THE IMPACT OF SUPPLY CHAIN INTEGRATION ON SMEs SUSTAINABILITY PERFORMANCE: THE MEDIATING ROLE OF AGILE CAPABILITIES AND LEAN OUTSOURCING

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Abstract

Traditional markets play a crucial role in developing local products, with a focus on sustainable performance. Most of the traders in the traditional market come from small and medium enterprises (SMEs), which tend to struggle with increasing sustainability performance practices, often facing obstacles to supply chain integration as a catalyst. Thus, we examined the interaction effects between supply chain integration and sustainability performance, through agile capabilities and lean outsourcing as mediators from the perspective of Dynamic Capability Theory. This study uses partial least squares-structural equation modelling to explore structural relationships. The sample in this study consisted of 139 SME traders who had stalls in the Pancasari traditional market. The empirical results showed that the indirect positive statistical effect of agile capabilities and lean outsourcing on the linkage between supply chain integration and sustainability performance. Practically, encouraging SME traders to proactively build collaborative relationships with suppliers, distributors, and customers that share information on demand forecasts and enable rapid response to change through agile capabilities. Additionally, lean operations enable traders to systematically identify and eliminate waste by mapping work processes to pinpoint inefficiencies within the business.

Keywords: Supply Chain Integration; Sustainability Performance; Agile Capabilities; Lean Outsourcing, SME Trader

JEL Classification: M31, M11, L23, L25

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INTRODUCTION

Economic development is influenced by Small and Medium Enterprises (SMEs), which provide valuable strategic contributions (Yolanda, 2024). SMEs are also a key source of national economic development in Bali (Purbadharmaja & Widanta, 2023). Bali is known for its rapidly developing tourism sector, which provides opportunities to improve the quality of its trade sector, particularly in the form of products and food supplies for the community and tourists (Pemayun, 2018). Traditional traders in Bali play a crucial role in developing local products and ingredients, focusing on sustainable perfor-

mance that supports all aspects of the trade sector (Grabs & Carodenuto, 2021). However, this strategic position is now vulnerable due to its high reliance on post-harvest production, which is weather-dependent (Gc & Hall, 2020). The extreme climate change poses challenges for SME traders in traditional markets in improving sustainability performance (Knight et al., 2022). SMEs tend to struggle with implementing sustainability performance practices, as they lack the human, financial, time, and skills necessary for implementing sustainable performance practices (Boakye et al., 2020). Most SMEs are unaware that good sustainability performance can improve operational cost efficiency and create new business opportunities (Akomea et al., 2023). Achieving sustainability performance is perceived as wasteful use of chillers for storing vegetables and fruit (Parajuli et al., 2019). Weather uncertainty and seasonal factors contribute to the instability of agricultural product supplies in traditional markets, negatively impacting business performance (Davis et al., 2021; Haile et al., 2017). SME traders tend to make short-term plans, react only to emerging situations, and focus on survival (Etemad, 2020). Temporary policy structures, tailored to the owner's wishes without regard for the surrounding local community, often lead to distractions from other traders, such as inconsistent product pricing (Reardon et al., 2021). Thus, SME traders have low awareness of sustainability performance practices that can be enhanced by supply chain integration.

Supply chain integration in SME traders has a significant impact on sustainability performance, especially by reducing costs (Ariadi et al., 2024; Krishnan et al., 2021). Integration between farmers and traders helps reduce unnecessary distribution costs by enabling collective delivery with fellow traders, thereby lowering transportation costs per unit compared to transporting small quantities alone (Wijaya & Ariadi, 2025). In addition, accurate information integration reduces the number of products discarded, thereby reducing food loss and, in turn, increasing traders' profits. Information integration ensures that vegetables and fruit reach traders quickly after harvest, thereby maintaining product freshness for longer and reducing food loss (Ariadi et al., 2024). Supply chain integration focuses on synchronizing processes, information, and resources among entities involved in the supply chain, such as farmers and traders, thereby increasing social capital through partnership strategies that ensure the certainty of supply and product prices (Singh et al., 2024). Collaboration and communication within supply chain integration create a smooth flow of goods and information, thereby improving sustainability performance (AL-Shboul, 2025a; Qi et al., 2017). However, traders must navigate the complexity of coordinating with collectors and farmer groups (Untari & Vellema, 2022), which is due to the untimely exchange of information, such as the quantity of fruit and vegetable supplies, between supply chain partners, resulting in slow decision-making and response (Umar & Wilson, 2024). The problem in the trade sector is a jammed product distribution system from suppliers to traders, leading to unstructured and overlapping operational costs, including soaring product prices (Chakraborty et al., 2024). In addition, SME traders often have to work beyond normal working hours without proper compensation to meet precision-delivery standards in an integrated supply chain (Johnson et al., 2019). Moreover, products such as fruit and vegetables are considered perishable because they have a short shelf life, making it difficult for SME traders to reduce food loss (Karthick et al., 2023). Although scholar on the relationship between supply chain integration and sustainability performance has been widely conducted in the industry, there remains a significant research gap in the context of SME traders.

