



PRODUCTIVITY MEASUREMENT ANALYSIS USING OMAX AND AHP METHODS ON BATIK SME

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ABSTRACT

Batik is a cultural heritage originating from Indonesia which has been designated by UNESCO. Since then, the business of making batik has grown rapidly in Indonesia, with each region having its characteristics. In making batik, there are two kinds of manufacturing processes, namely the manufacturing production process and the traditional manufacturing process. Batik production is a unique process because it contains works of art with a traditional manufacturing process and contains elements of local policies. The difference in the manufacturing production process using modern technology, the resulting batik products also have the same results and can produce a lot of batik cloth in a short processing time. As for the process of making traditional batik, it must be produced one by one using traditional equipment, the batik pattern of each cloth is different, for the results cannot be identified this makes it special, and each stage of the process takes quite a long time. Productivity is important for batik production. Especially done by craftsmen in areas that are relatively new to developing traditional batik since the era of world cultural heritage has only been accepted by Indonesia. This study measures the productivity of BM batik SME in Malang. Based on the calculation and analysis of productivity using the Objective Matrix (OMAX) method for BM Batik SME, it can be concluded that the productivity of SME is low, with the lowest being the productivity of batik working time (value 1), the productivity of batik products having (value 1). 3) and labor productivity (score 5). With fishbone diagram analysis, it can be found the cause of the low productivity of these traditional batik SME. From here, several alternative solutions can be obtained, as recommendations for efforts to increase the productivity of SME based on traditional production without eliminating the heritage standards of batik works.

Keywords: Batik, SME, Objective Matrix, Productivity

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1. INTRODUCTION

One of the cultural heritages from Indonesia and has been designated by UNESCO in 2009 is batik. (Chauliah Fatma Putri, Nugroho and Purnomo, 2019) Since then, the business of making batik has been growing in Indonesia with each region having its characteristics. The production activities that occur in Batik SME have long and complicated stages. This is what makes batik a unique work and has high artistic value. As in other businesses, batik SME are increasingly advanced and spread throughout Indonesia, including in Malang Raya.

So far, Indonesian batik is known to develop rapidly in the Central Java area where batik was first developed, namely Solo, Yogyakarta, and Pekalongan (CF Putri, I Nugroho, 2018). Batik making in these three cities has developed into the center of the batik industry in Indonesia, both traditionally produced and modern manufacturing. Traditional production is still maintained, both in producing batik, stamps, and stamps in the three cities. Meanwhile, modern manufacturing production in the form of batik printing products has also been developed (Siregar et al., 2020). This can make batik widely known throughout the world with various qualities.

Malang Raya is an area that is still relatively new to developing regional batik. As with other cities, batik SME have also sprung up with the advantages and peculiarities of their respective regional motifs. The conditions of Batik SME in Malang are different from those of Batik SME in batik-producing cities such as Yogyakarta, Solo, and Pekalongan. This batik city, which has grown rapidly, has used a lot of batik equipment that is more diverse, which allows the batik-making process to be faster. Meanwhile, in general, Malang Raya still traditionally develops batik, namely producing handmade batik products, stamps, and combinations of written stamps. The process of making batik is very unique, both from the traditional process, loaded with local wisdom content and as a work of art that cannot be standardized in terms of processing time from one batik product to another. Batik SME in Malang Raya, which focus more on the traditional manufacturing process, need to measure their productivity. Due to the long processing time, productivity will be relatively low. Productivity measurements that need to be measured include

labor productivity, work time productivity, and batik product productivity.

As is known, that productivity is the result of a comparison between input and output. (Ramayanti, Sastraguntara and Supriyadi, 2020) The input in question is a factor of production while the output is the product produced. This research was conducted using the Objective Matrix (OMAX) method in BM Batik UKM.

This research on productivity in batik SME with OMAX was carried out because previous research on productivity-focused more on manufacturing companies with relatively modern technology, while batik SME themselves, had long traditional processing stages. So the novelty of this research is distinguished from the previous one, namely its application to the traditional production process. Further, the research differences can be explained in the results and discussion sub-chapters. This research can help batik SME in determining priorities to increase productivity.

