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SMEs' SUPPLY CHAIN PERFORMANCE: THE ROLE OF COLLABORATION, CAPABILITIES AND INNOVATION

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Abstract. This study aims to assess supply chain performance in the context of SMEs including supply chain collaboration and capabilities, as well as innovation performance as the drivers and analyse the moderating role of knowledge sharing on the relationship between supply chain collaboration and innovation, as well as the collaboration and supply chain performances. The data were obtained from 179 SMEs involving 537 respondents in nine districts of Bali, Indonesia. Furthermore, a partial least square modelling was used to evaluate the proposed supply chain performance model. The present study generated three important findings; 1) supply chain collaboration has a significant effect on supply chain capability, innovation performance and supply chain performance, 2) innovation performance has no significant effect on supply chain performance, and 3) knowledge sharing acts as a moderating variable of the relationship between supply chain collaboration and innovation performance. By testing the research model conceptually and verifying it empirically, we contribute to the study of the relationship between collaboration and the capability of SMEs to generate innovation and supply chain performance.

Keywords: Supply chain collaboration, supply chain capabilities, innovation performance, supply chain performance, SMEs.

JEL Classification: O31, P17.

Introduction

The contemporary business environment shows that competition is no longer between organizations, but among supply chains (Jafari et al., 2021; Hu et al., 2020; Kähkönen et al., 2017; Iddris, 2016) to reduce various disturbances (Wieland & Wallenburg, 2013) and cost efficiency (Negi, 2021). This is the basis for making strategic changes and evaluating the collaboration structure in the supply chain to improve operational performance (Baah et al., 2021b; Huang et al., 2020). Although supply chain management has been extensively studied (Asamoah et al., 2021; Lim et al., 2017; Lin, 2017), the role of supply chain capabilities as an important trigger in SCM is still limited (Hong et al., 2019b). Therefore, organizations need to optimize potential resources to develop supply chain capabilities (Liao & Li, 2019; Aslam et al., 2020) and create competitive advantages (Tukamuhabwa et al., 2021). This capability can be improved by building collaboration (Liao & Kuo, 2014) either with buyers (Liu et al., 2020) suppliers, or even competitors (Kähkönen et al., 2017). Strengthening collaboration enhances supply chain capability improvement (Aslam et al., 2020; Yu et al., 2018) and innovation (Yunus, 2018; Arsawan et al., 2022), thereby, increasing supply chain performance (Nandi et al., 2020; do Canto et al., 2020). Despite the advantages mentioned above, collaboration causes high transaction costs (Schmidt & Wagner, 2019), hence, it is necessary to build an ecosystem that supports the relationship quality between members (Tsai & Hung, 2016; Jean et al., 2014).

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On the other hand, innovation performance which is considered to play an important role in the supply chain literature has not been sufficiently investigated (Hong et al., 2019a; Iddris, 2016). Studies should therefore be carried out to understand innovation in the supply chain context (Bravo et al., 2017; Zimmermann et al., 2016; Singhry, 2015). Apart from various examinations on innovation performance driven by supply chain capabilities, there has been no empirical study between collaboration and capabilities to build innovation performance (Liao & Li, 2019). Hence, it takes an integrated perspective to examine how both are determinants of innovation performance due to the need for empirical study in supply chains (Asree et al., 2018).

The literature showed that supply chain performance is complex and determined by several factors, such as collaboration (Liu et al., 2020; Mandal, 2017; Kähkönen et al., 2017), capability (Liao & Kuo, 2014; Brusset & Teller, 2017; Asamoah et al., 2021) and innovation performance which is the backbone of the SCP (Wang & Hu, 2017; Kähkönen et al., 2017). However, there is still a lack of insight into the mechanisms underlying the quality of relationships that affect innovation performance (Tsai & Hung, 2016), therefore, the role of moderation needs to be considered (Rungsithong et al., 2017). This will enrich the understanding of supply chain collaboration practices in building sustainability (Chen et al., 2017). This study aims to explore predictors of supply chain performance by including relevant variables, such as knowledge sharing, which has not been previously assessed. Knowledge sharing is a key element for collaboration between organizations, hence, the impact on innovation and supply chain performances will be stronger in the future.