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This research gap could be addressed by focusing on implementing agile capabilities and lean outsourcing to enhance SME performance from the perspective of the theory dynamics capabilities view (DCV). The application of the DCV theory in the context of SME traders underlies how internal capabilities are managed to deal with the characteristics of vegetable or fruit products that have high risks (highly perishable) and a highly fluctuating market, depending on supplies from farmers (Teece et al., 2016). In this framework, supply chain integration is stated as the initial capacity, while lean outsourcing and agile capabilities serve as dynamic mechanisms that transform that capacity into sustainable performance (Manzoor et al., 2022a; Mohaghegh et al., 2024; Najar, 2022). Lean outsourcing is the ability of traders to reduce non-value-added activeties by using external parties (Kemokai, 2017), thereby making logistics functions more efficient and reducing food loss in the logistics process (Lizarelli et al., 2023; Reardon et al., 2024). Moreover, SCI, as a real-time information provider, helps traders respond quickly to disrupttions (such as distribution bottlenecks or sudden weather changes) (Geyi et al., 2020a) so they can redistribute vegetable stocks to other markets if one market is experiencing a downturn (Akhter et al., 2024; Nematollahi et al., 2021). This way, traders avoid total losses from spoiled goods that are not sold on time and ensure that food availability in the market remains stable (Ariadi et al., 2024). Thus, DCV theory emphasizes that supply chain integration can leverage dynamic capabilities to execute it in a lean (to prevent inventory waste) and agile (to adapt to market volatility) manner, thereby improving sustainability performance among SME traders.

This study examines the effect of supply chain integration on sustainability performance, mediated by agile capabilities and lean outsourcing, among traders at the Pancasari Traditional Market. The traditional market is located in Pancasari Village, Buleleng Regency, Bali Province, which is frequently visited by international tourists shopping for fruits and vegetables. The paper establishes a conceptual framework that helps practitioners recognize the link between supply chain integration and sustainability performance. The study highlights that the role of mediators in supply chain integration not only increases administrative costs but also has a positive impact on environmental, social, and economic dimensions.

LITERATURE REVIEW

Theory of Dynamic Capabilities View

Dynamic capability theory serves to encourage organizations to integrate dynamic capabilities into environmentally friendly practices, improve supply chain quality, and create business chain innovations in the business sector (Manzoor et al., 2022b). As stated by Rashid & Ratten (2021), businesses are developed with knowledge, experience, and capabilities to face market changes to become more stable. There are several steps in developing business performance, one of which is supply chain integration to improve the quality of agile and lean outsourcing capabilities based on open, structured, and adaptive information sources in managing external resources (Oliveira-Dias et al., 2022). Furthermore, sustainability performance is influenced by organized costs, readiness in changing markets, and consistent operational systems. Supply chains contribute to SMEs by implementing dynamic capabilities, so that these SMEs have the opportunity to maintain coordination, disseminate information quickly, collaborate between related parties, develop supply chain quality, minimize operational risks, and create cooperative businesses (Wankmüller & Reiner, 2020). Therefore, SMEs implement supply chain integration as a solution to the problems encountered in the trade sector.

Supply Chain Integration

Supply Chain Integration is a comprehensive process of coordination and collaboration between various functions within the trader and with business partners such as suppliers, distributors, and end customers (Shashi et al., 2018). The SME traders must be able to integrate information and logistics flows with farmers and customers to respond to rapid market fluctuations (Ariadi et al., 2024). From the dynamic capabilities view perspective, this integration is not just a routine operational activity but a strategic capability to sense price changes and field stock availability in real time (Oliva et al., 2019a). Traders who can seize opportunities through close coordination with suppliers will more easily secure high-quality commodities amid weather uncertainty (Jilane et al., 2023). Furthermore, the process of transforming (reconfiguring) assets and resources is carried out by adopting simple digital technologies to accelerate communication throughout the existing supply chain (Ngo et al., 2023). Through these dynamic capabilities, SME traders can create a sustainable competitive advantage because they are more agile in adapting than their rigid competitors.

Lean Outsourcing

Lean Outsourcing is a management strategy that combines lean principles (streamlining/waste elimination) with outsourcing practices (Waqas et al., 2022). In this context, traders not only outsource non-core activities to third parties to reduce costs, but also ensure that the outsourced processes are free of non-value-added activities (waste). SME traders implement lean outsourcing by outsourcing non-core functions, such as delivery logistics, to third parties to minimize resource waste (Kemokai, 2017). Within the Dynamic Capabilities View framework, this strategy strengthens sensing capabilities, allowing traders to focus more on monitoring price fluctuations and daily customer preferences without the burden of fleet management (Al-Minhas et al., 2020). This outsourcing of activities represents an opportunity-seizing approach, enabling SMEs to respond nimbly to surges in demand without the need for large physical assets. Through lean coordination with external partners, traders reconfigure their cost structure from fixed to more flexible variable costs. As a result, integrating lean efficiency and dynamic capabilities creates strong business resilience in the face of uncertain food commodity supplies.

Agile Capabilities

Agile Capabilities are the ability of traders to detect changes in the business environment quickly and respond effectively to exploit opportunities or mitigate threats (Geyi et al., 2020a). Traders develop agile capabilities, enabling them to respond instantly to changing consumer preferences and supply disruptions (Oliva et al., 2019a). Within the DCV framework, this agility begins with the ability to sense daily market trends through direct customer interactions in the field. Seizing opportunities involves making quick decisions to change commodity types when shortages or sudden price spikes occur. Reconfiguring occurs when traders flexibly adjust distribution routes or sales methods, such as switching to delivery services via application (Waqas et al., 2022). The synergy between operational agility and dynamic capabilities ultimately ensures SME business continuity amidst the highly volatile food trade ecosystem.