This research was conducted at UKM Batik BM, which is a home industry that makes/produces its quality traditional Malang handwritten batik cloth and uses simple equipment. Judging from the traditional production process carried out by BM batik SME with relatively simple equipment, this will have an impact on the level of productivity. (Fatma Putri and Agus Sahbana, 2021) Therefore, this study aims to determine the level of productivity in SME. BM Batik.

Similarly, the analysis of productivity measurement with the OMAX method on Batik BM SME is to find out the results of the OMAX calculation, and the causes. This is to improve and increase productivity.

2. RESEARCH METHODS

Objective Matrix (OMAX)

The steps taken to calculate using the OMAX method are as follows:

Determination of productivity criteria

In setting the measurement criteria, the focus is on the main categories of determining productivity criteria, namely:

- Efficiency criteria, is to describe how to use the resources in the company as efficiently as possible. These criteria consist of

1. Ratio I: the ratio of the amount of output produced to the raw materials used

2. Ratio II: the ratio of the amount of output produced to the number of working hours used.

- Inferential criteria are criteria that indirectly affect productivity but if they are included in the target matrix, they will support the calculation process. The calculation in question is about the extent to which a variable affects the main factors. The criteria in question consist of Ratio III, namely the ratio of the number of absenteeism of workers compared to working hours.

Ratio value calculation.

The formula used in calculating the ratio value are:

$$\text{Ratio I} = \frac{\text{Number of working hours}}{\text{Employee Absence}} \quad (1)$$

$$\text{Ratio II} = \frac{\text{Total product produced}}{\text{Working Hours}} \quad (2)$$

$$\text{Ratio III} = \frac{\text{Output}}{\text{Input}} \quad (3)$$

Information:

Ratio (I) = labor productivity

Ratio (II) = working time productivity

Ratio (III) = batik productivity

Set final goals and scores (0.3,10)

$$1 - 2 = \frac{\text{level 3} - \text{level 0}}{\text{criteria 3} - \text{criteria 0}} \times \text{criteria 1} - \text{criteria 2} \quad (4)$$

$$4 - 9 = \frac{\text{level 10} - \text{level 3}}{\text{criteria 10} - \text{criteria 0}} \times \text{criteria 4} - \text{criteria 3} \quad (5)$$

Determination of the weight of performance criteria

This weight describes the priority level of the company against several criteria used. The total weight of the performance criteria is 100. Criteria with a higher priority level receive a high weight as well. The weighting of the performance criteria will be carried out using the Analytical Hierarchy Process (AHP) method (Ramadhani, Prihandoko, and Adiwijaya, 2018).

Calculation of performance value

To calculate the performance value achieved for each criterion in a certain period, it is obtained from the score of a criterion multiplied by the weight of the criteria.

Intensity Interest	Description	Explanation
1	Both elements are equally important	Two elements have the same influence on the goal
3	One element is slightly more important than the others	Experience and judgment slightly favor one element over the other
5	One element is more important than the others	Experience and judgment strongly favor one element over the other
7	One element is more important than other elements	One element that is strongly supportive and dominant is seen in the facts
9	One element is absolutely important than Other Elements	Evidence in favor of one element against another has the highest possible level of affirmation to corroborate
2,4,6,8	The values between two adjacent consideration values	

Calculation of achievement indicator values

The total value of each criterion in a certain period is listed in the achievement indicator table. The greater the increase in achievement indicators, the more productivity will increase. The formula used in calculating the achievement indicator value is:

Productivity Achievement Indicator Value

$$NP = NP_{\text{ratio 1}} + \dots + NP_n \quad (6)$$

Description: NP = Productivity Value

Productivity index calculation

The productivity index is intended to determine the pattern of development of the company's productivity level in an initial period compared to a certain previous period. Calculation of the productivity index is calculated by the formula:
 Productivity Index = $\frac{IP_i - IP_{i-1} \times 100\%}{IP_{i-1}}$ (6)

Information:

IP_i = Achievement indicator value in one period

IP_{i-1} = Initial achievement indicator value

Analytical Hierarchy Process (AHP)

The Analytical Hierarchy Process (AHP) is a method to describe a complex and unstructured situation into several elements arranged in a hierarchical form, which has a subjective value related to the level of importance of each relative variable, then determines the variable with the highest level of importance. effect on the results under these conditions. are as follows. (Ramayanti, Sastraguntara, and Supriyadi, 2020)

Compiling a comparison matrix

Compile a pairwise comparison matrix between criteria and fill it with the appropriate number of priority values. An explanation of the intensity of interest can be seen in the following Saaty Scale Table.

