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The Influence of Raw Materials and Technology on Production Output of MSMEs Slondok Crackers in Sumurarum Village, Grabag District, Magelang Regency

Nur Fiana[1], Wijayanti[2], Dedi Runanto[3]

[a] *Faculty of Economics, Muhammadiyah University of Purworejo, Purworejo, Indonesia*
[b] *Faculty of Economics, Muhammadiyah University of Purworejo, Purworejo, Indonesia*
[c] *Faculty of Economics, Muhammadiyah University of Purworejo, Purworejo, Indonesia*

Corresponding author. E-mail address: nurfiana1008@gmail.com

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A B S T R A C T

This research aims to examine the influence of Raw Materials and Technology on Production Output in micro, small, and medium enterprises (MSMEs) producing Slondok Crackers in Sumurarum Village, Grabag District, Magelang Regency, Central Java. In an industry, achieving success in the production process highly depends on production factors. The production factors of Raw Materials and Technology are among the key components that, when combined well, can lead to optimal production results. Well-managed production factors can enhance quality and significantly improve production output. This study uses a quantitative approach with a survey method. The population in this study consists of slondok cracker craftsmen in Sumurarum Village, with a sample of 100 respondents. Data collection was conducted thru questionnaires and analyzed using SPSS 29.0 for Windows with the multiple linear regression method. The research results show that raw materials have a positive effect on production output, and technology also has a positive effect on production output. The results of the multiple linear regression analysis indicate that raw materials have an influence of 63.2% on production output, while technology has an influence of 30.2%. Furthermore, based on the research results, it shows that the variables of raw materials and technology simultaneously have a positive and significant effect on production output. These findings highlight the importance of effectively managing raw materials and technology to enhance the productivity of MSMEs.

1. Introduction

1.1 Background

Indonesia is a developing nation with a diverse range of business sectors that make up its economy. This industry contributes significantly to the expansion of the national economy. Among the various business sectors in Indonesia, one of them is the micro, small, and medium enterprises (MSMEs) sector. MSMEs themselves are businesses conducted by individuals or groups on a small or medium scale that meet certain criteria in terms of asset value or turnover. MSMEs are crucial to achieving a number of economic goals for the advancement of the country, particularly in establishing new companies and employment possibilities [1].

Based on data from the Ministry of Cooperatives and MSMEs of the Republic of Indonesia in 2022, one of the provinces with the highest number of MSMEs in Indonesia is Central Java, with the second-highest number of MSMEs, totaling 1.457.126 businesses. One of the developing

MSMEs centers in Central Java is Magelang Regency, specifically in Grabag District, Sumurarum Village. In this area, there are many MSMEs engaged in food processing based on cassava. One of their flagship products is slondok crackers, a typical snack made through the fermentation and drying process of cassava.

An effort to achieve success in the production process heavily relies on production factors to produce quality products. The production output is the final result of a production process. When the quality of input is good, it will also result in good production, and vice versa [2]. Factors of production that are well combined in the production process can achieve more optimal results. The factors of production that must be well combined include raw materials and technology due to their very important roles in the production process.

The success of a business is when it produces a quality product, which depends on the effort in selecting good raw materials, resulting in a product that meets the standards. Raw materials are materials that are directly used for processing, so that these materials will eventually become finished goods [3]. In addition to raw materials, technology also plays an important role in the production process. Technology is a tool or machine used in the production process. By utilizing technology, a business can increase efficiency in the production process, such as making the process faster and more efficient [4].

However, in practice, the small and medium enterprises (MSMEs) producing slondok crackers in Sumurarum Village often face various obstacles that can affect their production output. The factor of unstable raw material availability, the influence of unstable weather which can affect the quality of the produced cassava, limited labor, as well as the lack of machinery and frequent disruptions such as machine breakdowns, become the main challenges. Therefore, it is important to test how the role of raw materials and technology as the main production factors can improve production output.

