).

The effective realization of resource leveraging also depends on the active participation of

stakeholders and collaborative governance (Freeman, 2010; Touboulic & Walker, 2015). Stakeholders not only provide critical resources, but also promote the diffusion and institutionalization of SSCM norms across the supply chain through legitimacy provision, knowledge support, joint rule-making, and standard diffusion (Ketokivi & Schroeder, 2004; L. Liu et al., 2018; Siems et al., 2022; Touboulic et al., 2015).

On the basis of the above theoretical foundations, the following analysis focuses on how the case enterprises achieve comprehensive value through resource leveraging, and examines the roles of stakeholder participation and dynamic feedback mechanisms in this process, thereby providing an empirical basis for Proposition 5, Proposition 6, and Proposition 7.

8.4.2 Characteristics and connotations of resource leveraging in case enterprises

Across the three cases, resource mobilization involves systematically identifying, selecting, and prioritizing internal and external resources.

8.4.2.1 Connotations and categories of resource mobilization in case enterprises

Across the three cases, resource mobilization was characterized by the systematic identification, strategic selection, and focused prioritization of internal and external resources and capabilities.

Internal mobilization centered on core resources and capabilities such as technology, organizational structures, managerial expertise, and knowledge. Alpha established a Digital Development Center to build digital capabilities; Beta created a Quality Research Institute and Production Technology Center to strengthen process capabilities; Gamma formed an Energy and Environmental Protection Department and an Environmental Management Committee to advance environmental governance. These initiatives supported capability development and continuous improvement.

External mobilization drew on suppliers' technological resources, financial and managerial resources from supply-chain partners, and expertise from cross-industry collaborations. For example, Gamma collaborated with Huawei, IBM, and Alibaba to adopt advanced digital technologies, while Alpha upgraded equipment standards to enhance supplier capabilities.

8.4.2.2 Connotations and Implementation of Resource Coordination in Case enterprises

The core task of resource coordination is to configure mobilized internal and external resources and capabilities, cultivate shared understandings across upstream, downstream, and ecosystem partners, and minimize redundancy and waste. Case evidence shows that firms primarily applied four strategies:

Sharing explicit and tacit SSCM knowledge. Through supplier conferences, targeted training, and industry exchanges, firms disseminated accumulated SSCM knowledge to supply-chain partners, fostering common understandings and shared sustainability standards.

Establishing sustainability-oriented performance and incentive systems. Clear incentives and evaluation mechanisms motivated partners to participate proactively in SSCM, ensuring that internal and external resources supported strategic goals.

Restructuring ecological networks and organizational frameworks. Alpha and Gamma built ecosystem-based supply-chain systems led by the focal firm and supported by partners, extending SSCM standards across the chain and broader industrial ecosystem to integrate resources and capabilities effectively.

Institutionalizing and standardizing knowledge. By creating entities such as quality research institutes and digital transformation centers, firms translated SSCM practices into standardized norms and disseminated them across the industry to enhance supply-chain knowledge and capabilities.

These coordination efforts ensured efficient resource integration within the firm, among supply-chain partners, and across the ecosystem, unifying SSCM standards and shared understandings to support strategic objectives and improve supply-chain performance.

8.4.2.3 Connotations of resource deployment and SSCM performance in case enterprises

Resource deployment refers to applying coordinated capability configurations to strategic actions that enhance supply-chain performance across economic, environmental, and social dimensions. Case data reveal the mechanisms through which these improvements occur.

Regarding economic performance, enhancements were primarily driven by the capabilities of digital production and refined supply-chain management. Alpha used digital technologies to reduce production and management costs and improve operational efficiency and competitiveness. Beta leveraged intelligent production monitoring and digital logistics to optimize production, logistics, and warehousing efficiency. Gamma implemented ERP systems to integrate production, supply, and sales, improving management efficiency, decision-making quality, and competitive strength in the strong-aroma Baijiu market.

Regarding environmental performance, improvements stemmed from deploying ecological management and green technology capabilities. Alpha used green technologies and energy management systems to increase efficiency and reduce emissions. Beta implemented strict ecological controls to mitigate pollution in core production areas. Gamma established eco-industrial parks and applied green production technologies, lowering the environmental burden

of the supply chain.

Regarding social performance, advances were driven by deploying social responsibility management and stakeholder engagement capabilities. Alpha strengthened supply-chain collaboration and employee welfare, improving CSR outcomes. Beta supported rural revitalization and local development while expanding employee career opportunities. Gamma created public-welfare funds and conducted environmental training to enhance social responsibility awareness and overall social performance.

Alpha and Gamma also participated in industry forums and government standard-setting efforts to institutionalize SSCM practices and promote sustainable development at industry and national levels. Through such deployment, firms created value within their organizations and supply chains while exerting broader external influence.

8.4.2.4 The role of stakeholders in resource leveraging of case enterprises

The case analysis finds that, in the SSCM context of the baijiu industry, stakeholders not only provide critical resources and support in the resource leveraging process, but also participate deeply in resource coordination and value creation through joint rule-making, standard diffusion, and institutional diffusion. This aligns with Stakeholder Theory, which highlights stakeholders' roles in resource provision, supervision and feedback, and strategic collaboration (L. Liu et al., 2018; Siems et al., 2022).

First, suppliers and distributors. As key stakeholders, they participated in resource coordination under explicit SSCM assessment standards. Alpha's suppliers upgraded facilities and technologies to meet SSCM requirements, improving efficiency and environmental performance. Beta's suppliers joined conferences and training programs to deepen SSCM understanding and management capabilities. Gamma's suppliers signed Energy and Environmental Requirement Statements to clarify responsibilities and jointly advance green supply-chain development.

Second, cross-industry partners. Collaborations with partners from other sectors expanded the scope and depth of resource coordination. Gamma worked with Huawei, Alibaba, and IBM to adopt advanced digital technologies. Beta partnered with art schools and local enterprises to strengthen cultural branding and competitiveness.

Third, industry associations. These organizations supported the institutionalization of SSCM standards. Beta issued the Internal Control Standards for Sauce-Aroma Products, while Gamma helped draft the China Liquor Industry ESG Disclosure Guidelines, reinforcing industry leadership and advancing sustainable development standards.

Fourth, local governments and communities. They provided social and policy support essential for sustainability. Alpha strengthened government and community relations through fiscal contributions; Gamma advanced regional collaboration through industrial poverty alleviation and rural revitalization; Beta promoted regional industrial cooperation to support local economic development.

Fifth, internal talent. mployees played a critical role in resource leveraging. Alpha and Beta promoted SSCM through diversified training and career development systems, while Gamma stressed digital training and innovation incentives to encourage employee participation in digital transformation and SSCM practices.

8.4.2.5 Dynamic feedback mechanisms and resource management cycles in case enterprises

The case data show that, in the process of actual resource deployment, the case enterprises are able to identify new resource needs or capability gaps in a timely manner, which in turn drives them to reinitiate resource structuring activities, thereby forming a dynamic feedback process of cyclical interaction and continuous optimization between resource leveraging and resource structuring. During the advancement of production automation, Alpha identified shortcomings in suppliers' equipment-related technological capabilities, which were unable to meet the requirements of continuous upgrading, thereby prompting the enterprise to reinitiate the strategic mobilization and acquisition of suppliers' equipment technology resources. After deploying digital technologies across dispersed supply chain stages, Gamma found deficiencies in internal and external data sharing and technological integration, and therefore quickly launched a new round of technological resource accumulation, continuously improving the ERP system that connects the entire chain of production, supply, and sales, and thereby achieving effective linkage across production, procurement, packaging, and sales. During the implementation of SSCM, Beta identified problems of missed detection and insufficient precision in its automated quality inspection line, and organized supplier enterprises and the development company to improve it.

8.4.3 Propositions on resource leveraging and SSCM performance in baijiu enterprises

This section integrates case evidence to explain how Baijiu enterprises improve SSCM performance through resource leveraging—mobilizing, coordinating, and deploying—and compares these findings with established theories. The study validates core propositions of ROT, the Dynamic RBV, and Stakeholder Theory, while refining and extending them in an

industry-specific context.

First, case evidence illustrates how the three subprocesses of resource leveraging create value, clarifying the mechanisms and pathways of ROT in Baijiu enterprises and SSCM settings.

Second, the study finds that stakeholders—through supplier collaboration, cross-industry partnerships, government and industry standard building, and community support—play key roles in the leveraging process, enhancing the effectiveness of resource coordination. Accordingly, in the SSCM context of the baijiu industry, stakeholders are not merely passive resource providers, but important drivers of rule-making and institutional diffusion.

Finally, the data show that during deployment, enterprises continuously identify new resource needs and capability gaps, triggering renewed structuring actions and generating a dynamic cycle of resource management. This confirms the feedback logic highlighted in ROT and the Dynamic RBV (Helfat & Peteraf, 2003; Ketchen et al., 2014).

Based on these validations and extensions, the study proposes the following propositions:

Proposition 5: Baijiu enterprises create comprehensive SSCM value through resource leveraging.

Proposition 6: In the SSCM context of the baijiu industry, stakeholders are both resource providers and important drivers of rule-making and institutional diffusion.

Proposition 7: In the process of resource leveraging, baijiu enterprises identify new resource needs, which in turn trigger a new round of resource structuring.

8.5 Chapter summary

Grounded in ROT, the Dynamic RBV, and Stakeholder Theory, and drawing on the systematic analysis of the case enterprises, this chapter discusses the underlying logic of SSCM implementation in baijiu enterprises and proposes a set of theoretical propositions. On this basis, this study develops an integrated theoretical framework (Figure 8.1) to reveal the overall logic through which baijiu enterprises achieve comprehensive SSCM value and the internal relationships among Propositions 1–7.

Overall, the process through which baijiu enterprises achieve comprehensive sustainable supply chain value is dynamic and complex. First, SSCM implementation is jointly driven by internal and external factors (Proposition 1). The stage of industry development and the institutional environment moderate the strength of external drivers (Proposition 1a); higher internal management standards weaken the additional constraining effect of external coercive pressure (Proposition 1b); and a clearer sustainability orientation in organizational culture

enables firms to perceive and respond more proactively to external changes, thereby advancing SSCM more actively (Proposition 1c).

Second, under these drivers, baijiu enterprises promote resource structuring through SSCM practices (Proposition 2). SSCM practices in procurement, production, and distribution are not only managerial responses to external requirements, but also important processes through which firms acquire, accumulate, divest, and restructure resources. In this context, this study further identifies resource inheriting as a distinctive mode of resource structuring in the baijiu industry (Proposition 3), through which traditional resources are sustained and regenerated in modern supply chain management.

However, resource structuring alone is insufficient to realize strategic value. Baijiu enterprises must further transform the structured resource base into capabilities, thereby entering the stage of capability bundling. By strategically bundling digital technologies and financial services, they significantly enhance both foundational supply chain capabilities and dynamic capabilities (Proposition 4).

Furthermore, enterprises realize comprehensive SSCM value through resource leveraging (Proposition 5), that is, by systematically deploying resources and capabilities within the firm, across upstream and downstream supply chain stages, and throughout the broader ecosystem, thereby creating integrated economic, environmental, and social sustainable value. In the process of value realization, broad stakeholder participation plays a critical role. Through deep collaboration with suppliers, distributors, cross-sector partners, government, and community stakeholders, firms further institutionalize SSCM and extend it into industry norms or policy orientations (Proposition 6). Finally, in the process of resource leveraging, baijiu enterprises identify new resource needs and thereby trigger a new round of resource structuring (Proposition 7), ensuring that firms can dynamically adapt to changes in both the internal and external environment.

Taken together, the discussion in this chapter shows that SSCM in baijiu enterprises does not unfold in a linear manner. Rather, the process through which baijiu enterprises achieve comprehensive sustainable value through SSCM can be summarized as follows: resource structuring forms the resource base, resource bundling promotes capability formation, and resource leveraging realizes value creation. Accordingly, this study further summarizes this dynamic evolutionary process as “resource structuring–capability bundling–value leveraging.” This summary is not intended to replace the original ROT framework, but rather to reveal its process attributes and underlying orientation more clearly. The empirical findings on SSCM in baijiu enterprises provide empirical support for this refinement.

Chapter 9: Conclusion

This thesis consists of nine chapters.

Chapter 1 introduces the research background. It highlights the sustainability pressures faced by the industry at the supply chain level, including high resource consumption, high pollution, and high inventory. On this basis, it explains the necessity of translating industry-level sustainable development problems into firm-level SSCM issues and presents the research questions. The chapter also discusses the connection between the baijiu industry and sustainable development issues in the traditional liquor industry in emerging economies, thereby clarifying the empirical context of this study and its broader theoretical significance.

Chapter 2 reviews the relevant literature, examining SSCM, ROT, the Dynamic RBV (Dynamic RBV), and Stakeholder Theory, as well as SSCM development and application in the alcoholic beverage sector and emerging economies. It identifies existing research gaps and proposes the research approach and framework of this thesis.

Chapter 3 explains the research methodology, including the rationale for the multiple-case study design, case selection logic, data collection, interview protocols, and coding procedures, thereby ensuring research validity and reliability.

Chapters 4 to 6 provide single-case analyses of Alpha, Beta, and Gamma, examining SSCM drivers, specific practices, the roles of digital technologies and financial services, resource allocation within the firm, across the supply chain, and within the ecosystem, as well as resulting performance improvements.

Chapter 7 offers a cross-case analysis based on the ROT framework, comparing resource structuring, bundling, and leveraging practices and revealing the logic underlying their supply chain processes

Chapter 8 develops the theoretical discussion and propositions, explaining the dynamic mechanisms through which Baijiu enterprises achieve integrated SSCM value and extending ROT and SSCM theory in an industry context.

Finally, **Chapter 9** summarizes the research. Section 9.1 answers the research questions; Section 9.2 presents the theoretical contributions; Section 9.3 discusses the implications; Section 9.4 identifies the limitations; and Section 9.5 offers directions for future research.

9.1 Addressing the research questions

This study proposed four research questions in Chapter 1:

RQ1. What SSCM practices have been implemented by baijiu enterprises across purchasing, manufacturing, and distribution, and what internal and external factors have driven these practices?

RQ2. What are the performance objectives associated with SSCM?

RQ3. What are the dynamic development mechanisms through which baijiu enterprises achieve sustainable development?

RQ4. What impacts do digital technologies and SCF services have on the long-term sustainability of baijiu enterprises?

