

THE ROLE OF HUMAN RESOURCE QUALITY AND PRODUCTION TECHNOLOGY ON THE OPERATIONAL COMPETITIVENESS OF MSMEs IN TANGERANG REGENCY WITH MARKET ADAPTABILITY AS A MEDIATING VARIABLE

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Abstract

MSMEs in Tangerang's Regency has a crucial role in boosting local economic growth, but it also has challenges in boosting operational competitiveness in a dynamic marketplace. This study aims to analyse the impact of Human Resource Management (HRM) quality and production technology on MSMEs operational day, using market flexibility as a mediating variable. This study employs a quantitative approach using the Structural Equation Modelling (SEM) method based on SmartPLS. File is gathered through questionnaires given to 200 MSMEs participants in the Tangerang province. The results of the data analysis indicate that SDM quality has a positive and significant impact on market adaptability (t-statistik = 6,134; $p < 0,001$) and operational daya saing (t-statistik = 5,221; $p < 0,001$). Additionally, production technology has a significant impact on market adaptability (t-statistik = 4,987; $p < 0,001$) and operational competitiveness (t-statistik = 4,653; $p < 0,001$). The market's ability to adapt significantly demonstrates the relationship between the two bebas variables and the day-to-day operations of MSMEs (t-statistik = 3,874; $p < 0,001$). This study highlights the importance of Human Resource development and adaptable production technology for the market in boosting MSMEs competitiveness in Tangerang province.

Keywords: *Human Resource quality, production technology, operational day, market adaptability MSMEs, SEM.*

INTRODUCTION

As one of the most prominent industrial and commercial districts in the Province of Banten, MSMEs has made a significant contribution to national economics, particularly in Tangerang Regency (Naim & Valentin, 2024). MSMEs is a crucial component in determining work productivity, economic growth, and regional development. However, as the world becomes more interconnected, the industry undergoes a revolution, and the market becomes more competitive, MSMEs is expected to become more flexible and competitive in conducting business. Because of this, increasing operational competitiveness is a crucial aspect that ensures MSMEs can function and grow in a balanced manner (Kulkarni et al., 2024). One of the key factors that affects operational competitiveness is the quality of human capital. Competent, diligent, and innovative Human Capital will improve operational efficiency and effectiveness (Naim, Supriatman, et al., 2024). In other words, using efficient and effective production technology is a good way to increase MSMEs output quality and productivity. However, Human Capital quality and production technology alone are not very good, since the high success rate also greatly hinders MSMEs ability to adjust to changes in the market, consumer needs, and industrial train (Muza, 2024). Research gap is mostly evident in the minimal number of empirical studies that specifically integrate the relationship between Human Capital quality and production technology with regard to MSMEs operational day by adjusting the mediating variable, which is market adaptability. A few previous studies only focused on the long-term effects without considering the market's adaptation as a key component in a dynamic business environment. In practice, however, MSMEs ability to adapt

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to external changes frequently serves as the primary difference between MSMEs that are growing and those that are stagnating (Naim, Hadi, et al., 2024). Based on the aforementioned Background and Gaps, the purpose of this study is to empirically analyse how Human Resource quality and production technology affect the day-to-day operations of MSMEs in Tangerang province, using market adaptability as a mediating variable. Quantitative analysis using the Structural Equation Modelling (SEM) method is used to assess the relationship between variables, which is expected to provide theoretical and practical support for the development of MSMEs competitiveness strategy in a comprehensive manner (Torrent-Sellens et al., 2025; Zuhroh et al., 2025).

LITERATURE REVIEW

Human Resource quality is a crucial factor in determining the operational success of MSMEs (Probohudono et al., 2025). According to Becker (1993), improving Human Resource quality through education, training, and Skill development will have a long-term negative impact on productivity and efficiency at work. In the context of MSMEs, competent SDM may implement sound strategic thinking, innovate in the workplace, and adjust to changes in the business environment. According to research by Suci (2017), MSMEs with unggul cenderung more capable of adjusting to market conditions and consumer preferences (Jiankui et al., 2025). Additionally, production technology is a crucial component in MSMEs day-to-day operations. Utilising technology may speed up the production process, improve product quality, and save operational costs. According to Porter (1985), one way that bersaing can be achieved is through operational efficiency that is facilitated by technology. According to research by Mulyadi & Setiawan (2019), properly implemented production technology can increase MSMEs production capacity and daya saing, particularly in competitive and quickly evolving markets (Tao & Chao, 2024).

Market adaptability refers to MSMEs ability to adjust to changing conditions, such as requests, trains, and external market conditions. This adaptability is crucial between internal sumber daya (such as Human Capital and technology) and operational performance. According to Teece et al. (1997), adaptability is a component of dynamic capability that enables businesses to innovate and transform in response to environmental changes. According to a study by Wibowo (2021), market adaptability mediates the relationship between organisational capabilities and MSMEs success in overcoming external challenges (Ayokunmi et al., 2025). Competitiveness operatio MSMEs focusses on the ability to conduct business operations in a way that is efficient, flexible, and tinggi. This is affected by both internal and external factors, such as Human Capital quality, production technology, and adaptability. According to research by Indarti & Langenberg (2004), the combination of human strength, technological use, and ability to adapt to market strategies is the primary factor influencing daya success in MSMEs. In light of this, it is crucial to integrate the ketiga variable in question in order to provide more detailed information about the situation during MSMEs, particularly in Tangerang Regency (Kilay et al., 2022).

