BUSINESS MANAGEMENT REVIEW

2025 vol 29, No. 1

https://doi.org/10.56279/bmrj.v29i1.1006

Research Article

BMR, 29,1

71

Horizontal Collaboration Practices and Operational Performance of Smallholder Farmer Groups in Horticultural Supply Chain

***Herieth J. Rogath*[1] **; Juma James Masele*[2] *Gerald Magova*[2]**

1 *Mbeya University of Science and Technology (MUST)*

2 *University of Dar es Salaam Business School, Tanzania:*

* ***Correspondence:*** *rogathherieth@gmail.com*

Abstract

Collaboration has increasingly been recognized as a strategic approach for enhancing performance. However, limited attention has been given to the relationship between horizontal collaboration practices and the operational performance of horticultural smallholder farmer groups in downstream supply chains. This study examined this relationship through the lens of Social Exchange Theory. Data were collected using self-administered questionnaires from 195 smallholder horticultural farmer groups across the southern highlands of Tanzania, including Mbeya, Iringa, Njombe, and Songwe regions. Analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS 4.0. The findings reveal that all collaboration practices improve operational performance; resource sharing is strongest, information sharing supports coordination, and group commitment has a weaker effect. Theoretically, SET shows practical exchanges (resources, information) drive performance more than relational exchanges; horizontal collaboration practices among smallholder horticultural farmer groups is a key performance driver in resource-limited agricultural settings. Practically, smallholder horticultural farmer groups should prioritize resource and information sharing to boost operational performance, while commitment supports long-term collaboration. Furthermore, policymakers are encouraged to design agricultural policies that promote horizontal collaboration, contributing to the achievement of Sustainable Development Goal (SDG) 17. Training institutions and development stakeholders are also advised to develop targeted programs to enable smallholder horticultural farmer groups to maximize the benefits of collaboration practices and improve efficiency in horticultural supply chains

Keywords: Horizontal collaboration practices, information sharing, resource sharing, stakeholder commitment and operational performance

Received: 17 September 2025
Revised: 12 February 2026
Accepted: 18 February 2026
Published: 30 April 2026

Citation: Rogath. H.J., Masele, J. J. & Magova, G. (2026). Horizontal Collaboration Practices and Operational Performance of Smallholder Farmer Groups in Horticultural Supply Chain. *Business Management Review, 29*(1), 71-84. **https://doi.org/10.56279/bmrj.v29i1.1006**

Introduction

Across the globe, smallholder horticultural farmers play a vital role in feeding populations. In developing countries they play a crucial role in economic transformation and poverty reduction (Verhofstadt & Maertens, 2014). However, they face a range of challenges that hinder their effective performance in the downstream segment (Abdul-Rahaman & Abdulai, 2020). These challenges include limited capacity to negotiate due to lack of market information (Huang & Liang, 2018), semi-subsistence farming practices, and significant mismatches between demand and supply that drive up operational costs (Hosseinnezhad & Heavey, 2023). Additionally, they suffer from high postharvest losses and elevated transaction costs per trading unit (Tarekegn & Kelem, 2022; Zhou & Liang, 2018). According to the United Republic of Tanzania (2018–2027), the Agriculture Sector Development Programme Phase II (ASDP II) indicates that horticultural crops are among the most affected by postharvest losses in Africa, and particularly in Tanzania, with losses surpassing those observed in other crop categories.

In contexts characterized by high uncertainty, market volatility, and weak institutional support, collaboration is no longer merely a strategic option but a critical survival mechanism for improving performance within agricultural supply chains. Recent scholarship increasingly recognizes collaboration as a strategic capability through which supply chain actors jointly enhance operational outcomes by coordinating activities, sharing resources, and aligning incentives (Leuschner et al., 2013; Chen et al., 2017; Tarifa-Fernández et al., 2019). Fundamentally, collaboration entails collective action toward shared objectives rather than isolated decision-making, and may occur both internally within organizations and externally across organizational boundaries (Wu et al., 2014; Raweewan & Ferrell, 2018). External collaboration is commonly conceptualized in two forms: vertical collaboration, involving coordination among actors at different tiers of the supply chain such as suppliers and buyers.

Horizontal collaboration, which entails cooperative arrangements among actors operating at the same level, including competitors (Seok & Nof, 2014; Nha Trang et al., 2022).

However, the empirical literature on collaboration and performance is heavily skewed toward vertical collaboration, with most studies examining supplier–buyer relationships in manufacturing and agribusiness contexts (Zelbst et al., 2014; Luzzini et al., 2015; Pérez-López et al., 2019; Yang et al., 2022). In contrast, horizontal collaboration particularly among smallholder farmer groups remains underexplored, despite its growing relevance in improving performance in agricultural markets (Uddin, 2022). Moreover, existing studies tend to operationalize performance narrowly, often emphasizing cost efficiency or flexibility, while overlooking critical operational indicators such as quality, reliability, post-harvest loss reduction, on-time delivery, and productivity dimensions that are especially salient in perishable horticultural supply chains.

Prior research converges on three core collaboration practices that are particularly influential in shaping performance outcomes: information sharing, resource sharing, and group commitment. Information sharing is widely regarded as the foundation of effective collaboration, as it enhances coordination, responsiveness, and joint optimization of supply chain activities (Huo et al., 2021; Tang et al., 2023). Resource sharing, through the joint utilization of physical and intangible assets such as transport, storage facilities, knowledge, and labor, reduces duplication, lowers transaction costs, and strengthens collective resilience (Wang et al., 2021; Jamili et al., 2025). Group commitment reflects partners' willingness to invest in and sustain collaborative relationships over time, reinforcing trust, reducing opportunism, and ensuring continuity of joint action (Prodhan et al., 2022).

Drawing on social exchange theory, collaboration enables organizations to access critical knowledge, accelerate decision-making, and improve performance by aligning mutual benefits with long-term relational investments (Liao et al., 2017; Zhuo & Liang, 2018). Collaborative arrangements also minimize redundant decision processes, facilitate faster resolution of operational challenges, and improve the quality and timeliness of information flows across partners (dos Santos et al., 2020). Importantly, partners engaged in collaboration evaluate the costs of relationship exit against the relational and performance benefits accrued, thereby reinforcing commitment and sustaining cooperation when net gains are perceived to be positive. Collectively, these insights underscore the need for more context-specific empirical investigation into how collaboration practices operate among smallholder horticultural farmer groups, where horizontal coordination, perishability risks, and institutional constraints jointly shape performance outcomes.

Despite the widely acknowledged role of collaboration practices in enhancing performance, empirical research within agricultural supply chains remains uneven. Recent studies on food supply chains demonstrate that collaborative mechanisms such as information and resource sharing, joint knowledge creation, and coordinated action generate significant relational and performance benefits. However, this body of work has largely concentrated on food supply chains in developed-country contexts, offering limited insight into smallholder horticultural systems in developing economies (Hosseinnezhad & Heavey, 2023; Huo et al., 2021). Consequently, the applicability of these findings to smallholder-based horticultural supply chains remains uncertain.

