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The Impact Of Information Technology and Supply Chain Management On Firm's Operational Performance

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Abstract.*This research aims to determine the relationship between supply chain management and information technology on the operational performance of SMEs in Makassar. A quantitative approach was used in this research. A questionnaire survey was conducted to collect data from Makassar SMEs. Data was obtained directly from informants who were selected purposively, while respondents were selected randomly (Random Sampling). The selection of respondents was based on the assumption that the population was relatively homogeneous. The research results show that supply chain management and information technology have a positive and significant effect on the operational performance of SMEs in Makassar. Likewise, information technology has a positive and significant relationship to supply chain management.*

Keywords: *Supply chain management,Information technology,operational performance*

1. INTRODUCTION

Information has become the most important force needed by companies due to rapid change, technology, competition, and globalization. Information systems play an important strategic role in organizations. Information technology in many organizations supports the sustainability and growth of their businesses (Van Grembergen and De Haes, 2017). Information systems that shape and support a company's competitive strategy affect the speed and flexibility of decision-making and make it easier to adapt to environmental conditions. Globalization accelerates the development of new technologies so that every day there are new discoveries (Joensuu-Salo, Sorama, Viljamaa, & Varamäki, 2018; Oladimeji, Ebodaghe, & Shobayo, 2017).

Information technology has an important and effective role in fulfilling organizational goals (Stein et al., 2015; Navimipour and Soltani, 2016). In addition, information technology increases staff and organizational productivity and reduces employee bad behavior (Pierce et al., 2015). Information technology provides the infrastructure to support organizational-level development.

Changes in the business environment have caused companies to increasingly rely on information technology to achieve and maintain competitiveness, increase productivity, and achieve prosperity in today's dynamic market (Apulu, Latham, & Moreton, 2011; Yunis et al., 2018). However, although information technology has been widely adopted by organizations

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in various sectors, several survey reports have found that many companies fail to pass through the stages of the business life cycle (Amankwah-Amoah, 2018).

The role of information technology in supply chain management has been highlighted in the past, integrated information systems can improve a company's business performance in the supply chain (Gonzálvez-Gallego et al.. 2015). Information is important for maintaining long-term supplier relationships (Akrout et al., 2016; Teller et al., 2016; Kumar and Rahman, 2015). Most companies are increasingly implementing information technology systems, especially in supply chain management, to improve their performance in competitive global markets (Tseng, Wu, & Nguyen, 2011).

According to Prajogo and Olhager (2012), information technology plays a central role in SCM in the following aspects. First, information technology allows companies to increase the volume and complexity of information they need to communicate with their trading partners. Second, information technology allows companies to provide real-time supply chain information, including inventory levels, delivery status, and production planning and scheduling that allows companies to manage and control their supply chain activities. Third, information technology also facilitates the alignment of estimates and scheduling of operations between companies and suppliers, thereby enabling better inter-company coordination.

Supply chain management has emerged as a real field in providing several advanced strategies for organizations to establish lasting competitive advantage (Kaliani Sundram et al., 2016; Sari, 2015). SCM is known as a significant area of information technology innovation and investment (Ali et al., 2018; Patterson et al., 2003). Supply chain performance is improved by adopting information technology. Organizations in supply chains often adopt information technology due to institutional pressure exerted by supply chain partners (Lai et al., 2006; Martinez-Sanchez and Lahoz-Leo, 2018).

SCM has been seen as a key pillar of operations in improving overall organizational performance (Dehgani and Jafari Navimipour, 2019; Lambrechts et al., 2017). Supply chain processes are shifting to information technology-based business processes in conjunction with service-oriented integration. This is done to increase the flexibility of information technology-based applications on company networks (Mohammadi et al., 2018).

Company performance is influenced by information technology infrastructure through high-level business capabilities (Andrade and Doolin, 2016). Tarafdar and Qrunfleh, (2016) said that investment in information technology guarantees organizational performance. The goal of information technology infrastructure is to create and expand telecommunications networks and services, transmission, acquisition, and supply networks, multimedia

communications, data storage, portable prototyping, cryptographic and security technologies, and more (Luo and Bu, 2016).

Organizations improve performance with the rapid growth of information technology and networks in SCM. Information technology and networks can support company operations, unite long-distance relationships in supply chains, and increasingly connect companies with their customers (Barros et al., 2015). The operation of organizations has been influenced by advances in computer-based technology for more than 30 years (Paganetto, 2017).

At this stage, SMEs need to prioritize their capabilities in assessing technology needs related to optimal efficiency and productivity (Rahman et al., 2016). Previous research shows that the implementation of information technology among SMEs is slower than in large companies (Ntwoku, Negash, & Meso, 2017). According to Albar and Hoque (2017), the main obstacles to the implementation of information technology in SMEs include inadequate top management support, resistance to change, lack of innovation, lack of skilled labor, and the increasing digital divide between developing and developed countries.