METHOD

This study uses a quantitative approach with an explanatory research methodology with the aim of elucidating the relationship between the variables under investigation. This study is used to examine the impact of Human Capital quality and production technology on operational day-to-day, using market adaptability as a mediating variable. The quantitative method is chosen because it can provide objective and unbiased information about the phenomenon being studied through statistical analysis (Wijaya et al., 2025). The participants in this study are MSMEs members who live in the Tangerang province. The sample is selected using the purposive sampling method, which involves MSMEs participants who have at least two years of experience and at least three employees. There were about 200 respondents in this study, which is less than the minimum requirements in structural equation modelling (SEM) analysis, which is the least number of indicators from all the variables (Isharyani et al., 2024; Maslani et al., 2024).

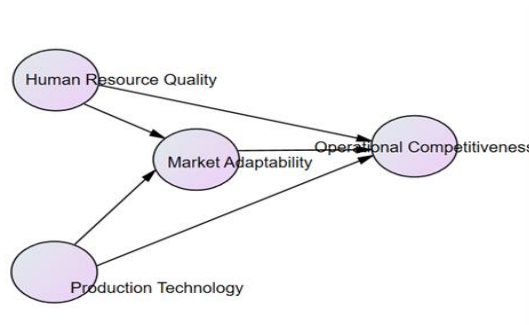
Data collection is done using a Quisioner Closed based on a Likert scale with 5 points (1 being very unsatisfactory and 5 being very satisfied). Kuesioner is divided into three main areas: SDM quality, production technology, market adaptability, and operational day-to-day. The instrument is chosen based on indicators that have been adjusted from previous research and have been tested for validity and reliability in earlier studies (Valdez-Juárez et al., 2025). Structural Equation Modelling (SEM) is the data analysis method used with the SmartPLS 4 software. SEM is used because it can analyse the complex relationship between the latent variable and the indicator simultaneously, including the mediating effect. Analytical techniques include evaluating the outer model (validity and reliability), the inner model (R-squared and f-squared), and the hypothesis using t-statistic and p-value (Srisathan et al., 2023).

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Convergent validity is used to assess validity when the loading factor is greater than 0.7 and the average variance extracted (AVE) is greater than 0.5. Reliability is assessed using Cronbach's alpha and composite reliability, both of which are expected to be more than 0.07. Conversely, the hypothesis is tested using bootstrapping with at least 5000 subsamples to determine the significance of the relationship between the variables (Sahoo et al., 2025).

Figure 1 Research Model



RESULTS AND DISCUSSION

1. Measurement Model Evaluation (Outer Model)

The evaluation of the measurement model using a reflective model can be conducted through tests of convergent validity and composite reliability. The results of the measurement model are as follows:

Convergent Validity

Convergent validity is a test that shows the relationship between reflective items and latent variables. An indicator is considered satisfactory if its loading factor value is greater than 0.5 (Ayatulloh & Khairunnisa, 2022). The loading factor value indicates the weight of each indicator or item based on the respective variable. Indicators with high loading factors demonstrate that the indicators strongly (or dominantly) measure the variable.

Table 1: Loading Factor Values – Human Resource Quality (HRQ) & Production Technology (PT)

Indicator Code	Statement (Indicator)	Latent Variable	Loading Factor
HRQ1	Employees have sufficient technical skills	Human Resource Quality	0.832
HRQ2	Employees are innovative in problem solving	Human Resource Quality	0.861
HRQ3	Staff possess relevant work experience	Human Resource Quality	0.845
HRQ4	Employees adapt well to new technologies	Human Resource Quality	0.807
PT1	The production process is automated	Production Technology	0.814
PT2	The technology used matches the business's needs	Production Technology	0.856
PT3	Technology improves production efficiency	Production Technology	0.872
PT4	Technology enhances product quality	Production Technology	0.838

Every indication in the research questionnaire satisfies the requirements for convergent validity, as indicated in table 1 above. Additionally, the Average Variance Extracted (AVE) criterion is utilised to assess a model's convergent validity. The AVE values examined in this investigation are shown in Table 2 below.