Sustainability performance

Sustainability performance for SME traders is measured by the balance among economic profit, social concerns, and long-term environmental preservation (Ariadi et al., 2024). Through the lens of the DCV, this performance achievement begins with the ability to understand environmental regulations and increasing consumer awareness of organic or plastic-free products. Traders then seize opportunities by integrating environmentally friendly practices, such as reducing the use of

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plastic bags, into their core business model. The reconfiguration process involves building sustainable partnerships with local farmers to ensure a consistent, safe, and high-quality supply of vegetables (Wijaya & Ariadi, 2025). Ultimately, these dynamic capabilities enable SMEs not only to survive financially but also to be ethically competitive and relevant in the future.

The Relationship of Supply Chain Integration and Sustainability Performance

Supply chain integration, encompassing internal integration, process integration, and product integration, has a substantial impact on enhancing a company's operational performance (Anwar et al., 2025). Internal integration enables cross-functional coordination within an organization, such as production, logistics, and marketing, thereby improving process efficiency and product quality (Li et al., 2022). Process integration with suppliers and customers supports synchronization of supply chain activities, accelerates delivery times, and reduces operational costs through closer collaboration and real-time information sharing. Meanwhile, product integration contributes to the development of more innovative and market-responsive products through the active involvement of supply chain partners in the design and development process (Nakandala & Lau, 2019). These three forms of integration complement each other and collectively can drive operational excellence for SMEs in the face of dynamic market competition.

Sustainability performance is influenced by supply chain integration (SCI), ensuring it is developed, structured, and aligned with trade objectives (Shashi et al., 2018). The more advanced the supply chain integration, the stronger the coordination between related parties, such as farmers, distributors, and customers (Fu et al., 2021). SMEs facilitate information dissemination, minimize uncertain market changes, and improve trade quality to be more effective and efficient (Arfi et al., 2018). Consequently, distribution costs can be managed efficiently, work productivity increases, and trade adaptability increases (Berendes et al., 2025). Market changes are challenging to detect, necessitating that SMEs address market challenges and obstacles by implementing supply chain integration (Kumar & Kumar Singh, 2017). SCI facilitates traders in reconfiguring their business operations from a DCV perspective, for example, by synchronizing farmers' harvest schedules with courier delivery schedules (Jayalath et al., 2025). This high level of synchronization can reduce food waste because goods don't accumulate for too long in warehouses. This waste reduction can improve cost efficiency while reducing negative environmental impacts. The more optimally supply chain integration is implemented in the cooperative trade sector, the better the sustainability performance of SMEs.

H1: Supply chain integration positively influences sustainable performance.

The Relationship of Supply Chain Integration and Agile Capabilities

Market changes impact business development, but supply chain integration and agile capabilities offer solutions to these negative impacts (Shukor et al., 2021). Internal integration, distributor integration, and customer integration are considered essential components of supply chain integration. SMEs strive to achieve business growth by implementing these strategies (Wang et al., 2025). Supply chains are integrated with agile capabilities and sustainable performance to improve production processes (Geyi et al., 2020). High integration with partners (farmers or distributors) allows traders to quickly capture market opportunities (Wijaya & Ariadi, 2025). If traders detect a trend in vegetables like broccoli, increasing market demand, integrated relationships allow them to quickly redirect orders or secure stock from partners without having to source from scratch. Furthermore, traders can minimize the negative impacts of these market changes, particularly unstable and

unpredictable demand. Strategies are designed to address these issues, with stakeholders in the agricultural sector playing a crucial role (Hauser et al., 2020). This can create a benchmark for decision-making, which is further developed through supply chain integration.
H2: Supply chain integration positively influences agile capabilities.

The Relationship of Agile Capabilities and Sustainability Performance

Supply chain integration helps maximize the role of agile capabilities in developing sustainability performance by focusing on production processes, particularly in the agricultural sector (Butt et al., 2021). SMEs are required to develop products that are safe, hygienic, timely, and responsive to customer needs, thereby increasing customer loyalty (Wicaksono & Illés, 2022). Oliva et al. (2019) added that agile capabilities advance SMEs, particularly through knowledge, experience, and professional business skills. For example, agility allows traders to have a keen eye for sustainability issues. Agile traders can quickly pick up on signals from consumers who are starting to care about reducing plastic or organic vegetables. When conventional vegetable prices soared due to climate change, agile traders quickly switched to sourcing from local farmers which are more stable price (Nematollahi et al., 2021). This swift action not only maintained economic viability (profit) but also supported sustainable local smallholder farmers (social). Additionally, traders can quickly reroute daily deliveries using a simple app, reducing fuel consumption (an environmental benefit) (Aljazzar et al., 2018). Furthermore, agile inventory management directly reduces the number of inventory that rot and are thrown away, thereby significantly reducing food waste. Therefore, SMEs can advance and excel by focusing on the quality of their supply chains.
H3: Agile capabilities positively influence sustainability performance.