Most MSMEs in Indonesia still run their businesses using traditional methods. It is a shame that the use of information technology among MSMEs is still very limited. There are several reasons for the lack of applications in this field. The main reason is that some MSMEs are still hesitant because they don't really understand this technology. Various studies show that the perception and behavior of using information technology are more influenced by the ignorance of small business actors regarding its functions and benefits (Basry & Sari, 2018).

In Makassar City, which is the capital of South Sulawesi Province, MSMEs operating in various industries have consistently recorded quite high growth in the last few years. Based on data from the Department of Cooperatives and SMEs in South Sulawesi Province, the number of MSME business units in South Sulawesi increased quite significantly from 2019 to 2021. In 2019 there were more than 940 thousand business units, then to around 1.2 million in 2020. and increase again to 1.5 million business units in 2021 (https://sindikatpost.com accessed on 20 July 2022).

However, behind this significant growth of MSMEs, there are of course several obstacles or problems that occur. One of the problems is that MSMEs in Makassar City still do not use information technology enough to run their businesses. Chairman of the Makassar City DPRD, Rudianto Lallo, believes that it is time for business people to be able to utilize information technology to manage their business. The reason is, currently there are still many MSMEs who are not aware of the benefits of technology (https://m.bisnis.com accessed January 2024). This research aims to determine the relationship between SCM and information

technology in improving the operational performance of SMEs in Makassar. Therefore, this research is expected to provide theoretical and practical contributions to support strategic plans in stimulating SMEs to increase company operational efficiency.

1.1 Supply Chain Management

SCM integrates all infrastructure, resources, processes, and events to create value for each entity (Marotta et al., 2018). SCM must be adopted by organizations as a medium to generate and support competitive benefits (Nair and Reed-Tsochas, 2019). SCM practices are a series of events and activities that occur within an organization to ensure effective value chain management (Truong et al., 2017; Toyin, 2012). SCM also acts as a means to minimize total costs while satisfactorily meeting service-level requirements (Marino et al., 2018; Zachariassen, 2008). SCM, thus, helps companies to allocate resources and produce products appropriately and proportionally (Oghazi et al., 2018; Agus and Hajinoor, 2012)

1.2 Information Technology

Information technology capabilities have been conceptualized as the organization and utilization of information technology resources, combined with additional resources and capabilities, to achieve organizational goals (Cassia, Costa, da Silva, & de Oliveira Neto, 2020; Nwankpa & Roumani, 2016). Information technology capability refers to the ability to utilize information technology resources and competencies, combined with other organizational resources and capabilities, to respond to a rapidly changing business environment (Bharadwaj, et al., 2000; Chakravarty et al., 2013).

This perspective emphasizes the need for companies to integrate information technology investments into broader organizational strategies to generate business value revenues (Benitez, Castillo, Llorens, & Braojos, 2018; Benitez, Chen, Teo, & Ajamieh, 2018). Tidd and Bessant (2010), argue that technology is the key to the success of SMEs, because they use technology to innovate, which provides a competitive advantage. A company's ability to develop and utilize new technologies, or information technology capabilities, for organizational processes leads to sustainable competitive advantage (Hsu, 2013; Agan, 2011; Tan et al., 2010; Daugherty et al., 2009; Byrd et al ., 2008; Rai et al., 2006). The successful implementation of information technology infrastructure is the beginning of better information technology capabilities (Bharadwaj, et al., 2000; Gunasekaran et al., 2017).

1.3 Company performance

Performance is the result of management and operation of the resulting system, providing information on how well internal and external resources are used. Performance measurement often emphasizes a process-oriented approach that focuses on assessing business

effectiveness and efficiency using a set of metrics (Henri, et al., 2004) and can be used to improve business operations (Gu et al., 2021; Martínez-Caro et al., 2020; Karimi & Walter, 2015). Measuring performance contributes to the planning and control cycle by providing data and feedback, as well as tracking strategy implementation (Mendonça & Andrade, 2018; Ravichandran, 2018).

Successful performance emerges from implementing actions that utilize internal and external resources (Liu, Li, & Li, 2019; Ravichandran, 2018; Auh & Menguc, 2005; Cho & Pucik, 2005). These actions include launching new products or services, implementing adaptive responses to competitors' actions, and resilience to defend against emerging legislative changes.