To address these questions, the study first conducts a literature review of SSCM, ROT, Dynamic RBV, and Stakeholder Theory, thereby developing a preliminary analytical framework. It then employs a multiple-case study to analyze three Baijiu enterprises that are representative and successful in SSCM. Case selection follows three criteria: (1) the enterprises have comprehensively implemented SSCM; (2) they are representative and influential in China's Liquor Industry; and (3) they serve as core firms in the Baijiu supply chain. These cases reveal the diverse SSCM challenges during industry transformation and demonstrate high research value due to their substantial influence within and beyond the industry.

The empirical findings of this study not only answer questions concerning the drivers, practices, and performance objectives of SSCM implementation in baijiu enterprises, but also generate three further implications. First, the study redefines the nature of sustainable development problems in the baijiu industry, showing that the industry's difficulties are not isolated firm-level operational problems, but systemic problems that run through all stages of the supply chain. Second, the study advances understanding of SSCM from the identification of practices to the explanation of mechanisms, revealing the dynamic process through which baijiu enterprises achieve comprehensive SSCM performance through resource structuring, capability bundling, and value leveraging. Third, the study shows that digital technologies and financial services are not external supporting conditions outside SSCM, but important enabling factors embedded within it that promote upstream–downstream coordination and value diffusion. Accordingly, this study not only answers the research questions, but also further deepens understanding of the mechanisms and pathways through which the traditional liquor industry in emerging economies can achieve sustainable development.

9.1.1 SSCM practices in baijiu enterprises

This thesis addresses the RQ1: the specific practices implemented by baijiu enterprises in procurement, production, and distribution in pursuit of sustainable development. The findings show that baijiu enterprises do not undertake sustainable management activities in a fragmented manner across the supply chain; rather, in response to the industry's "three-high" constraints, they have developed targeted bundles of SSCM practices at different stages.

9.1.1.1 SSCM in the procurement stage: ensuring the long-term stability of supply

In the procurement stage, baijiu enterprises primarily implement three categories of SSCM practices in response to the problem of high resource consumption. First, because baijiu brewing is highly dependent on grain resources, firms establish long-term cooperative relationships with suppliers, farmers, or cooperatives and undertake SSCM practices aimed at ensuring supply chain continuity, such as contract farming, long-term contracts, and the development of dedicated cultivation bases. These SSCM practices not only help secure a stable supply of grain specifically for baijiu production, but also lay the foundation for raw material quality control and the efficient use of resources.

Second, baijiu enterprises undertake risk management-oriented SSCM practices by establishing supplier evaluation and governance mechanisms. Based on quality, environmental, and responsibility standards, the case enterprises screen, assess, and dynamically manage suppliers, and gradually transmit sustainability requirements to upstream partners through regular audits, performance evaluations, supplier training, and long-term incentives. In this way, they reduce the risks of raw material quality fluctuations and supply disruptions, while promoting continuous improvement among suppliers in quality control, environmental governance, and social responsibility. SSCM practices in the procurement stage thus contribute to the standardization and greening of the upstream raw material system.

Third, some firms also undertake collaboration-oriented SSCM practices by jointly developing grain specifically for baijiu production with suppliers, in order to improve raw material suitability and grain utilization efficiency and to reduce resource waste and unnecessary losses. These practices indicate that procurement is no longer confined to raw material sourcing itself, but has further extended to collaborative optimization and joint innovation with upstream actors.

9.1.1.2 SSCM in the production stage: strengthening collaboration, risk control, and technological innovation

In the production stage, SSCM practices in baijiu enterprises are primarily focused on addressing the high pollution associated with the baijiu brewing process, while simultaneously promoting resource conservation and green transformation. The findings show that baijiu enterprises mainly implement three categories of SSCM practices at this stage. First, baijiu enterprises undertake collaboration-oriented SSCM practices by jointly developing intelligent brewing hardware and software resources with external actors such as universities, research institutes, and equipment suppliers, thereby strengthening external collaborative innovation and enhancing green production capabilities.

Second, baijiu enterprises advance **pro-activity** SSCM practices. On the one hand, by introducing new equipment, new technologies, and green energy-saving processes, they optimize traditional brewing procedures, reduce energy and water consumption as well as pollutant emissions, and thereby achieve the goals of cleaner production, energy saving, and emission reduction. On the other hand, by establishing a prevention and control system covering the entire production process, baijiu enterprises improve both environmental governance capabilities and production process stability.

Third, firms implement society category SSCM practices. Through environmental training, baijiu enterprises enhance employees' awareness and ability in green brewing and environmental protection, thereby gradually embedding green values into production management..

9.1.1.3 SSCM in the distribution stage: strengthening mutual-interest communities and resource allocation

In the distribution stage, SSCM practices in baijiu enterprises are primarily directed at the problem of high inventory and the underlying contradictions associated with low channel efficiency, information opacity, and misaligned interests. The findings show that baijiu enterprises mainly enhance supply chain transparency, reduce inventory risk, and strengthen supply chain responsiveness to market changes through collaborative governance, logistics integration, and multi-stakeholder coordination.

First, by undertaking **supply chain continuity**-oriented SSCM practices, baijiu enterprises not only maintain long-term cooperative relationships with distributors, but also strengthen coordination in areas such as market strategy, new product promotion, and regional management. In doing so, they reduce the risk of inventory accumulation caused by information

asymmetry and channel conflicts.

Second, firms undertake **collaboration**-oriented SSCM practices through the establishment of in-house logistics subsidiaries or logistics integration with third-party logistics providers, thereby promoting delivery optimization, improving inventory turnover efficiency, and enhancing the overall responsiveness of the supply chain. This not only helps reduce redundant transportation and resource waste, but also improves overall supply chain efficiency.

Third, firms also advance **pro-activity** SSCM practices by strengthening coordination among the goals and behaviors of different stakeholders. For example, through integrated online–offline membership systems, digital platforms, and ESG information disclosure mechanisms, firms enhance interactive communication with consumers, distributors, logistics service providers, and the broader public, thereby improving supply chain information transparency and strengthening their ability to perceive market changes. On this basis, some firms further optimize their product and channel structures by divesting products and regional markets with low contribution or low efficiency, thereby promoting a shift from the traditional multi-tier distribution model toward a flatter channel system. In this way, they improve the matching efficiency between products and markets and alleviate the pressure of high inventory on both firms and distribution channels.

9.1.2 Drivers of SSCM in baijiu enterprises

In addressing the first research question (RQ1) concerning the SSCM practices implemented by baijiu enterprises, this thesis also further examines the internal and external drivers shaping these practices. Findings from the within-case analyses and cross-case comparison show that external factors—policies, markets, industry competition, and stakeholder expectations—create institutional and market pressures, while internal factors such as strategy, culture, and resource endowments shape firms' interpretations of and responses to these pressures. Together, these two sets of forces constitute the drivers of SSCM implementation in baijiu enterprises.

9.1.2.1 External drivers

External forces exert an important influence on the advancement of SSCM in baijiu enterprises, but the strength of different types of pressure is not the same. The findings show that, although mimetic pressure objectively exists, it is not the core force driving baijiu enterprises to implement SSCM; by contrast, coercive pressure arising from government policy and normative pressure exerted by stakeholders constitute the main drivers of firms' SSCM strategies. In the face of increasingly stringent environmental regulations and rising social

responsibility expectations, firms are more inclined to advance sustainable transformation through compliance management, responsibility fulfilment, and governance optimization, rather than merely imitating industry leaders.

Specifically, government policy constraints in areas such as environmental protection, market regulation, and taxation push firms to optimize supply chain processes and improve environmental performance, reflecting significant coercive pressure. Meanwhile, rising consumer awareness of health and environmental protection, together with the growing prominence of ESG and CSR issues, encourages firms to accelerate green innovation, optimize procurement, production, and packaging strategies, and reduce carbon emissions, thereby reflecting normative pressure from the market and society. Although industry competition generates a certain degree of mimetic pressure, its role is manifested more in prompting firms to benchmark against leading firms in order to narrow capability gaps.

9.1.2.2 Internal drivers

Internal factors are also important drivers of SSCM advancement in baijiu enterprises, mainly reflected in three aspects: corporate strategy, organizational culture, and resource endowment. First, strategic orientation provides systematic planning and resource allocation support for SSCM, enabling sustainability requirements to be more effectively integrated into business OSCM. Second, organizational culture strengthens the initiative of both firms and their partners in implementing sustainable practices by encouraging the participation of all employees in sustainability strategies. Finally, resource endowments—such as high-quality water sources, traditional fermentation pits, distinctive geographical conditions, and traditional brewing techniques—not only constitute important competitive advantages for baijiu enterprises, but also provide endogenous motivation for advancing resource conservation, cleaner production, and long-term sustainable utilization.

9.1.3 Integrated value and realization pathways of SSCM in baijiu enterprises

RQ2 and RQ3 examine what types of value baijiu enterprises create through SSCM and how these values are realized. Drawing on the within-case analyses in Chapters 4–6 and the cross-case comparison in Chapter 7, the study finds that baijiu enterprises realize integrated value across the economic, environmental, and social dimensions. This not only enhances operational efficiency and market competitiveness, but also improves resource utilization efficiency and the ecological environment, while promoting regional development, improving stakeholder relationships, and enhancing employee well-being. The realization of comprehensive SSCM

value is not the result of any single practice, but depends on a systemic process of resource structuring, capability bundling, and value creation, reflecting a dynamic evolutionary process from resource structuring to capability bundling and value creation. Specifically, firms first reshape their resource base through SSCM practices, then gradually form capabilities that support organizational action and supply chain collaboration through resource integration, and ultimately create integrated economic, environmental, and social value through the mobilization, coordination, and deployment of resources and capabilities.

9.1.3.1 Integrated value of SSCM

Through SSCM, Baijiu enterprises generate integrated value across economic, environmental, and social dimensions, forming the basis for long-term competitiveness and sustainable growth.

Economically, SSCM strengthens collaboration and agility, improving efficiency and market responsiveness and contributing to stable revenue growth, stronger profitability, and enhanced brand leadership.

Environmentally, enterprises adopt clean energy and circular resource practices, reduce energy consumption and emissions, and improve wastewater and waste management while investing in green innovation to minimize environmental impact.

Socially, SSCM supports value creation at multiple levels. At the societal level, enterprises contribute to regional development and rural revitalization. At the stakeholder level, they engage in philanthropy, promote responsible drinking, disclose ESG information, and respond to expectations to enhance legitimacy and trust. Internally, they ensure safe workplaces, fair opportunities, and competitive compensation, improving employee well-being and motivation.

Together, these outcomes illustrate how SSCM enables Baijiu enterprises to pursue profitability and sustainability simultaneously, achieving integrated value that aligns business growth with broader social and ecological progress.

9.1.3.2 Resources for structuring integrated value

The realization of integrated SSCM value in the Liquor Industry is a systemic process in which resources and capabilities continuously interact and evolve. Driven by internal and external factors, Baijiu enterprises implement a range of SSCM practices aligned with sustainability goals. Through these practices, they acquire, accumulate, inherit, and divest resources in ways that build a sustainability-oriented resource system while removing inefficient, high-risk, or non-compliant resources from the supply chain.

Through acquisition, enterprises secure stable, high-quality raw materials via standardized

grain cultivation, premium contracts, and regional base planning, and obtain long-term strategic resources by developing partnerships with core suppliers, forming manufacturer–distributor communities of shared interest, and building logistics alliances. Through accumulation, they strengthen tangible and intangible resources across the supply chain. Collaborative platforms and data-sharing mechanisms support organizational knowledge accumulation, while ESG evaluation, life-cycle traceability, and supplier audits create institutionalized risk-control resources. Promotion of green culture and environmental R&D enhances brand reputation and cultural capital, and stakeholder engagement and membership systems deepen social capital and customer loyalty. Divestment enables firms to eliminate inefficiencies by phasing out low-performing products or redundant channels, freeing resources for redeployment in strategic areas. Through inheritance, enterprises systematically preserve and innovate traditional craftsmanship and culture, transforming them into resources with lasting competitiveness.

Together, these structuring activities establish a dynamic and diversified resource base—encompassing material, institutional, relational, and cultural resources—that supports the development of supply chain capabilities and the realization of integrated SSCM value.

9.1.3.3 Capabilities for bundling integrated value

Building on their resource base, Baijiu enterprises do not merely accumulate resources but integrate them systematically, transforming dispersed organizational, institutional, relational, technological, and cultural resources into capabilities. This process consolidates existing strengths and expands capabilities at multiple levels, gradually reinforcing both foundational and dynamic supply chain capabilities.

At the foundational level, stable raw and packaging material supply, together with long-term strategic partnerships, ensures reliability across the supply chain. Collaborative platforms and institutionalized mechanisms improve coordination and information sharing. Green processes and digital tools enhance efficiency and reduce costs, while ERP systems, big data, and traceability mechanisms integrate fragmented information into end-to-end monitoring systems, strengthening risk control.

At the dynamic level, enterprises enrich and stabilize adaptive capacities to cope with environmental uncertainty. By integrating data resources, they enable real-time production and market monitoring, enhancing reflexive control. Knowledge sharing and information exchange improve knowledge assessment. Green technologies and intelligent equipment support co-evolution with partners in process improvement, workflow optimization, and product innovation. Strategic alliances enable firms to provide partners with orders, technologies, and

financial support, strengthening partner development. By reorganizing supply chain structures, processes, and collaboration models, enterprises enhance reconceptualization capabilities.

9.1.3.4 Leveraging integrated value

Leveraging builds on the existing resource and capability base, focusing on mobilizing, coordinating, and deploying resources to generate integrated value across the supply chain.

First, firms efficiently mobilize internal and external resources and apply their supply chain capabilities to cross-organizational collaboration, enabling rapid integration of dispersed resources.

Next, they coordinate resources and capabilities to maximize synergy through four approaches: (1) sharing explicit and tacit SSCM knowledge with suppliers; (2) linking performance evaluation and incentives to sustainability goals to enhance supplier participation; (3) extending internal standards upstream and downstream through digital systems; and (4) restructuring the ecosystem and organizational framework to improve coordination and utilization through structural design and process optimization. These measures gradually integrate scattered resources and capabilities, embedding SSCM as a supply chain-wide norm.

Finally, firms deploy resources and capabilities by institutionalizing knowledge management through research institutes and disseminating organizational knowledge to industry actors, local governments, and national platforms. This fosters broader learning and contributes to local and sectoral standards, transforming internal experience into shared social value.