The Relationship of Supply Chain Integration and Lean Outsourcing

Supply chain integration and lean outsourcing collaborate to form the foundation for developing business quality, particularly internal and external factors within a company (Yu & Huo, 2018). Supply chain integration requires farmers, suppliers, customers, and others to play an important role in developing SMEs, especially products, to be of higher quality, advanced, and superior (Chowdhury et al., 2024). It enables SMEs to share real-time demand data with outsourcing partners (e.g., third-party logistics) (Valashiya & Luke, 2023). Integrated collaboration capabilities help merchants determine inventory levels more accurately, prevent wasted lead time, and organize more flexible delivery schedules. Meanwhile, lean outsourcing focuses on eliminating waste by utilizing third parties to perform processes that are not the company's primary focus, thereby allowing companies to concentrate more on their core competencies (Machado Guimarães & Crespo De Carvalho, 2013). By integrating their supply chains, SMEs can more effectively manage outsourcing, ensuring that all processes operate efficiently and responsively to meet customer needs, while also supporting lean principles at every stage (Ariadi et al., 2021).
H4: Supply chain integration positively influences lean outsourcing.

The Relationship of Lean Operations and Sustainability Performance

Lean outsourcing and sustainability performance are integrated in developing the quality of a SME’s operational system (Omigie & Oguns-Obasohan, 2023). Lean outsourcing focuses on non-core processes that are outsourced to third parties to perform specific tasks, particularly operational systems, which are managed and organized by the company (Tsay et al., 2018). Lean strategies are integrated into SME systems, particularly the resources that determine production and service quality (Bouazza et al., 2021). From a

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DCV perspective, lean outsourcing partnerships provide SMEs with access to advanced vendor technology and expertise without significant investment (Rezaei et al., 2018). SMEs can seize sustainability opportunities, such as using logistics services with optimized routing systems, which directly reduce carbon emissions and operational costs (economic efficiency) (Creazza et al., 2024). SMEs strive to develop their core business to drive innovation, thereby providing opportunities to enhance their sustainability performance (Islam & Wahab, 2021). Furthermore, lean outsourcing forms the basis for developing performance, innovation, and readiness to face market changes, thereby maintaining customer loyalty (Nevries & Wallenburg, 2021).

H5: Lean outsourcing positively influences on sustainability performance.

The Relationship of Supply Chain Integration and Sustainability Performance Mediated by Agile Capabilities

Market changes serve as a driving force for companies to implement supply chain integration in collaboration with sustainability performance (Hendijani & Saeidi Saei, 2020). Agile capabilities can be linked to overall SME performance, for example, operational systems such as distribution route or switching supplier supported by the quality of farmers, suppliers, customers, and others that responses (Domenek & Moori, 2025). Rapidly changing distribution routes or switching suppliers when disruptions occur directly reduces food waste and increases profits. Furthermore, agile capabilities encourage SME traders to focus on market changes influenced by customer demand for product quality (Geyi et al., 2020). This also includes quickly switching to eco-friendly packaging or organic products when the integration radar detects market demand signals. Agile capabilities and sustainability performance are stated as strategic models for business development (Ciccullo et al., 2018).

H6: Supply chain integration positively influences sustainability performance, where agile capabilities as mediator.

The Relationship of Supply Chain Integration and Sustainability Performance Mediated by Lean Outsourcing

Business development is influenced by the implementation of lean outsourcing, which is based on supply chain integration (Zhang et al., 2022). Farmers, distributors, customers, and others collaborate to exchange information about products distributed to the market (Ariadi et al., 2024). Resources play a crucial role in improving product quality (Waqas et al., 2022). SME traders leverage this influence by generating revenue from salable waste products. In this case, lean outsourcing supports the production process by focusing on structured sustainability performance (Kovilage, 2021). According to Mofolasayo et al. (2022), SMEs are seizing the opportunity to increase efficiency by implementing lean outsourcing. Theys hand over product distribution management to a more skilled and efficient third party. This ensures that every process carried out by external partners remains lean (waste-free) because it is supported by integrated data from the SME. Furthermore, traders gain insight into business strategies, particularly collaboration with partners regarding products distributed in the market (Lizarelli et al., 2023). Consequently, SMEs have the potential to advance with products produced with systems and performance that align with business standards.

H7: Supply chain integration positively influences sustainability performance, where lean outsourcing as a mediator.

These research hypotheses are stated as the main focus in designing the research model as Figure 1.