In production activities, raw materials are a fundamental component that determines the smoothness of the process and the quality of the final product. The availability of adequate and high-quality raw materials, such as fresh cassava with the appropriate moisture content, is very important in the production process of slondok crackers. The quality of the raw materials produced can be influenced by several factors, one of which is weather fluctuations. During the rainy season, the moisture content in cassava tends to be high, resulting in less starch being produced due to shrinkage during the grating and pressing processes. Based on information from business operators, 10 tons of good quality cassava can produce 4 tons of slondok crackers. However, if the quality of the cassava is low, the yield is only 3 tons. Conversely, during the dry season, the cassava becomes too hard, making the grating process difficult and resulting in less crispy crackers. In addition, the type of cassava also affects the quality of the final product. Only certain types such as madon, super, and renganes cassava are considered suitable for producing high-quality slondok crackers.

In addition to raw materials, the role of technology is also very crucial. The use of modern machines, such as graters, presses, and slondok cracker molding machines, can increase production efficiency and speed. However, reliance on machines also carries risks, such as the production process halting when the machine breaks down. Therefore, machine maintenance, as well as adding machines and improving technology quality, becomes important to support productivity.

With these various challenges, this research is important to determine the extent of the influence of raw materials and technology on production outcomes in the slondok cracker MSMEs in Sumurarum Village. The results of this research are expected to serve as a basis for decision-making for MSMEs actors in improving their production efficiency and quality.

1.2 Problem Statement

The problem in this study has been formulated as follows in light of the background information provided:

1. Does the raw material have a good effect on the production output of slondok crackers MSMEs in Sumurarum Village?
2. Does technology improve the output of MSMEs in Sumurarum Village that produce slondok crackers?

1.3 Objectives and Scope

Based on the background of the problem and the formulation of the problem, this research is proposed with the aim of:

1. To test the influence of raw materials on production output.
2. To test the influence of technology on production outcomes.

2. Literature Review

2.1 Related Work

Research related to raw materials and technology affecting production outcomes has been quite extensively conducted by several researchers. Generally, based on some findings, it shows that raw materials influence production outcomes, whereas technology does not affect production outcomes. For example, the research conducted by:

- Sa'diyah & Moehadi (2019) conducted a study on "the influence of labor, capital, and technology on the production output of bags in Soko District, Tuban Regency." The study employed a quantitative approach, and the findings showed that technology significantly and favorably affects industrial productivity.
- Nurasika (2021) conducted research on "the influence of raw materials, labor, and technology on production output of bottled drinking water (AMDK) at PT. Malenggang Utama, Luwu Regency." The researcher used a quantitative descriptive research method, and the findings of this study indicate that raw materials have a positive but insignificant effect on production output, while technology has a negative but insignificant effect on production output.
- Hidayat & Hendra (2023) conducted research on "the influence of raw materials and technology on production output on MSMEs producing Opak in Pengajahan Village, Pengajahan District, Serdang Bedagai Regency." This study employed a quantitative analytic approach as its methodology. The findings of the study demonstrate that raw materials significantly and favorably impact industrial output, while technology does not have an effect on production output.
- Santi et al. (2023) conducted a study on "the influence of raw materials, capital, and labor on production output at PT.ABC." This research used an associative quantitative analysis approach, with the results indicating that raw material factors exert a beneficial and statistically meaningful effect on production performance.

In connection with previous research conducted by Hidayat & Hendra (2023) and Santi et al. (2023), this study shows that when raw materials encounter problems, it can affect the quality and production output. Meanwhile, according to Nurasika (2021) and Hidayat & Hendra (2023) in their research recommendations and conclusions, it is stated that when technology is utilized properly, it can increase efficiency, thereby impacting the improvement of production output.

2.2 Research Gap

Although studies on the influence of raw materials and technology on production outcomes have been extensively conducted, there is still limited research specifically proving the role of technology in enhancing production outcomes, particularly in the industrial sector focusing on the context of slondok cracker SMEs as a typical local household industry. Therefore, this research is expected to fill that gap by providing relevant empirical contributions, based on a study of slondok cracker SMEs in Sumurarum Village.

3. Methodology

This study uses an associative research design and quantitative analysis methodology, which involves using a survey approach to find correlations between two or more variables. Survey research is a quantitative research approach that collects data about past or present events, beliefs, opinions, traits, behaviors, and variable relationships through in-depth observations (interviews or questionnaires) and data collection tools. Additionally, it examines several hypotheses about psychological and sociological factors using a sample taken from a certain community. The research findings are typically [5].