1. Literature review

1.1. Stakeholder theory

The stakeholder concept is Freeman's (1984) idea that business organizations should focus on the interests of other stakeholders when making strategic decisions (Freeman et al., 2018). The theory states the relationship between business and communities, groups, as well as individuals who have a common goal and influence each other (Baah et al., 2021a). These relationships involve contacts, exchanges, and collaborations (Miles, 2017) to create value (Huge-Brodin et al., 2020), innovate, address inclusiveness, as well as the interrelation of relevant groups and individuals (Oruc & Sarikaya, 2011). The supply chain is relevant to the theory because it requires companies to interact with a variety of stakeholders.

Although some SCM studies utilized the theory as a theoretical background, its progress through SCM is still limited (Sarkis et al., 2011). Also, supply chain management has been examined and implemented by various industries around the world, such as hospitals (Mandal, 2017), logistics companies, textile industry (Lim et al., 2017), and manufacturing firms (Lin, 2017). In the SMEs' context, the role of supply chain management has received attention from scholars like Thakkar et al. (2008, 2009) and Singh et al. (2012). However, the companies are considered organizations that do not formally define or understand their competitive strategy (Thakkar et al., 2008), therefore, they need continuous improvement regarding product development (Lin & Chen, 2021), collaboration with supply chain members (Zaridis et al., 2021), and distribution capabilities for competitive advantage (Tukamuhabwa et al., 2021). This theory was utilized as a theoretical basis to examine the relationship between collaboration, capability, and supply chain performance.

1.2. Supply chain collaboration

Most studies define supply chain collaboration as a partnership process in which no less than two independent parties work together to orchestrate and carry out operations for the achievement of common goals or mutual benefit (Chen et al., 2017). Collaborating with manufacturers and suppliers is an important success factor for implementing supply chain management practices to improve business outcomes (Banchuen et al., 2017) and maintain sustainability (do Canto et al., 2020). This is important in managing external and internal processes, and consequently, the movement of products, services, organizational information, and capital will be more effective and efficient (Kumar et al., 2020).

1.3. Supply chain capabilities

According to Rajaguru and Matanda (2013), supply chain capabilities refer to an organization's ability to identify, use, or assimilate internal and external resources, as well as information to facilitate all supply chain activities (Liu et al., 2020). Previous studies categorized this capability in terms of efficiency and efficacy. Efficiency-related capabilities enable organizations to achieve logistics performance at lower costs (Lin & Chen, 2021), while efficacy-related capabilities allow relationships maintenance with partners and respond to consumer needs (Damert et al., 2021). Meanwhile, Peng et al. (2021) stated supply chain capabilities as logistics and customer service-oriented capabilities. This study conceptualized the capabilities as a second-order construction which is reflected by the dimensions of information exchange, integration, coordination, and responsiveness (Rajaguru & Matanda, 2019).

2. Research methods

2.1. Sampling procedure

This study has a population of 179 SMEs with a total of 537 respondents which include assistant and

operational managers who are assumed that the company leaders are strategic policymakers regarding supply chains and organizational policies. The pre-test was conducted by three expert academics and four Ph.D. students using a questionnaire consisting of 69 instrument items on a survey to improve its content and performance. Furthermore, a total of 30 SMEs were contacted to assist in the instrument trial. The survey package included a cover letter explaining the study purpose, a questionnaire, and envelopes stamped with return addresses distributed to the production managers of each participating company. The respondents were required to fill out the questionnaire and provide comments about the wording, understanding, and clarity of the items. The distribution of the questionnaire was conducted by manual delivery when visiting the company. The present study was conducted in January–October 2021. The types of SMEs participating in this study are divided into five fields, namely food SMEs with a total of 29 (16.2%), textile SMEs 35 (19.5%), wood craft SMEs 44 (24.6%), export SMEs 42 (23.5%), and tourism SMEs 29 (16.2%). The distribution of the questionnaire was conducted by manual delivery when visiting the company. The present study was conducted in January–October 2021. The types of SMEs participating in this study are divided into five fields, namely food SMEs with a total of 29 (16.2%), textile SMEs 35 (19.5%), wood craft SMEs 44 (24.6%), export SMEs 42 (23.5%), and tourism SMEs 29 (16.2%).

2.2. Measurement of variables

The variable was measured by adopting previous studies which used a Likert scale of 1–7 ("1-strongly disagreed – 7-strongly agreed") to collect responses. Supply chain collaboration was measured by four dimensions with a total of 16 indicators adopted from Chen et al. (2017). Also, the capability was measured by 4 dimensions with a total of 17 indicators adopted from Asamoah et al. (2021). The innovation performance was measured by 3 dimensions and a total of 9 indicators adopted from Hong et al. (2019a). Meanwhile, knowledge sharing was measured by two dimensions with a total of 13 indicators and supply chain performance by 3 dimensions with a total of 14 indicators.