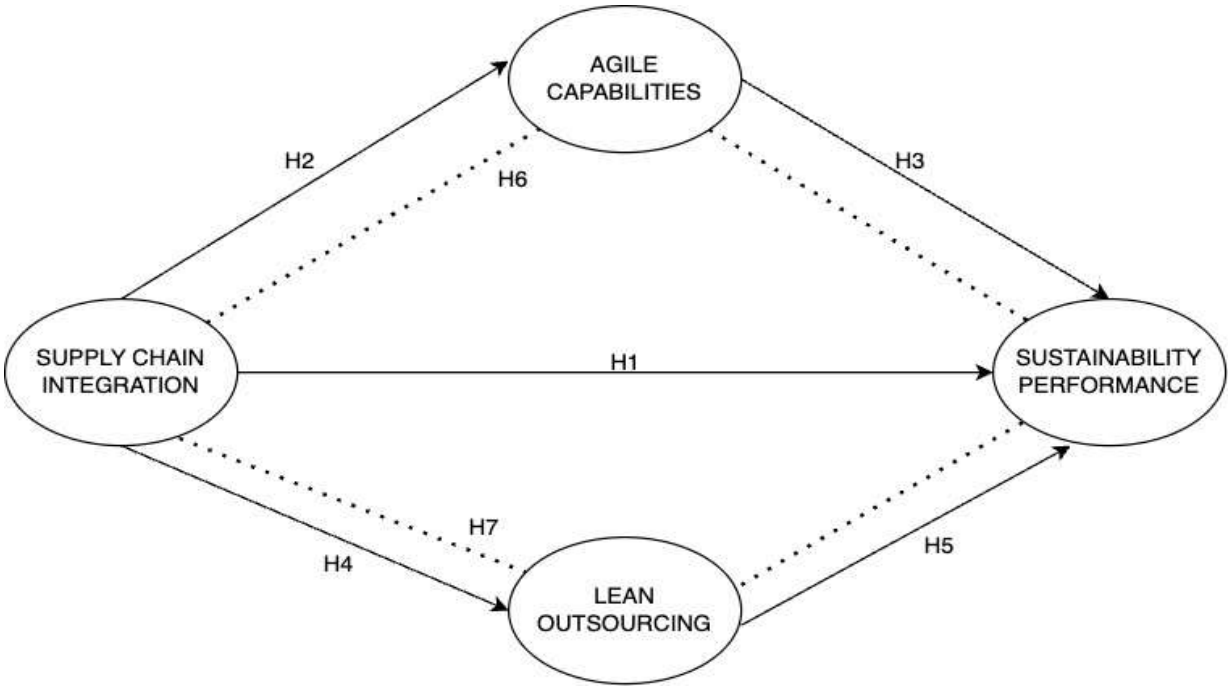

Figure 1. Conceptual Model

RESEARCH METHOD

The analysis of the relationships between variables in this study used a technique called Partial Least Squares-Structural Equation Modeling (PLS-SEM) (Hair et al., 2019). SmartPLS 3 functions as software that displays the results of the analysis in the form of structural relationships, mediating influences, and their positions. This study focused on an approach analyzed in two stages. The data in the form of relationships between exogenous variables are tested with supply chain integration as the measurement model of this study. In addition, agile capabilities, lean outsourcing, and sustainability performance are stated as endogenous variables of this study. Therefore, these results served as a reference in measuring the validity of the design and reliability of the model. Finally, agile capabilities and lean outsourcing can be stated as mediators in the analysis of the relationship between the two variables using a structural model.

For the purposes of this research, a questionnaire instrument was developed and show supply chain integration influences sustainability performance development through agile capabilities and lean outsourcing as mediators. among traders at Pancasari Traditional Market. The population in this study was 214 traders at Pancasari Traditional Market, based on data from the Buleleng Market Regional Company (Brida, 2024). The traders had been operating their stalls for more than five years at the location. The respondents were traditional market traders operating in the vegetable and fruit sectors. The sampling technique used was the Slovin formula (error term = 5%), with 139 market traders located at Pancasari Market where the selection of sample units uses the "Random Sampling" technique. The demographics respondent are summarized in Table 1.

The variables in the research conceptual model were measured based on operational definitions using measures validated in previous supply chain literature and published in peer-reviewed journals. This research employed a Likert scale, where one is categorized as 'strongly disagree' and five is categorized as 'strongly agree'. The measurement of indicator items for each variable represented in the ques-

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tionnaire instrument refers to previous literature. The measurement of supply chain integration consists of six items that are Sharing information with suppliers, long-term relationships, involvement in decision-making, cooperation in solving problems, customer involvement in business processes, and collaboration between traders (Ariadi et al., 2021; Wijaya & Ariadi, 2025). Moreover, the agile capabilities comprise five items that are response to market change, strategy flexibility, service flexibility, digital technology adaptation, responsive decision making (AL-Shboul, 2025b; Geyi et al., 2020b). The lean outsourcing comprises five items that are reducing excess stock of raw materials or finished products, reducing waiting times, outsourcing work, zero defect products, and minimizing unnecessary product movements (De et al., 2020; Waqas et al., 2022). Finally, the sustainability performance comprises six items that are profit growth, sales market, employee welfare, waste management, use of environmentally friendly materials, and customer satisfaction (Ariadi et al., 2024; Malesios et al., 2020).

PLS-SEM was used to measure the structural relationships between the variables in this study. The standardized factor loadings of each measurement component are shown in Table 2, ranging from 0.720 to 0.899. Furthermore, Cronbach's Alpha values range from 0.842 to 0.890, and the Average Variance Extracted (AVE) values range from 0.557 to 0.696, indicating reliability. In addition, as shown in Table 3, indicating that each construct in the discriminant category is significant when compared to its correlation with other constructs. These results provide information related to acceptable reliability, convergence, and validity.

RESULTS

This study used SmartPLS3 to analyze the research hypotheses by focusing on the conceptual model and structural path (Hair et al., 2019). The validity of the hypothesis is assessed by the regression coefficient and the "t" statistic after obtaining the results in the form of model validity. If the significance level is lower than 1.96, then the "t" test must be higher than 1.96. Relevant parameters are categorized as statistically significant. If the p-value is less than 0.5, then each hypothesis is determined by significance, namely 95% and 99%. Figure 2 and Table 4 shows the results of the PLS analysis in the form of statistical significance of the research hypotheses that focus on the coefficient value (β) and the t-test. Therefore, the relationship between supply chain integration (SCI) and sustainability performance can be categorized as insignificant. These results indicate that H1 is rejected (β = 0.088; p-value > 0.05). SCI has a positive effect on agile capabilities with a value of β = 0.582; p-value < 0.01 can be categorized that H2 is supported. Agile capabilities positively influence sustainability performance with a β value of 0.444; a p-value <0.01, supporting H3. SCI also significantly influences lean outsourcing with a β value of 0.633; a p-value <0.01, supporting H4. Lean outsourcing positively influences sustainability performance with a β value of 0.379; a p-value <0.01, supporting H5. SCI positively influences sustainability performance, mediated by agile capabilities (H6) (β = 0.258, p-value <0.01), supporting H6. SCI positively influences sustainability performance, mediated by lean outsourcing (H7) (β = 0.240, p-value <0.01), supporting H7.