3.1 Data Collection

In this research, primary data is used, which is directly collected from its source. Primary data is a type of data obtained directly from its source by the data collector [5].

In this study, data were obtained using a questionnaire, by distributing a questionnaire containing written questions or statements directly to the respondents, namely the slondok cracker MSME actors in Sumurarum Village, to be answered according to their experienced conditions. One hundred respondents served as the sample size for this investigation.

3.2 Analysis Technique

- Multiple Linear Regression Analysis

  With the aid of Software, namely SPSS 29.0 for Windows, will be used to perform multiple linear regression analysis on the data collected and obtained for this project. Multiple linear regression analysis is a statistical technique used to evaluate how one or more independent variables affect one dependent variable in a relationship between two variables [6].

  The purpose of this analysis is to determine whether technology and the raw material variable have a partial impact on production output. The regression equation method used is:

$$\mathbf{Y = a + b1X1 + b2X2 + e}$$

- Significance Tes

  Showing how much of the dependent variable can be explained by the influence of a single independent variable is the goal of the partial significance test [6]. The significance level (α) for this test is 5%. According to the criteria used in the significance test, there is a significant influence between the independent and dependent variables when the t-count > t-table and the p-value < α (0,05). However, when the p-value > α (0,05) and the t-count < t-table, there is no partial impact between the variables

3.3 Validation

In this study, the questionnaire instrument used will be tested for validity and reliability with a total of 30 respondents. The criteria for the tests conducted are as follows:

- The validity test gauges how well the questionnaire's items can actually reveal the desired variables. This test uses Pearson correlation, with an r value > 0,3 indicating validity.
- Examining a questionnaire's consistency, which serves as an indicator of a variable, is possible using a reliability test..In this test, when Cronbach Alpha > 0,7, the instrument in the research is said to be reliable and suitable for use.

4. Results and Discussion

4.1 Key Findings

Validity tests

In this study, a validity test was conducted on the variables of Raw Materials (X_1), Technology (X_2), and Production Output (Y) involving 30 respondents.

Table 1
Validity test results

Variable	Question Item	r count	r table
Raw Materials (X1)	X1.1	0,895	0,3
	X1.2	0,808	
	X1.3	0,627	
	X1.4	0,925	
Technology (X2)	X2.1	0,774	0,3
	X2.2	0,762	
	X2.3	0,696	
	X2.4	0,779	
Production Output (Y)	Y1	0,812	0,3
	Y2	0,842	
	Y3	0,753	
	Y4	0,814	

Source: SPSS Output Results 29, 2025

Based on Table 1 above, it shows that each variable, namely Production Output (Y), Raw Materials (X_1), and Technology (X_2), has a Pearson correlation value above the r-rim of 0,3 so it can be said that each item of the statements in the questionnaire is positive and valid, thus the entire items can be used for further data collection.

Reliability test

Reliability testing in the research was conducted on the variables of raw materials (X_1), Technology (X_2), and Production Output (Y) with a total of 30 respondents.

Table 2
Reliability test results

Variable	Cronbach's Alpha	Reliability Value Limit	Information

Raw Materials	0,846	0,7	Reliable
Technology	0,745	0,7	Reliable
Production Output	0,861	0,7	Reliable

Source: SPSS Output Results 29, 2025

Based on Table 2 above, It demonstrates that the Cronbach's Alpha for each variable statement item is more than 0,7. This indicates that each statement in the questionnaire is trustworthy, allowing for the measurement of the questionnaire's consistency over time and the observation of similar responses from each respondent.

Multiple Linear Regression Analysis

analysis that establishes if the independent variable (X) and the dependent variable (Y) are related. One hundred people participated in this analysis.