9.1.4 The impact of digital technologies and financial services on realization of SSCM value

RQ4 investigates how digital technologies and financial services influence baijiu enterprises' realization of SSCM value. The findings show that both are embedded in the "resource structuring–capability bundling–value creation" transformation chain, accelerating resource integration and capability development while extending SSCM's diffusion and synergistic effects across supply chain partners and the broader industrial ecosystem.

9.1.4.1 Accelerating resource bundling and capability transformation

During capability formation, digital technologies and financial services support the stabilization, enrichment, and expansion of supply chain capabilities.

Digital technologies significantly enhance foundational and dynamic capabilities. ERP

systems, intelligent production monitoring, and smart logistics platforms integrate dispersed resources, stabilizing raw material supply, logistics, and production quality to strengthen reliability and cost-efficiency. Real-time data analysis and collaborative platforms reinforce dynamic capabilities: data become signals for early warning and adjustment to strengthen reflexive control; information sharing and joint innovation improve co-evolution and partner development; and data-driven market insights enhance reconceptualization capabilities.

Financial services facilitate capital and credit integration during resource bundling. They enhance foundational capabilities through financing support, guarantee mechanisms, risk-sharing, and improved information exchange. They also promote dynamic capability development by accelerating green technology upgrading and partner cultivation, while diversified financial instruments extend service boundaries, support structural reconfiguration, and further reinforce reconceptualization capabilities.

9.1.4.2 Expanding collaboration across supply chains and the broader ecosystem

At the leveraging stage, digital technologies and financial services extend baijiu enterprises' SSCM practices to upstream and downstream partners and to the wider industrial ecosystem.

First, firms use digital collaboration systems to extend internal SSCM standards across the supply chain. By building supply chain data platforms, they integrate data from upstream and downstream partners, strengthen connectivity, and cultivate shared understanding and collaboration on sustainability goals within the ecosystem.

Second, supply chain financing tools—such as supplier financing and distributor credit guarantees—enhance the liquidity of upstream and downstream firms and encourage their participation in SSCM. Financial services are also shifting from offline collateral-based guarantees to more flexible, data-driven financing models, attracting additional ecosystem participants and financial institutions and strengthening resource interaction and integration within the ecosystem.

9.2 Theoretical contributions

Drawing on the case analyses, this thesis extends SSCM theory, ROT, and Stakeholder Theory by developing a multidimensional, context-specific SSCM framework. It offers new perspectives for theoretical development and practical application in emerging economies and industry-specific settings.

9.2.1 Contributions to SSCM theory

First, this study extends the contextual and industry boundaries of SSCM research. Existing empirical evidence on SSCM is drawn mainly from developed economies, and the industries examined have largely focused on general manufacturing, energy, apparel, and food. There remains a lack of systematic explanation of how the traditional liquor industry in emerging economies responds, through supply chain management, to resource constraints, environmental regulation, and pressures arising from market transformation (Sánchez-Flores et al., 2020). Using Chinese baijiu enterprises as the empirical setting, this study reveals the dynamic process through which firms implement SSCM practices across procurement, production, and distribution under the constraints of high pollution, high resource consumption, and high inventory. In doing so, it provides contextualized evidence for SSCM research on the traditional liquor industry in emerging economies. This study examines SSCM within the previously underexplored industry–context combination of the traditional liquor industry in an emerging economy, thereby extending the explanatory scope of SSCM research in relation to sustainability issues under specific industrial and institutional conditions.

Second, this study deepens the theoretical explanation of the mechanism through which SSCM generates comprehensive value. Building on prior research, it further reveals the relationship between SSCM practices and resource structuring, showing that the SSCM practices undertaken by baijiu enterprises in procurement, production, and distribution are not only managerial responses to internal and external pressures, but also important processes through which resource structuring takes place. On this basis, the study incorporates resource structuring into the process through which SSCM generates comprehensive value, and identifies the dynamic process through which baijiu enterprises achieve comprehensive sustainable performance through SSCM, namely, "resource structuring–capability bundling–value leveraging." The contribution of this study does not lie in once again demonstrating that SSCM practices influence capabilities and performance, but in showing that baijiu enterprises do not achieve performance improvement directly through isolated practices. Rather, they gradually realize resource structuring through the continuous advancement of SSCM practices, then bundle capabilities on that basis, and finally leverage economic, environmental, and social value across the upstream and downstream supply chain.

Third, this study extends understanding of how digital technologies and financial services function in the SSCM context. By incorporating digital technologies and financial services into a unified analytical framework, this study reveals that they not only strengthen basic supply

chain capabilities, but also play an enabling role in stabilizing, strengthening, and pioneering dynamic capabilities under SSCM conditions. This study does not treat digital technologies or financial services as isolated variables or exogenous supporting conditions. Instead, it embeds them within the mechanism through which SSCM generates comprehensive value, thereby revealing their enabling role in the chain of "resource structuring–capability bundling–value leveraging."

9.2.2 Contributions to Resource Orchestration Theory

First, this study extends the application boundaries of ROT in the SSCM context and in emerging-economy industrial settings. By taking Chinese baijiu enterprises as the empirical setting, this study not only validates the applicability of ROT in the SSCM context, but also situates and refines it within the specific industrial setting of the baijiu industry, thereby enhancing its explanatory power for sustainable supply chain issues.

Second, this study enriches the theoretical understanding of the resource structuring stage in ROT by proposing and identifying resource inheriting as a new mode of resource structuring. In the SSCM context of the baijiu industry, this study finds that firms not only reshape their resource base by acquiring new resources, accumulating existing resources, and divesting inefficient resources, but also inherit resources through the continuation, transformation, and innovation of traditional craftsmanship, cultural assets, and historical experience. In doing so, this study enriches the theoretical understanding of the resource structuring process in ROT and shows that, in industries characterized by deep cultural embeddedness and strong craft traditions, resource inheriting is also an important mode of resource structuring.

Finally, this study deepens understanding of the processual nature of ROT by revealing the feedback effect of value leveraging on resource structuring. It finds that baijiu enterprises do not follow a static and linear resource orchestration path when achieving comprehensive sustainable value through SSCM. In the process of resource leveraging, firms continuously identify new resource needs, which in turn drive a new round of resource structuring. Accordingly, this study further demonstrates that the resource orchestration process in ROT is not unidirectional, but instead exhibits continuous feedback and iterative evolution.

On this basis, this study further refines the dynamic process of ROT in the SSCM context of baijiu enterprises as "resource structuring–capability bundling–value leveraging." This formulation reveals the internal logic of ROT: resource structuring forms the resource base, capability bundling drives capability formation, and value leveraging realizes value creation.

The empirical findings in baijiu enterprises provide empirical support for this refinement.

9.2.3 Contributions to stakeholder theory

At the resource leveraging stage, this study reveals the multidimensional roles of stakeholders in the SSCM context. Prior research has often simplified stakeholders as resource providers or external constraint factors (Siems et al., 2022; Touboulic & Walker, 2015). In contrast, this study finds that, in SSCM practices in the baijiu industry, stakeholders assume more active and deeply embedded governance functions. First, they ensure the implementation of corporate sustainability strategies through evaluation and supervision. Second, they enhance the managerial capabilities of upstream and downstream actors through training and knowledge sharing. Third, they promote the diffusion and institutionalization of SSCM norms across the supply chain and the broader ecosystem through joint institution-building and standard-setting. In the SSCM context, stakeholders are not merely passive external influencing factors, but important actors.This study not only extends understanding of the strategic roles of stakeholders, but also reveals their key role in the process through which focal firms achieve comprehensive SSCM value.

9.3 Managerial implications

9.3.1 Implications for focal firms (baijiu enterprises)

Against the backdrop of increasingly stringent environmental regulation, intensifying market competition, and rising pressure from diverse stakeholders, how baijiu enterprises can advance SSCM while preserving traditional craftsmanship and culture has become a key issue for achieving long-term sustainable development. Based on the findings, this study offers the following four managerial implications for focal firms.

First, firms should respond proactively to external pressures and strengthen their capacity for forward-looking adaptation. The findings show that coercive and normative pressures exert significantly stronger influences on baijiu enterprises than mimetic pressure, while high internal control standards and a sustainability-oriented culture help mitigate external pressures. Firms should therefore not respond passively to policy requirements, but should instead proactively identify changes in policy, market conditions, and stakeholder demands. By raising internal standards, strengthening risk prevention and control, and cultivating a sustainability-oriented culture, firms can enhance their capacity to adapt to changes in the external environment.

Second, firms should strengthen strategic resource management in order to promote the realization of comprehensive value. The findings indicate that baijiu enterprises do not achieve sustainable development through any single practice, but rather through the gradual process of resource structuring, bundling, and leveraging. Firms should therefore strengthen the strategic management of resources by not only managing resource acquisition, accumulation, and divestment, but also attaching importance to **resource inheriting**. Traditional craftsmanship, cultural assets, and historical experience should be incorporated into the resource management system so that comprehensive economic, environmental, and social value can be realized through inheritance, transformation, and innovation.

Third, firms should promote the deep integration of supply chains with digital technologies and financial services. The case analyses show that digital technologies and financial services not only strengthen basic supply chain capabilities, but also play an enabling role in stabilizing, strengthening, and pioneering dynamic capabilities. Firms should therefore embed digital technologies and financial services more deeply into key stages such as procurement, production, inventory management, channel coordination, and consumer interaction, so as to enhance supply chain transparency, collaborative efficiency, and risk response capability.

Fourth, firms should establish an SSCM management mechanism based on multi-stakeholder collaboration. The findings show that the role of stakeholders in SSCM extends beyond resource provision, as they also promote the diffusion and institutionalization of sustainability standards across the supply chain through supervision, training, rule-setting, and joint institution-building. Firms should therefore build an SSCM management mechanism characterized by multi-stakeholder collaboration, incorporating the efforts of suppliers, distributors, consumers, industry associations, and government to form a pattern of co-governance and value co-creation. At the same time, firms should establish a dynamic feedback mechanism to continuously identify gaps in resources and capabilities and adjust managerial priorities in a timely manner, thereby enhancing the resilience of long-term SSCM development.

9.3.2 Implications for upstream suppliers

In SSCM practices, the role of suppliers has shifted from that of mere providers of raw materials and packaging materials to important participants in the co-creation of sustainable value. Based on the findings, this study offers the following three practical implications for upstream supplier firms. First, suppliers should strengthen their strategic alignment with focal firms, proactively adapt to their SSCM requirements, and enhance their level of collaboration and responsiveness.

Second, suppliers should actively participate in the training, evaluation, and joint development activities led by focal firms, so as to continuously improve their capabilities in green production, quality management, and risk control. Finally, suppliers should move from short-term transactional relationships to long-term cooperative relationships, thereby increasing their degree of embeddedness in sustainable supply chains and strengthening their long-term competitive advantage.

9.3.3 Implications for downstream distributors

As important bridges linking focal firms with end markets, distributors play a critical role in the implementation and diffusion of SSCM. Based on the findings, this study offers the following three practical implications for downstream distributor firms. First, distributors should strengthen their strategic collaboration with focal firms and develop closer coordination in channel management, brand promotion, and customer service, so as to enhance the stability of cooperation and the efficiency of market coordination. Second, distributors should proactively integrate into the digital platforms of focal firms, increase the speed of their response to changes in market demand, and optimize inventory management and channel operating efficiency, thereby improving supply chain information transparency and collaborative capability. Finally, distributors should make active use of the financial service tools provided by focal firms in order to improve liquidity, alleviate operational pressure, and strengthen both market expansion capability and risk resilience.

9.3.4 Implications for digital technology and financial service providers

This thesis shows that bundling digital technologies and financial services significantly strengthens foundational and dynamic supply chain capabilities, making digital and financial service providers essential to advancing SSCM in the Liquor Industry. Providers of digital systems—such as ERP and intelligent logistics solutions—and financial service institutions should view the Baijiu sector as a key area for business expansion. By gaining a deeper understanding of firms' needs in digital application and capital management, they can offer scenario-based solutions that better align with industry requirements.

The findings further indicate that these institutions should act not only as tool and capital providers but also as knowledge partners. Through ongoing training, knowledge sharing, and interactive communication, they can help focal firms effectively apply digital technologies and financial services to strengthen supply chain capabilities.

Moreover, digital and financial service providers should enhance collaboration with one another. By integrating their service offerings, they can jointly promote supply chain capability development and support Baijiu enterprises in realizing comprehensive SSCM value.

9.3.5 Practical implications for SMEs in advancing SSCM

The three baijiu enterprises examined in this thesis are all in the first tier of China's baijiu industry, with substantial market scale, strong brand influence, and relatively mature organizational capabilities, resource bases, and strategic vision. According to the *Mid-2025 Industry Report* issued by the Liquor Market Professional Committee of the CADA, China had 989 baijiu enterprises above designated size by mid-2025, generating RMB 796.38 billion in sales revenue and RMB 250.87 billion in total profit. Alpha, Beta, and Gamma rank among the leading firms in revenue and are therefore highly representative of the industry. Their SSCM practices provide valuable references for other large-scale baijiu enterprises, while the logic chain of "resource structuring–capability bundling–value leveraging" also offers important insights for small and medium-sized enterprises.

However, SSCM implementation usually requires firms to progress through stages such as resource structuring, capability bundling, and value leveraging, all of which place high demands on financial investment, capability development, and professional support. Small and medium-sized baijiu enterprises (SMEs) may therefore face greater resource constraints. Even so, they still have considerable potential to advance SSCM. Through industry collaboration, regional alliances, and resource sharing and co-development, SMEs can compensate for resource shortages and improve sustainable development capabilities at lower cost. By making full use of policy support and industry platforms, they can also gradually build SSCM systems suited to their own characteristics.

9.4 Research limitations

Although this thesis provides an in-depth and systematic examination of SSCM in the Liquor Industry, several limitations remain. These limitations also point to important directions for future research.

9.4.1 Limitations of research samples and scope

The applicability of the findings may be constrained by the characteristics of the Liquor

Industry and China's emerging-economy context. Future research could expand the analysis to other industries to improve the cross-industry applicability of the insights.

Second, this thesis examines three leading Baijiu enterprises with well-developed SSCM practices. Although representative of the industry, the sample excludes smaller firms or those at earlier development stages. Such firms also face high pollution, high energy use, and high inventory levels and likewise require SSCM, but the lack of mature cases prevented their inclusion, limiting the generalizability of the findings. Moreover, this thesis does not analyze cases in which SSCM initiatives failed or were discontinued, which may provide complementary insights.