3. Result

3.1. Respondent profiles

This study involved 537 respondents from 179 SMEs in Bali, Indonesia. To achieve the study objectives, questionnaires were distributed to operational and assistant managers, as well as main directors to obtain information on strategic policies related to supply chain management. The demographic information of the respondents is presented in Table 1.

Table 1 reveals that respondents have the greatest experience of 6–10 years with 33.7% indicating the need to build mature collaboration with stakeholders. Judging from age, it turns out that the age group of 25–30 and 31–35 dominates with 30.20% which proves that they are mature in making decisions regarding SCM, while the education level is dominated by bachelors with 91.60%. This has an impact on decision making. Research respondents are also dominated by women with 76.70, which indicates the important role of women in decision making. Meanwhile, when viewed from the level of positions, operational managers are in the highest position with 40.06% because they are in direct contact with SCM practices.

Table 1 Demographic facts

Sample descriptive (N = 537)		
Characteristics	Frequency	Percentage
Experiences		
<5	2	4.00
6–10	181	33.7
11–15	82	15.3
16–20	163	30.4
>20	109	20.3
Age		
<25	25	4.70
25–30	162	30.20
31–35	162	30.20
36–40	141	26.30
Educational Level		
Bachelor	492	91.60
Master	41	7.70
Doctor	4	0.70
Gender		
Male	125	23.30
Female	412	76.70
Level of positions		
Manager	121	22.54
Assistant Managers	201	37.40
Operational Managers	215	40.06

3.2. Outer model measurement

Table 2 showed the current model was based on 69 items from 5 main variables. The reliability of the model was measured by Cronbach's alpha (Hair Jr et al., 2016) to give a value of 0.7 which was considered appropriate (Hair et al., 2014). As described in Table 2, all Cronbach's alpha values were >0.7. The convergent validity of this model was assessed through composite reliability (CR) and average variance extract (AVE), while item reliability was obtained from each variable (loading factor) (Hair Jr et al., 2016). In accordance with the expert opinion, the CR and AVE

Table 2. Instrument reliability test

Variables	Items*	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Supply chain collaboration			1.000		
	Internal collaboration	0.786	0.837	0.874	0.700
	Collaboration with supplier	0.899	0.911	0.924	0.671
	Collaboration with customer	0.847	0.858	0.898	0.688
	Collaboration with competitors and others	0.837	0.841	0.902	0.755
Supply chain capabilities			1.000		
	Information exchange	0.832	0.956	0.893	0.704
	Integration	0.833	0,887	0.893	0.683
	Coordination	0.846	0,869	0.887	0.612
	Responsiveness	0.860	0.897	0.911	0.725
Innovation performance			1.000		
	Product innovation	0.856	0.864	0.912	0.776
	Process innovation	0.885	0.890	0.929	0.813
	Management innovation	0.888	0.889	0.930	0.816
Supply chain performance			1.000		
	Reliability	0.801	0.815	0.868	0.623
	Efficiency	0.870	0.897	0.914	0.731
	Flexibility	0.864	0.870	0.901	0.647
Knowledge sharing			1.000		
	Explicit	0.854	0.857	0.892	0.579
	Tacit	0.828	0.841	0.872	0.599

values should be >0.7 and >0.5. Table 2 confirmed that all the values maintained these criteria. Furthermore, the loading factors of all items at the individual level were also higher than 0.7.

To confirm the discriminant validity of this study, the HTMT criteria were used, where the value of the HTMT ratio should be <0.85 although, values up to 0.90 are acceptable (Hair Jr et al., 2016).

According to Table 3, all HTMT ratios were <0.85, which confirmed that the discriminant validity in this study model fulfilled the criteria.

Table 3. HTMT Heterotrait-Monotrait ratio (HTMT)

Constructs	SCCol	SCCap	IP
Supply chain collaboration			
Supply chain capabilities	0.534		
Innovation performance	0.485	0.354	
Supply chain performance	0.394	0.475	0.317

Notes: *SCCo – Supply chain collaboration, SCCs – supply chain capabilities, IP – innovation performance, SCP – supply chain performance.