2. METHODOLOGY

The population in this research is all Small, and Medium Enterprises in Makassar. This research uses 12 indicators in the form of statement points in a questionnaire, therefore the minimum number of samples taken is 12 x 10 = 120. Hair et, al (2019) state that the sample size should be 100 or larger. The study used a quantitative research design and a semi-structured questionnaire to collect the necessary data. The questionnaire was prepared based on literature (Yu, 2012; Babin & Carr, 2010; Mugenda & Mugenda, 1999). The research model was verified using PLS (Hair et al., 2019). PLS was chosen primarily because this research uses a reflective measurement model, and this research model has multiple independent dependent relationships (Sheko and Spaho, 2018). All questionnaires use a five-point Likert-type scale where 1 = strongly disagree, 3 = neither agree nor disagree and 5 = strongly agree (Zareie and Navimipour, 2016).

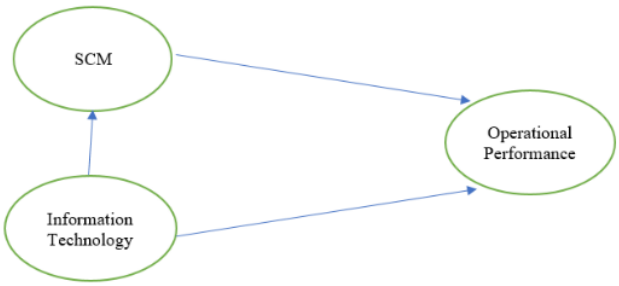

Figure 2.1 Conceptual framework

3. RESULTS AND DISCUSSION

Convergent validity is carried out through the average variance extracted (AVE), which must pass a minimum standard level of 0.5 (Fornell and Larcker, 1981; Harrigan et al., 2017). Based on table 1, shows that the research model is supported because it meets the requirements.

Table 3.1 Convergent validity

	Average Variance Extracted (AVE)
Operational Performance	0.587
SCM	0.589
Information Technology	0.703

The discriminant validity test is a stage carried out to find out whether the variables or indicators in the research we are conducting have unique values and are only related to the variables or indicators themselves and not to variables or indicators outside of what is expected or represented. Based on Table 2, it shows that the discriminant validity of the measurement model is met (Henseler, Ringle, & Sarstedt, 2015).

Table 3.2 Discriminant Validity

	Operational Performance	SCM	Information Technology
Operational Performance	0.766		
SCM	0.537	0.767	
Information Technology	0.755	0.397	0.838

The reliability test is measured using two methods, namely Cronbach's alpha and composite reliability. A construct (variable) can be said to be reliable if Cronbach's alpha value is above > 0.6 and composite reliability is above > 0.7. Based on the research results, it shows that Cronbach Alpha for all variables is more than 0.6. Therefore, the variables and items are valid (Shin and Biocca, 2017).

Table 3.3 Construct Reliability

	Cronbach's Alpha	Composite Reliability
Operational Performance	0.825	0.876
SCM	0.825	0.875
Information Technology	0.935	0.949

3.1 Measurement Model Analysis

The dependent variable in the PLS structural model is evaluated using the R-Square value, for the independent variable by looking at the path coefficient value. Meanwhile, the P-

value value of each path is used to assess significance. The structural model (Inner Model) in this research can be seen in the following picture:

The significance of the prediction model in the PLS structural model can be seen from the P-value between the independent variable and the dependent variable which is listed in the following path coefficient table:

Table 3.4 Results of hypotheses testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
SCM-> Operational Performance	0.281	0.281	0.071	3.942	0.000
Teknologi Informasi -> Operational Performance	0.643	0.647	0.056	11.418	0.000
Teknologi Informasi -> SCM	0.397	0.405	0.079	5.026	0.000

To evaluate the PLS model by looking at the R-square value of each dependent latent variable. The following table shows the results of estimating the R-Square value using SmartPLS analysis. R Square is also used to assess the model's ability to explain the variance of the dependent variable (Wang and Huang, 2012; Liu and Huang, 2015).

Table 3.5 R^2 and R^2 adjusted

	R Square	R Square Adjusted
Operational Performance	0.637	0.631
SCM	0.158	0.151

3.2 The Influence of Supply Chain Management on Operational Performance

Based on the research results show that supply chain management has a positive and significant effect on the operational performance of MSMEs in Makassar. This proves that SCM is becoming increasingly important in business operations and MSMEs are important actors in the business supply chain. Improving operational performance, through measures such as improving cycle performance and reducing costs, has been identified as one of the important goals of implementing SCM. Harrison and New (2002) found that two of the four management priorities in terms of supply chain performance are order cycle time reduction and inventory cost reduction. Additionally, reducing shipping costs and serving costs is also an important operational goal.