Third, although some upstream and downstream partners were examined, time and resource constraints prevented full stakeholder coverage, particularly secondary-tier suppliers and distributors. Future studies could incorporate a broader set of stakeholders to offer a more comprehensive understanding of SSCM implementation.

9.4.2 Limitations of theoretical framing

This thesis adopts an abductive reasoning approach and follows rigorous case study procedures—including multi-source data collection, in-depth interviews, and triangulation (Gibbert et al., 2008)—yet qualitative research inevitably contains elements of subjectivity. Future research could incorporate quantitative methods to provide complementary validation.

Second, the theoretical framework is primarily grounded in ROT. Although ROT provides a strong foundation for explaining how resource structuring, bundling, and leveraging enable SSCM value creation, it may not fully capture SSCM's complexity. Other theories can offer complementary insights. Network Theory (Borgatti & Li, 2009) may help explain how network structures influence resource flows; Resource Dependence Theory (Pfeffer & Salancik, 1978) may clarify how firms reduce resource acquisition risks through alliances; and Institutional Theory (Dimaggio & Powell, 1983) may illuminate how firms in emerging economies adapt to institutional environments and promote the institutionalization of sustainable practices. Future research could integrate these perspectives to further advance SSCM research.

9.4.3 Limitations of findings

This thesis uses a cross-sectional case design that clarifies SSCM practices and performance at a specific point in time but cannot show their long-term evolution. Because SSCM outcomes often emerge gradually, future studies could adopt longitudinal designs to track how resource

management and supply chain performance evolve over time and provide a more comprehensive understanding of SSCM's long-term value creation.

9.5 Future research directions

Future research could broaden SSCM investigations in the liquor industry by including firms that vary in size, development stage, and SSCM maturity. A more diverse sample would clarify heterogeneous adoption challenges and pathways.

Extending inquiry across industries, countries, and regions would further test the transferability of the framework and mechanisms developed in this thesis under different institutional and cultural conditions.

Future studies may also incorporate additional stakeholders—such as second-tier suppliers, distributors, industry associations, and public governance bodies—to better capture multi-actor motivations and interactions in SSCM value creation.

Given the long-term nature of SSCM outcomes, longitudinal designs could track how firms recalibrate practices in response to policy changes, market shifts, and technological advances, thereby revealing SSCM's dynamic evolution and sustained value creation.

Beyond ROT and the Dynamic RBV, alternative theoretical lenses may offer complementary explanations of SSCM mechanisms. Moreover, emerging digital technologies (e.g., blockchain, AI, and digital-currency payment systems) and innovative service models may reshape supply chain capabilities and enable new forms of sustainable value creation.

Finally, deeper interdisciplinary collaboration across supply chain management, technology, finance, environmental governance, and public policy could further strengthen SSCM research and its theoretical and practical contributions.

9.6 Concluding remarks

It has been a privilege to conduct this thesis and to explore SSCM, a research field with both theoretical value and practical significance. The research process has not only deepened my understanding of SSCM-related theories but also broadened my perspective on the intersections of digitalization, SCF, and resource management. The theoretical insights and managerial implications developed in this thesis are intended to provide useful references for future academic research and enterprise practice.

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Annex A: Annex Tables and Figures

Table A3.1 Data collection information

Case	Names of Organisation & Code	Interview sources		Additional sources
		Date & Interview length	Format	
Alpha	Deputy General Manager and Board Secretary (A1)	12 Nov 2024 (60 mins)	Face to face	- 2023 Annual Report - 2023 CSR Report (A11) - Written materials provided by the company's General Office (A12) - On-site visit to the corporate exhibition hall - On-site visit to the ancient distillery pools and traditional craftsmanship - On-site visit to Huangyi Brewing Ecological Park and the Intelligent Packaging Center - On-site visit to the Customized Liquor Base - On-site cocktail mixing experience - Product introductions - Product samples
	Deputy General Manager, Brewing Co., Ltd. (A2)	12 Nov 2024 (60 mins)	Face to face	
	Deputy Director, General Manager's Office (A3)	12 Nov 2024 (60 mins)	Face to face	
	Deputy General Manager, Packaging Material Procurement Center (A4)	12 Nov 2024 (60 mins)	Face to face	
	Senior Supply Chain Manager, Supply Chain Management Center (A5)	12 Nov 2024 (60 mins)	Face to face	
	Deputy General Manager, Wealth Management and Operations Center (A6)	13 Nov 2024 (60 mins)	Face to face	
	Deputy General Manager, Digital Development Center (A7)	13 Nov 2024 (60 mins)	Face to face	
	Deputy Director, Information Department, Sales Co., Ltd. (A8)	13 Nov 2024 (60 mins)	Face to face	
	Deputy General Manager of the Quality Management Center（A9）	20 Dec 2024 (30 mins)	Online	
	Deputy General Manager of the Ecological Environmental Protection Center (A10)	20 Dec 2024 (30 mins)	Online	
Beta	Deputy General Manager (B1)	15 Nov 2024 (90 mins)	Face to face	- Company introduction (B8) - Written materials provided by the company (B9) - Langjiu Estate introduction - On-site visit to the Tianbao
	Supply Chain Director (B2)	15 Nov 2024 (90 mins)	Face to face	
	Director, Procurement and Logistics Center (B3)	14 Nov 2024 (60 mins)	Face to face	
	Manager 1, Procurement and Logistics Center (B4)	14 Nov 2024 (60 mins)	Face to face	
	Manager 2, Procurement and Logistics Center (B5)	14 Nov 2024 (60 mins)	Face to face	

	Deputy General Manager, Sales Co., Ltd. (B6)	21 Dec 2024 (30 mins)	Online	Cave pottery jar wine storage - On-site visit to the sauce-flavored liquor brewing base and blended-flavor liquor brewing base - On-site visit to the customized liquor base - On-site cocktail mixing experience - Product introductions - Product samples
	Deputy General Manager, Gulin Manor Co., Ltd. (B7)	21 Dec 2024 (30 mins)	Online	
Gamma	Manager, Strategic Development Department (C1)	18 Nov 2024 (60 mins)	Face to face	- 2023 CSR Report (C14) - 2024 Annual Report (C15) - Written materials provided by the strategic development department (C16) - On-site visit to the corporate exhibition hall - On-site visit to the liquor brewing base - On-site visit to the industrial wastewater ecological treatment wetland - Product introductions - Product samples
	Deputy General Manager, Changjiang Source Liquor Co., Ltd. (C2)	18 Nov 2024 (90 mins)	Group interview	
	Packaging Materials Procurement Supervisor, Material Procurement Center (C3)			
	Assistant Director, Technology Research Center (C4)	19 Nov 2024 (120 mins)	Group interview	
	Deputy Director, Information Management Center (C5)			
	Manager, Information Management Center (C6)			
	Deputy Director, Finance Department, (C7)	19 Nov 2024 (90 mins)	Group interview	
	Assistant General Manager, Group Company Finance Co., Ltd. (C8)			
	Executive Deputy Director, Business Management Department, Strong Aroma Liquor Company (C9)	19 Nov 2024 (120 mins)	Group interview	
	Director, Information Digitalization Center, Logistics Group Co., Ltd. (C10)			
	Deputy General Manager, Anshiji International Logistics Co., Ltd. (C11)			
	Deputy Director, Energy and Environmental Protection Management Department (C12)	19 Dec 2024 (30 mins)	Online	
	Director of the Quality Management Department (C13)	19 Dec 2024 (30 mins)	Online	

Table A4.1 Open codes summary of Alpha

Drivers of SSCM		**Open codes**
External Drivers		Environmental policies encourage enterprises to prevent and monitor pollution Customer and consumer habits influence corporate profitability Intensified industry competition and structural adjustments reshape market dynamics Stakeholder expectations drive standardized corporate development
Internal Drivers		Strategic decisions equally balance environmental, social, and economic considerations Strategic decisions integrate sustainability across the entire supply chain Corporate culture embodies sustainability principles Abundant natural and regional resources support enterprise development
Resource Structuring		**Open codes**
Acquiring	SC Continuity	Standardize cultivation and offer premium-priced orders for baijiu grains Select packaging suppliers for long-term industrial park cooperation Improve supplier quality through stable orders and profit-sharing mechanisms Promote manufacturer–distributor integration
Accumulating	SC Collaboration	Jointly develop equipment technologies with suppliers Share equipment and IT systems across the supply chain Achieve data interconnection throughout the supply chain Integrate third-party logistics providers into supply chain operations
	Risk management	Establish environmental standards for supplier selection Implement early-warning systems for timely supply chain risk detection Reduce the use of pesticides and chemical fertilizers in raw materials. Improve packaging design to reduce environmental impact Implement lifecycle quality management
	Pro-activity	Collaborate with universities to improve brewing technologies Establish a technology subsidiary to manage invention patents Adopt energy-saving measures and environmental protection equipment Promote sustainability and environmental awareness internally
	Stakeholder management	Engage stakeholders and respond to their expectations Establish membership systems through online and offline channels Continuously optimize and innovate products
Divesting		Replace the former marketing team with a restored direct sales team Exit non-core businesses and refocus on core operations
Inheriting		Inherit a corporate culture of coexistence with nature

		Preserve traditional craftsmanship through modern technology
Resource Bundling		**Open codes**
Capabilities bundling Digital Technologies	Stabilizing	Stabilize supply chain quality through digital technologies
	Enriching	Enrich supply chain collaboration by breaking data silos Enrich supply chain efficiency through bundling digital elements
	Pioneering	Pioneer data-driven decision-making through data value realization
Capabilities bundling Financial Services	Stabilizing	Stabilize manufacturer–distributor relationships through pledge guarantees
	Enriching	Enrich information sharing through financing platforms
	Pioneering	Pioneer supplier financing products through service extension Pioneer financial risk-control capabilities through emerging technologies
Resource Leveraging		**Open codes**
Mobilizing	External Resource	Align supplier management and assessment with strategic requirements
	Internal Resources	Establish dedicated departments to implement strategic initiatives Enhance internal talent vitality within the organization
Coordinating		Share explicit and tacit SSCM knowledge with suppliers Establish SSCM-linked measurement and reward systems Provide digital products customized for key supply chain operations Integrate supply chain partners into digital systems to extend SSCM standards Reconstruct SSCM collaboration networks and management frameworks
Deploying		Embed knowledge into organizational routines Promote experience sharing and technical exchanges across industries Participate in developing national, local, and industry-specific standards
SSCM Performance		**Open codes**
Environmental performance		Improve energy efficiency and resource recycling rates Reduce energy consumption and pollutant emissions
Social performance		Contribute to local tax revenue, urban development, and economic growth Support essential industries in less-developed counties Establish rural poverty alleviation funds with distributors Promote responsible drinking and healthy lifestyles Engage in social services and educational support activities Enhance employee income and benefits Provide safe workplaces and equal development opportunities
Economic performance		Achieve significant growth in revenue and profits Maintain stable and consistent high dividend payouts Maintain market position and enhance industry influence

			Improve supply chain collaboration and agility	

Table A4.2 Alpha's SSCM practices and resource structuring process

Resource Structuring	**Practice Type**	**Sub-category**	**SSCM Practice**	**Resource**
Acquiring	SC Continuity	Long term relationships	Standardize cultivation and offer premium-priced orders for baijiu grains	Tangible Resources (Raw Materials)
		Partner selection	Select packaging suppliers for long-term industrial park cooperation	Organizational Resources (Strategic Alliances)
		SC Partner Development	Improve supplier quality through stable orders and profit-sharing mechanisms	
			Promote manufacturer–distributor integration	
Accumulating	SC Collaboration	Joint development	Jointly develop equipment technologies with suppliers	Intangible Resources (Intellectual Property)
		Technological Integration	Share equipment and IT systems across the supply chain	Organizational Resources (Data)
		Enhanced communication	Achieve data interconnection throughout the supply chain	
		Logistical integration	Integrate third-party logistics providers into supply chain operations	Organizational Resources (Strategic Alliances)
	Risk management	Standards and Certifications	Establish environmental standards for supplier selection	Organizational Resources (Corporate Standards)
		Pressure group management	Implement early-warning systems for timely supply chain risk detection	
		Environmental purchasing	Reduce the use of pesticides and chemical fertilizers in raw materials.	
		Green packaging	Improve packaging design to reduce environmental impact	
		Life cycle assessment	Implement lifecycle quality management	
	Pro-activity	Green Brewing Innovation	Collaborate with universities to improve brewing technologies	Intangible Resources (Intellectual Property)
			Establish a technology subsidiary to manage invention patents	

		Application of Cleaner Process Technology	Adopt energy-saving measures and environmental protection equipment	Organizational Resources (Corporate Standards)
		Environmental training	Promote sustainability and environmental awareness internally	
		Stakeholder management	Engage stakeholders and respond to their expectations	
			Establish membership systems through online and offline channels	Relational Resources (Channels)
			Continuously optimize and innovate products	Tangible Resources (Products)
Divesting	/	/	Replace the former marketing team with a restored direct sales team	Relational Resources (Channels)
	/	/	Exit non-core businesses and refocus on core operations	Organizational Resources (Organizational Routines)
Inheriting	/	/	Inherit a corporate culture of coexistence with nature	Organizational Resources (Culture)
			Preserve traditional craftsmanship through modern technology	

Table A5.1 Beta's SSCM practices and resource structuring process

Resource Structuring	**Practice Type**	**Sub-category**	**SSCM Practice**	**Resource**
Acquiring	SC Continuity	Long term relationships	Order-based procurement, establish a government-farmer-enterprise partnership	Tangible Resources (Raw Materials)
			Develop self-bred grain varieties and standardize cultivation	
		Partner selection	Establish packaging subsidiaries to support internal procurement alliances	Organizational Resources (Strategic Alliances)
		SC Partner Development	Avoid channel overstocking to prevent market saturation	
			Support distributor growth through value co-creation and profit sharing	
Accumulating	SC Collaboration	Logistics integration	The transition from third-party cooperation to a self-built logistics system.	Organizational Resources (Strategic Alliances)
		Technological Integration	Integrate automated inspection technologies	Organizational Resources (Data)
	Risk	Standards and	Implement environmental standards that exceed national	Organizational

	management	Certifications	requirements	Resources (Corporate Standards)
		Pressure group management	Develop multi-regional grain bases to reduce procurement risks	
		Life cycle assessment	Implement end-to-end quality monitoring and traceability	
	Pro-activity	Green Brewing Innovation	Continuously innovate packaging materials and production technologies	Intangible Resources (Intellectual Property)
		Application of Cleaner Process Technology	Invest in environmental systems and equipment to enhance ecological management	Organizational Resources (Corporate Standards)
		Environmental training	Deliver environmental training programs to improve awareness and capabilities	
		Stakeholder management	Reward stakeholders for valuable suggestions and contributions	
			Engage consumers through the estate platform	Relational Resources (Consumers)
			Establish consumer and membership participation mechanisms	
			Develop differentiated products based on consumer needs	Tangible Resources (Products)
			Enhance base liquor aging processes for premium market segments	
Divesting	/	/	Optimize workforce structure through performance-based evaluations	Organizational Resources (Human Resources)
Inheriting	/	/	Innovate cultural heritage and expression in baijiu production	Organizational Resources (Culture)
			Preserve traditional craftsmanship by integrating modern technology	