Table 1. Determining Priority of Elements with Pairwise Comparison

Calculates the priority vector weights.

Calculating eigen values

The calculation of $\sum \max$ is done by the formula:

$$\sum \max = \sum_{i,j=1}^n a_{ij} \cdot \frac{w_i}{w_j} \quad (7)$$

With:

$\sum \max$ = eigenvalue

a = Matrix Value

Calculating Consistency Index (CI)

(1) Calculation of CI is done by the formula:

$$\text{Consistency Index (CI)} = \left(\frac{\lambda \max - n}{n - 1} \right) \quad (8)$$

With:

CI = Index consistency

$\sum \max$ = The largest eigenvalue of a matrix of order n

N = number of criteria

(2) Calculation of Consistency Ratio (CR), is declared consistent if the value of $CR \leq 0.1$. CI calculation is done by the formula:

$$CR = \frac{CI}{RI} \quad (9)$$

With:

CI = Index consistency

RI = Random index

Table 2. List of Random Consistency Index (RI)

N	RI
1	0
2	0
3	0,58
4	0,9
5	1,12
6	1,24
7	1,32
8	1,41
9	1,45
10	1,49
11	1,51
12	1,48
13	1,56
14	1,57
15	1,59

3. RESULTS AND DISCUSSION

Data processing with Objective Matrix (OMAX) method is one of the productivity measurement systems used to measure productivity in each unit or part of the company according to productivity criteria that are following existing units or sections (objective). The results of the calculation of productivity in Batik BM SME are as follows.

Ratio Calculation

$$\text{Ratio I} = \frac{50}{10} = 5$$

Indicator Value	3,33
Productivity Index	0,37
$\text{Ratio II} = \frac{6}{480} = 0,013$	

$$\text{Ratio III} = \frac{0,99}{540} = 0,183$$

AHP Weighting

Table 3. AHP Weighting

Criteria	PTK	PWK	PB	Total	Average
PTK	0,4	0,2	0,6	1,2	0,4
PWK	0,4	0,2	0,1	0,7	0,23
PB	0,2	0,6	0,3	1,1	0,37

Table 4. Matrix Scale

Criteria	PTK	PWK	PB
Achievement	9	0,013	0,185
Level	10	10	0,5
	9	9	0,046
	8	8	0,041
	7	7	0,037
	6	6	0,033
	5	5	0,029
	4	4	0,024
	3	3	0,02
	2	2	0,017
	1	1	0,013
	0	0	0,01
Score	5	1	3
Weight	0,4	0,2	0,4
Value	2,0	0,23	1,1

Information :

PTK : Labor Productivity

PWK : Working Time Productivity

PB : Batik Productivity

Productivity Index Value

Table 5. Productivity Index Value 2018

The total value of the productivity index is 0.37. The ratio with the level of importance from the highest or the most influencing productivity to the lowest is Ratio I, namely Labor productivity with a value of 5, Ratio II, namely productivity of Working Time with a value of 1, and Ratio III, namely Batik productivity with a value of 3.