Table 1. Demographics

Characteristic	Frequency	Percent
Gender		
Male	37	36.27%
Female	102	63.73%
Education		
Junior High School	25	17.98%
Senior High School	111	79.85%
Undergraduate	3	2.17%
Trading Experience		
1 – 5 years	37	26.62%
6 – 10 years	82	58.99%
> 10 years	20	14.39%
Total Annually Sales		
< Rp 100 million	47	33,82%
> Rp 100 – Rp 500 million	84	60,43%
> Rp 500 million	8	5,75%
	139	100%

Source: Author's Own Work, year??

Table 2. Item Measurement Model

Item Name	Item Loading	Cronbach's Alphas	AVE
Supply Chain Integration			
SCI1	0.749		
SCI2	0.747		
SCI3	0.780		
SCI4	0.746	0.842	0.557
SCI5	0.720		
SCI6	0.736		
Agile Capabilities			
AC1	0.883		
AC2	0.868	0.890	0.696
AC3	0.863		
AC4	0.798		
AC5	0.751		
Lean Outsourcing			
SC1	0.763		
SC2	0.849	0.864	0.649
SC3	0.724		
SC4	0.877		
SC5	0.806		
Sustainability Performance			
SP1	0.899		
SP2	0.882		
SP3	0.773		
SP4	0.749	0.888	0.689
SP5	0.838		
SP6	0.687*		

(Source: Author's Own Work) (* dropped item loading < 0,7)

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Table 3. Discriminant Validity

Variable	AC	LO	SCI	SP
AC				
LO	0.817			
SCI	0.648	0.723		
SP	0.886	0.876	0.648	

Source: Author's Own Work

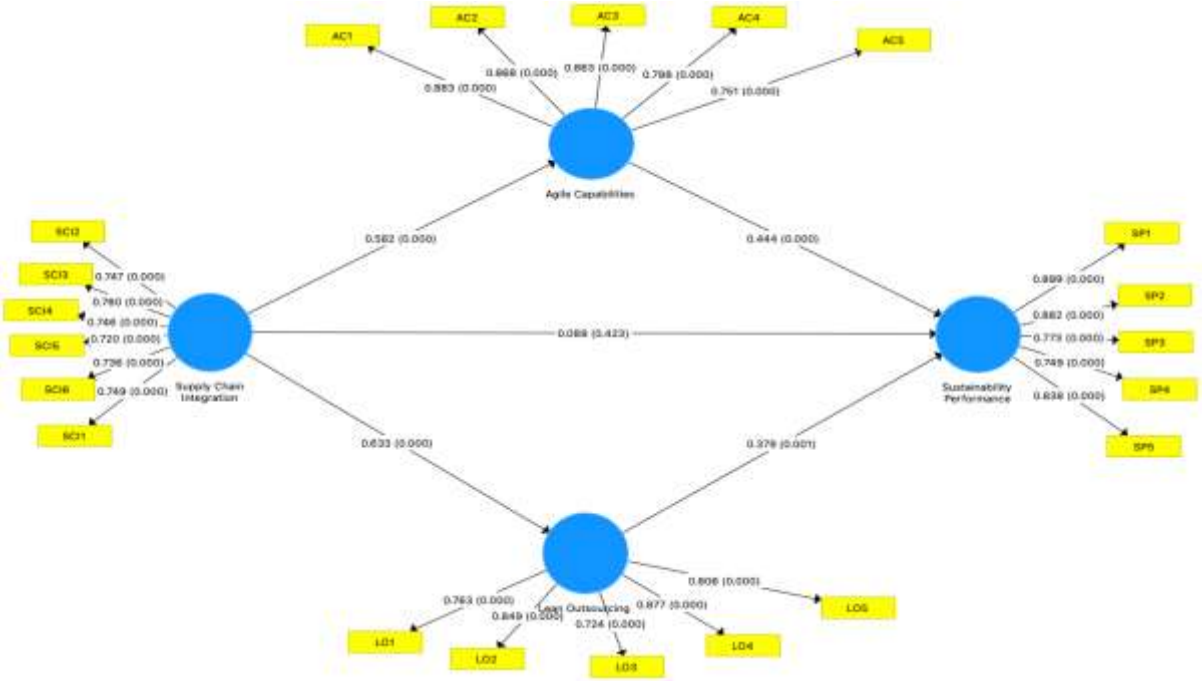

Figure 2. The Model Results
(Source: Author's Own Work)