Table A5.2 Open codes summary of Beta

Drivers of SSCM	**Open codes**
External Drivers	Reduced consumption affects product sales and corporate profitability Shrinking industry demand intensifies competition among baijiu enterprises Stakeholder suggestions drive standardized corporate development
Internal Drivers	The enterprise adopts a long-term vision to build a century-old brand Strategic decisions balance environmental, social, and economic considerations Strategic decisions embed sustainability across the entire supply chain Corporate culture reflects natural harmony, scientific rigor, and ecological values

		Distinctive natural and regional resources support sustainable baijiu production
Resource Structuring		**Open codes**
Acquiring	SC Continuity	Order-based procurement, establish a government-farmer-enterprise partnership Develop self-bred grain varieties and standardize cultivation Establish packaging subsidiaries to support internal procurement alliances Avoid channel overstocking to prevent market saturation Support distributor growth through value co-creation and profit sharing
Accumulating	SC Collaboration	The transition from third-party cooperation to a self-built logistics system.
	Risk management	Implement environmental standards that exceed national requirements Develop multi-regional grain bases to reduce procurement risks Implement end-to-end quality monitoring and traceability
	Pro-activity	Continuously innovate packaging materials and production technologies Invest in environmental systems and equipment to enhance ecological management Deliver environmental training programs to improve awareness and capabilities
	Stakeholder management	Reward stakeholders for valuable suggestions and contributions Engage consumers through the estate platform Establish consumer and membership participation mechanisms Develop differentiated products based on consumer needs Enhance base liquor aging processes for premium market segments
Divesting		Optimize workforce structure through performance-based evaluations
Inheriting		Innovate cultural heritage and expression in baijiu production Preserve traditional craftsmanship by integrating modern technology
Resource Bundling		**Open codes**
Capabilities bundling Digital Technologies	Stabilizing	Stabilize supply chain quality through digital technologies
	Enriching	Enrich supply chain efficiency through bundling digital elements
	Pioneering	Pioneer data-driven decision-making through data value realization
Capabilities bundling Financial Services	Stabilizing	Stabilize raw material supply through government subsidy alignment Stabilize manufacturer–distributor relationships through pledge guarantees
	Enriching	Enrich supply chain capital flow through cash payments
Resource Leveraging		**Open codes**
Mobilizing	External Resource	Deepen collaboration with external strategic partners Learn from peer companies and cross-sector firms to achieve strategic goals
	Internal Resources	Establish dedicated departments to implement strategic initiatives
Coordinating		Incorporate professional supplier training into the supplier evaluation system

	Implement sustainability-linked evaluation and reward mechanisms
Deploying	Formulate and publish internal control standards, and accept public supervision. Establish a research institute focused on liquor Industry standardization
SSCM Performance	**Open codes**
Environmental performance	Reduce and control environmental pollution in core sauce-aroma baijiu production areas
Social performance	Establish local factories to boost county tax revenue and employment opportunities Actively foster and support local specialty industries Construct wastewater treatment facilities to serve the entire town Sustain long-term funding for public welfare initiatives Provide safe workplaces and equal development opportunities Offer comprehensive benefits for employees and their families Promote responsible drinking and healthy lifestyles
Economic performance	Drive rapid corporate expansion through revenue growth Expand sauce-aroma baijiu market share and enhance industry influence Improve operational efficiency in production, logistics, and warehousing

Table A6.1 Gamma's SSCM practices and resource structuring process

Resource Structuring	Practice Type	Sub-category	SSCM Practice	Resource
Acquiring	SC Continuity	Long term relationships	Maintain long-term relationships with dedicated grain bases	Tangible Resources (Raw Materials)
		Partner selection	Establish subsidiaries for internal procurement	Organizational Resources (Strategic Alliances)
			Introduce diversified external suppliers	
		SC Partner Development	Strategically align and share benefits with distributors	
Accumulating	SC Collaboration	Joint development	Jointly innovate processes and products with research and industry partners	Intangible Resources (Intellectual Property)
		Technological Integration	Deploy ERP systems for supply-chain data integration	Organizational Resources (Data)
		Enhanced communication	Enhance communication with channels, retailers, and consumers	Relational Resources (Channels)
		Logistical integration	Integrate group logistics subsidiaries for supply-chain stability	Organizational Resources (Strategic Alliances)
	Risk management	Standards and Certifications	Include ESG criteria in supplier entry standards	Organizational Resources (Corporate Standards)

		Individual monitoring	Individually monitor supplier compliance and risks	
		Environmental purchasing	Implement eco-efficient and cost-effective procurement	
		Green packaging	Adopt sustainable, recyclable packaging	
		Pressure group management	Manage market pressures from intellectual property infringement	
			Continuously improve internal control systems	
		Life cycle assessment	Apply lifecycle-based quality management	
	Pro-activity	Green Brewing Innovation	Collaborate with universities to enhance brewing efficiency	Intangible Resources (Intellectual Property)
			Build comprehensive innovation platforms	
			Strictly manage intellectual property	
		Application of Cleaner Process Technology	Employ clean production technologies	Organizational Resources (Corporate Standards)
		Environmental training	Strengthen environmental training for employees and suppliers	
		Stakeholder management	Improve disclosure transparency	Relational Resources (clients)
			Establish enduring stakeholder relationships	
			Innovate products to meet diverse stakeholder needs	
Divesting	/	/	Divest low-contribution channels, distributors, and products	Relational Resources (Channels)
	/	/	Focus resources on core businesses and key functions	Organizational Resources
Inheriting	/	/	Integrate cultural research into brand promotion	Organizational Resources (Culture)
			Drive baijiu cultural development through technological innovation	

Table A6.2 Open codes summary of Gamma

Drivers of SSCM	**Open codes**
External Drivers	National regulations mandate stricter pollution control Consumers increasingly prioritize product sustainability and authenticity Intensified market competition requires compliant supply-chain management Suppliers' environmental investments foster positive supply-chain collaboration
Internal Drivers	The enterprise pursues a green and zero-carbon vision

		Strategic decisions equally emphasize environmental, social, and economic sustainability Strategic planning considers sustainability across the whole supply chain Corporate culture promotes green and low-carbon principles Abundant natural and regional resources enhance corporate sustainability
Resource Structuring		**Open codes**
Acquiring	SC Continuity	Maintain long-term relationships with dedicated grain bases Establish subsidiaries for internal procurement Introduce diversified external suppliers Strategically align and share benefits with distributors
Accumulating	SC Collaboration	Jointly innovate processes and products with research and industry partners Deploy ERP systems for supply-chain data integration Enhance communication with channels, retailers, and consumers Integrate group logistics subsidiaries for supply-chain stability
	Risk management	Include ESG criteria in supplier entry standards Individually monitor supplier compliance and risks Implement eco-efficient and cost-effective procurement Adopt sustainable, recyclable packaging Manage market pressures from intellectual property infringement Continuously improve internal control systems Apply lifecycle-based quality management
	Pro-activity	Collaborate with universities to enhance brewing efficiency Build comprehensive innovation platforms Strictly manage intellectual property Employ clean production technologies Strengthen environmental training for employees and suppliers
	Stakeholder management	Improve disclosure transparency Establish enduring stakeholder relationships Innovate products to meet diverse stakeholder needs
Divesting		Divest low-contribution channels, distributors, and products Focus resources on core businesses and key functions
Inheriting		Integrate cultural research into brand promotion Drive baijiu cultural development through technological innovation
Resource Bundling		**Open codes**
Capabilities bundling Digital Technologies	Stabilizing	Stabilize supply chain quality through digital technologies
	Enriching	Enrich supply chain collaboration by breaking data silos

		Enrich supply chain efficiency through bundling digital elements
	Pioneering	Pioneer data-driven decision-making through data value realization
Capabilities bundling Financial Services	Stabilizing	Stabilize manufacturer–distributor relationships through pledge guarantees
	Enriching	Enrich supply chain risk-control through internal and external financial resources.
	Pioneering	Pioneer innovative banking practices through internal financial companies
Resource Leveraging		**Open codes**
Mobilizing	External Resource	Deepen collaboration with external strategic partners
	Internal Resources	Engage all departments in sustainability strategies Establish specialized units to implement strategic initiatives Activate internal talent potential
Coordinating		Share explicit and tacit SSCM knowledge Establish SSCM-linked measurement and reward systems Extend SSCM standards across the supply chain Build a collaborative industry ecosystem
Deploying		Embed knowledge into organizational routines Promote experience sharing and technical exchanges across industries Participate in developing national, local, and industry-specific standards
SSCM Performance		**Open codes**
Environmental performance		Improve resource efficiency and waste utilization Strengthen environmental pollution control and ecological restoration
Social performance		Invest development funds to support rural revitalization Engage in community services and educational donations Implement salary reforms and enhance employee benefits Safeguard employee rights, workplace safety, and occupational health Promote responsible drinking and healthy lifestyles
Economic performance		Maintain stable high dividend payouts Continuously strengthen leadership in the strong-aroma baijiu market Enhance supply chain management efficiency and decision-making capability

Table A7.1 Distribution of SSCM drivers

Second-order themes	First-order concepts	Aggregated open codes	Alpha	Beta	Gamma
External Drivers	Coercive pressures from policies and regulations	National environmental policies require firms to enhance pollution control.	Y	N	Y

Internal Drivers	Coercive pressures from market demand changes	Changing consumer habits influence product sales and profitability.	Y	Y	Y
	Mimetic pressures from industry competition	Industry contraction and intensified competition drive firms toward standardized development.	Y	Y	Y
	Normative pressures from stakeholders	Stakeholder expectations and oversight promote corporate sustainability practices.	Y	Y	Y
	Drivers from corporate strategy	Firms prioritize long-term strategic vision over short-term economic gains.	Y	Y	Y
		Firms equally integrate environmental, social, and economic considerations into strategic decisions.	Y	Y	Y
		Firms incorporate overall supply-chain sustainability into strategic planning.	Y	Y	Y
	Drivers from organizational culture	Corporate culture embodies sustainability principles.	Y	Y	Y
	Drivers from adequate resources	Firms possess abundant natural and regional resources.	Y	Y	Y

Table A7.2 Cross-summary of SSCM drivers

Identified drivers from cases	**Representative quotes**
National environmental policies require firms to enhance pollution control.	Alpha submitted 13 quarterly pollutant discharge permit reports and 5 annual implementation reports to environmental authorities and conducted 609 self-monitoring activities. [A11] Enterprises comply with national discharge regulations for wastewater, emissions, and waste. [C16]
Changing consumer habits influence product sales and profitability.	Unpredictable market demand significantly increases uncertainty in the Baijiu supply chain. [A12] Despite high-end positioning, market expansion remains cautious amid recent consumption downgrade trends. [B1] Companies strictly prohibit unverified promotional claims and ambiguous labeling to prevent consumer complaints. [C3]
Industry contraction and intensified competition drive firms toward standardized development.	We recognize that staying competitive requires keeping pace with the times and leading industry development. [A12] Competition among large baijiu enterprises is becoming increasingly comprehensive and intense. [B1] Intensified competition persists in the Baijiu market, characterized by growth potential and rising concentration. [C16]
Stakeholder expectations and oversight promote corporate sustainability practices.	Enterprises actively engage stakeholders, improving communication and proactively addressing demands and oversight. [A11] Annually, we allocate 80 million RMB to reward constructive suggestions from diverse sectors. [B1] Suppliers in high-risk environmental sectors, such as electroplating and spraying, invest in environmental facilities due

	to regulatory pressures[C3]
Firms prioritize long-term strategic vision over short-term economic gains.	Aiming to "build a green supply chain and provide green products and services," the company has integrated green supply chain management into its long-term strategic development planning. [A12] Enterprises prioritize long-term strategic value over short-term economic gains. [B1] Committed to sustainability, enterprises aim for world-class excellence in products, branding, innovation, and governance. [C14]
Firms equally integrate environmental, social, and economic considerations into strategic decisions.	Companies emphasize balanced economic, social, and environmental growth. [A11] Businesses should make every effort to align environmental protection with economic benefits. [B8] Guided by "ecology first, green development," the enterprise aspires to become a pioneering "zero-carbon liquor company." [C1]
Firms incorporate overall supply-chain sustainability into strategic planning.	Enterprises standardize management through internal control systems spanning product development to marketing. [A12] The liquor industry now faces comprehensive competition across the entire supply chain. [B1] The Baijiu supply chain's complexity and industry interconnectivity impose high demands on logistics. [C16]
Corporate culture embodies sustainability principles.	The corporate culture embodies the philosophy: "Brewed from Heaven and Earth, Shared Among People." [A1] "Integrity, Virtue, Respect for Nature, Scientific Pursuit, and Brewing Excellence" summarizes the company's development philosophy. [B8] The enterprise advocates a harmonious ecological vision emphasizing "green, low-carbon, harmonious development." [C14]
Firms possess abundant natural and regional resources.	Policy adjustments have enabled us to fully leverage our resource advantages, allowing Alpha to achieve a higher standing within the new ecosystem of the Liquor Industry [A12] The estate, situated in the Chishui River's "Golden Valley," offers natural liquor caves and unique geographic advantages. [B7] The company's ancient fermentation pits and mud are permanently exhibited at the National Museum as unique cultural heritage. [C1]

Table A7.3 Distribution of SSCM practices

Second-order themes	First-order concepts	Aggregated open codes	Alpha	Beta	Gamma
Acquiring	Acquire stable and secure raw material resources	Standardize specialized grain cultivation and procure at premium prices.	Y	Y	Y
		Establish regional bases; collaborate with leading agricultural enterprises.	N	Y	Y
	Establish long-term strategic alliances	Select packaging suppliers based on rigorous entry conditions.	Y	N	Y
		Develop internal packaging supply by establishing subsidiaries.	N	Y	Y