Systematic reviews of collaboration-related behavioural factors further indicate that research on collaboration in agri-food supply chains is still at an early stage of development. While information sharing and commitment are consistently identified as critical drivers of effective collaboration, empirical evidence remains relatively sparse, particularly in horticultural contexts characterized by uncertainty (García-Alcaraz et al., 2021). In contrast, the majority of existing supply chain studies are grounded in manufacturing and business-sector settings. This imbalance has left collaboration practices in horticultural supply chains underexplored, especially in developing-country environments where perishability, price volatility, high transaction costs, and weak institutional support further complicate coordinated action. These gaps underscore the need for a focused investigation into collaboration practices among smallholder horticultural farmer groups. To address this gap, the present study adopts Social Exchange Theory (SET) as its theoretical lens to examine the relationships between collaboration practices specifically information sharing, resource sharing, and group commitment and operational performance among smallholder horticultural farmer groups in Tanzania.

Literature Review

Theoretical Perspectives - Social Exchange Theory

In Social Exchange Theory (SET) Blau, (1964) provides a foundational lens for understanding collaboration in supply chains by viewing inter-organizational relationships as exchanges governed by cost–benefit evaluations. According to SET, collaboration is sustained when perceived economic and social benefits outweigh associated costs. These exchanges extend beyond transactions to include relational elements such as trust, reciprocity, and commitment, which are critical for maintaining long-term collaborative relationships (Cropanzano & Mitchell, 2005). Reciprocity is central to SET, as partners engage with the expectation of fair and mutually beneficial returns over time.

In smallholder horticultural supply chains, SET helps explain why smallholder farmers collaborate despite severe resource constraints. Horizontal collaboration enables smallholder groups to address challenges such as limited market information, high transaction costs, supply–demand mismatches, and postharvest losses (Huang & Liang, 2018; Hosseinnezhad & Heavey, 2023; Tarekegn & Kelem, 2022). By pooling resources and sharing knowledge, smallholder farmers enhance coordination, efficiency, and bargaining power (Narrod et al., 2009). From a SET perspective, these arrangements represent rational responses to external pressures, driven by expectations of reciprocal gains and reduced uncertainty.

Trust is a critical condition for effective exchange. High trust encourages information sharing, resource investment, and long-term commitment, whereas low trust fosters opportunism and weakens collaboration (Morgan & Hunt, 1994). Power asymmetries may further undermine reciprocity when stronger actors dominate decision-making or capture disproportionate benefits, reducing perceptions of fairness (Cao & Zhang, 2011). Collaboration outcomes are also shaped by social and institutional contexts; while norms of solidarity may reinforce reciprocity, weak infrastructure and legal enforcement can limit the effectiveness of collaborative arrangements (Ma et al., 2016).

SET also acknowledges potential negative dynamics. Violations of reciprocal expectations can lead to free-riding and opportunism, eroding trust and group cohesion. Moreover, SET in the study explain performance outcomes, as it pays attention to external opportunities that influence performance gains.

Conceptual Framework

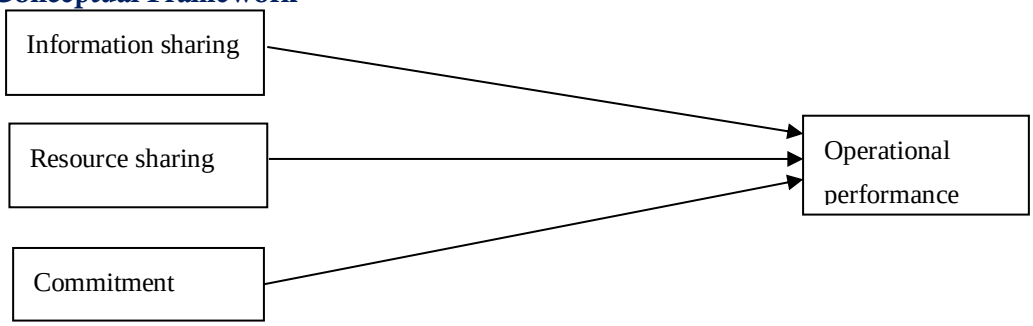


Figure 1: Collaboration practices and operational performance

Source: Blau (1964), Tarifa-Fernández et al. (2019) & Leuschner (2013)

Figure 1 above, illustrates the conceptual framework underpinning this study by depicting the hypothesized relationships between collaboration practices namely, information sharing, resource sharing, and group commitment and the operational performance of smallholder horticultural farmer groups. Drawing on Social Exchange Theory (SET), which suggests that social behaviour is the result of an exchange process where individuals seek to maximize benefits and minimize costs in interactions (Blau, 1964), the framework posits that collaborative behaviours are based on reciprocal exchanges. In this context, smallholder farmers who share information, resources, or demonstrate group commitment expect mutual benefits such as improved efficiency, reliability, and access to collective knowledge. Collectively, the framework assumes that stronger collaboration practices, grounded in reciprocal trust and mutual support, lead to superior operational performance, including enhanced efficiency, product quality, and reliability. Accordingly, the model hypothesizes direct and positive relationships between each collaboration practice and operational performance (H_1–H_3), providing a structured basis for empirically examining how collaborative practices contribute to performance outcomes among smallholder horticultural farmer groups.

Empirical Literature Review and Hypothesis Development

Information Sharing and Operational Performance

Information sharing is widely acknowledged as a critical component for improving operations (Valashiya & Luke, 2023). It has been identified as a fundamental enabler of performance enhancement (Valashiya & Luke, 2023; Leuschner et al., 2013), playing a vital role in facilitating effective and efficient supply chain management (Jermsittiparsert & Rungsrisawat, 2019; Raweewan & Ferrell, 2018).

Through the sharing of timely and accurate information, supply chain partners can establish strong relationships and make real-time decisions that positively impact operational performance (Dominguez et al., 2018). This practice supports strategic decision-making and allows organizations to optimize supply chain processes (Dominguez et al., 2018). Numerous studies across various industries and geographic regions have confirmed the positive role of information sharing in enhancing operational outcomes (Cao & Zhang, 2013; Wang et al., 2021).

While much of the literature has examined vertical collaboration typically involving suppliers and customer's studies also highlight how different dimensions of operational performance are influenced by information sharing. For instance, Pérez-López et al. (2019) and Jermsittiparsert et al. (2019) examined customer-supplier collaboration, while Shahbaz et al. (2018) analyzed customer-based partnerships in Malaysia. In terms of performance dimensions, Prodhan et al. (2022) assessed the influence of information sharing on efficiency, effectiveness, quality, and reliability in the Bangladeshi fishing industry.