The low level of labor productivity in SME is due to the relatively low number of workers. In addition, most of the workforce works in batik with part-time or side jobs, so the time spent on batik work is relatively small. The high turnover of workers is due to several workers who stop working for various reasons. This causes SME to change their workforce frequently. This is in line with the results of research on production factors that affect batik productivity in Malang Raya, that the variable man or human resources have a negative and significant effect on productivity (Fatma Putri and Agus Sahbana, 2021). This is not the case with the results of other studies which show that there is a significant influence on the Quality of Resources consisting of Technical Skills, Mental Attitudes, Work Discipline, and Work Motivation either simultaneously or partially on the Performance of Small Ikat Weaving Center Craftsmen in Lamongan. This can mean that in Batik UKM in Malang Raya, human resources have not played their role as they should. Several things can be the cause, namely the limited number of batik or batik craftsmen, as well as the skills that still need to be improved.

Likewise, the productivity of working time is very low, due to the relatively low total product yield and relatively low working hours.

Meanwhile, based on the overall productivity of batik, the productivity level is very low. It can be explained that the small amount of

batik output produced is compared to the low input of labor and available working time. The description of the time of making a piece of batik cloth by one craftsman can reach 1 to 2 months because all traditional batik work is done manually or hand-made. Batik art is a high artwork created with the innovation and creation of the maker who is very likely to spend quite a long time both in sparking ideas, realizing them in different shapes, colors, skills, and even moods.

Overall, the low productivity of batik in BM SME is due to the very small number of workers. This low number of workers can be caused by relatively low wages, the existence of other jobs that are considered relatively better, and also the low interest in craft and artistic work that requires patience and perseverance as well as a specific interest in unique works of art. This makes recruitment of employees relatively difficult and a challenge for traditional batik entrepreneurs in general in Malang.

The proposed alternative solutions that are possible to do related to this productivity problem include collaboration with investors, both from coaching companies from the government / BUMN / private institutions that provide capital capabilities to entrepreneurs so that entrepreneurs can increase the number of products produced and increase wages for entrepreneurs. batik craftsmen. Another long-term effort to regenerate batik craftsmen can be in the form of introducing the art of batik from school age, as part of art education and preserving local/local indigenous culture (local wisdom) so that batik becomes a work that is popular in the community in Malang Raya as referred to as an education city, industrial city, and tourism city.

The results of research on the performance of a Batik SME in Malang are related to the Internal Business Process, especially work productivity, the results of the measurement of Key Performance Indicators for Increasing Work Productivity are still relatively high, the achievement is at a score of 8 from a rating scale of 0 to 10. This means that in a similar batik SME, productivity can still achieve good performance (CF Putri, Nugroho, and Purnomo, 2019).

A result of research on individual and group characteristics of a batik SME has a conclusion that individual characteristics have no

significant effect on the performance of batik SMEs, and entrepreneurial characteristics have a significant effect on the current performance of batik SMEs. Individual characteristics are not significantly influenced by the variables of gender, age/business experience, education level, and age of owner/manager of batik SMEs. Meanwhile, the entrepreneurial characteristics of batik SMEs in Malang Raya are significantly influenced by the variables of motivation, optimism, self-efficacy, and self-management. The search for human resources for batik SMEs is a challenge and has a direct effect on the productivity of SMEs. Because in the search for human resources, they must have the ability and great will to carry out the batik process which goes through many processes and takes a long time (Putri et al., 2017). Therefore, the productivity of batik SMEs will be very low if the human resources are in such condition.

The performance of batik SMEs in the average productivity level, which is still considered almost reaching the target, can be seen in the results of the study (CF Putri, I Nugroho, 2018). These results are in line with the results of this study. The KPI performance that is almost reaching the target but still needs improvement is the Average Productivity Level, Number of Patents Produced, Percentage of Employee Skills Improvement Activities, and Percentage of Salary Compatibility Level, and Employee Turnover Rate (CF Putri, I Nugroho, 2018).

In contrast to the results of productivity research in the modern manufacturing industry, according to the results of the study, it is known that the results of productivity measurements at the pharmaceutical company PT Nbfd in the measurement period from April to December 2016 tend to fluctuate compared to productivity standards. The increase in productivity occurred for 5 consecutive months from May to October with the highest productivity in October, namely 878. After the analysis, it was found that the reasons why the productivity decreased were the lack of maintenance on the machine, the lack of checking the raw materials to be used, and the lack of operator skills. by 2 factors of production, namely machines and labor. (Jauhari, et.al., 2019)

Similar research has been conducted on the CV. BJ. The results of the measurement of the productivity index on the CV. BJ. shows that the lowest productivity index was in February

2017 at -82.58% and the highest productivity index was March 2017 at 240.74%. From the results of the measurement of the productivity index, the efforts that need to be taken so that production targets are achieved in the future are the supply of 1471.5 kg of raw materials per month, 6 daily workers, and 54 hours of machine work per month (Mail et al., 2018).