3.3. Inner model measurement

The structural model check showed the Tenenhaus' goodness of fit index value by 0.482, meaning the model fitness was large (Tenenhaus et al., 2005). Furthermore, evaluating the normal fit index value (0.684) and standardized root mean square residual value (0.113) showed the model was fit. The R^2 check illustrated that supply chain capabilities and innovation performance was 0.311 (31.1%) of supply chain performance variance. Finally, all the Q^2 had a positive value, indicating that all variables showed a sound predictive of relevance (Chin et al., 2008).

The data analysis results showed 5 of the 6 direct relationship hypotheses were supported (Table 4). The relationship between supply chain collaboration and capabilities was significantly positive as proven by the path coefficient of 0.462 with a t-statistic of 11.363 greater than 1.96, therefore, hypothesis 1 is accepted. The relationship between supply chain collaboration and performance (β = 0.239, STDEV 0.041, T Statistics 4.429 > 1.96) was significantly positive, therefore, H2 is accepted. Furthermore, the relationship between supply chain collaboration and innovation performance (β = 0.187, STDEV 0.038, T Statistic 4.875 > 1.96) was significantly positive, hence, H3 is accepted. Supply chain capabilities and innovation performance (β = 0.300, STDEV 0.049, T Statistics 6.098 > 1.96) had a significant positive relationship, and, H4 is accepted.

The relationship between supply chain capabilities and performance (β = 0.230, STDEV 0.047, T Statistics

Table 4. Supply chain collaboration effect on capabilities, innovation, and supply chain performance

Constructs	Direct		Indirect		Total	
	β	t-value	β	t-value	β	t-value
Supply Chain Collaboration -> Supply Chain Capabilities	0.462	11.363	–	–	–	–
Supply Chain Collaboration -> Supply Chain Performance	0.239	4.429	0.106	4.250	0.345	5.882
Supply Chain Collaboration -> Innovation Performance	0.187	4.875	0.139	5.140	0.326	5.806
Supply Chain Capabilities-> Innovation Performance	0.300	6.098	–	–	–	–
Supply Chain Capabilities -> Supply Chain Performance	0.230	4.858	0.021	1.363	0.013	1.375
Innovation Performance -> Supply Chain Performance	0.071	1.433	–	–	–	–

4.858 > 1.96) was significantly positive, and H5 is accepted. Meanwhile, innovation and supply chain performance (β = 0.071, STDEV 0.050, T Statistics 1.433 < 1.96) were insignificant, hence, hypothesis 6 is rejected.

Conclusions

Based on the analysis result, the effect of supply chain collaboration on capabilities was significantly positive. This is consistent with previous studies that collaboration improves capabilities (Liao & Kuo, 2014) through resource integration among supply chain partners (Rajaguru & Matanda, 2019). Collaboration increases capabilities in the areas of procurement, planning, and sales targets (Chand et al., 2020). This is in line with previous studies (Mandal, 2017) that collaboration improves performance (Wang et al., 2015; Arvitrida et al., 2015), reduces transaction costs, and expands resources (Um & Kim, 2019; Chen et al., 2017). The relationship between supply chain capabilities and innovation performance was significantly positive. The analysis supports Hong et al. (2019a) that capability increases the acceleration of value creation and innovation (Kumar et al., 2020). Likewise, the relationship between supply chain capabilities and performance was significantly positive. This is in line with Asamoah et al. (2021) and Rajaguru and Matanda (2013) that capabilities assist organizations to identify, use, and assimilate internal or external resources, and also facilitate all activities to achieve sustainable performance (Yu et al., 2018; Mandal, 2017).

In the moderation test, knowledge sharing moderated the relationship between supply chain collaboration and innovation performance. This means that the relationship between collaboration and innovation is strengthened by knowledge sharing, which can be obtained from internal sources of the organization like employees or external sources, such as government agencies, consultants, universities, and research institutions. Organizational supply chain partners are considered important sources in the creation of new knowledge and learning. They also have important role in the innovation realization of organizations (Kumar et al., 2020) both incrementally and radically (Soosay et al., 2008). Meanwhile, in the relationship between supply chain collaboration and performance, knowledge sharing does not act as a moderating variable. This means the relationship cannot be strengthened by sharing knowledge with SMEs in Indonesia. However, this study contradicts (Attia & Essam Eldin, 2018) that sharing between supply chain members can accelerate the knowledge flow, increase supply chain efficiency and effectiveness, or enable organizations to respond quickly to changing customer needs.

Disclosure statement

The authors declare that there is no conflict of interest.

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