Mashiloane et al. (2018) noted that information sharing not only enhances operational performance but also reduces costs and increases profitability. Raweewan and Ferrell (2018) further emphasized its role in fostering collaborative advantage, while Huo et al. (2021) linked information sharing to improved flexibility through enhanced knowledge sharing. However, contrasting findings exist in the literature. Yang et al. (2021), using Information Processing Theory, found no direct effect of information sharing on operational performance among 216 manufacturers in China. Similarly, Zelbst et al. (2014), applying Systems Theory, reported no direct relationship in U.S. manufacturing firms. The study by Sezen (2008) in Turkey also revealed insignificant or non-positive effects. Given these mixed results, this study aims to test the following hypothesis in the downstream segment of the horticultural supply chain:

H_1: *Information sharing has positive relationship with operational performance of smallholder horticultural farmer groups.*

Resource Sharing and Operational Performance

Resource sharing has been widely recognized as a strategy for enhancing operational efficiency and sustainability in the supply chain. Jamili et al. (2025) argue that the benefits of resource sharing depend on customer characteristics; for instance, sharing is particularly optimal for low-demand customers. As a fundamental component of horizontal collaboration, resource sharing involves organizations with similar resources, production processes, equipment, or customer bases combining efforts to achieve collective goals that might not be attainable individually (Cao & Zhang, 2013). Such collaboration can reduce investment costs, enhance responsiveness, and mitigate risks in supply chain operations (Chen & Hu, 2020).

The advantages of resource sharing are particularly significant in the transportation and distribution of fresh and perishable products, which often require specialized infrastructure (Wang et al., 2021). Stakeholders in the supply chain can share assets such as personnel, expertise, equipment, transportation, storage facilities, and even time (Jamili et al., 2025). This collaborative approach allows cost savings through the optimized use of available resources for example, leveraging idle transport capacity and distributing expenses among partners based on their usage share (Jamili et al., 2025). In this way, horizontal collaboration through resource sharing becomes a viable strategy to manage demand fluctuations and reduce the financial burden of capacity investments (Hosseinnezhad & Heavey, 2023). Organizations can generate value by utilizing business resources they do not necessarily own or control (Mustapha et al., 2022).

Empirical research supports the positive relationship between resource sharing and operational performance. Wang et al. (2021), in their study on fresh produce distribution in China, demonstrated that resource-sharing models enhanced operational performance after optimization. Maghsoudi and Pazirandeh (2016), examining humanitarian organizations in Southeast Asia, found a significant relationship using structural equation modeling with partial least squares (PLS-SEM).

Cao and Zhang (2011) further highlighted the impact of resource sharing in manufacturing settings, noting improvements in quality, efficiency, flexibility, effectiveness, and reliability. Their findings suggest that resource-sharing organizations are better positioned to improve operational performance by capitalizing on shared capacities and capabilities (Cao & Zhang, 2011; Wang et al., 2021; Maghsoudi & Pazirandeh, 2016). Given the existing evidence, this study investigates the following hypothesis in the context of horizontal collaboration of smallholder farmer groups downstream of the horticultural supply chains:

H_2: *Resource sharing has positive relationship with operational performance of smallholder horticultural farmer groups.*

Group Commitment and Operational Performance

Commitment refers to the willingness of individuals or groups to dedicate resources, effort, and time to maintain a valued relationship and achieve shared goals. In organizational and supply chain contexts, commitment reflects a long-term orientation toward a relationship, characterized by trust, loyalty, and the intention to continue collaboration despite challenges (Morgan & Hunt, 1994). According to Meyer and Allen (1991), commitment in organizations can be understood as a psychological attachment that binds an individual to an organization, influencing their decision to remain a member. They identify three components of commitment: affective commitment (emotional attachment), continuance commitment (cost-based attachment), and normative commitment (sense of obligation). In inter-organizational relationships such as supply chains or farmer groups, commitment is often viewed as the extent to which partners are dedicated to sustaining a relationship and are willing to make short-term sacrifices to achieve long-term mutual benefits (Anderson & Weitz, 1992). Meyer and Allen (1990) noted, individuals may choose to remain in organizational relationships due to the perceived costs of withdrawal.

Empirical studies generally suggest that higher levels of commitment are associated with enhanced performance outcomes. Prodhan et al. (2022) and Hashemi et al. (2022) support the notion that increased commitment among organizational members correlate with improved operational outcomes. In sector-specific contexts, Uddin (2022) examined 178 pharmaceutical firms in Bangladesh, utilizing Resource-Based Theory and Resource Dependence Theory. The study, which employed structural equation modeling (SEM) with partial least squares (PLS), found a significant positive relationship between commitment and operational performance. Similarly, Luzzini et al. (2015), in a study involving 383 procurement executives, confirmed a positive linkage between commitment and operational performance using a Resource-Based View in upstream supply chain relationships. Additional evidence from the fishing industry (Prodhan et al., 2022) and non-profit sector (Hashemi et al., 2022) reinforces the positive influence of commitment on performance indicators such as delivery flexibility, responsiveness, and inventory cost reduction.

However, some studies report conflicting findings. Shin et al. (2019), using data from 423 suppliers and customers and drawing on Social Capital Theory and Resource Dependence Theory, found no significant direct relationship between commitment and operational performance. Similarly, Ramirez et al. (2021), studying the agri-food industry in Latin America, identified only a weak relationship between commitment and performance. These inconsistencies highlight the contextual nature of commitment and performance relationship and underscore the need for further research, particularly in underexplored sectors. Thus, this study investigates the following hypothesis in the context of downstream horticultural supply chains in Tanzania:

H_3: *Group commitment has positive relationship with operational performance of smallholder horticultural farmer's groups*.

Methodology

Research Design and Data Collection

This study used a positivist research philosophy because assumes reality is objective and can be measured through observable and quantifiable facts, emphasizing hypothesis testing and statistical analysis (Saunders et al., 2019). To align with the positivism philosophy, this study used deductive approach that relies on hypotheses development and testing with the use of research design strategy to obtain the outcomes for generalization. The deductive approach was used to test the theory through hypotheses testing in which survey strategy and explanatory cross-sectional research design was employed (Creswell, 2018 & Saunders, 2019

The survey design was employed as a strategy to capture real-life settings, using measurement items adapted from previous research on collaboration practices and operational performance (Creswell, 2018). Data were collected from smallholder horticultural farmer groups in Iringa, Mbeya, Njombe, and Songwe. A simple random sampling procedure was applied to minimize selection bias, while a proportional sampling approach ensured that all regions were adequately represented, giving each group an equal chance of being selected.

Since this study collected data on both collaboration practices (information sharing, resource sharing, and group commitment) and operational performance from the same respondents using a self-administered questionnaire, there was a potential risk of common method bias (CMB). To minimize this, procedural remedies were applied, including ensuring respondent anonymity, separating sections for independent and dependent variables, and varying the wording of questionnaire items. Additionally, Harman's single-factor test was conducted, and the results indicated that no single factor accounted for the majority of variance, suggesting that common method bias was not a significant concern in this study.