Table 3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1.177	.455		2.590	.011		
	Raw Material	.632	.057	.667	11.100	<.001	.238	4.198
	Technology	.302	.057	.318	5.295	<.001	.238	4.198

a. Dependent Variable: Production Result

Source: SPSS Output Results 29, 2025

The following multiple linear regression equation can be created using Table 3's results:

$$\mathbf{Y = 0{,}632(X_1) + 0{,}302(X_2)}$$

With the following interpretation:

- b1 = 0,632 is positive, meaning the raw material variable (X_1) has a positive influence on the production output variable (Y). This result shows that when a business does not face constraints on raw materials, it can increase production output. Thus, Raw Materials (X_1) have an impact of approximately 63,2% on the increase in Production Output (Y).
- b2 = 0,302 is positive, meaning the technology variable (X_2) has a positive influence on the production output variable (Y). This result shows that the use of technology can improve work efficiency, thereby contributing to an increase in production output. Thus, Technology (X_2) has an influence of 30,2% on the increase in Production Output (Y).

Significance Test

With reference to Table 3, p-values < 0,05 imply that both independent factors have a substantial impact on the dependent variable. The following are the specific findings:

- A significant level of 0,001 < 0,05 and a t-count value of 11,100 > t-table 1,984, surpassing the t-table value of 1,984, are observed in the relationship between raw materials (X_1) and production output (Y). This demonstrates that the production output is significantly and partially influenced by raw materials.

- With a t-count value of 5,295 > t-table 1,984 and a significance level of 0,001 (< 0,05), the effect of technology (X_2) on production output (Y) suggests that technology has a considerable and partial impact on production outcomes.

4.2 Interpretation of Results

H1: Production output is positively and significantly impacted by raw materials.

The statistical analysis reveals that raw materials directly affect production output, as shown by the regression coefficient of 0,632X (positive) with a significance level of 0,001 (p-value < 0,05) and a t-statistic of 11,100, exceeding the t-table value of 1,984. This outcome supports the first hypothesis of the study, which asserts that raw materials have a partial positive impact on production output.

In this study on the slondok cracker SMEs in Sumurarum Village, it was found that the entrepreneurs face raw material constraints such as the quality of the cassava obtained being less than optimal, where the moisture content in the cassava is too high, resulting in significant shrinkage when the cassava is grated and pressed to produce starch. Generally, when the quality of the cassava is good, 10 tons of cassava can produce 4 tons of slondok crackers, but when the quality of the cassava is poor, 10 tons of cassava can only produce 3 tons of slondok crackers. Not only that, delays in the raw material delivery process can also affect production results. If there are delays in the delivery process, which should allow for production to be carried out twice a month, the production process can only be conducted once a month. One of the consequences of delays is that the quality of the cassava raw material can become less fresh due to being on the road for too long, which can result in the produced product being of suboptimal quality.

This research reinforces the findings of previous studies conducted by Hidayat & Hendra (2023) and Santi et al. (2023), which state that raw material factors exert a beneficial and statistically meaningful effect on production performance.

H2: Production output is positively and significantly impacted by technology.

According to the results of the multiple linear regression analysis, the technology variable's regression coefficient is 0,302X (positive), with a t-statistic of 5,295 that is higher than the t-table value of 1,984 and a significance level of 0,001 (p-value < 0,05). These results support the study's second hypothesis, which holds that technology partially boosts manufacturing output.

Based on the analysis of the data, it can be stated that technological factors offer advantageous and substantial effects on the level of production achieved. In the process of managing slondok crackers, most of the production process is assisted by machines and tools. Therefore, if there are issues with the machine technology, such as machine breakdowns, the production process will be hindered, resulting in no production taking place. This will cause delays in the production process. On the other hand, when the machines are improved, the entrepreneurs can produce more products and at a faster rate.

The results of this research are consistent with the findings of Sa'diyah & Moehadi (2019), who concluded that technological implementation contributes in part with a notable and meaningful effect on production results.

5. Discussion

5.1 Comparison with Prior Research

This study found that the availability and quality of raw materials play a crucial and beneficial role in determining production results. This aligns with the findings of Hidayat & Hendra (2023)

and Santi et al. (2023), who also reported a positive and significant effect of raw materials on production output. This underscores the importance of the quality and availability of raw materials in optimizing production output. However, these results differ from Nurasika's (2021) study, which found a positive but not significant effect.

In addition, this study also found that technological factors offer advantageous and substantial effects on the level of production achieved, indicating that adequate utilization of technology can enhance efficiency and production capacity. These findings differ from the research by Hidayat & Hendra (2023) and Nurasika (2021), which reported that technology does not have a significant impact on production outcomes, but are in line with the study conducted by Sa'diyah & Moehadi (2019).

