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The Effect of Process Selection and Layout on Productivity: A Case Study in Micro, Small and Medium Enterprises

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Abstract
The study aims to discover the effect of process selection and layout on Micro, Small and Medium Enterprises (MSMEs) Productivity. The unit of analysis is Micro, Small and Medium Enterprises (MSMEs) in Padang City. The study utilized primary data which is obtained through the questionnaire. Sampling technique by using quota sampling. 100 questionnaires from MSMEs were returned as a final sample. Data were analyzed using multiple regression analysis performed by SPSS software. The result shows that process selection positively and significantly affects MSMEs productivity. Layout has a positive and significant effect on organizational performance. The combined impact of process selection and layout results in increased throughput, reduced production costs, and higher overall productivity. MSMEs that invest in aligning their process and layout strategies are better equipped to overcome operational challenges, adapt to changing market demands, and maintain competitiveness.

Keywords: Process Selection; Layout; MSMEs Productivity

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) play a critical role in driving economic growth, creating employment, and fostering innovation, particularly in developing economies (Tekola & Gidey, 2019). Despite their significant contribution, MSMEs often face challenges in optimizing their operational efficiency due to limited resources, infrastructure constraints, and inadequate process planning. To remain competitive in increasingly dynamic markets, these enterprises must improve productivity and reduce operational inefficiencies (Liu & Atuahene-Gima, 2018).

One of the key strategies to achieve this is by selecting the right processes and designing an effective layout for their operations. Process selection involves determining the most suitable production method to meet customer demand while maintaining efficiency and cost-effectiveness (Dereli, 2015). On the other hand, layout design ensures that the physical arrangement of equipment, workstations, and material flow aligns with the selected process to minimize waste, reduce lead times, and optimize resource utilization (Dulina et al., 2024).Existing studies have highlighted the importance of aligning process selection with layout design to improve productivity. However, limited attention has been given to exploring this relationship in the context of MSMEs, which often operate under resource constraints and unique environmental factors. Therefore, understanding the interplay between process selection and layout design is crucial for these enterprises to maximize output and maintain sustainable operations.

This study aims to examine the impact of process selection and layout design on productivity within MSMEs. By identifying key factors that influence these variables and analyzing their interrelation, the research seeks to provide practical insights for improving operational performance. The findings of this study are expected to contribute to the development of more effective strategies for process optimization and layout planning in MSMEs, ultimately enhancing their competitiveness in the market.

The theoretical framework was determined by reviewing some literature. So model of (Bender et al., 2018) for process selection and MSMEs Productivity. Model of (Gupta et al., 2023) for layout and MSMEs productivity. According to previous research and the definitions presented above, the following conceptual models are presented to test the effect of process selection and layout on MSMEs, as described in Figure 1 below:

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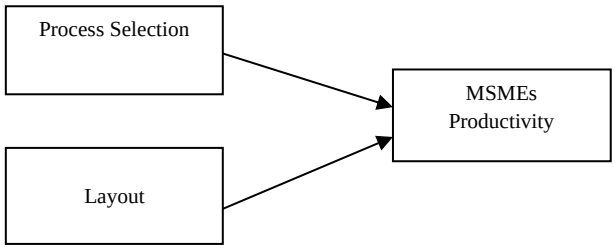

Figure 1: Conceptual Framework

The conceptual model above generates two hypotheses will be tested in the study. Therefore, the hypotheses could be formulated as follows:

H_1: Process selection has significant influence on MSMEs profitability

H_2: Layout has significant influence on MSMEs profitability

2. Methods

This study uses quantitative approach. The quantitative approach is explaining phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics) (Bell et al., 2018). The quantitative approach is used when one begins with a theory (or hypothesis) and test for confirmation or disconfirmation of that hypothesis (Mohajan, 2020). The data used in this study were obtained using a questionnaire. Respondents of this study all owners of MSMEs in Padang City. The information about companies was obtained from the Statistical Bureau Center of West Sumatera Province, Indonesia. A total of 100 MSMEs were selected based on quota sampling.

At the present model, process selection and layout are endogenous variables. MSMEs productivity is endogenous variables. The major material to collect data is questionnaire based on which five dimensions for selection layout: type of production process, suitability of the process, process flexibility, process time efficiency, process reliability (Bender et al., 2018). Layout used five dimensions: type of layout, alignment of layout with workflow, space utilization, ease of access, and layout flexibility (Zhang et al., 2019). Five dimensions were used to measure MSMEs productivity: output per hour or shift, labor utilization, machine efficiency ratio, throughput time, and defect rate (Bhattacharya & Ramachandran, 2021).