		Build mutually beneficial manufacturer-dealer alliances.	Y	Y	Y
		Deeply integrate logistics providers into the supply chain.	Y	Y	Y
Accumulating	Accumulate foundational resources for collaborative SCM	Collaborate with suppliers to develop foundational software and hardware.	Y	N	Y
		Accumulate data for seamless integration and information sharing.	Y	N	Y
	Accumulate standardized practices for supply-chain risk and quality management	Implement integrated whole-chain and lifecycle quality management.	Y	Y	Y
		Establish comprehensive supply-chain risk controls	Y	N	Y
		Set environmental entry criteria and evaluation standards for suppliers.	Y	Y	Y
		Individually monitor supplier compliance.	N	N	Y
		Prioritize energy-efficient and green procurement.	N	N	Y
		Adopt green and recyclable packaging.	Y	N	Y
	Cultivate a corporate culture of sustainable development	Promote sustainability awareness and corporate environmental culture.	Y	Y	Y
	Accumulate technological patents and IP resources	Adopt pollution-control and energy-efficient green technologies.	Y	Y	Y
		Partner with universities for R&D and process improvements.	Y	Y	Y
		Accumulate invention patents and refine IP management systems.	Y	N	Y
	Build stakeholder trust and support	Actively respond to stakeholder demands and expectations.	Y	Y	Y
	Accumulate consumer and member resources	Establish and operate integrated online-offline membership systems.	Y	Y	Y
		Innovate products to satisfy diverse consumer demands.	Y	Y	Y
Divesting	Divest non-core and redundant resources	Divest non-core businesses.	Y	N	N
		Divest inefficient structures, and outdated personnel.	Y	Y	Y
		Divest products and channels with low contribution or excessive dependency.	Y	N	Y
Inheriting	Inherit traditional cultural and craftsmanship resources	Enhance stakeholder identification with core corporate values and culture.	Y	Y	Y
		Use modern technologies to preserve traditional craftsmanship experience.	Y	Y	Y

Table A7.4 Cross-summary of Practices of SSCM

Identified Practices from cases	Representative quotes
Standardize specialized grain cultivation and procure at premium prices.	Level-15 organic sorghum, despite higher cost, improves quality and farmers' income. [A2] With government support, achieved multiple-win: corporate growth, local economy, farmer income, and grain supply stability.[B3] Grain subsidiaries contract farmers, supplying seeds, standards, and above-market grain prices. [C3]
Establish regional bases; collaborate	Successfully trialing the transplanting of red sorghum varieties to Northeast China, overcoming cultivation

with leading agricultural enterprises.	challenges. [B3] Companies mitigate grain supply risks from factors like the Russia-Ukraine war through advance stockpiling. [C3]
Select packaging suppliers based on rigorous entry conditions.	Around 40 packaging firms in the park operate facilities under contract with the enterprise. [A4] Introducing suppliers nationwide publicly, ensuring stable supplies and preventing monopolies or supply interruptions. [C14]
Develop internal packaging supply by establishing subsidiaries.	Established subsidiaries producing cartons, glass, and ceramic bottles, developing auxiliary industries. [B3] Diversified business centered on liquor; packaging partly supplied by affiliates, ensuring quality and stability. [C7]
Build mutually beneficial manufacturer-dealer alliances.	Actively advancing manufacturer-dealer integration and customer-service systems, fostering mutual growth culture. [A11] Dealers report sales independently to prevent inventory overstocking. [B1] Committed to collaborative decision-making and benefit-sharing with dealers. [C16]
Deeply integrate logistics providers into the supply chain.	Third-party logistics expanded into procurement, production, and sales, forming an integrated logistics system. [A12] Officially launching a packaging and logistics center after 4 years of construction and 360 million RMB investment. [B8] Logistics subsidiary manages nationwide distribution from raw-material procurement to final delivery. [C11]
Collaborate with suppliers to develop foundational software and hardware.	Through deep collaboration during automation upgrades, we provided the concepts, and equipment suppliers made them a reality. [A2] Collaborates with suppliers, institutes, and third parties on Baijiu green-design platform. [C14]
Accumulate data for seamless integration and information sharing.	Supplier platform visualizes procurement of 2000 spare parts and 3000 consumables. [A11] ERP integrates production, supply, and sales, enhancing management and digital decision-making. [C6]
Set environmental entry criteria and evaluation standards for suppliers.	Supplier contracts include environmental requirements, supervised by park management. [A4] Leading local enterprise consistently implements environmental standards exceeding national norms. [B1] Suppliers must provide social insurance for employees, submitting lists officially verified by the Social Security Bureau. [C3]
Establish mechanisms to manage multiple pressures.	Conducting various audits systematically for proactive risk warning and control in legal, financial, and environmental aspects. [A11] Beta established grain bases in multiple regions, building a stable sourcing network to reduce regional procurement risks. [B3] Gamma protects its brand and consumers through anti-counterfeiting measures and stronger internal controls. [C14]
Individually monitor supplier compliance.	Routine and surprise inspections upstream, real-time monitoring suppliers' production and shipments. [C1]

Prioritize energy-efficient and green procurement.	Organic cultivation reduces pesticide and fertilizer use, improves the environment, and raises farmers' incomes. [A2] Encourages suppliers' adoption of eco-friendly packaging materials and methods. [C12]
Adopt green and recyclable packaging.	Eliminating most plastic bag usage, reducing approximately 50 million plastic bags annually. [A12] Recycling discarded cartons and converting them into reusable paper-based eco-boxes. [C3]
Implement integrated whole-chain and lifecycle quality management.	New technologies, materials, and processes increase uncertainty; quality issues at any stage impact final products. [A9] Field-based processing facilities enable farmers as suppliers, ensuring quality through specialized seeds and traceability. [B9] Implemented strict quality and food-safety management across production stages. [C13]
Promote sustainability awareness and corporate environmental culture.	Conducting ESG training to strengthen employees' sustainability awareness. [A11] Organizing environmental-themed activities, inviting experts to interpret energy-saving practices. [B9] Regularly hosting supplier conferences to train and communicate newly introduced regulations. [C3]
Adopt pollution-control and energy-efficient green technologies.	Centralized raw-material delivery via pipelines, replacing vehicle transport. [A2] Invested over 500 million RMB in specialized wastewater treatment facilities. [B1] Wastewater treatment system uses four types of eco-friendly materials to meet discharge standards. [C5]
Cooperate on technological research and process improvement.	The National Solid-state Brewing Center supports the development of the company's innovation system. [A12] Planning internal packaging R&D center and brewing innovation research facility. [B3] Operates seven national-level platforms including Baijiu Quality Inspection and Enterprise Technology Centers. [C1]
Accumulate invention patents and refine IP management systems.	Establishing subsidiaries dedicated to centralized patent management, facilitating technological transfer, benefiting the industry. [A2] Implemented standardized IP management, achieving certification per guidelines. [C14]
Actively respond to stakeholder demands and expectations.	Addressing stakeholder needs and expectations through ESG materiality analysis. [A11] Annually investing 80 million RMB to reward individuals from society providing suggestions and advice to the enterprise. [B1] Publishes annual and ESG reports in English, meeting international investor needs. [C14]
Establish and operate integrated online-offline membership systems.	Launched online channels since 2000, developing exclusive member marketplace. [A7] Upgrading community channels into "Estate Memberships," emphasizing deep consumer experiences and engagement. [B6] Managing the full membership lifecycle to accumulate member assets and enhance sales quality. [C16]
Innovate products to satisfy diverse consumer demands.	Conducting targeted product optimization and innovation based on market analyses. [A8] Adopting differentiation strategies, innovatively introducing mixed-flavor products blending sauce- and strong-aroma Baijiu. [B1] Innovation center's 35 R&D staff partner with distributors to create culturally inspired products. [C3]

Divest non-core businesses, inefficient structures, and outdated personnel.	Temporarily separated group and listed-company operations, enabling listed entity's Baijiu focus. [A1] Implementing the "271 employee assessment," eliminating the bottom 10% of performers to optimize organizational structure. [B1] Unified multiple separate units under single management (e.g., three strong-aroma Baijiu series companies). [C1]
Divest products and channels with low contribution or excessive dependency.	Reorganizing original marketing teams into unified brand-exclusive subsidiaries, expanding directly managed sales teams. [A12] Gradually flattening liquor sales channels, reducing distribution layers for dealers to manage terminals directly. [C9]
Enhance stakeholder identification with core corporate values and culture.	Committed ambassadors of Chinese liquor culture, emphasizing brand leadership and heritage. [A11] Beta established estates that integrate culture and brewing, creating a new model for heritage preservation. [B6] Established institutes for cultural research, media convergence, and poetry-liquor culture promotion. [C16]
Use modern technologies to preserve traditional craftsmanship experience.	Reconstructed production systems based on workflows, elevating Baijiu intelligentization standards. [A2] Sensors digitally record traditional brewing techniques, preserving cultural heritage. [B1] Scientifically interpreting traditional inherited processes to highlight products' technological essence. [C4]

Table A7.5 Comparison of digital technology bundling models

	Alpha	**Beta**	**Gamma**
Bundling Process	Enterprise digital strategy End-to-end digital quality management Intelligent production transformation Digital supply chain coordination Internal digital collaboration Big data decision support Digital precision marketing	Digital production monitoring Production standardization and automation Channel-side digital integration Data accumulation and analytical infrastructure development	Digitalization of specific supply chain segments End-to-end digital quality management Smart logistics digital platform establishment ERP integration across internal supply chains Online functional department operations Data management and decision-support systems development Precision marketing and consumer operations
Bundling Model	**Strategic Guidance and Systematic Planning** Develop a Digit-Intell strategy, engaging professional consulting agencies to systematically advance enterprise digitalization. **End-to-End Supply Chain Coverage** Apply digital technologies across the entire supply chain, enhancing overall coordination through end-to-end digital integration.	**Differentiated Deployment, Balanced Pace** Steadily implement digitalization in core production processes while accelerating in non-core areas. **Production-Oriented, Stepwise Advancement** Accumulate data assets through sensor	**Decentralized Initiation, Gradual Integration** Departments independently explore digital technologies initially, followed by strategic integration after achieving standardization. **End-to-End Digital Quality Management** Employ a segmented traceability approach within the digital quality management system, enabling visibility, manageability, and control

	Enhanced Collaboration and Efficiency Utilize digital tools to remove interdepartmental barriers, reduce costs, improve efficiency, and enhance collaboration. **Data-Driven Intelligent Decision-Making** Establish an enterprise-level big data platform to accumulate and mine data assets, enhancing the scientific basis of decision-making through data-driven systems. **Precision Marketing and Market Orientation** Support sales activities with data analytics, accurately capture market trends, and promote precision marketing initiatives.	technologies in production, then gradually standardize production techniques. **Process Standardization with Scientific Support** Use digital technologies to translate traditional expertise into scientific logic and standard parameters, enabling scientifically managed production. **Precision Marketing and Channel Integration** Integrate online and offline channels, enhancing consumer engagement and precision marketing capabilities through digital technologies.	across the entire production process. **Platform-based Multidimensional Collaboration** Establish a unified ERP system and collaborative enterprise platform to eliminate data silos and facilitate multidimensional collaboration. **Strategic Integration and Dynamic Evolution** Officially launch a digitalization strategy blueprint in 2023, strategically integrating digitalization achievements across various segments. **Internal-External Integration for Efficiency** Utilize the smart logistics platform of the group's logistics subsidiary to enhance the integration of internal and external resources.

Table A7.6 Comparison of financial service bundling models

	Alpha	**Beta**	**Gamma**
Bundling Process	Leverage group credit for low-cost funding Provide distributor financial guarantees Launch supplier financing products based on real trade data Support diversified supply-chain financing Establish integrated online-offline financing platforms Apply technology for secure fund management	Link farmers to policy funding Adopt cash payments to boost cash flow Offer distributor financing guarantees	Leverage group credit for low-cost funding Support members and distributors via internal finance platform Recommend distributors to banks and supervise pledge-based credit business Internal finance platform initiates banking cooperation
Bundling Model	**Credit Empowerment, Enhanced Collaboration** Leverage corporate credit advantages through authorizations and financing guarantees to reduce supply chain capital costs and enhance supply chain	**Government Resources, Stable Raw Material Supply** Assist farmers in obtaining government subsidies and policy-based financing resources to stabilize the raw material supply chain. **Cash Payments, Accelerated Capital Flow**	**Internal Credit, Coordinated Funding** Utilize group credit and financial platforms to strategically invest in commercial banks, offering efficient and low-cost capital support for the supply chain. **External Collaboration, Institutional**

	collaboration. **Platform Establishment, Online Integration** Establish an online financing platform integrating multiple institutions and diversified financial products to fulfill varied financing demands across the supply chain. **Technology-Driven, Efficient Risk Control** Actively apply blockchain, smart contracts, and other emerging technologies to improve capital flow efficiency and risk management capabilities.	Implement cash payment models to accelerate capital flow in the upstream supply chain, strengthening raw material supply assurance. **Financial Guarantees, Distributor Support** Provide financial guarantees to downstream distributors, facilitating access to external funds and enhancing their financing capacity.	**Integration** Actively connect with external financial institutions, recommend qualified distributors to banks, and undertake pledge supervision, enhancing capital allocation efficiency. **Strategic Positioning, Channel Expansion** Proactively explore and offer financial services through internal financial platforms in areas not yet covered by banks.