The results of another study are about measuring the productivity of the TD cabin manufacturing industry at PT XYZ. In measuring the productivity of the TD cabin using the Objective Matrix. There are productivity indicators that have increased after improvements have been made, the period before improvements with a Productivity Indicator value of 486 and a Productivity Index of 62%. In the period after the improvement, the Productivity Indicator increased with a value of 540 and the Productivity Index of 80%. One of the causes of the decrease in cabin TD results is the hoist operator factor not checking the initial condition of the hoist before starting work activities. This causes when the machine is used it cannot function properly, then trouble occurs. The unavailability of mechanics on the conveyor machine in the painting conveyor section causes problem handling to be hampered. While the cause for the train is because there is no checksheet available, and differences in Maintenance capabilities. Actions that need to be taken to increase the productivity of the TD cabin are checking the condition of the hoist, conveyor, and train as well as doing good service regularly and making checksheets, and filling out checksheets regularly every day. The final result of this research is that the achievement of cabin TD productivity can be increased. (Annisa Mulia Rani, Muhammad Kosasih, 2018).

The results of another similar study stated that the total productivity index in IRT PL increased in the period August 2016, April 2017, January 2018, and July 2018 respectively 101%, 103%, 108%, and 109% from the base period, and experienced decrease in the period February 2016, September 2016 and November 2017 by 98%, 97%, and 91%. Based on the analysis conducted in PL, the factors causing the decline in productivity that occurred in IRT PL are a decrease in production due to unstable demand, increasing wages for workers, and raw material prices, machine maintenance that is not routinely scheduled, machines and equipment used with

capacity excess, and increased electricity tariffs per kWh. Actions taken to increase productivity include tighter monitoring of worker performance, creating awareness of workers to save energy, checking regularly for changes in raw material prices, and maintaining machines. To improve profitability, it can be done by giving bonuses to workers, using tendons to collect water, promoting through social media, and collaborating with gift centers in the surrounding area (Ifa Hanif, Iffan Maflahah, 2019).

Based on other research data processing in PLTG in the field of electrical energy using the objective matrix method, the productivity index in December 2016 which had the highest value occurred in the 2nd week with 245.42 while the lowest productivity index occurred in the 4th week with a value of 57.96 The productivity index in January 2017 which had the highest value occurred in the 3rd week with a value of 269.16, while the lowest value occurred in the 1st week with a value of 103.98. The biggest increase in productivity occurred in the 1st week of January 217 to the 2nd week of January 2017 by 107.90% while the largest decrease in productivity occurred in the 2nd week of the 3rd week of December 2016 by -65.27%. The criteria or ratios with the highest importance or the most affecting the productivity of PLTG are the ratio 1 (Total Electricity Production/hours of machine operation) with a weight of 35.22 while the ratio with the lowest importance is the ratio of 6 (number of dead machine hours/hours of machine operation).) with a weight of 4.02 (Hardiantara, Kusmindari and Zahri, 2019).

As for the identification of other productivity levels using the objective matrix, the results obtained where the achievement of the highest productivity level was obtained in November 2018 and February 2019 with a productivity value of 554 and a productivity index of 85%, up from standard productivity, while the lowest gain occurred in July 2018 with a value of 243 and a productivity index of -19% down from standard productivity. Meanwhile, the factors that affect the production output resulting from the number of working hours available are still not optimal, namely the total lead time is too long, the environment is not conducive and employee performance is not optimal. From the results of calculations using the VALSAT matrix, it was found that 2 selected tools were used to minimize waste, namely

process activity mapping and quality filter mapping with each mapping value of 44.63 and 26.25. Where to minimize waste using PAM mapping is to eliminate production activities that do not have added value so as to increase process cycle efficiency to 88.20% and for QFM by evaluating the type of defect waste that occurs and making some improvements so that it is expected to reduce the level of waste that occurs. occurs when the production process operates. Recommendations for improvement that can be given for QFM mapping are making production schedules and material procurement, periodically checking the condition of raw materials (Mollah et al., 2009).