In order to determine the degree with which participants agree with statements, a five answer Likert scale consisting of 5) Strongly agree 4) Agree 3) Neutral 2) Disagree 1) Strongly disagree were used in the answer section. The survey data was analyzed using SPSS software.

The validity instrument tested by Pearson Product Moment Correlation. The instrument has high validity if each indicator's correlation value to total correlation is more than 0.30 or r-value > 0.30 (Groenland & Dana, 2019). The instrument was tested for reliability with Cronbach's Alpha. The reliability criteria if Cronbach's Alpha > 0.6 (Pandey & Pandey, 2021)

The data analysis uses both descriptive statistics analysis and multiple regression analysis. The descriptive statistical analysis aims to describe respondent demographics i.e. age, sex, education, position, and salary. Multiple regression analysis used to predict the value of variables based on the value of two or more other variables.

3. Results and Discussion

Respondents of this research have quite different characteristics. Diversity can be seen from the personal data of respondents including sex, education and income. The majority of respondent who participated in this study as male gender (60.00%), aged between 41 to 45 years (37.00%), having level education bachelor degree (68.00%), and having income IDR 8,000,000 - 10,000,000 (31.00%). Demographics of respondents in is presented in table 1 below:

Table 1. Demographics of Respondents

		Numbers of respondents (NR)	Percentage (%)
Sex	Male	60	60.00%
	Female	40	40.00%
Age	<25	2	2.00%
	26≤30	16	16.00%
	31≤35	14	14.00%
	36≤40	25	25.00%

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	41≤45	37	37.00%
	46≤50	2	2.00%
	51≤55	2	2.00%
	<55	2	2.00%
Education	High School or below	-	
	Junior college	10	10.00%
	Bachelor	68	68.00%
	Master or above	22	22.00%
Income	<2,000,000	-	
	2,000,000- 4,000,000	-	
	4,000,001- 6,000,000	10	10.00%
	6,000,001- 8,000,000	12	12.00%
	8,000,001-10,000,000	31	31.00%
	10,000,001-12,000,000	15	15.00%
	>12,000,000	32	32.00%

Source: Primary data processed by the author, 2024

The research variables tested in this study consisted of process selection, total quality management, and MSMEs performance. Respondents answered each item on process selection (X1), layout (X2), and MSMEs productivity (Y) from strongly agree (scale 5) to strongly disagree (scale 1). The result of the mean value of the research variables/ indicators in table 2 below:

Table 2. Result of Mean Value of Research Variables/ Indicators

No	Variables/ Indicators	Mean	Description
1	**Process Selection (X1)**	**4.09**	**High**
	Type of production process	4.00	High
	Suitability of the process to the product type	4.17	High
	Process flexibility	4.11	High
	Process time efficiency	4.07	High
	Process reliability	4.08	High
2	**Layout (X2)**	**4.18**	**High**
	Type of layout	4.28	Very High
	Alignment of layout with workflow	4.17	High
	Space utilization	4.03	High
	Ease of access	3.99	High
	Layout flexibility	4.12	High
3	**MSMEs Productivity (Y)**	**4.15**	**High**
	Output per hour or shift	3.88	High
	Labor utilization	4.12	High
	Machine efficiency ratio	4.26	Very High
	Throughput time	4.29	Very High
	Defect rate	4.26	Very High

Source: Primary data processed by the author, 2024

According to table 2, it can reveal that average value (mean) of the process selection variable was in high category (4.09), suitability of the process to the product type (4.17) as the highest indicator, type of production process as the lowest indicator (4.00). Layout variable was in high category (4.18), type of layout as the highest indicator (4.28), and ease of access as the lowest indicator (3.99). MSMEs productivity were in the high category (4.15), with throughput time as the highest indicator (4.29) and output per hour or shift (3.88).

The conceptual model illustrated in Figure 1 has two hypothesized relationships among the variables process selection, layout, and MSMEs productivity. Table 3 and Table 4 display results from the multiple regression analysis using SPSS for Windows.

