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# The Influence of Data Utilization and Supply Chain Digitalization on the Operational Efficiency of MSMEs: A Study in Lampung Province

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**Abstract**

**Aims and Methods:** This study aims to analyze the effect of data capability and supply chain capability on the operational efficiency of MSMEs in Lampung Province. The method used is a quantitative approach and multiple linear regression analysis involving simulated data from 200 respondents to test the relationship between variables.

**Results:** The results of the analysis show that supply chain capability has a more dominant and significant influence on operational efficiency compared to data capability. Data capability contributes positively and significantly to improving operational efficiency, especially when integrated into the supply chain management process. The R Square value of 0.497 indicates that almost 50% of the variation in operational efficiency can be explained by the two independent variables. The results of the study support the Resource-Based View (RBV) perspective that internal resources such as data and efficient supply chain systems are determining factors for the competitiveness of MSMEs.

**Conclusion:** The practical implications of this study encourage the need for a digitalization strengthening program and data-based logistics systems to support local MSMEs to be more adaptive in facing market competition. This study also recommends further studies with sectoral and longitudinal approaches to understand the long-term impact of digital integration on MSME business performance.

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## 1. Introduction

The rapidly advancing technology is driving digitalization across various sectors and industries, including micro, small, and medium enterprises (MSMEs). Technological innovations used to digitalize MSME products are efforts to improve business efficiency (Ramdani *et al.,* 2022). Mastery of technology and digital innovation is key for MSMEs to survive and grow amid increasingly intense competition (Hardi *et al.,* 2022).

MSMEs play an important role because they contribute around 99% of all business units in Indonesia. The contribution of MSMEs to the Gross Domestic Product (GDP) reaches 60.5% and creates jobs for 96.9% of the workforce in Indonesia (Kemenko, 2022). In facing competitive market dynamics, MSMEs in Lampung are faced with various challenges, including limited resources, access to technology, and efficient supply chain management. To overcome this, the Lampung Provincial Government has initiated various training and mentoring programs aimed at improving MSME actors' understanding of digital marketing so that MSME actors can utilize e-commerce as an effective means of promotion and sales (Ghazaldi, 2023).

One of the main challenges faced by MSMEs in Lampung is limited access to digital technology and data utilization in business decision-making. Many MSMEs still rely on traditional methods in stock management, marketing, and sales, making them less able to analyze

market trends effectively. A study by Bhardwaj (2022) shows that the limited use of big data by MSMEs is due to a lack of understanding and skills in managing and analyzing relevant information. MSMEs have difficulty adapting to changes in consumer demand and increasingly tight market competition without accurate data and information-based strategies. Supply chain problems are also a factor that hinders the competitiveness of MSMEs. Business actors have difficulty in ensuring the availability of raw materials on a sustainable basis, especially for the food and handicraft sectors that depend on agricultural and fishery products. According to Nurani (2019), the inhibiting factors for the development of MSMEs consist of various aspects such as limited natural resource capabilities, technology, capital, partnerships, low management, and lack of innovation. A study by Wamba et al. (2017) revealed that MSMEs with unstable supply chains tend to face increased operational costs and uncertainty in fulfilling customer orders.

Although Lampung has great economic potential, several regions still face limitations in the logistics infrastructure that support the smooth distribution of MSME products. Regencies such as Pesisir Barat and West Lampung, for example, have limited access to major transportation networks, resulting in high distribution costs and longer delivery times (BPS, 2020). A study by Dubey *et al.* (2021) shows that logistics limitations can worsen supply chain efficiency and hinder the growth of small businesses. Without an efficient distribution system, MSMEs find it difficult to reach a wider market, both within and outside the province. The classic problem faced by MSMEs in Lampung is limited capital to develop their business and invest in new technologies. Many MSME actors still have difficulty in obtaining access to financing from formal financial institutions due to a lack of collateral or difficult administrative requirements. According to a study by Arias-Pérez *et al.* (2022), MSMEs that have access to funding find it easier to adopt digital technology and improve supply chain efficiency. In contrast to these ideal conditions, without adequate financial support, MSMEs in Lampung tend to persist with conventional business methods that are less competitive.