The results of another productivity level measurement using the Marvin E. Mundel method at PT. KBS, it can be concluded that (1). Material productivity fluctuates, because for the material itself there are differences for each model or type of shoe. (2). Labor productivity has decreased, due to unproductive employee performance. (3). Energy productivity tends to fluctuate due to wastage of electricity consumption in the production process. (d). Maintenance productivity tends to fluctuate, due to lack of maintenance on the machine or waiting for the machine to experience trouble and then be repaired. The suggestions given for efforts to increase productivity using the Productivity Evaluation Tree (PET) method are (1). The use of electrical energy should be paid more attention to reduce waste in the production process. (2). Machine maintenance is very necessary because the more often it is used, it must be balanced by its maintenance (Ollifia Ayu Ningtyas, 2019).

The results of another similar study show that the overall productivity level in the production sector which for one year, in January there was a fairly high increase, compared to the previous period, namely in December and the lowest value occurred in August. Based on the results of processing using the OMAX method, the comparison results are not sufficient to contribute to the rise and fall of each ratio (Robino Indan, no date).

From the results of other studies using the calculation of OMAX production for the period 2014 – 2015, the overall productivity is quite good, although some ratios are still low. The low level of productivity is found in the ratios 6 and 7, each of which has a value of 30. The reason is that there is a problem with the dough rolling

machine. Work gets stuck. Therefore it is necessary to carry out routine and thorough machine maintenance. In addition, it is known that the highest productivity level is a ratio of 2 which is worth 60. Thus, this ratio means that the productivity level is following the products produced and the availability of working time for employees. Another conclusion is that the cause of the decline in productivity is influenced by three dominant factors, namely, frequent employee absences, manual machines, and methods (Bahrudin and Wahyuni, 2018).

Another study found that the overall productivity value was obtained in 1 year where the monthly data were 57, 123, 57, 55, 130, 45, 112, 140, 140, 152, 118, and 145. The ratio that did not contribute to the increase in productivity and needs to be improved is the ratio of 1 and 5 because in this ratio the dominance of poor productivity is very much. Ratio 2 also needs to be improved although it is not too bad because it is dominated by moderate productivity. While ratios 3,4, and 6 indicate the ratio values tend to be good. The OMAX method is a systematic and effective method used to measure productivity which consists of critical factors in the company (productivity criteria). Where this calculation method gives priority to improvements to the ratio value that is below the standard value, and also maintains a good ratio value (Wibisono, 2019).

Another research on productivity analysis in the service department at PT. Astra International Tbk. Auto 2000 Kenjeran using the objective matrix (OMAX) method, it can be concluded that the best productivity occurred in Juliya, which was 528.8, far above the standard value of 300. The worst productivity occurred in February, which was 174.8. From the index of changes in productivity to standard product, it can be seen that in July the largest value was 156.27%. Meanwhile, February is the worst value of standard products, which is -41.73%. For the index value of changes to the productivity of the previous period, it can be seen that the largest value occurred in March, which was 128.71%, which was the largest increase from February. Meanwhile, the worst decline in productivity occurred in December, which was -52.25% from November (Suparto, 2019).