Table 4. The Hypotheses Result

Hypothesis	Relationship	Path Coefficient	Test Results
H1	Supply Chain Integration → Sustainability Performance	0.088	Non-Significant
H2	Supply Chain Integration → Agile Capabilities	0.582	Significant at 99%
H3	Agile Capabilities → Sustainability Performance	0.444	Significant at 99%
H4	Supply Chain Integration → Lean Outsourcing	0.633	Significant at 99%
H5	Lean Outsourcing → Sustainability Performance	0.379	Significant at 99%
H6	Supply Chain Integration → Agile Capabilities → Sustainability Performance	0.258	Significant at 99%
H7	Supply Chain Integration → Lean Outsourcing → Sustainability Performance	0.240	Significant at 99%

Discussions

The empirical data results showed that supply chain integration (SCI) could not increase sustainability performance at traditional market, which is represented by H1, because SMEs in the market generally have very short and simple supply chains. In general, traders buy horticultural products sourced from a single supplier, have relatively limited funds, and then sell them directly to consumers. For SME vegetable traders, capital constraints prevent them from immediately converting integration investments into costly green initiatives. Their supply chain integration is often informal, and the underlying essence of DCV is responding to rapidly changing environments (high-velocity markets). SCI remains static without adaptive capacity. Integration only provides information, but to achieve sustainability, traders must be able to make decisions based on that data. Therefore, direct relationships are considered too weak because they ignore the adaptation process that is the core of DCV theory. Deep integration with suppliers or logistics partners becomes irrelevant because their relationships are more transactional and traders have fewer supplier options and less bargaining power. Traders lack the literacy of applications to share data in real-time with suppliers, so communication is often still done manually, such as via telephone, which are not integrated. SME owners are typically both managers and workers who have lack the expertise or time to design complex strategies. Although it has not been able to run optimally because relationships with suppliers and customers are often based on personal trust, not on formal contracts or agreements that form the basis of integration. This finding aligns with (Sègbotangni et al., 2025; Shashi et al., 2018), traders' choice of suppliers is often based on the lowest price, without considering product quality aspects, making it difficult for SMEs to encourage sustainable practices among their suppliers.

Supply chain integration significantly influences agile capabilities, supporting H2 aligns with the findings of (AL-Shboul, 2025; Geyi et al., 2020). Traders and farmers coordinate with each other regarding market demand information. For example, if market demand increases, especially for certain vegetables, SMEs then provide information to suppliers to develop production. SCI can manage production time and distribute it to customers in an orderly and organized manner. It enables direct inventory reconfiguration, allowing merchants to consign goods with suppliers rather than holding all inventory. This flexibility to reorganize inventory flows directly translates into agile capabilities in the face of supply uncertainty. Traders gain an understanding of how agile capabilities can be implemented to address market challenges. Agile capabilities contribute to developing sustainable performance in SMEs through business strategies that focus on pricing and product availability that match market demand, which supports H3 aligns with the findings of (Ciccullo et al., 2018; Oliva et al., 2019b). Unsold products can be reprocessed as a revenue opportunity for the development of these SMEs. One way to manage this is to optimize the distribution process, which can be expensive and time-consuming. Market demand is also a primary focus for SME traders, inspiring them to process waste into marketable products and generate additionnal income from their products.

Supply chain integration is linked to lean outsourcing, which supports H4 aligns with the findings of (Shahzad et al., 2022; Waqas et al., 2022). Supply chain integration implemented by SMEs focuses on warehouse stock and farmer supply. It ensures accurate information on supply, demand, and ordering, eliminating excess stock that can lead to waste. The stronger the integration by SMEs, the greater the

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opportunity for effective and efficient product distribution. This minimizes production waste and maximizes company profits. Supply chain integration offers an opportunity for relevant parties to identify and significantly minimize such waste. According to DCV, sharp sensing of goods flow enables merchants to identify waste points that cannot be addressed internally. This provides a strong rationale for merchants to immediately outsource functions that hinder efficiency. Lean operations impact sustainability performance for SME traders, which supports H5 aligns with the findings of (De et al., 2020; Lizarelli et al., 2023). Lean principles help traders minimize losses from perishable products. With better inventory systems and smoother workflows, the risk of product spoilage in the warehouse or during shipping can be minimized. This has an impact on reducing costs and enhancing efficiency, directly increasing profit margins. One of the biggest wastes in the horticulture business is wasted products, where the implementation of lean operations (such as Just-in-Time systems) supports SMEs to ensure that supply matches demand, thereby drastically reducing product waste. In DCV, the ability to continuously eliminate non-value-added activities is a form of adaptive dynamic capability. For traders, reducing food loss or logistics waste through lean outsourcing automatically translates into achieving sustainability targets. Lean principles encourage better communication and collaboration with suppliers (farmers), which is aligned with the findings of Zhai et al. (2023). By working together to eliminate waste throughout the supply chain, SMEs can build stronger and fairer relationships with local farmers, providing them with greater income stability.

The mediating hypotheses, H6 and H7, were confirmed because agile capabilities and lean outsourcing had a significant positive indirect effect on SCI and sustainability performance. Close collaboration and real-time information exchange between traders, farmers, and distributors enable horticultural SMEs to act more quickly and adaptively. Information about demand fluctuations, supply availability, or price changes can be accessed and responded to immediately. Agile capabilities are solutions to problems that occur in supply chains that are categorized as fragile. Agile capabilities in the context of agility provide opportunities for SMEs to adapt to market changes, especially in effective and efficient production and distribution. From a DCV theory perspective, an organization's ability to reconfigure resources as the environment changes, such as changing merchandise types when market demand declines, directly reduces operational costs and food loss. Lean outsourcing can be optimally implemented with the involvement of relevant stakeholders in agribusiness, who focus on supply chain integration, particularly in SMEs. For example, merchandise deliveries are planned in coordination with logistics operations, which reduces food loss during transportation to the market. According to the DCV, SCI serves as a critical enabler of a lean outsourcing process. When outsourcing processes are free of waste, sustainability performance, including waste reduction and cost efficiency, is maximized. Traders can implement a pre-order concept, where products are distributed upon customer orders. This allows SMEs to manage their supply chains to avoid wasted inventory due to unsold products. Lean practices can support SME development, maximize profits while minimizing losses due to the negative impact of market changes, such as unstable product demand.