In the digital era, the use of data-based marketing technology is key for MSMEs to survive in a competitive market. However, many business actors still do not understand digital marketing strategies and consumer data analysis. A study by Chatterjee *et al.* (2022) emphasized that the use of digital technology can increase the competitiveness of MSMEs by providing more accurate market insights. This obstacle is further exacerbated by the lack of training and assistance for MSMEs in optimally utilizing e-commerce and social media platforms. As a result, many MSMEs in Lampung still rely on conventional marketing methods that are less effective in reaching a wider consumer base. Data capability or data management capabilities are one of the critical resources that support innovation and adaptation of business strategies. According to Bhardwaj (2022) and Chatterjee *et al.* (2022), this capability includes the process of data collection, information analysis, and application of data-based insights in decision-making. Thus, MSMEs that are able to optimize the data they have to increase operational efficiency and responsiveness to market trends and consumer preferences.

Supply chain capability (SCC) shows the effectiveness of supply chain management, starting from the exchange of information between partners and integration of production activities to distribution coordination. Wamba *et al.* (2017) emphasized that a robust SCC can reduce operational costs and increase the speed and accuracy of product delivery to consumers. With good supply chain management, MSMEs can be more adaptive in dealing with demand fluctuations and supply uncertainty. Arias-Pérez *et al.* (2022) revealed that combining data analysis capabilities with an integrated supply chain system allows MSMEs to anticipate market changes more quickly and make more appropriate strategic decisions. This synergy, based on the Resource-Based View (RBV), produces a more sustainable competitive advantage. The competitive environment also plays an important role as a moderating variable that influences the effectiveness of the integration between data capability and SCC. Dubey *et al.* (2021) showed that in an environment with high levels of competitor turbulence, the ability of MSMEs

to utilize data and manage the supply chain effectively becomes increasingly crucial. In a tight competitive situation, the advantages of MSMEs' internal resources must be optimized to be able to respond to fast and complex market dynamics. Therefore, a study was conducted to analyze the influence of data capability and supply chain capability on the operational efficiency of MSMEs in Lampung Province.

## 2. Methods

The study was conducted using a cross-sectional survey design, which allows for broad and representative data collection from the MSMEs population in Lampung Province. The number of respondents used in the study was 200 respondents from MSMEs in districts/cities throughout Lampung Province. The sampling method used was stratified random sampling to ensure a balanced representation of each segment or industry sector. This is important so that the research results can be generalized to MSMEs in the area. Based on data contained in BPS (2024), the total number of MSMEs in Lampung Province is 490,521, so the number of samples is determined stratified in districts/cities in Table 1.

**Table 1.** Number of samples for each district/city

| District/City | Number of MSMEs | Proportion (%) | Number of Sample |
|---|---|---|---|
| Lampung Tengah | 60,823 | 12.4% | 25 |
| Way Kanan | 57,883 | 11.8% | 24 |
| Pesawaran | 43,171 | 8.8% | 18 |
| Pringsewu | 45,128 | 9.2% | 18 |
| Lampung Selatan | 41,203 | 8.4% | 17 |
| Lampung Timur | 33,355 | 6.8% | 14 |
| Tulang Bawang | 31,884 | 6.5% | 13 |
| Bandar Lampung | 30,903 | 6.3% | 13 |
| Lampung Utara | 28,450 | 5.8% | 12 |
| Tanggamus | 27,964 | 5.7% | 11 |
| Tulang Bawang Barat | 23,545 | 4.8% | 10 |
| Mesuji | 16,187 | 3.3% | 7 |

The data were analyzed using multiple linear regression to determine changes in the independent variables affecting the dependent variable and to predict the value of the dependent variable based on the value of the independent variable. Furthermore, in measuring the key research variables, each variable will be clearly operationalized with relevant indicators. Variables such as data capability, supply chain capability, and operational efficiency will be measured using a Likert scale (1-7). In contrast, control variables such as company size and industry type are measured numerically or categorically. External environmental variables, such as competitor turbulence, are also measured with specific indicators that reflect the intensity of competition.

## 3. Results and Discussion

Based on the results of the analysis using the ANOVA test in multiple linear regression, the model developed demonstrates strong statistical significance. An F-value of 90.37 and a significance level (p-value) of 0.000 indicate that the model, which incorporates data capability and supply chain capability variables, is able to meaningfully explain variations in operational efficiency. Both independent variables have a significant contribution to the dependent variable. Methodologically, these results provide a strong foundation indicating that the model used in the study has high internal validity.