The results of other research on the application of the Objective Matrix and AHP methods used in the hotel productivity

measurement information system are used to provide the Productivity Index value which is used as a determinant of increasing or decreasing productivity. The first step is to determine the priority weight value of each criterion based on its level of importance using the AHP method. Furthermore, productivity calculations are carried out by selecting the measurement period, to produce a performance scale for each of the existing criteria. After the performance scale is obtained, the value will be scored according to the omatrix that has been created previously, then the score will be multiplied by the priority weight calculated using the AHP method to obtain the performance indicator value. After the performance indicators are obtained, they are compared with the performance indicators of the previous period, so that the productivity index value is obtained. The value of the productivity index is used to determine which period is experiencing an increase or decrease in productivity. In addition, it can also find out what factors cause the increase or decrease in productivity. The implementation of the objective matrix method in this system uses five ratios, namely the ratio between the number of rooms occupied and the number of rooms available, the ratio between the number of rooms cleaned and the number of room maintenance days, the ratio between the number of food & beverage portions and the amount of raw material procurement, the ratio between the number of absent employees and the number of employees as well as the ratio of the number of repairs by engineering and the number of damage to facilities. The five ratios that have been determined are based on data collection and literature studies whose weights have been determined based on the importance of each ratio using the AHP method. The hotel productivity measurement information system using the objective matrix and AHP methods can generate performance scale values, scale categories, performance indicators, and productivity indexes in each period, so that it can assist hotel management in controlling productivity, and can find out what factors cause an increase or decrease productivity so that evaluations can be carried out on factors that cause a decrease in productivity in that period (Ramadhani, Prihandoko and Adiwijaya, 2018).

4. CONCLUSION

Based on the calculation and analysis of productivity using the Objective Matrix (OMAX) method on BM Batik UKM, it can be concluded that the productivity of BM Batik UKM is relatively low. This is evidenced by the low ratio. Labor productivity is at a score of 5, working time productivity is at a score of 1, and batik product productivity is at a . . Another cause of the low number of batik SME is the low wage of labor so that it is less attractive to prospective batik workers and the lack of interest and insight regarding the preservation of traditional batik art and culture as local wisdom. The uniqueness of batik SME is that almost all stages of batik work are traditional and handmade have a low level of productivity, but have high artistic excellence and often have their characteristics.

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References

- Annisa Mulia Rani, Muhammad Kosasih, R. M. S. (2018) 'Upaya Peningkatan Produktivitas Cabin Td Pretreatment Electro Diposition (Pted) Berbasis Model Objective Matrix (Omax) Pt . Xyz', *Jurnal Integrasi Sistem Industri*, 5(1), pp. 12–17.
- Bahrudin, M. and Wahyuni, H. C. (2018) 'Pengukuran Produktivitas Kerja Karyawan pada Bagian Produksi