Measurement Variables

A semi-structured questionnaire was developed using previously validated measures. The literature review guided the identification of reliable and valid constructs, allowing for the adaptation of existing scales with minor modifications. The variables in this study were operationalized as follows:

For collaboration practices, the information sharing construct was adapted from Hung et al. (2011) and consists of four items measuring the sharing of information on changing needs, product prices, challenges, and solutions related to business operations. The resource sharing construct was adapted from Cao and Zhang (2011) and includes five items assessing the utilization of cross-organizational teams for planning and improvement, technical support, and the sharing of equipment, transport, and storage facilities. The commitment construct was adapted from Afshan et al. (2018) and Ramirez et al. (2021), with four items measuring members' willingness to invest effort into collaboration, maintain positive attitudes toward other groups, remain active members, allocate additional time to collaborative activities, and sustain long-term collaborative relationships. For operational performance, measurement variables were adapted from Hong et al. (2019), Aramyan et al. (2007), and Shou et al. (2018). After modifications, the construct included five items measuring quality, reliability, loss reduction, on-time delivery, and productivity. These items were used to capture the overall operational performance of smallholder horticultural farmer groups.

Sample Selection

The study identified a population of 356 registered smallholder horticultural farmer groups engaged in vegetable and fruit production, obtained from community-based, agricultural, and cooperative offices. Krejcie and Morgan's formula was used to determine the minimum required sample size. A total sample of 200 respondents was proportionally allocated to each region based on the number of smallholder horticultural farmer groups available, ensuring fair regional representation. Within each region, a simple random sampling technique was then applied to select the farmer groups included in the study. Questionnaires were administered accordingly. During data screening, five questionnaires were identified as invalid: two were excluded due to uniform responses across items, which could compromise result validity, and three were excluded due to missing responses. After data cleaning and coding, 195 correctly completed questionnaires were retained for analysis. The final sample distribution across regions was 53% for Iringa, 22% for Njombe, 17% for Mbeya, and 8% for Songwe. Overall, the study achieved a high valid response rate of 97.5%, indicating strong participation and data reliability.

Data Analysis

The developed conceptual model depicting the relationships between variables was tested using a quantitative research methodology. Data analysis was conducted using Smart-PLS version 4.0 employing structural equation modeling (SEM) techniques. Smart-PLS was selected due to its suitability for testing relationships with relatively small sample sizes (Jhantasana, 2023; Hair et al., 2021). Structural equation modelling (SEM) technique was used to assess construct validity and reliability, as well as to estimate the hypothesized relationships in the structural model (Hair, et al., 2021). The analysis was divided into two main stages. The first stage involved assessing the measurement model to evaluate construct reliability and validity. The second stage focused on analyzing the structural model, where bootstrapping was applied to estimate path coefficients and test the proposed hypotheses.

Findings

Measurement Model

First, the analysis started by verifying the measurement model before structural model. The verification of the measurement model was done by confirming the factors in the measurement model using construct reliability and validity. The internal consistency method was used to assess the reliability of the constructs using Cronbach's alpha and Composite Reliability (CR) scores. According to Hair, Hult, Ringle, and Sarstedt (2021), a reliability coefficient of 0.7 or higher is considered adequate, making 0.7 the critical threshold. Similarly, Fornell, Larcker, and Larcker (1981) recommended that the Average Variance Extracted (AVE) for a construct should be 0.5 or above.

The study results show that Cronbach's alpha and composite reliability score for all constructs are above 0.7 which show adequate reliability of the measurement scales (see table 2) which ranged from 0.841 to 0.982, which indicate strong internal reliability. The estimated construct loadings ranged from 0.731 to 0.911 and AVE was ranged from 0.653 to 0.792 greater than the required 0.5 as shown in table 1. This indicates that convergent validity conditions are satisfied for further analysis.

Table 1: Cronbach's Alpha (CA), Composite Reliability (CR) and Average Variance Extracted (AVE)

Factors	Measurement Indicators	Factor loadings	AVE
Information sharing	**ISH1:** We inform our fellow groups on the changing needs in the market	0.831	0.644
	ISH2: We share product price information with other groups	0.763	
	ISH3: We share solutions to face the challenges that affect our operations	0.812	
	ISH4: We share challenges that affect our business with other groups	0.803	
Resource sharing	**RSH1:** We use cross-organizational teams frequently in our operations	0.721	0.635
	RSH2: We share technical support with other groups	0.742	
	RSH3: We share equipment such as packaging materials with other groups	0.805	
	RSH4: We share transport facilities with other groups	0.841	
	RSH5: We share storage facilities with other groups	0.867	
Group commitment	**COM1:** We are willing to put more effort and invest in the relationship	0.911	0.792
	COM2: We want to remain a member of the group's network because we genuinely enjoy the relationship	0.891	
	COM3: We expect the relationship with group partner to continue for a long time	0.89	
	COM4: We have positive feelings toward the group partner as a major reason for group to continue working with it	0.868	
Operational performance	**OPP1:** There is an enhancement in quality performance	0.834	0.667
	OPP2: We supply reliable horticultural products	0.814	
	OPP3: There is significant decrease in postharvest losses	0.853	
	OPP4: There is an increase in good delivered on time	0.769	
	OPP5: We increase productivity gradually	0.81	

Source: Field data 2024

In assessing discriminant validity, both the square root of the Average Variance Extracted (AVE) and the cross-loading matrix are commonly used. Table 2 presents the results, showing that all constructs meet the requirements for discriminant validity. Specifically, the diagonal values of the constructs (square root of AVE) are greater than their corresponding off-diagonal values in both rows and columns, indicating that each construct shares more variance with its own indicators than with other constructs. This confirms that the constructs are distinct and measure separate concepts as intended.

Table 2: Discriminant validity - Fornell and Larcker Criterion (Correlation matrix and AVE square root)

Constructs	COM	ISH	RSH	OPP
COM	**0.890**			
ISH	0.512	**0.803**		
RSH	0.517	0.527	**0.797**	
OPP	0.692	0.723	0.756	**0.816**

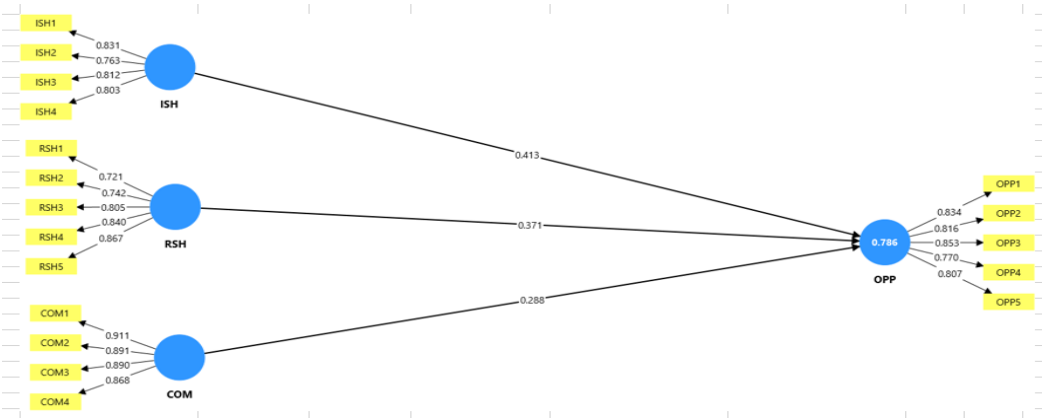
Source: Data analysis 2024

Note: The diagonal values in the table represent the square root of the Average Variance Extracted (AVE) for each construct, while the off-diagonal values indicate the correlations between constructs, including Commitment (COM), Information Sharing (ISH), and Resource Sharing (RSH). The bolded diagonal values specifically highlight the square roots of the AVE, which are used to assess discriminant validity.