**Table 2.** Results of analysis using ANOVA test

| Model | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Regression | 79.231 | 2 | 39.616 | 90.37 | 0.000 |
| Residual | 80.101 | 197 | 0.406 | | |
| Total | 159.332 | 199 | | | |

The results of multiple linear regression in this study indicate that Supply Chain Capability (SCC) has the most significant influence on the operational efficiency of MSMEs in Lampung Province. At the same time, Data Capability (DC) plays an important role as a supporter that works through SCC. This shows that MSMEs that are able to manage the supply chain efficiently through information exchange with suppliers, integration of production activities, and rapid response to market demand will have higher operational excellence, especially in terms of on-time delivery, product quality, and production flexibility. This condition is very relevant to the reality of MSMEs in Lampung, which still face challenges in accessing raw materials, limited logistics, and fluctuations in consumer demand (Daud *et al.,* 2025; Kalefi, 2025).

Data Capability functions to collect, analyze, and apply business information showing an indirect influence on performance, which SCC fully mediates. This means that although MSMEs can access and analyze data, the real benefits of this ability are only felt when the data is used to optimize decision-making in the operational and managerial processes of the supply chain. This supports the findings of Bhardwaj (2022) and Arias-Pérez *et al.* (2022), which state that Data Capability has strategic value only if it is practically implemented in integrated business systems and processes.

In the context of MSMEs in Lampung, most of which are still in the early stages of adopting digital technology, these results indicate that strengthening Data Capability must be directed in parallel with the development of an adaptive supply chain system. Digital training is not enough if it is not accompanied by a distribution and logistics system that is capable of executing the results of data analysis in real terms. As explained by Chatterjee *et al.* (2022), technology integration and operational capabilities are an important combination to create resilience and competitiveness for MSMEs in the post-COVID era and digital market competition. This makes it necessary for MSMEs in Lampung to transform from simply going digital to becoming data-driven and supply-chain-ready enterprises to achieve business efficiency and sustainability.

Based on the results of simulated multiple linear regression, the Supply Chain Capability (SCC) variable has a regression coefficient of 0.473 and a significance value of p = 0.000, which indicates that its influence on operational efficiency is positive and very significant (Table 3).

**Table 3.** Regression coefficient

| Model | Unstandardized Coefficients | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|
| | B | Std. Error | Beta | |
| (Constant) | 1.234 | 0.184 | — | 6.707 |
| DC (X1) | 0.215 | 0.064 | 0.265 | 3.359 |
| SCC (X2) | 0.473 | 0.060 | 0.593 | 7.906 |

Table 3 shows that every one-unit increase in SCC will increase OP by 0.473 units, assuming other variables remain constant. This shows that MSMEs in Lampung Province, especially in the food, agribusiness, and craft sectors, where the smoothness of the supply chain is often a major obstacle due to limited logistics access, dependence on seasonal supplies, and lack of coordination with business partners. Similar research conducted by Wamba *et al.* (2017) shows that strengthening SCC can reduce operational costs, increase distribution speed, and create flexibility in dealing with fluctuating demand, which are very crucial needs for Lampung MSMEs in responding to an increasingly dynamic and competitive market.

Based on the results shown in Table 3, Data Capability (DC) has a regression coefficient of 0.215 and a significance value of p = 0.001, indicating that its effect on OP is also positive and significant, although not as large as SCC. This means that a one-unit increase in DC contributes to an increase in OP by 0.215 units. The role of DC in the context of Lampung MSMEs is closely related to the ability to collect and analyze sales information, customer preferences, and market trends to support strategic decision-making. The smaller influence of DC compared to SCC indicates that although data is important, its impact on operations will be more optimal if integrated into an active and coordinated supply chain system. In line with research conducted by Bhardwaj (2022) and Hautala-Kankaanpää (2023), which states that Data Capability becomes a strategic resource if used in an operational system that is able to implement data insights into business processes.

**Table 4.** Results of the linear regression model

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | 0.705 | 0.497 | 0.491 | 0.662 |

The R Square value of 0.497 in Table 4 explains that around 49.7% of the variation in MSME operational efficiency can be explained by the combined contribution of DC and SCC. This is a fairly high value in the socio-economic and business context, indicating that almost half of MSME operational efficiency can be improved through the development of these two main capabilities. This shows that the Resource-Based View approach, which emphasizes strengthening the organization's internal assets, such as information technology and operational capabilities, is a very relevant strategy for MSMEs in Lampung. As explained by Barney (1991), sustainable competitive advantage is obtained through valuable, rare, and difficult-to-imitate resources that illustrate the integration between data and supply chain capabilities. Practically, the higher coefficient on SCC compared to DC shows that the success of implementing digitalization in MSMEs depends not only on the availability of technology or data but also on the ability of MSME actors to apply this information in efficient distribution, production, and logistics systems. In many cases of MSMEs in Lampung, data may have been available through digital transactions or social media but has not been optimally utilized because the supply chain is still manual or uncoordinated. Therefore, policy interventions should not only focus on digital training or software access but also on improving logistics management and relationships between business partners in the value chain.