Table A7.7 Distribution of impacts of digital technology and financial service bundling on supply chain dynamic capabilities

Second-order themes	First-order concepts	Aggregated open codes	Alpha	Beta	Gamma
Capability of digital technology bundling	Stabilizing supply chain Reflexive Control capability	Stabilize supply chain quality through digital technologies	Y	N	Y
	Enriching supply chain Knowledge Management capability	Enrich supply chain collaboration by breaking data silos	Y	N	Y
	Enriching supply chain Co-Evolving capability	Enrich supply chain efficiency through bundling digital elements	Y	Y	Y
	Pioneering supply chain Supply Chain Re-Conceptualization capability	Pioneer scientific decision-making through data analytics	Y	N	Y
		Pioneer precision marketing through data value realization	Y	Y	Y
Capability of financial service bundling	Enriching Partner Development financing capability	Stabilize low-cost capital supply through group credit	Y	N	Y
		Stabilize manufacturer–distributor relationships through pledge guarantees	Y	Y	Y
		Pioneer supplier financing products through service extension	Y	N	Y
		Stabilize raw material supply through government subsidy alignment	N	Y	N
		Enrich supply chain capital flow through cash payments	N	Y	N

Pioneering supply chain reconceptualization capability in financial services	Enrich information sharing through financing platforms	Y	N	N
	Pioneer financial risk-control capabilities through emerging technologies	Y	N	N
	Pioneer innovative banking practices through internal financial companies	N	N	Y

Table A7.8 Cross-summary of resource bundling

Identified Practices from cases	**Representative quotes**
Stabilize supply chain quality through digital technologies	We advance digital and intelligent transformation across the industrial chain to enhance quality control. [A11] Developing smart sensors with research institutes enables real-time monitoring of key brewing data and improves process control.[B3] Key production stages have been digitally upgraded, achieving full digital control of brewing quality. [C14]
Enrich supply chain collaboration by breaking data silos	Digitalization has broken down departmental silos and improved coordination efficiency. [A7] Unified digital platforms for collaboration and knowledge sharing support data-driven operations across the organization. [C6]
Enrich supply chain efficiency through bundling digital elements	The application of the automated mixing system has shortened a 20-minute procedure to just 90 seconds. [A2] Introducing intelligent inspection equipment in testing and packaging processes enhances supply chain quality and efficiency. [B4] A centralized procurement platform was established to enhance efficiency and shorten the procurement cycle. [C14]
Pioneer scientific decision-making through data analytics	To strengthen competitiveness, the company advances from experience-based to technology-driven operations. [A11] A data system enables company-wide analysis and the shift from digitalization to data intelligence. [C6]
Pioneer precision marketing through data value realization	To better understand market trends and consumer demand, we have strengthened its digital consumer engagement systems. [A11] Digital precision marketing started early, assigning each product a unique QR code for consumer interaction. [B3] The company conducts multidimensional data analysis to guide precision marketing and data-based decision-making. [C6]
Stabilize low-cost capital supply through group credit	We leverage credit resources to support supply chain partners and reduce their financing costs without charging fees. [A6] Using the group's credit strength, the company obtains low-cost capital to provide liquidity for member enterprises. [C8]

Stabilize manufacturer–distributor relationships through pledge guarantees	The company provides financing guarantees to distributors to ease cash flow pressure and strengthen partnership trust. [A12] The company provides supply chain finance mainly through guarantee services for distributors. [B1] The company recommends high-quality distributors to banks and assumes a supervisory role in the process. [C9]
Pioneer supplier financing products through service extension	Using verified trade data with upstream suppliers, the company launched financing products tailored to their needs. [A12] Most suppliers are group subsidiaries; under financial pressure, payments to the group are temporarily retained for internal use. [C7]
Stabilize raw material supply through government subsidy alignment	We promote "smart farms" to assist farmers in applying for national subsidies for high-standard farmland projects. [B3]
Enrich supply chain capital flow through cash payments	We cooperate with local sorghum-growing villages, adopting cash payments to enhance supply chain liquidity. [B1]
Enrich information sharing through financing platforms	A financing platform enables upstream and downstream partners to access low-cost, efficient financing. [A6]
Pioneer financial risk-control capabilities through emerging technologies	Technologies such as digital RMB, blockchain, and smart contracts integrate information and financial flows to ensure fund security and proper use under transparent trade processes. [A12]
Pioneer innovative banking practices through internal financial companies	The financial company acts as the group's internal bank, sharing information with business units and pioneering services traditional banks avoid. [C8]

Table A7.9 Distribution of resource leveraging

Second-order themes	First-order concepts	Aggregated open codes	Alpha	Beta	Gamma
Resource Mobilizing	Mobilization of External Resources	Strategically aligned supplier management	Y	N	N
		Deepened external strategic partnerships	N	Y	Y
		Cross-sector and peer learning	N	Y	N
	Mobilization of Internal Resources	Dedicated departments for strategy execution	Y	Y	Y
		Stimulating internal talent vitality	Y	Y	Y
Resource Coordinating	Share explicit and tacit SSCM knowledge with suppliers	Clear communication of environmental standards to suppliers	Y	Y	Y
		Knowledge standardization and industry exchanges	Y	Y	Y
	Establish SSCM-linked measurement and reward systems	Sustainability-linked supplier incentives	Y	Y	Y

	Extend SSCM practices from internal to external contexts.	Digital integration across supply chain	Y	N	Y
		Supply-chain data platforms extending SSCM	Y	N	Y
	Reconstruct ecological networks and organizational management frameworks	Rebuilt internal collaboration frameworks	Y	N	N
		Core enterprises building industrial ecosystems	N	N	Y
Resource Deploying	Export organizational knowledge to industry, regional, and national levels.	Participation in setting national, regional, industry standards	Y	Y	Y

Table A7.10 Cross-summary of resource leveraging

Identified Practices from cases	**Representative quotes**
Strategically aligned supplier management	Adjust supplier assessments based on company growth, emphasizing testing equipment for automated production. [A4]
Deepened external strategic partnerships	Partnered with global spirits leader Pernod Ricard, expanding international markets with new insights. [B7] Cooperated with leading internet companies to advance digital transformation strategies. [C16]
Cross-sector and peer learning	Environmental managers from mixed-flavor regions visited liquor parks to improve eco-management skills. [B9]
Dedicated departments for strategy execution	Established dedicated digital sales teams and Digital Development Center managed by CIO. [A7] Procurement Logistics Center oversees raw-material procurement and product delivery. [B3] Specialized departments manage digitalization, IT, archives, and knowledge. [C6]
Stimulating internal talent vitality	Promoted industrial workforce reforms (“Two Paradises”) to boost employee innovation and enthusiasm. [A11] Almost every household has members employed by the company, with annual minimum salary increases of RMB 100,000. [B1] Established Employee Training Center for diverse capability-building programs. [C14]
Clear communication of environmental standards to suppliers	Conducted environmental training and advocacy, building sustainability-oriented corporate culture. [A10] Provided comprehensive training to all suppliers and their downstream partners. [B1] Signed energy and environmental standards agreement with suppliers. [C3]
Sustainability-linked supplier incentives	Supplier incentive/penalty system rewards high-performing suppliers with increased orders. [A4] Awarded 40 villages annually, spending RMB 300 million extra on red sorghum. [B1] Established regular supplier assessments guiding order allocation. [C14]
Digital integration across supply chain	Extended digital management upstream/downstream, encouraging independent digital system development. [A7] Unified production planning via supply-chain platform for supplier coordination. [C1]
Supply-chain data platforms extending SSCM	Upgraded procurement platform to a data hub, driving industry-wide digitalization. [A12] Built business/data platforms, providing digital tools for distributors and consumers. [C6]

Rebuilt internal collaboration frameworks	Established rapid-response headquarters structure, replacing traditional bureaucracy to enhance sales support. [A1]
Core enterprises building industrial ecosystems	Played a leading role, creating industrial ecosystems centered around logistics, packaging, and finance. [C16]
Knowledge standardization and industry exchanges	Obtained patents in automated brewing technologies, promoting industry-wide adoption. [A2] Released internal control standards for sauce-flavor products covering cultivation to distribution. [B9] Selected as a Digital Transformation Promotion Center to support industry-wide digitization. [C6]
Participation in setting national, regional, industry standards	Contributed expertise to national/local industry standards development. [A11] Corporate control standards publicly supervised, ensuring sustainable industry practices. [B9] Collaborated with agricultural departments and universities on sustainable grain cultivation manuals. [C14]

Table A7.11 Distribution of SSCM performance

Second-order themes	First-order concepts	Aggregated open codes	Alpha	Beta	Gamma
SSCM Environmental Performance	Improve energy efficiency and resource recycling rates	Improve energy efficiency and recycling rates.	Y	N	Y
	Reduce energy consumption and pollutant emissions	Reduce energy consumption and pollutant emissions	Y	Y	Y
		Participate in ecological restoration and water protection.	N	Y	Y
SSCM Social Performance	Achieve community-centered social performance.	Stimulate local economic growth and infrastructure development	Y	Y	Y
		Advocate rational drinking and healthy lifestyles	Y	Y	Y
		Support rural revitalization through industrial assistance	Y	Y	Y
		Maintain long-term commitment to charitable activities	Y	Y	Y
	Achieve employee-oriented social performance.	Provide safe working environments, fair growth opportunities, and favorable employee benefits	Y	Y	Y
SSCM Economic Performance	Financial performance improvements	Achieve substantial increases in revenue and profit, driving rapid corporate growth	Y	Y	Y
		Maintain high, consistent, and stable dividend payouts	Y	N	Y
	Market share leadership	Maintain industry leadership and enhance industry influence	Y	Y	Y
	Enhanced operational efficiency	Significantly improve supply chain collaboration and agility	Y	Y	Y

Table 7.12 Cross-summary of SSCM performance

Identified Performance from cases	Representative quotes
Improve energy efficiency and recycling rates.	Annual biogas utilization replaces approximately 450,000 cubic meters of natural gas, improving resource efficiency. [A12] Increasing non-fossil energy usage, establishing a clean, efficient energy system, continuously enhancing energy utilization efficiency. [C12]
Reduce energy consumption and pollutant emissions	Automation and intelligent upgrades reduce wastewater by around 4.7 million tons and carbon emissions by nearly 7,000 tons annually. [A2] Achieved 100% compliance in waste emissions, with industry-leading energy efficiency. [C12]
Participate in ecological restoration and water protection.	Established ecological mechanisms to safeguard the Chishui River basin, driving regional green development. [B7] We have strengthened the water resource management from three dimensions—protection, development, and conservation. [C14]
Stimulate local economic growth and infrastructure development	Annual investment of tens of billions in urban construction significantly boosts local economic growth. [A1] Constructed wastewater treatment plants providing public services to both the company and local towns. [B3] Contributes billions annually in local taxes and economic value. [C16]
Advocate rational drinking and healthy lifestyles	Advocates scientific, healthy, and rational drinking practices, actively giving back to society. [A11] Targets business professionals aged 30–50, discourages youth drinking, recommends moderation over 50. [B8] Promotes public awareness about moderate and rational drinking, and strictly prohibits alcohol consumption by minors. [C14]
Support rural revitalization through industrial assistance	Supports underdeveloped counties through infrastructure, industry, education projects, and charitable donations. [A11] Established support factories in counties, creating local employment and contributing taxes. [B1] Supports agricultural development, driving over 300 billion RMB in economic value and 300,000 jobs. [C14]
Maintain long-term commitment to charitable activities	Established poverty alleviation funds with distributors to build rural roads, waterways, and educational facilities. [A1] Long-term educational donations, assisting 275 students through charity auctions in 2022. [B9] Actively contributes to disaster relief, poverty alleviation, rural revitalization, and education. [C14]
Provide safe working environments, fair growth opportunities, and favorable employee benefits	Ensures employees have dignified lives, securing welfare and steadily increasing income levels. [A1] Nearly every village household has company employees, with minimum annual income per capita of 100,000 RMB, growing annually. [B1] Strictly observes laws protecting women's and disabled persons' rights, advocating diversity, equality, and inclusion. [C14]
Achieve substantial increases in revenue and profit, driving rapid	In 2023, achieved revenue of 30.233 billion RMB (up 20.34% YOY) and net profit of 13.246 billion RMB (up 27.79% YOY). [A12]

corporate growth	Sales grew from under 300 million RMB to 22 billion RMB over 20 years, as of 2023. [B1] 2024 revenue reached 89.175 billion RMB (+7.09% YOY), net profit 31.85 billion RMB (+5.44% YOY). [C15]
Maintain high, consistent, and stable dividend payouts	Corporate bylaws mandate annual dividend distributions of at least 50% of distributable profit. [A11] Annual cash dividends exceeded 10 billion RMB over the past three years, exemplifying commitment to investor returns. [C14]
Maintain industry leadership and enhance industry influence	Achieved historic breakthroughs in brand sales and market order, significantly elevating total sales. [A11] By 2030, aims to become a significantly influential enterprise in the Liquor Industry. [B1] Dominates the thousand-yuan price segment as the representative of strong-aroma Baijiu. [C1]
Significantly improve supply chain collaboration and agility	Uses digital tools for real-time order and inventory sharing, ensuring a “two-hour guarantee” with suppliers. [A7] Implements zero-inventory model, significantly reducing inventory costs through procurement-on-demand. [B9] Integrated ERP systems across production, supply, and sales chains, improving alignment between production and sales. [C6]

Table A8.1 Summary of propositions

Proposition	**Core Content**	**Theoretical Contribution**
Proposition 1	SSCM implementation in baijiu enterprises is jointly driven by internal and external factors.	Theoretical validation
Proposition 1a	The stage of industry development and the institutional environment moderate the strength of the influence of external drivers on SSCM implementation in baijiu enterprises. In more mature industrial contexts characterized by greater transformation pressure, coercive and normative pressures are more salient.	Theoretical extension
Proposition 1b	The higher a firm’s internal management standards, the weaker the additional constraining effect of external coercive pressure.	Theoretical extension
Proposition 1c	The clearer the sustainability orientation of organizational culture, the more sensitive and responsive the firm is to changes in the external environment, and the more likely it is to implement SSCM proactively.	Theoretical extension
Proposition 2	Baijiu enterprises promote resource structuring through the implementation of SSCM practices.	Mechanism refinement
Proposition 3	In the SSCM context of the baijiu industry, resource inheriting constitutes an important mode of resource structuring.	Theoretical extension
Proposition 4	Baijiu enterprises enhance foundational supply chain capabilities and dynamic capabilities by bundling digital technologies and financial services.	Mechanism refinement
Proposition 5	Baijiu enterprises create comprehensive SSCM value through resource leveraging.	Theoretical validation
Proposition 6	In the SSCM context of the baijiu industry, stakeholders are both resource providers and important drivers of rule-making and institutional diffusion.	Theoretical extension

Proposition	Core Content	Theoretical Contribution
Proposition 7	In the process of resource leveraging, baijiu enterprises identify new resource needs, which in turn trigger a new round of resource structuring.	Mechanism refinement