The results of this research also inform that SMEs in Makassar have optimized the implementation of supply chain management by implementing effective human resource

management practices and building the integrative mechanisms needed to coordinate suppliers and customers in the existing system. SCM has become a cooperative practice with responsive and flexible characteristics (Rezaei et al., 2018; Gunasekaran et al., 2008). This cooperative approach helps companies meet changing customer needs by maximizing the efficiency of the entire supply chain, thereby helping to achieve maximum operational performance (Thai and Jie, 2018; Tolossa et al., 2013). The results of this research are in line with what was done by Wahyudi et al., 2023; Kitchot et al., 2020; Sharma & Modgil, 2020; Thai and Jie, 2018; Gandhi et al., 2017; Truong et al., 2017; Ince et al., 2013; Ou et al., 2010)

3.3 The Influence of Information Technology on Operational Performance

Based on the data results show that information technology has a positive and significant effect on the operational performance of SMEs in Makassar. This identifies that companies with strong information technology capabilities will be better able to manage the trade-off between exploration and exploitation, which is the essence of organizational ambidexterity.

The result of the emergence of virtual organizations is a dramatic reduction in costs and increased efficiency in conducting business activities as well as increased company performance and customer service levels. The application of information technology is a driving factor for companies to detect and appropriately react to market opportunities and challenges. To understand the complexity of market changes, companies must process large amounts of data using information technology for proper organization and analysis (Chakravarty et al., 2013; Gu et al., 2021).

Managers must develop their information technology capabilities since employing information technology effectively is their most powerful tool for managing market pressures and expectations. The study found that information technology capabilities play an important role in shaping organizational ambidexterity and resilience, which in turn has a positive impact on gig companies. Specifically, this research Additionally, information technology capabilities also contribute to organizational resilience by enabling businesses to adapt and respond quickly to changes in the business environment.

The important role of information technology capabilities in SME operations has been confirmed and attracted much theoretical and experimental attention (Bustinza et al., 2019; Chakravarty et al., 2013; Lu & Ramamurthy, 2011), and found that the importance of information technology capabilities is greater than previously estimated. This study confirms that information technology capability has a direct influence on company performance and is

in line with previous research (Trieu et al., 2023; Bustinza et al., 2019; Chakravarty et al., 2013; Oh et al., 2012; Kalkan et al., 2012; ., 2011; Liang et al., 2010).

3.4 The Influence of Information Technology on Supply Chain Management

The research results show that information technology has a positive and significant relationship to supply chain management. This suggests that By incorporating information technology into supply chain systems, organizations can leverage specific channel assets through effective information exchange and better coordination with supply chain partners. One of the advantages of information

compared to competitors is the company's supply chain capabilities through access to knowledge and resource integration. The company's response to market changes is faster than competitors due to increased information technology-based supply chain capabilities.

Integration of supply chain activities with the technology used to carry out those activities. In this case, organizations need to coordinate the adoption and implementation of supply chain and e-commerce technologies. Otherwise, it is not only impossible to penetrate new markets but also unable to maintain market share. Because it is important for MSMEs in Makassar to understand and practice the use of technology in every series of business then also accepting information technology and its efficient application can improve cooperation between supply chain members through the fast transfer and distribution of accurate information and the use of information systems.

The use of information technology has resulted in widespread transformation in administrative and information systems, enabling the electronic transmission of data, documents, and communications via computer and telecommunications channels (Dutta et al., 2015). Information technology also increases an organization's ability to increase product diversity and improve quality and customer satisfaction as well as SCM system agility (Vangala et al., 2017). The research is also in line with Jiang et al., 2019; Zeraati et al., 2019; Thöni & Tjoa, 2017; Okano & Marins, 2014; Ye & Wang, 2013).

4. CONCLUSIONS AND SUGGESTIONS

Conclusion

Based on the results of the research discussion that has been carried out, it can be concluded that:

1. Supply chain management has a positive and significant effect on the operational performance of SMEs in Makassar. This means that the better the implementation of SCM, the greater the operational performance of SMEs in Makassar.

2. Information technology has a positive and significant effect on the operational performance of SMEs in Makassar. This indicates that the better the use of information technology, the better the operational performance of SMEs in Makassar.
3. Information technology has a positive and significant effect on supply chain management. This shows that the more efficient and effective the application of information technology, the better the SCM process will be for SMEs in Makassar.

Suggestions

Suggestions that can be given are as follows

1. Respondent errors were discovered due to the design of the questionnaire, and care was taken to minimize response errors by conducting pre-testing sessions in person at a retail company in Makassar.
2. Research should conduct a longitudinal research design to establish empirical causality between SCM, IT and operational performance.
3. Operational performance may be influenced by various other internal and external variables that are not taken into account in this research. So it is necessary to test and consider these variables.

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