Structural model for horizontal collaboration practices and operational performance

Figure 2 presents the structural model examining the relationships between horizontal collaboration practices and operational performance of smallholder horticultural farmer groups. The results indicate that all three collaboration practices have positive and statistically significant effects on operational performance. Overall, the structural model confirms the hypothesized relationships and supports the role of horizontal collaboration practices in enhancing performance, as visualized in Figure 2.

Figure 2: Structural model output



Source: Data analysis 2024

Hypothesis H_1 proposed that information sharing has a positive and significant relationship with operational performance among smallholder horticultural farmer groups. The results, presented in Table 3, reveal a significant positive effect ($\beta = 0.321$, $t = 3.819$, $p < 0.001$), supporting the alternative hypothesis H_1 and leading to the rejection of the null hypothesis. This indicates that a one standard deviation increase in information sharing is associated with a 0.321 standard deviation increase in operational performance**,** highlighting the importance of effective information exchange in improving operational outcomes.

Hypothesis H_2 examined the relationship between resource sharing and operational performance**.** The results, presented in Table 3, indicate a strong and statistically significant positive association ($\beta = 0.324$, $t = 6.117$, $p < 0.001$), supporting the alternative hypothesis H_2 and leading to the rejection of the null hypothesis. These findings suggest that a one standard deviation increase in resource sharing is associated with a 0.324 standard deviation increase in operational performance among horticultural smallholder farmer groups, highlighting the critical role of resource sharing in enhancing operational outcomes.

Hypothesis H_3 examined the impact of group commitment on operational performance. The results, presented in Table 3, indicate a positive and statistically significant relationship ($\beta = 0.123$, $t = 2.181$, $p = 0.029$), supporting the alternative hypothesis H_3 and leading to the rejection of the null hypothesis. Although the effect size is smaller compared to information sharing and resource sharing, the findings suggest that a one standard deviation increase in group commitment is associated with a 0.123 standard deviation increase in operational

performance, highlighting the meaningful contribution of commitment to enhancing operational outcomes.

Table 3: Hypothesis testing

	β -coefficient	S.E	T- statistics	P-values
H_1 ISH -> OPP	0.321	0.081	3.819	Supported
H_2 RSH -> OPP	0.324	0.053	6.117	Supported
H_3 COM -> OPP	0.123	0.059	2.181	Supported

Source: Field data 2024

Discussion

Information Sharing and Operational Performance

Hypothesis H_1 proposed a positive and significant relationship between information sharing and operational performance among smallholder horticultural farmer groups. The empirical results ($\beta = 0.321$, $t = 3.819$, $p < 0.001$) strongly support this hypothesis, confirming that information sharing has a significant direct effect on operational outcomes. Specifically, a one standard deviation increase in information sharing corresponds to a 0.321 standard deviation increase in operational performance, supported by a low standard error (0.081) and high t-value. Sharing information on changing needs, product price, challenges and solutions among smallholder horticultural farmer groups, thus emerges as a key driver of performance, with the measurement indicators demonstrating strong validity and reliability.

These findings are consistent with prior research that links information sharing to improved coordination and performance (Tang et al., 2023; García-Alcaraz et al., 2021; Jermsittiparsert et al., 2019; Shahbaz et al., 2018; Prodhan et al., 2022). While earlier studies have emphasized efficiency gains in industrial supply chains (Han & Huo, 2020) and productivity improvements in smallholder contexts (Ogutu et al., 2014), this study contributes by situating the discussion within smallholder horticultural farmer groups in Tanzania. Unlike prior work that largely focuses on vertical, formalized supply chains, this study highlights the role of information sharing in horizontal collaboration among smallholder horticultural farmer groups in a developing country context.

From the perspective of Social Exchange Theory (SET), the results suggest that smallholder horticultural farmer groups share information because they perceive relational benefits that outweigh potential costs. The findings provide empirical support for the SET suggestion that collaborative practices are sustained when actors expect and experience positive returns from their engagement. By demonstrating that information sharing associates with operational performance in resource-constrained horticultural supply chains, the study reinforces the theoretical argument that exchanges of information can yield tangible performance outcomes.

Resource Sharing and Operational Performance

Hypothesis H_2 proposed a positive and significant relationship between resource sharing and operational performance among smallholder horticultural farmer groups. The results confirm a significant relationship ($\beta = 0.324$, S.E. $= 0.053$, $t = 6.117$, $p < 0.001$), indicating that a one standard deviation increase in resource sharing corresponds to a 0.324 increase in operational performance. The low standard error and high t-value highlight the robustness and statistical significance of this finding (see Table 3).

These results align with prior studies showing that collective use of equipment, storage, transport, personnel, and knowledge enhances productivity and responsiveness (Zhao et al., 2023). While earlier research focused on broader agri-food systems or contexts with stronger institutional support, this study extends the discussion to Tanzanian smallholder horticultural farmer groups, demonstrating the value of resource sharing in resource-constrained environments.

From the perspective of Social Exchange Theory (SET), the findings indicate that smallholder horticultural farmer groups engage in resource sharing because it generates reciprocal benefits that enhance overall group performance. By pooling tangible resources (such as equipment, storage facilities, and transport) and intangible assets (including expertise, labor, time, and knowledge through cross-organizational teams and technical support), these groups are able to reduce individual costs while improving collective efficiency. This pattern of reciprocity aligns with SET's core principle that exchanges are sustained when members perceive that the benefits outweigh the costs.

This study contributes to knowledge by providing quantitative evidence of the relationship between resource sharing and operational performance, moving beyond qualitative findings in earlier studies. It confirms that both tangible and intangible resources jointly enhance.

performance among smallholder horticultural farmer groups, and in doing so, it validates SET's assertion that collaborative exchanges of resources material or non-material are instrumental in generating operational and relational value.

Group Commitment and Operational Performance

Hypothesis H_3 proposed a positive and significant relationship between group commitment and operational performance among smallholder horticultural farmer groups. The results confirm this relationship ($\beta = 0.123$, S.E. = 0.049, $t = 2.181$, $p = 0.029$), indicating that a one standard deviation increase in group commitment corresponds to a 0.123 increase in operational performance.

In this context, commitment reflects members' willingness to invest effort, maintain long-term membership, and sustain positive relational ties within their groups (Meyer & Allen, 1991). Such commitment indicates that smallholder horticultural farmers value the enduring benefits provided by collective networks. From the perspective of Social Exchange Theory (SET), these behaviors can be understood as relational investments: farmers commit to the group because they anticipate reciprocal benefits, such as shared labor, knowledge, and access to resources. The findings support prior research showing that commitment improves operational outcomes by reducing postharvest losses (Chagwiza et al., 2016) and sustaining cooperative behavior (Tsanos et al., 2014). This study extends the evidence to Tanzanian smallholder horticultural farmer groups, demonstrating that commitment fosters trust and reciprocity, which is critical in resource-constrained environments with high costs, postharvest losses, and limited market information.