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Table 3. Coefficient of Determination Test Result

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.590[a]	.580	.575	1.72128

a. Predictors: (Constant), Selection_X1, Layout_X2
Source: Primary data processed by the author, 2024

The results of testing the coefficient of determination show that MSMEs' performance is influenced by quality control (QC) variables and total quality management (TQM) variables by 57.5%. Other variables outside the research framework influence the rest.

Table 4. Multiple Regression Test Result

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	12.918	2.334		5.535	.000
	Selection_X1	.127	.048	.163	3.178	.025
	Layout_X2	.268	.053	.358	4.170	.000

a. Dependent Variable: MSMEs_Y

The results of the multiple regression analysis are also presented in table 4, indicating support for all the hypotheses. Hypothesis 1 stated that process selection significantly affects MSMEs productivity, which is statically significant at prob. 0.025 < 0.05 (t-statistic = 3.178). The statistical significance of hypothesis 1 confirms the process selection improves MSMEs productivity. So, hypothesis 1 is **confirmed**. Process selection significantly impacts an organization's productivity by determining how efficiently resources are utilized and how effectively operations align with production goals (Prajogo et al., 2018). Businesses can optimize workflows, reduce waste, and enhance output by choosing the most suitable process (De Ramon Fernandez et al., 2020). For example, selecting a continuous process for high-volume, standardized products ensures seamless operations, while a batch production process suits moderate demand with customization. An optimized process minimizes idle time and ensures workers and machines are engaged in productive activities, directly contributing to higher output levels. Additionally, flexible processes allow organizations to quickly adapt to changes in market demand, avoiding downtime and inefficiencies (Javaid et al., 2022).

Proper process selection also reduces defects and rework, ensuring that time and resources are not wasted on correcting errors. Furthermore, efficient processes streamline the flow of materials and information, increasing throughput and enabling faster delivery (Vaka, 2024). Overall, process selection plays a critical role in shaping productivity, as it directly influences resource utilization, cost efficiency, and the ability to scale operations in response to growth or market shifts. Organizations can achieve sustained operational success and competitiveness by strategically aligning the production process with business objectives (Caiado et al., 2019).

Hypothesis 2 stated layout have significant effect toward MSMEs productivity, which is statically significant at prob 0.000 < 0.05 (t-statistic = 4.170). The statistical significance of hypothesis 2 confirms the implementation layout improve MSMEs productivity. So, hypothesis 2 is confirmed. The choice of layout type—such as process layout, product layout, or cellular layout—also influences productivity. A process layout, ideal for low-volume, high-variety production, allows flexibility but may require longer transportation times (Gan et al., 2023). In contrast, a product layout, suited for high-volume, standardized production, ensures faster workflows with minimal interruptions. Similarly, a cellular layout, which groups related processes, fosters better teamwork and reduces delays in collaborative tasks. Effective layout design also optimizes space utilization, ensuring that areas are neither overcrowded nor underutilized (Halawa et al., 2020). By strategically placing equipment and workstations, organizations can enhance safety, reduce employee fatigue, and promote ergonomic practices, all of which contribute to improved performance and productivity. Moreover, a well-planned layout facilitates better supervision and communication, enabling managers to address issues quickly and maintain operational flow.

Additionally, a flexible layout allows businesses to adapt to changes in demand or process requirements without significant disruption. This adaptability is crucial for maintaining productivity in dynamic environments or

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during periods of growth. Overall, a carefully designed layout streamlines operations and supports the organization's long-term goals by improving efficiency, reducing costs, and enhancing the working environment.

4. Conclusion

The findings of this study demonstrate that process selection and layout design significantly influence productivity in Micro, Small, and Medium Enterprises (MSMEs). Proper process selection ensures that production methods align with the type and volume of demand, leading to efficient resource utilization, reduced waste, and streamlined workflows. This alignment allows MSMEs to respond effectively to market requirements, minimize downtime, and maintain consistent output levels.

Similarly, an effective layout design plays a crucial role in optimizing the flow of materials, information, and resources within the production system. Well-planned layouts reduce unnecessary movements, eliminate bottlenecks, and enhance coordination among workstations. The study highlights that layouts tailored to the specific needs of production processes improve operational efficiency and foster better employee performance by minimizing fatigue and creating an organized working environment.

The combined impact of process selection and layout results in increased throughput, reduced production costs, and higher overall productivity. MSMEs that invest in aligning their process and layout strategies are better equipped to overcome operational challenges, adapt to changing market demands, and maintain competitiveness. Therefore, prioritizing these elements is essential for the sustainable growth and success of MSMEs

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