- dengan Menggunakan Metode Objective Matrix (OMAX) Dan Root Cause Analyze (RCA)', *PROZIMA (Productivity, Optimization and Manufacturing System Engineering)*, 1(2), p. 116. doi: 10.21070/prozima.v1i2.1299.
- CF Putri, I Nugroho, D. P. (2018) 'Performance Measurement the AN Batik SMEs in Batu Using Smart System Method, International Conference on Science Technology and Engineering For Sustainable Development', *ICoSTES*.
- Fatma Putri, C. and Agus Sahbana, M. (2021) 'The Influence of Production Factors on Productivity in Batik SME's in Malang Raya', *Journal of Physics: Conference Series*, 1908(1). doi: 10.1088/1742-6596/1908/1/012027.
- GAMINDRA JAUHARI, MELDIA FITRI, A. S. D. N. (2019) 'PENERAPAN METODE OBJECTIVE MATRIX (OMAX) UNTUK MENGANALISIS PRODUKTIVITAS DI PT. NUSANTARA BETA FARMA PADANG GAMINDRA', *Ensiklopedia of Journal PENERAPAN*, 1(2), pp. 54–59. doi: 10.1017/CBO9781107415324.004.
- Hardiantara, Y., Kusmindari, C. D. and Zahri, A. (2019) 'ANALISIS PRODUKTIVITAS PEMBANGKIT LISTRIK TENAGA GAS DENGAN METODE OBJECTIVE MATRIX (OMAX) (Studi Kasus: PT SA ARY INDORAYA)', *Jurnal Tekno*, 16(1), pp. 17–37. doi: 10.33557/jtekn.v16i1.357.
- Ifa Hanif, Iffan Maflahah, M. F. (2019) 'ANALISIS PRODUKTIVITAS DENGAN METODE APC (AMERICAN PRODUCTIVITY CENTER) ROTI PIA PADA IRT PIA LATIEF KEDIRI', *Agrointek Agroindustrial Technology*, 13(2), pp. 143–154. doi: 10.21107/agrointek.v13i2.5291.g3749.
- Mail, A. *et al.* (2018) 'Analisis Produktivitas Dengan Metode Objektive Matrix (Omax) Pada Cv. Bintang Jaya', *Journal of Industrial Engineering Management*, 3(2), p. 48. doi: 10.33536/jiem.v3i2.234.
- Mollah, M. K. *et al.* (2009) 'Analisis Peningkatan Produktivitas Perusahaan Menggunakan Objective Matrix dan Pendekatan Lean Manufacturing', *Seminar Nasional Sains dan Teknologi Terapan*, pp. 291–296.
- Ollifia Ayu Ningtyas, L. (2019) 'Analisis Produktivitas Menggunakan Metode Marvin E . Mundel dan Productivity Evaluation Tree (PET)', *e-journal Itats*, 6(1), pp. 303–308.
- Putri, C. F. *et al.* (2017) 'Pengaruh Karakteristik Individu Dan Kewirausahaan Terhadap Kinerja Ikm Batik Di Malang Raya', in *Seminar Nasional Gelar Produk*. Malang: Universitas Muhammadiyah Malang, pp. 3–8.
- Putri, Chauliah Fatma, Nugroho, I. and Purnomo, D. (2019) 'Performance Measurement of SMEs of Malang Batik as a Result of Local Wisdom with Balanced Scorecard', *IOP Conference Series: Materials Science and Engineering*, 505(1). doi: 10.1088/1757-899X/505/1/012022.
- Putri, C. F., Nugroho, I. and Purnomo, D. (2019) 'Performance Measurement of SMEs of Malang Batik as a Result of Local Wisdom with Balanced Scorecard', *IOP Conference Series: Materials Science and Engineering*, 505(1). doi: 10.1088/1757-899X/505/1/012022.

- Ramadhani, S. N., Prihandoko, A. C. and Adiwijaya, N. O. (2018) 'Sistem Informasi Pengukuran Produktivitas Hotel di Kabupaten Jember Menggunakan Metode OMAX (Objective Matrix) dan AHP (Analytical Hierarchy Process) (Studi Kasus Hotel Istana)', *Berkala Sainstek*, 6(1), p. 10. doi: 10.19184/bst.v6i1.7555.
- Ramayanti, G., Sastraguntara, G. and Supriyadi, S. (2020) 'Analisis Produktivitas dengan Metode Objective Matrix (OMAX) di Lantai Produksi Perusahaan Botol Minuman', *Jurnal INTECH Teknik Industri Universitas Serang Raya*, 6(1), pp. 31–38. doi: 10.30656/intech.v6i1.2275.
- Robino Indan, R. A. (no date) 'Analisis Pengukuran Produktivitas Produksi Teh Hitam Dengan Metode Objective Matrix', *Civil Engineering Colaboration*, 1(2), pp. 129–134.
- Siregar, A. P. *et al.* (2020) 'Upaya Pengembangan Industri Batik di Indonesia', *Dinamika Kerajinan dan Batik: Majalah Ilmiah*, 37(1). doi: 10.22322/dkb.v37i1.5945.
- Suparto, dan M. H. (2019) 'ANALISIS PENGUKURAN PRODUKTIVITAS DENGAN METODE OBJECTIVE MATRIX (OMAX) PADA DEPARTEMEN SERVICE PT. ASTRA INTERNATIONAL TBK AUTO 2000 CABANG KENJERAN', in *Prosiding SENDI_U*, pp. 673–677.
- Wibisono, D. (2019) 'Analisis Produktivitas Dengan Menggunakan Pendekatan Metode Objective Matrix (OMAX) Studi Kasus di PT. XYZ', *Jurnal Optimasi Teknik Industri (JOTI)*, 1(1), p. 1. doi: 10.30998/joti.v1i1.3423.