Conclusion

This study examined the effect of horizontal collaboration practices on the operational performance of smallholder horticultural farmer groups in Tanzania. The findings demonstrate that all three collaboration practices positively and significantly have relationship with operational performance, though their impact varies. Resource sharing emerged as the strongest predictor, highlighting the critical role of pooled resources in addressing operational constraints, enhancing efficiency in resource-limited agricultural settings. Information sharing also contributed significantly, supporting coordinated decision-making and timely responses to market challenges. Group commitment, while statistically significant, exhibited a comparatively weaker effect, suggesting that relational exchanges alone may not immediately translate into operational gains without complementary tangible exchanges.

Grounded in Social Exchange Theory (SET), the study illustrates that the type of exchange mechanism matters and involved exchanges that provide immediate, practical benefits, such as resources and information, have a more pronounced effect on performance than purely relational exchanges, though the latter remains important for long-term collaboration. These insights have practical implications for cooperative leaders, extension officers, and policymakers: interventions should prioritize mechanisms that facilitate resource sharing and structured information exchange while nurturing commitment for sustainable group performance.

Recommendations and policy implications

This study addresses a critical knowledge gap by examining the relationship between horizontal collaboration practices and operational performance among smallholder horticultural farmer groups in developing country contexts. The findings demonstrate that collaboration practices specifically information sharing, resource sharing, and group commitment positively and significantly enhance operational performance in the horticultural supply chain. These results carry important practical and policy-oriented implications.

Theoretical Implications

This study adds to research on collaboration and performance in agriculture by applying Social Exchange Theory (SET) to smallholder horticultural farmer groups in developing countries. The results show that practical exchanges, like sharing resources and information, improve operational performance more than relational exchanges, such as group commitment. This means that in resource-limited settings, the type of exchanges versus relational is important. The study also shows that horizontal collaboration among smallholder farmer groups is a key driver of performance, providing real-world evidence of how reciprocal exchanges work in agriculture, not just in traditional business or organizational settings.

Practical Implications

For practice, smallholder horticultural farmer groups should prioritize resource and information sharing, as these have the greatest impact on operational performance.

Cooperatives and extension agencies can support this by providing structured platforms, including shared resources, digital systems, and training programs. Although group commitment has a smaller immediate effect, but long-term relationships remains important for sustainable performance.

Policymakers and training institutions should design programs that combine practical exchanges with relational collaboration, enabling smallholder farmer groups to pool resources, share knowledge, and maintain cooperative behavior. Such efforts also support broader development goals, including SDG 17 on partnerships and the FAO's objectives of reducing postharvest losses and improving supply chain efficiency.

Overall, this study contributes to theory and practice by empirically demonstrating how horizontal collaboration practices enhance operational performance in horticultural smallholder contexts, extending SET to a resource-constrained agricultural environment. Future research could explore the role of external factors, such as institutional support and market access in strengthening the effectiveness of collaborative practices.

Funding Statement

The study was supported by the Mbeya University of Science and Technology (MUST) and the Ministry of Science and Technology under HEET Project – Tanzania.

Acknowledgments

We would like to express our sincere gratitude to the Regional Commissioners of Iringa, Njombe, Mbeya, and Songwe for granting us permission to conduct this study within their respective regions. Their support and cooperation were influential to the successful completion of this research.

Declaration of Conflicting Interests

The authors declare no conflict of interest.

References

Abdul-Rahaman, A., & Abdulai, A. (2020). Social networks, rice value chain participation and market performance of smallholder farmers in Ghana. *African Development Review, 32*(2), 216–227. https://doi.org/10.1111/1467-8268.12429

Afshan, N., Chatterjee, S., & Chhetri, P. (2018). Impact of information technology and relational aspect on supply chain collaboration leading to financial performance: A study in Indian context. *Benchmarking: An International Journal, 25*(7), 2496–2511. https://doi.org/10.1108/BIJ-09-2016-0142

Anderson, E., & Weitz, B. (1992). The use of pledges to build and sustain commitment in distribution channels. *Journal of Marketing Research, 29*(1), 18–34. https://doi.org/10.1177/002224379202900103

Aramyan, L. H., Oude Lansink, A. G. J. M., Van der Vorst, J. G. A. J., & Van Kooten, O. (2007). Performance measurement in agri-food supply chains: A case study. *Supply Chain Management: An International Journal, 12*(4), 304–315. https://doi.org/10.1108/13598540710759826

Arora, A., Arora, A. S., & Sivakumar, K. (2016). Relationships among supply chain strategies, organizational performance, and technological and market turbulences. *The International Journal of Logistics Management, 27*(1), 206–232. https://doi.org/10.1108/IJLM-09-2013-0103

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Blau, P. M. (1964). *Exchange and power in social life.* New York, NY: John Wiley & Sons. https://doi.org/10.4324/9780203792643

Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management, 29*(3), 163–180. https://doi.org/10.1016/j.jom.2010.12.004

Cao, M., & Zhang, Q. (2013). Information sharing and collaborative advantage. *International Journal of Production Economics, 144*(1), 163–174. https://doi.org/10.1016/j.ijpe.2012.12.019

Chagwiza, C., Muradian, R., & Ruben, R. (2016). Cooperative membership and dairy performance. *Food Policy, 59*, 165–176. https://doi.org/10.1016/j.foodpol.2016.01.008

Chen, H., & Hu, H. (2020). Resource sharing and supply chain efficiency. *The International Journal of Logistics Management, 31*(3), 623–645. https://doi.org/10.1108/IJLM-10-2018-0274

Chen, J., Sohal, A. S., & Prajogo, D. I. (2017). Supply chain operational risk mitigation: A collaborative approach. *International Journal of Production Research, 55*(21), 6430–6446. https://doi.org/10.1080/00207543.2017.1330569

Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.

Cropanzano, R., & Mitchell, M. S. (2005). Social exchange theory: An interdisciplinary review. *Journal of Management, 31*(6), 874–900. https://doi.org/10.1177/0149206305279602

Dominguez, R., Cannella, S., Barbosa-Póvoa, A. P., & Framinan, J. M. (2018). OVAP: A strategy to implement partial information sharing among supply chain retailers. *Transportation Research Part E: Logistics and Transportation Review, 110*, 122–136. https://doi.org/10.1016/j.tre.2017.12.010

dos Santos, L. P., Schmidt, C. M., & Mithöfer, D. (2020). Impact of collective action membership on the economic, social and environmental performance of fruit and vegetable farmers in Toledo, Brazil. *Journal of Co-operative Organization and Management, 8*(1), 100107. https://doi.org/10.1016/j.jcom.2020.100107

Fornell, C., & Larcker, D. F. (1981). Structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50. https://doi.org/10.1177/002224378101800313

García-Alcaraz, J. L., Díaz-Reza, J. R., Montalvo, F. J. F., Jiménez-Macías, E., Blanco-Fernández, J., & Lardies, C. F. J. (2021). Effects of information sharing, decision synchronization and goal congruence on supply chain performance. *Computers & Industrial Engineering, 162*, 107744. https://doi.org/10.1016/j.cie.2021.107744

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2021). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). Sage Publications.