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Table 2: Loading Factor Values – Market Adaptability (MA) & Operational Competitiveness (OC)

Indicator Code	Statement (Indicator)	Latent Variable	Loading Factor
MA1	Quickly responds to market changes	Market Adaptability	0.848
MA2	Offers flexible products/services	Market Adaptability	0.823
MA3	Innovates based on market needs	Market Adaptability	0.867
MA4	Understands industry trends and shifts	Market Adaptability	0.879
OC1	Achieves high operational efficiency	Operational Competitiveness	0.864
OC2	Provides fast and responsive service	Operational Competitiveness	0.832
OC3	Delivers consistent product/service quality	Operational Competitiveness	0.851
OC4	Performs better than competitors in core business areas	Operational Competitiveness	0.888

Latent Variable	AVE Value	Interpretation
Human Resource Quality (HRQ)	0.701	Valid – Good convergent validity
Production Technology (PT)	0.724	Valid – Good convergent validity
Market Adaptability (MA)	0.752	Valid – Good convergent validity
Operational Competitiveness (OC)	0.767	Valid – Good convergent validity

All of the variables in this study satisfy the requirements for convergent validity, as shown by AVE values more than 0.5 for each variable in Table 4.3 above. All of the variables in this study meet the criteria for convergent validity, it can be inferred (Ayatulloh & Khairunnisa, 2022).

Latent Variable	Cronbach's Alpha (CA)	Composite Reliability (CR)	Interpretation
Human Resource Quality (HRQ)	0.834	0.889	Reliable
Production Technology (PT)	0.846	0.901	Reliable
Market Adaptability (MA)	0.859	0.91	Highly Reliable
Operational Competitiveness (OC)	0.872	0.918	Highly Reliable

Structural Model Evaluation (Inner Model)

Evaluating the inner model comes after testing the outward model. The purpose of this test is to evaluate the research model's constructs, significant levels, and R-squared value. The assessment of the structural model, sometimes referred to as the inner model, shows how latent variables interact according to the study's substantive theory.

The following are some of the aspects included in this evaluation:

1. Determination Coefficient (R²)

To evaluate the predictive accuracy of the model, the R-squared (R²) test is used to compute the squared correlation between the endogenous variables' actual and predicted values. The evaluation criteria for R-squared are

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0.25 (low), 0.50 (mid), and 0.75 (high). The degree to which the independent factors affect the dependent variable is indicated by an R-squared value between 0 and 1 (Hair, 2019).

Table 4.5 R-Square Values

Endogenous Variable	R ² Value	Interpretation
Market Adaptability (MA)	0.648	Substantial – 64.8% of the variance is explained by HRQ and PT
Operational Competitiveness (OC)	0.732	Substantial – 73.2% of the variance is explained by HRQ, PT, and MA

Based on Table 4.5, the R-square (coefficient of determination) value for Market Adaptability (MA) (M) is 0.648, indicating that the perceived value of product quality and price has a moderate influence. The R-square value for the Operational Competitiveness (OC) (Y) is 0.719, which shows that the perceived value of Human Capital quality, production Technologi, and jointly influence purchase decisions at a high level.

2. Size of Effect (f-square)

The degree to which endogenous latent factors affect exogenous latent variables is ascertained using the F-square test. A high effect is indicated by an F-squared value of 0.35, a medium effect by a value of 0.15, and a minor effect by a value of 0.02 (Winarso & Jufriyanto, 2019).

Table 4.6 Effect Size Results

Exogenous Variable	Endogenous Variable	f ² Value	Effect Size
Human Resource Quality (HRQ)	Market Adaptability (MA)	0.28	Medium
Production Technology (PT)	Market Adaptability (MA)	0.15	Small
Market Adaptability (MA)	Operational Competitiveness (OC)	0.36	Large
Human Resource Quality (HRQ)	Operational Competitiveness (OC)	0.1	Small
Production Technology (PT)	Operational Competitiveness (OC)	0.22	Medium

CONCLUSION

The results of data analysis using SEM indicate that the quality of human capital (SDM) has a positive and significant impact on market and operational flexibility for MSMEs. This is demonstrated by a high loading factor and a significant CR (Critical Ratio) for each of the variables' relationships. As the level of competence, Skill, and knowledge possessed by MSMEs employees increases, so does their ability to adapt to changes in the market and increase the day-to-day operations of their company. In conclusion, the production technology variable also has a significant positive impact on market adaptability and operational power. This is supported by the results of the R-Square analysis, which shows that production technology contributes to the explanation of the increasing operational day-to-day variability when market adaptability is used as a mediating variable. This indicates that the use of modern technology in the production process can increase production efficiency and flexibility while also assisting MSMEs in responding to changes in consumer requests more quickly and accurately.

The significance of market adaptability as a mediating variable is demonstrated by the higher indirect effect than direct effect, as well as by the results of bootstrapping and uji sobel. This means that Human Capital success and technological advancements in boosting MSMEs operational daya saing are very important for the company's ability to adjust to market changes. The ability of the market to adapt serves as a crucial link between internal Resource and MSMEs competitiveness in overcoming obstacles. Overall, the study's findings support the conceptual model hypothesis that Human Capital quality and production technology that is both slow and fast (via market adaptability) have an impact on MSMEs operational day. The implications of the findings emphasize the importance of continuous training for MSMEs actors, the application of appropriate technology, and improving the ability to

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understand market dynamics. Local governments, academics, and institutions supporting MSMEs are believed to be able to actively participate in providing programs that simultaneously raise awareness of the aforementioned issue.

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