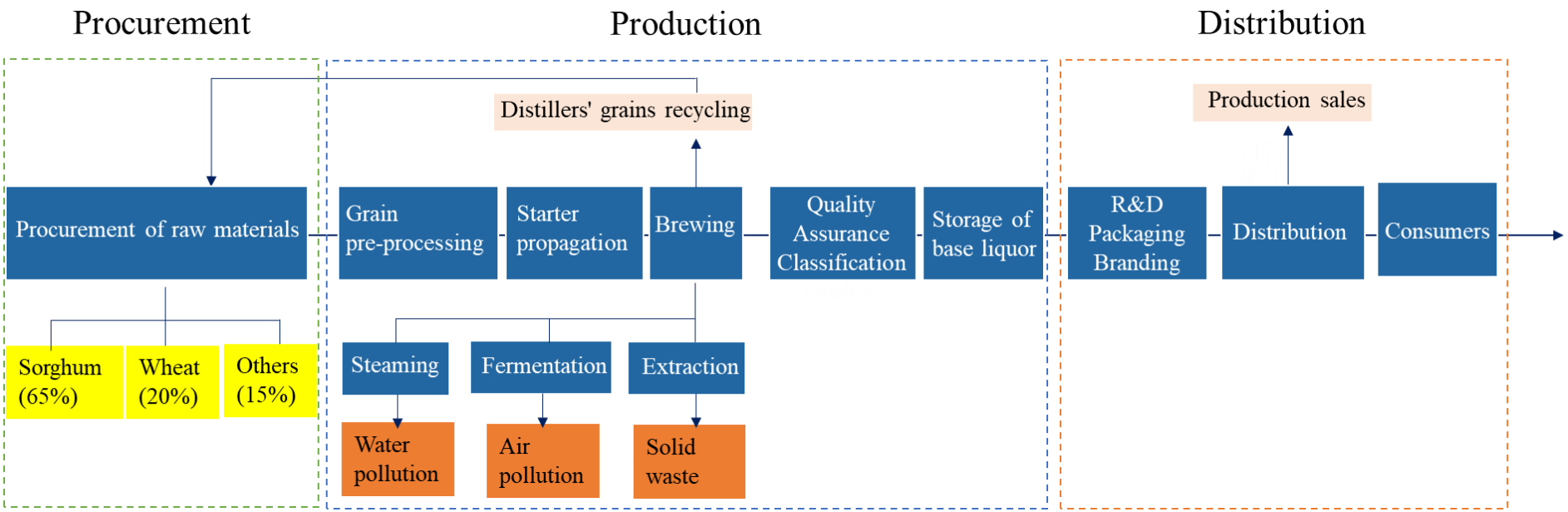
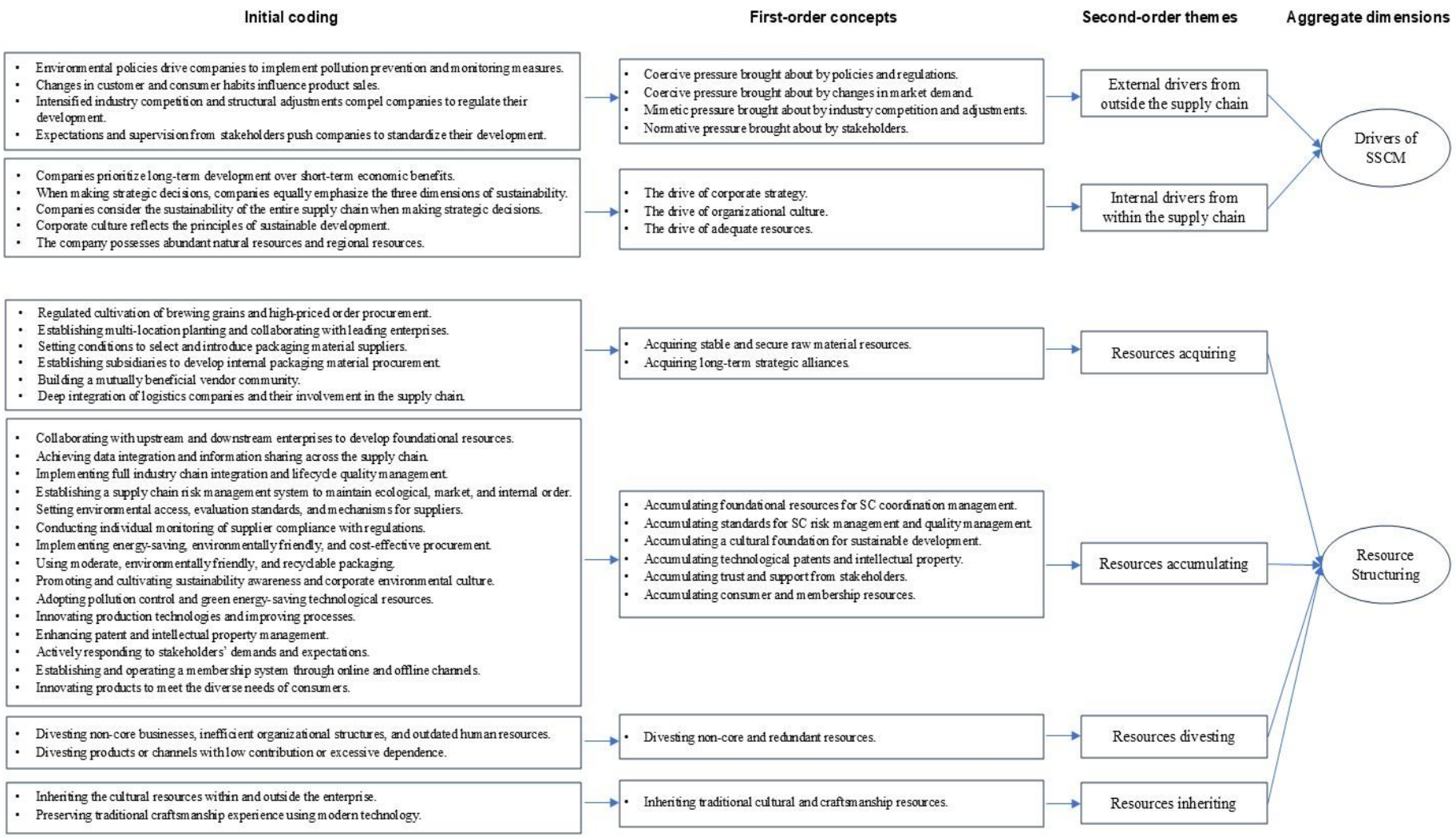


Figure A1.1 Map of the supply chain of baijiu enterprises


Initial coding
First-order concepts
Second-order themes
Aggregate dimensions
Environmental policies drive companies to implement pollution prevention and monitoring measures.
Changes in customer and consumer habits influence product sales.
Intensified industry competition and structural adjustments compel companies to regulate their development.
Expectations and supervision from stakeholders push companies to standardize their development.
Coercive pressure brought about by policies and regulations.
Coercive pressure brought about by changes in market demand.
Mimetic pressure brought about by industry competition and adjustments.
Normative pressure brought about by stakeholders.
External drivers from outside the supply chain
Companies prioritize long-term development over short-term economic benefits.
When making strategic decisions, companies equally emphasize the three dimensions of sustainability.
Companies consider the sustainability of the entire supply chain when making strategic decisions.
Corporate culture reflects the principles of sustainable development.
The company possesses abundant natural resources and regional resources.
The drive of corporate strategy.
The drive of organizational culture.
The drive of adequate resources.
Internal drivers from within the supply chain
Drivers of SSCM
Regulated cultivation of brewing grains and high-priced order procurement.
Establishing multi-location planting and collaborating with leading enterprises.
Setting conditions to select and introduce packaging material suppliers.
Establishing subsidiaries to develop internal packaging material procurement.
Building a mutually beneficial vendor community.
Deep integration of logistics companies and their involvement in the supply chain.
Acquiring stable and secure raw material resources.
Acquiring long-term strategic alliances.
Resources acquiring
Collaborating with upstream and downstream enterprises to develop foundational resources.
Achieving data integration and information sharing across the supply chain.
Implementing full industry chain integration and lifecycle quality management.
Establishing a supply chain risk management system to maintain ecological, market, and internal order.
Setting environmental access, evaluation standards, and mechanisms for suppliers.
Conducting individual monitoring of supplier compliance with regulations.
Implementing energy-saving, environmentally friendly, and cost-effective procurement.
Using moderate, environmentally friendly, and recyclable packaging.
Promoting and cultivating sustainability awareness and corporate environmental culture.
Adopting pollution control and green energy-saving technological resources.
Innovating production technologies and improving processes.
Enhancing patent and intellectual property management.
Actively responding to stakeholders' demands and expectations.
Establishing and operating a membership system through online and offline channels.
Innovating products to meet the diverse needs of consumers.
Accumulating foundational resources for SC coordination management.
Accumulating standards for SC risk management and quality management.
Accumulating a cultural foundation for sustainable development.
Accumulating technological patents and intellectual property.
Accumulating trust and support from stakeholders.
Accumulating consumer and membership resources.
Resources accumulating
Resource Structuring
Divesting non-core businesses, inefficient organizational structures, and outdated human resources.
Divesting products or channels with low contribution or excessive dependence.
Divesting non-core and redundant resources.
Resources divesting
Inheriting the cultural resources within and outside the enterprise.
Preserving traditional craftsmanship experience using modern technology.
Inheriting traditional cultural and craftsmanship resources.
Resources inheriting

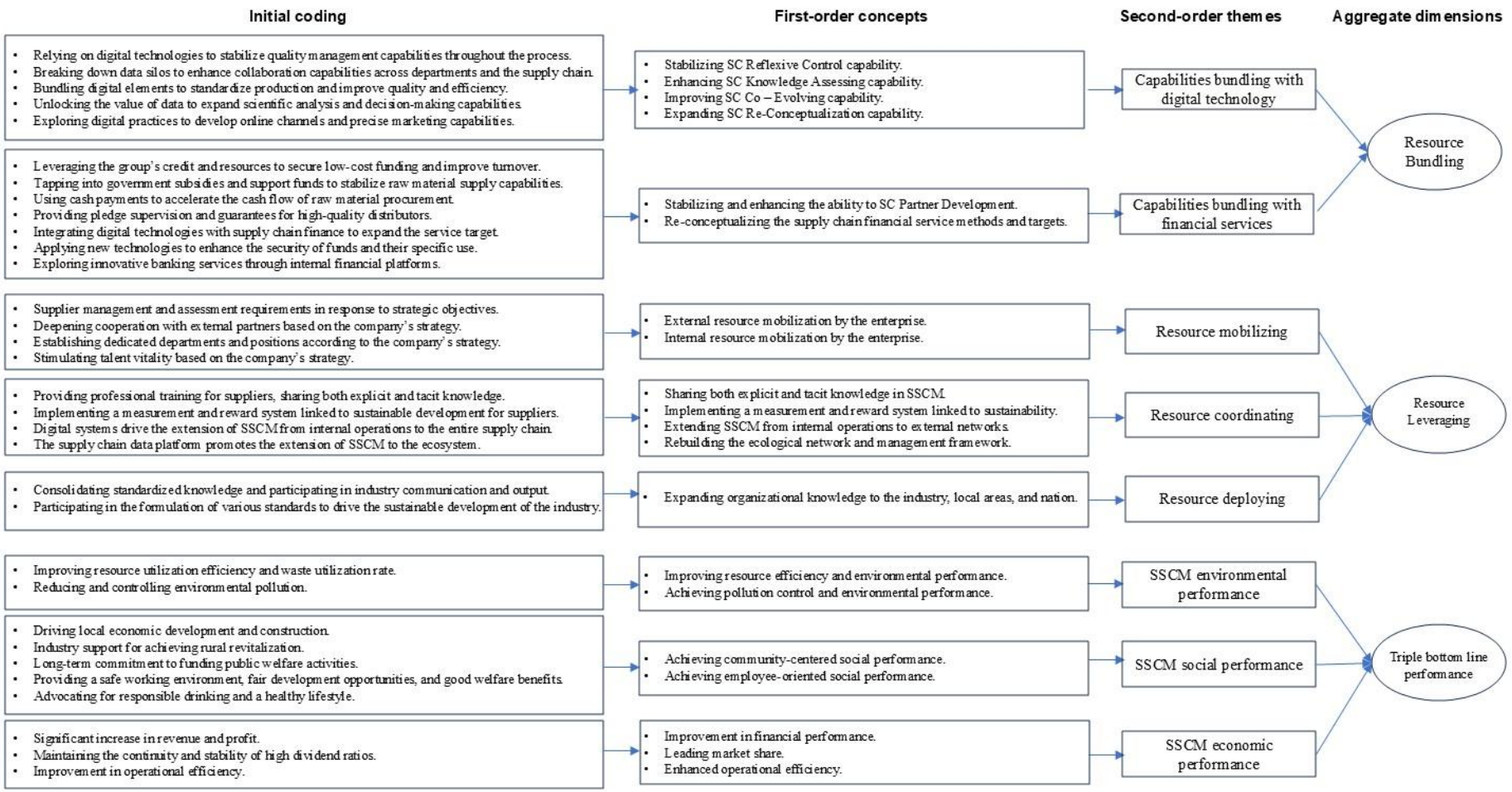


Figure A3.1 Data structure

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Annex B: Initial Interview Guide

Company Strategy, Resources, & Drivers

1. Could you please describe the policies and competitive landscape in the liquor market?

2. Could you provide an overview of the characteristics of the liquor supply chain and the challenges it faces? Additionally, what are the potential risks of these sustainability issues negatively impacting the environment, individuals, and companies?

3. How would you describe your company's positioning?

4. What would you consider to be your company's main competitive advantages or core competencies?

5. Would you be able to introduce your company's corporate culture?

Sustainability Orientation & Practices

1. Could you please introduce the sustainability strategy of your company?

2. What measures has the company implemented to achieve this strategy?

3. Which units and departments are involved?

4. Could you explain why they are willing to get involved?

5. What challenges has your company encountered in advancing the implementation of these measures?

6. Could you elaborate on why these challenges are occurring?

7. How is your company addressing these issues?

Digital Technology & Financial Services Factors

1. Could you please introduce how your company applies digital technology and explain whether it has an impact on the implementation of your sustainable development strategy?

2. As a focal company, does your company support suppliers in obtaining financing to strengthen their financial position?

Dynamic Capabilities & Performances

1. Could you please provide an overview of the following changes that occurred during the implementation of the strategy: the supply chain participants, the webs of collaboration and resource sharing among them, their competitive advantages, and the management model of the supply chain?

2. How have your company's key financial indicators evolved before and after the

implementation of your sustainability strategy?

3. Aside from financial indicators, what other key data and metrics does your company use to evaluate the results of your sustainability strategy, particularly with regard to environmental and social contributions?

4. What are your company's long-term objectives for sustainable growth in the future?