Han, Z., & Huo, B. (2020). The impact of green supply chain integration on sustainable performance. *Industrial Management & Data Systems, 120*(4), 657–674. https://doi.org/10.1108/IMDS-07-2019-0393

Hashemi, S. M., Handayanto, E., Masudin, I., Zulfikarijah, F., & Jihadi, M. (2022). The effect of supply chain integration, management commitment and supply chain challenges on non-profit organizations performance: Empirical evidence from Afghanistan. *Cogent Business & Management, 9*(1), 2143008. https://doi.org/10.1080/23311975.2022.2143008

Hong, J., Liao, S., Zhang, Y., & Yu, X. (2019). Operational performance measures in supply chain quality management. *International Journal of Production Economics, 212*, 227–235. https://doi.org/10.1016/j.ijpe.2019.02.010

Hosseinnezhad, D., Nugroho, Y. K., & Heavey, C. (2023). Horizontal collaboration between suppliers to mitigate supply chain disruption: A secure resource sharing strategy. *Computers & Industrial Engineering, 177*, 109088. https://doi.org/10.1016/j.cie.2023.109088

Huang, Z., & Liang, Q. (2018). Agricultural organizations and the role of farmer cooperatives in China since 1978: Past and future. *China Agricultural Economic Review, 10*(1), 48–64. https://doi.org/10.1108/CAER-10-2017-0192

Hung, W.-H., Ho, C.-F., Jou, J.-J., & Tai, Y.-M. (2011). Sharing information strategically in a supply chain: Antecedents, content and impact. *International Journal of Logistics: Research and Applications, 14*(2), 111–133. https://doi.org/10.1080/13675567.2010.549716

Huo, B., Haq, M. Z. U., & Gu, M. (2021). The impact of information sharing on supply chain learning and flexibility performance. *International Journal of Production Research, 59*(5), 1411–1434. https://doi.org/10.1080/00207543.2020.1753896

Jamili, N., van den Berg, P. L., & de Koster, R. (2025). The impact of resource sharing on the design of multi-client warehouses. *IISE Transactions, 57*(3), 336–350. https://doi.org/10.1080/24725854.2024.2312147

Jermsittiparsert, K., & Rungsrisawat, S. (2019). Supply chain management and information sharing as antecedents of operational performance: A case of SMEs. *Humanities & Social Sciences Reviews, 7*(2), 495–502. https://doi.org/10.18510/hssr.2019.7257

Jhantasana, C. (2023). Should a rule of thumb be used to calculate PLS-SEM sample size? *Asia Social Issues, 16*(5), e254658. https://doi.org/10.48048/asi.2023.254658

Leuschner, R., Rogers, D. S., & Charvet, F. F. (2013). A meta-analysis of supply chain collaboration. *Journal of Supply Chain Management, 49*(2), 34–57. https://doi.org/10.1111/jscm.12006

Liao, Y., Deschamps, F., Loures, E. de F. R., & Ramos, L. F. P. (2017). Past, present and future of Industry 4.0 - a systematic literature review and research agenda proposal. International Journal of Production Research, 55(12), 3609–3629. https://doi.org/10.1080/00207543.2017.1308576.

Luzzini, D., Brandon-Jones, E., Brandon-Jones, A., & Spina, G. (2015). From sustainability commitment to performance: The role of intra- and inter-firm collaborative capabilities in the upstream supply chain. *International Journal of Production Economics, 165*, 51–63. https://doi.org/10.1016/j.ijpe.2015.03.004

Ma, W., & Abdulai, A. (2016). Does cooperative membership improve household welfare? Evidence from apple farmers in China. *Food Policy, 58*, 94–102. https://doi.org/10.1016/j.foodpol.2015.12.002

Maghsoudi, A., & Pazirandeh, A. (2016). Visibility, resource sharing and performance in supply chain relationships: Insights from humanitarian practitioners. *Supply Chain Management: An International Journal, 21*(1), 125–139. https://doi.org/10.1108/SCM-02-2015-0062

Mashiloane, M. W., Mafini, C., & Pooe, R. D. I. (2018). Supply chain dynamism, information sharing, inter-organisational relationships and supply chain performance in the manufacturing sector. *Acta Commercii, 18*(1), Article a466. https://doi.org/10.4102/ac.v18i1.466

Meyer, J. P., & Allen, N. J. (1990). The measurement of commitment. *Journal of Occupational Psychology, 63*(1), 1–18. https://doi.org/10.1111/j.2044-8325.1990.tb00506.x

Meyer, J.P. & Allen, N.J. (1991). A three-component conceptualization of organizational commitment. Human Resource Management Review. 1 (1), 61-89. https://doi.org/10.1016/1053-4822(91)90011-Z.

Muhyi, H. A., & Raharja, S. U. J. (2025). Analysis of factors forming organisational commitment of cooperative management in Purwakarta Regency, Indonesia. *Review of Integrative Business and Economics Research, 14*(1), 223–236. Retrieved from https://buscompress.com/uploads/3/4/9/8/34980536/riber_14-1_14_b24-108_223-236.pdf

Mustapha, S. A., et al. (2022). The role of collaborative resource sharing in supply chain recovery during disruptions: A systematic literature review. *IEEE Access, 10*, 115610–115628. https://doi.org/10.1109/ACCESS.2022.3223174

Morgan, R. M., & Hunt, S. D. (1994). The commitment–trust theory of relationship marketing. *Journal of Marketing, 58*(3), 20–38. https://doi.org/10.1177/002224299405800302

Narrod, C., Roy, D., Okello, J., Avendaño, B., Rich, K., & Thorat, A. (2009). Public–private partnerships and collective action in high value fruit and vegetable supply chains. *Food Policy, 34*(1), 8–15. https://doi.org/10.1016/j.foodpol.2008.10.005

Nha Trang, N. T., Nguyen, T. T., Pham, H. V., Anh Cao, T. T., Trinh Thi, T. H., & Shahreki, J. (2022). Impacts of collaborative partnership on the performance of cold supply chains of agriculture and foods: A literature review. *Sustainability, 14*(11), 6462. https://doi.org/10.3390/su14116462

Ogutu, S. O., Okello, J. J., & Otieno, D. J. (2014). Impact of information and communication technology–based market information services on smallholder farm input use and productivity: The case of Kenya. *World Development, 64*, 311–321. https://doi.org/10.1016/j.worlddev.2014.06.011

Perez-Lopez, R. J., Olguin Tiznado, J. E., Mojarro Magana, M., Camargo Wilson, C., Lopez Barreras, J.& Garcia-Alcaraz, J. L. (2019). Information sharing with ICT in production systems and operational performance. Sustainability, 11(13), 3640

Pérez Mesa, J. C., & Galdeano-Gómez, E. (2015). Collaborative firms managing perishable products in a complex supply network: An empirical analysis of performance. *Supply Chain Management: An International Journal, 20*(2), 128–138. https://doi.org/10.1108/SCM-03-2014-0096