Theoretical and Practical Implications

SME traders contribute to the Dynamic Capabilities View (DCV) theory, which is supported by the results of this study. They strive to design strategies to address market challenges. Agile capabilities and lean outsourcing are the mediators that

form the basis for developing dynamic capabilities. The DCV theory plays a crucial role in horticultural SMEs, particularly in their operational and production systems. The results of this study offer SCI, agile capabilities, and lean outsourcing as useful theories for business sustainability, especially for SMEs. SMEs gain insight into the importance of these conceptual models in designing horticultural SME systems for product development, distribution, partner development, and other aspects. Market changes remain a primary focus for SME traders in adapting their products. Therefore, agile capabilities serve as a solution to problems arising from market changes. The results of this study present a theory that serves as valid evidence for the future development of horticultural SMEs.

The theory of DCV posits that firms develop dynamic capabilities, such as learning, reconfiguration, and innovation, to transform static resources like SCI into operational agility. Agile capabilities, including supply chain flexibility and responsiveness, enable this transformation by converting integrated processes into sustainable practices amid the uncertainties commonly encountered by SMEs, such as fluctuating demand or supply risks. Empirical studies indicate that agility fully mediates the relationship between integration practices and sustainability, with DCV serving as the foundational enabler in resource-constrained environments. For SME traders in sectors such as Indonesia's agribusiness or Bali's markets, SCI alone provides limited sustainability benefits without the agility DCV enables to manage volatility. DCV supports resource orchestration, enabling traders to reconfigure partnerships for eco-friendly logistics or circular practices, thereby enhancing triple-bottom-line performance. This approach is particularly important for SMEs, as dynamic capabilities strengthen resilience and foster innovation without requiring substantial investments.

Practically, the development of a conceptual model that identifies agile capabilities and lean operations as mediators between supply chain integration and sustainability performance provides valuable practical contributions for horticultural SME traders. The first practical contribution is encouraging SME traders to proactively build collaborative relationships with suppliers (farmers), distributors, and customers. It can include sharing information on demand forecasts, product quality, or harvest schedules. Traders need to build systems that enable rapid response to change through agile capabilities. An example is an efficient communication system to notify farmers of urgent requests or changing market trends. Second, lean operations help traders systematically identify and eliminate waste by mapping work processes to identify inefficiencies, such as long lead times for product deliveries. Implementing lean and agile strategies supports SMEs in consistently providing fresher products and developing a reputation as a reliable and responsible business, increasing profitability and reducing operational costs.

CONCLUSIONS AND LIMITATIONS

Agile capabilities and lean outsourcing are the primary focus of this research, particularly their impact on the relationship between supply chain integration and the sustainability performance of SME traders. Supply chain integration does not directly impact their sustainability performance. Supply chain integration does not directly influence sustainability performance. The findings indicate that supply chain integration is frequently informal and remains static in the absence of adaptive capacity. However, agile capabilities can mediate the relationship between supply chain integration and sustainability performance. Traders provide information to farmers to facilitate the production planning related on inventory. Supply chain integration (SCI) manages production schedules and coordinates distribution

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to customers regularly. SCI enables direct inventory reconfiguration, allowing merchants to consign goods to suppliers rather than maintaining all inventory themselves. This flexibility in inventory management enhances agile capabilities when facing supply uncertainty. As a result, traders can better understand and implement agile strategies to address market challenges. The success of supply chain integration by SME traders provides opportunities to increase knowledge, experience, and capabilities in preparing for uncertain market changes. Agility influences the development of sustainability performance, as evidenced by minimized product waste, valid demand responses, and maximized results. Lean outsourcing acts as a mediating factor between supply chain integration and sustainability performance. Effective supply chain integration enhances the flow of high-quality information and products, enabling SMEs to achieve optimal development. According to the dynamic capabilities view (DCV), improved sensing of goods flow enables organizations to identify inefficiencies that cannot be addressed internally. These findings support the prompt outsourcing of functions that hinder operational efficiency. However, integration attains significance when agile capabilities and lean outsourcing serve as intermediaries linking it to sustainable performance. By demonstrating agility in market responsiveness and efficiency in outsourcing non-core functions, traders can transform supply chain information into strategic actions that reduce waste and increase profitability. Therefore, the sustainability of SME traders depends less on the degree of system integration and more on their agility and efficiency in reconfiguring resources through these dynamic capabilities. This research provides valuable knowledge, experience, and skills for businesses, but there are limitations in conducting this research, particularly for horticultural SMEs in specific regions. Future research can expand this model in different industries or regions with other mediating variables, such as digital technology integration or innovation capabilities, for more proven, valid knowledge. It can focus on employing longitudinal designs to collect valid data.

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