5.2 Limitations

This research was conducted only in Sumurarum Village, which produces slondok crackers, so the results may not necessarily be generalized to all slondok cracker SMEs in other areas or to other SMEs. In addition, this research is limited to the independent variables of raw materials and technology, without considering other factors such as labor, capital, or production processes.

5.3 Future Research

Future researchers are expected to include additional variables such as labor, capital, or production processes, and to involve other locations or different MSMEs in order to compare the influence of these variables in different settings.

6. Conclusion

Based on the research and analysis conducted, the following findings can be made:

- Raw materials (X_1) have a positive and significant impact on production output (Y). The test results show that the regression coefficient value is 0,632, the t-statistic is 11,100 > t-table 1,984 and the Sig value is 0,001 < 0,05. This means that the raw materials must have good quality and sufficient supply to produce optimal products. When the raw materials do not encounter issues in terms of quality and supply, it can increase production output for the slondok cracker SMEs in Sumurarum Village.
- Technology (X_2) has a favorable and substantial influence on manufacturing volume (Y). The test results show that the regression coefficient value is 0,302, the t-statistic is 5,295 > t-table 1,984 and the Sig value is 0,001 < 0,05. This means that when technology is utilized effectively, it can enhance efficiency, thereby impacting the increase in production results for the slondok cracker SMEs in Sumurarum Village.

Thus, to improve production results, MSME actors need to ensure the quality and availability of raw materials sustainably and optimize the use and maintenance of the technology used in the production process.

7. Recommendation

For MSME actors: it is recommended to improve the planning of the production process to make it more optimal, such as maintaining the sustainability of raw material supply, optimizing the use of raw materials, to prevent shortages in raw material usage. Next, always maintain the machines or tools used and increase the number of machines to improve work efficiency. Always monitor product quality regularly to reduce defects in the produced products.

To Future Research: this study discusses the influence of raw materials and technology on the production output of slondok crackers SMEs in Sumurarum Village, Grabag District, Magelang Regency, where it is recommended for researchers to add other variables such as labor, capital, and production processes, as well as to expand the research area coverage.

Appendix

Image

Research Questionnaire

THE INFLUENCE OF RAW MATERIALS AND TECHNOLOGY ON PRODUCTION OUTPUT IN SLONDOK CRACKER SMEs IN SUMURARUM VILLAGE, GRABAG DISTRICT, MAGELANG REGENCY

A. RESPONDENT IDENTITY

Name :
Gender : Male ☐ Female ☐
Age : 21 - 30 ☐ 31 - 40 ☐
41 - 50 ☐ > 50 ☐
Duration of Effort : 3 - 10 ☐ 11 - 20 ☐
21 - 30 ☐ > 30 ☐
Monthly production of slondok crackers : Tons

B. FILLING INSTRUCTIONS

Below are various statements regarding the research variabels. Please provide your honest answer by marking (√) in the available columns.

SA	Strongly Agree	5

A	Agree	4
SD	Somewhat Disagree	3
D	Disagree	2
SD	Strongly Disagree	1

Raw Material (X1)

No	Pernyataan	1	2	3	4	5
		SD	D	SD	A	SA
1	The quality of the raw materials used must meet the established standards to achieve optimal.					
2	The supply of raw materials must be continuously availabel and meet production needs.					
3	The price of raw materials must be in accordance with the established capital budget.					
4	Raw materials become an important aspect in improving production output.					

Technology (X2)

No	Pernyataan	1	2	3	4	5
		SD	D	SD	A	SA
1	The machines or equipment used in the production process are more modern machines that support work efficiency.					
2	The use of technology or machines in business can increase productivity and time efficiency.					
3	Never experienced issues such as machine breakdowns in the production process.					
4	Technology such as machines can help produce crackers with consistent thickness.					

Production Results (Y)

No	Pernyataan	1	2	3	4	5
		SD	D	SD	A	SA
1	The quality of the slondok crackers offered is already up to standard.					
2	The production output of slondok crackers is always the same every month.					
3	The more raw materials used, the more slondok crackers are produced.					
4	The production generaled has high quality and standards.					

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