Prodhan M.H., Khan A., Palash S., Rahman T. (2022). Nature, extent, and causes of post-harvest losses at fisher and farmer level: An in-depth study. Aquaculture, 550 (1), 737856 https://doi.org/10.1016/j.aquaculture.2021.737856

Prodhan, M. M. H., Khan, M. A., Palash, M. S., Hossain, M. I., & Kumar, G. (2023). Supply chain performance of fishing industry in Bangladesh: Emphasizing information sharing and commitment. *Aquaculture Economics & Management, 27*(4), 523–543. https://doi.org/10.1080/13657305.2022.2083033

Raharja, S. U. J., & Muhyi, H. A. (2024). Effects of organisational competence and commitment on cooperative human resource performance: A study on cooperatives in Bandung City, Indonesia. *Review of Integrative Business and Economics Research, 13*(2), 176–196. Retrieved from https://buscompress.com/uploads/3/4/9/8/34980536/riber_13-2_11_k23-071_176-196.pdf

Ramirez, M. J., Roman, I. E., Ramos, E., & Patrucco, A. S. (2021). The value of supply chain integration in the Latin American agri-food industry: Trust, commitment and performance outcomes. *The International Journal of Logistics Management, 32*(1), 283–301. https://doi.org/10.1108/IJLM-03-2020-0134

Raweewan, M., & Ferrell, W. G. (2018). Information sharing and supply chain performance. *Computers & Industrial Engineering, 126*, 269–281. https://doi.org/10.1016/j.cie.2018.09.038

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research methods for business students (8th ed.). Pearson Education Limited

Seok, H., & Nof, S. Y. (2014). Collaborative capacity sharing among manufacturers on the same supply network horizontal layer for sustainable and balanced returns. *International Journal of Production Research, 52*(6), 1622–1643. https://doi.org/10.1080/00207543.2013.848482

Sezen, B. (2008). Design, integration, and information sharing in supply chain management. *Supply Chain Management: An International Journal, 13*(3), 233–240. https://doi.org/10.1108/13598540810871217

Shahbaz, M. S., Rasi, R. Z. R. M., Ahmad, M. B., & Sohu, S. (2018). The impact of supply chain collaboration on operational performance: Empirical evidence from manufacturing of Malaysia. *International Journal of Advanced and Applied Sciences, 5*(8), 64–71. https://doi.org/10.21833/ijaas.2018.08.009

Shou, Y., Li, Y., Park, Y., & Kang, M. (2018). Supply chain integration and operational performance: The contingency effects of production systems. *Journal of Purchasing and Supply Management, 24*(4), 352–360. https://doi.org/10.1016/j.pursup.2018.01.004

Shin, N., Park, S. H., & Park, S. (2019). Partnership-based supply chain collaboration: Impact on commitment, innovation, and firm performance. *Sustainability, 11*(2), 449. https://doi.org/10.3390/su11020449

Tarifa-Fernández, J., De Burgos-Jiménez, J., & Céspedes-Lorente, J. J. (2019). Supply chain integration and performance relationship: A moderating effects approach. *International Journal of Production Economics, 211*, 68–80. https://doi.org/10.1016/j.ijpe.2019.01.003

Tang, Y. M., Chau, K. Y., Ip, Y. K., & Ji, J. (2023). Impact of customer integration and information sharing on supply chain performance in community-based homestays in China. *Enterprise Information Systems, 17*(7), 2037161. https://doi.org/10.1080/17517575.2022.2037161

Tarekegn, K., & Kelem, F. (2022). Assessment of mango post-harvest losses along the value chain in the Gamo Zone, Southern Ethiopia. *International Journal of Fruit Science, 22*(1), 170–182. https://doi.org/10.1080/15538362.2021.2014047

Tsanos, C., Zografos, C., & Harrison, A. (2014). The effects of behavioural supply chain relationship antecedents on integration and performance. *The International Journal of Logistics Management, 25*(3), 497–514. https://doi.org/10.1108/IJLM-07-2012-0067

Uddin, M. B. (2022). The effect of strategic commitment and supply chain collaboration on operational and innovation performance. *IIMB Management Review, 34*(4), 364–377. https://doi.org/10.1016/j.iimb.2022.10.001

United Republic of Tanzania. (2018). *Agriculture Sector Development Programme Phase II (ASDP II) 2018–2027/28* [Government programme]. Prime Minister's Office. https://asdp.kilimo.go.tz/uploads/ASDP_II_-ENGLISH_VERSION_.pdf

Valashiya, M. C., & Luke, R. (2023). Enhancing supply chain information sharing with third-party logistics service providers. *The International Journal of Logistics Management, 34*(6), 1523–1542. https://doi.org/10.1108/IJLM-03-2022-0135

Verhofstadt, E. & Maertens, M. (2014). Smallholder cooperatives and agricultural performance in Rwanda: do organizational differences matter? Agricultural Economics, Agricultural Economics 45 (S1), 1–14. https://doi.org/10.1111/agec.12128.

Verhofstadt, E., & Maertens, M. (2015). Can agricultural cooperatives reduce poverty? Heterogeneous impact of cooperative membership on farmers' welfare in Rwanda. *Applied Economic Perspectives and Policy, 37*(1), 86–106. https://doi.org/10.1093/aepp/ppu021

Wang, Y., Zhang, J., Guan, X., Xu, M., Wang, Z., & Wang, H. (2021). Collaborative multiple centers fresh logistics distribution network optimization with resource sharing and temperature control constraints. *Expert Systems with Applications, 165*, 113838. https://doi.org/10.1016/j.eswa.2020.113838

Wu, I.-L., Chuang, C.-H., & Hsu, C.-H. (2014). Information sharing and collaborative behaviors in enabling supply chain performance: A social exchange perspective. *International Journal of Production Economics, 148*, 122–132. https://doi.org/10.1016/j.ijpe.2013.09.016

Yang, L., Huo, B., & Gu, M. (2022). The impact of information sharing on supply chain adaptability and operational performance. *The International Journal of Logistics Management, 33*(2), 590–619. https://doi.org/10.1108/IJLM-05-2020-0202

Yang, Z., Xiang, W., You, W., & Sun, L. (2021). The influence of distributed collaboration in design processes: an analysis of design activity on information, problem, and solution. International Journal of Technology and Design Education, 31, 587-609. https://doi.org/10.1007/s10798-020-09565-2.

Zelbst, P., Green, K. W., Jr., Sower, V. E., & Abshire, R. D. (2014). Impact of RFID and information sharing on JIT, TQM and operational performance. *Management Research Review, 37*(11), 970–989. https://doi.org/10.1108/MRR-07-2013-0161

Zhao, G., Liu, S., Elgueta, S., Manzur, J. P., & Lopez, C. (2023). Knowledge mobilization for agri-food supply chain decisions: Identification of knowledge boundaries and boundary-spanning mechanisms. *International Journal of Decision Support System Technology, 15*(2), 1–25. https://doi.org/10.4018/IJDSST.327977

Zhou, W., & Liang, X. (2018). Post-harvest losses reduction by small-scale farmers: The role of handling practices. *Food Policy, 77*, 103–115. https://doi.org/10.1016/j.foodpol.2018.04.004