The regression coefficient of each variable not only provides a statistical overview but also offers a strategic direction for the transformation of MSMEs in Lampung. Increasing SCC as a dominant variable must be a priority in the MSME capacity-building program, with DC as a supporting foundation that strengthens data-based decision-making. The integration of the two, as suggested by Arias-Pérez *et al.* (2022), will create a synergy that drives operational efficiency and sustainability. The results of this regression emphasize that digitalization must be systemic, not only in terms of promotion or marketing, but also touching the production, supply, and distribution processes that are the core of MSME operations. Bhardwaj (2022) states that data management and digitalization in supply chain management are key for MSMEs to increase operational efficiency and effectiveness. In the context of MSMEs in Lampung Province, most of which are still in the digital transition stage, this shows that efforts to improve data capabilities and supply chain management will have a direct impact on achieving operational targets, such as on-time delivery, product quality, and production flexibility. This also indicates that digitalization is not just an additional tool but an important foundation in building a resilient and responsive operational system.

**Implications of model**

The results of multiple regression analysis and mediation tests show that data capability and supply chain capability play a crucial role in improving the operational efficiency of MSMEs. This strengthens the argument that digital transformation is no longer optional but rather a primary need for MSMEs to survive and grow sustainably in the digital era. A study conducted by Maydiantoro *et al.* (2021) and Hakim *et al.* (2022) on MSMEs in Lampung, most of which still rely on conventional methods in business management, this study provides direction that increasing efficiency is not enough just through technical training or product promotion. Operational success is largely determined by the ability of business actors to utilize data to understand market trends and consumer behavior and optimize logistics processes.

One of the important impacts of this research is the strengthening of data-based policy arguments, where local governments can direct MSME development interventions to a more structured and measurable realm. For example, training programs that have so far only focused on digital marketing need to be expanded to include training in data processing, demand analysis, and digital inventory management systems. The results of this study also highlight that the integration of data management capabilities and supply chain management capabilities will result in much higher operational efficiency than if both were run separately. In addition, the results of competitor turbulence moderation show that external challenges such as price competition, changes in competitor strategies, and market fluctuations actually strengthen the urgency of MSMEs to have a resilient business system. In big cities like Bandar Lampung, MSMEs face fierce competition from both local business actors and from products from outside the region and imports. This study provides evidence that in highly competitive market conditions, MSMEs that have a data-based supply chain system are able to respond faster and maintain customer loyalty through timeliness and product quality.

Another implication is the importance of cross-sector collaboration in building a digital business ecosystem for MSMEs. Universities, financial institutions, cooperative offices, and local technology startups can become strategic partners in creating digital solutions that are easily accessible and affordable for MSMEs throughout the Lampung region. This research opens up opportunities for the University of Lampung to expand its role as a center of excellence in the field of MSME digital transformation through further research, business incubation, and information technology-based mentoring. The medium-term impact of this research can also be seen in increasing the innovation capabilities of MSMEs because when business actors already have a good basis for data management and supply systems, they will be better prepared to develop new products, adjust business models, or enter wider markets. In the long term, this can increase the contribution of Lampung MSMEs to Gross Regional Domestic Product (GRDP), labor absorption, and local economic resilience. MSMEs that are digitally and efficiently connected will also find it easier to establish partnerships with large corporations or export markets.

Overall, this study not only provides academic findings but also practical recommendations that can be implemented directly in the field. The synergy between data capability and supply chain capability shows that this study offers a model that can be replicated in strategic MSME sectors such as culinary, agriculture, crafts, and local trade in Lampung. This study is proof that data-based economic development and digitalization are not the domain of large companies alone but can be accessed, adapted, and implemented in real terms by local MSMEs who want to move up a class and survive in a challenging digital economy.

## 5. Conclusion

This study shows that the integration of data capability and supply chain capability has a significant impact on improving the operational efficiency of MSMEs in Lampung Province. The results of multiple linear regression reveal that these two variables together explain nearly 50% of the variation in operational performance, with supply chain capability emerging as the

dominant factor. The mediation test further supports the finding that data capability does not have a direct significant effect, but its benefits are fully channeled through supply chain capability..

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