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A profile analysis of blacksmith in Desa Limbang Jaya I Kecamatan Tanjung Batu Kabupaten Ogan Ilir - Indonesia

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Abstract. This paper aims to analyze the relationship of factors showing the profiles of blacksmiths in Desa Limbang Jaya I in terms of social demography, average monthly income, and productivity of craftsmen. The productivity studied includes the average number of products for 1 month, the average length of working time per day, the average duration of the work of 1 kodi of product (in hours), and the price of 1 kodi of product. Based on the description analysis, artisan of blacksmith in Desa Limbang Jaya I majority aged 25-55 years, married status with majority of his wife works as a songket craftsman. The results of a biplot analysis with a representative level of 50.6% indicate that the income of the craftsmen depends only on the price of the product, but not on the number of products. Working hours of craftsmen in the day is quite high, but the effect is not significant enough to increase the number of products produced. The result of cluster analysis is found that majority of craftsmen have high age, high experience, and have the highest work day, but lower income. While most of the craftsmen have low productivity features. Only a small percentage of craftsmen whose age and work experience are low but they have higher income.

Keywords: Desa Limbang Jaya I, profiles of the blacksmith, biplot analysis, cluster analysis, productivity of blacksmith.

1. Introduction

The potential of craftsmen from Desa Limbang Jaya can be said the largest in South Sumatra Province. The village also has the most number of blacksmiths. Other villages with fewer blacksmiths are Desa Tanjung Pinang (as a neighboring village directly adjacent to Desa Limbang Jaya), Desa Tanjung Laut, and Desa Merangin. Production of, both artisans of songket and blacksmith in Limbang Jaya using raw materials imported from outside the region. Raw materials for the craft of iron in the form of iron that the steel level is good enough. The iron material is mostly sent from Surabaya. Charcoal fuel for this handicraft sent from Jambi.

The level of population migration in Desa Limbang Jaya is quite high, especially blacksmith. This is because the insufficient natural potential and also the artisans do not use the potential of their own region. They mostly migrated to Jambi, whereas a small number of people migrated to Sulawesi ² and Papua. They make and develop business as a blacksmith. They wander not to bring their family and



some are permanently moved to other areas. Although permanent, they often return home at least once a year. Their wife usually work as songket artisans.

The Blacksmith's products of Limbang Jaya artisans are marketed to smallholder plantations in Kecamatan Tanjung Batu and also out of areas with many plantation areas, such as Kabupaten OKI, MUBA, and even out of provinces, namely Bengkulu and Jambi. The products of the craftsmen are good enough for the traditional craftsmen class at the national level.

Reference [1] researched the factors that affect the productivity of lontar women craftsmen in Desa Bona, Kabupaten Gianyar. This study used multiple linear regression analysis, with the variables studied are social demographic and economic factors of craftsmen, including: age, education, work experience, and marital status. The results showed that factors affecting productivity were age, work experience and marital status. The level of education does not affect productivity. Age is an influential dominant factor.

The purpose of this paper is to present the character, profile, and potential of blacksmith in Desa Limbang Jaya in terms of social demography factors including age, education level, work experience as craftsman, marital status and wife profession, average income per month, and productivity of craftsmen. The productivity studied includes the average number of products produced in 1 month (in kodi), the average length of working time per day, the average duration of workmanship of 1 kodi product (in hours), and the price of the product. The monthly income is income after deducting the cost of raw materials.

By profile analysis of blacksmith, we can analyze the factors that affect productivity of blacksmith, so we can formulate the need of craftsmen to increase their productivity. The high productivity has strong relationship with income.

2. Literature Review

Reference [2] suggested the importance of government participation to contribute to how to increase the income of songket craftsmen in the industrial center of songket in Kelurahan 30 Ilir Palembang. Maternal income, maternal education, the number of family members, and investment influence the pattern of food consumption is greater than non-food.

Reference [3] discussed the profile of the bamboo handicraft creative industry and how innovations can improve the performance of artisans in Desa Sumber, Kecamatan Trucuk, Kabupaten Klaten. Research showed that there was a need for handycraft bamboo craftsmen to get training on entrepreneurship.

Reference [4] researched the work culture of female songket weavers in Desa Bukit Batu, Kabupaten Bengkalis. The business of the artisans had made no significant progress, even though the government had provided donation. This phenomenon occurs because of the low work culture (average 44.33%) and the absence of entrepreneurial mentality in the songket weavers in Desa Bukit Batu. The factors that cause the low work culture of songket weavers can be divided into two parts, namely (1) internal factors consisting of low levels of education and insight, the attitude of the songket weavers, and low motivation in work; (2) external factors consisting of customs and culture prevailing in society and government policies (especially during the New Order period).

The motivation of weavers is doing work more based on the material, not the non-material. They do this work more to economic demands or fulfilment of household needs [5].

Reference [6] examined the inhibiting factors and efforts made by craftsmen in maintaining the sustainability of the blacksmith industry in Desa Tumbukan Banyu and Desa Sungai Pinang, Kecamatan South Daha, Kabupaten Hulu Sungai Selatan. The results of this study showed that inhibiting factors affecting the blacksmith industry include expensive raw materials, limited capital, unsuitable labor with his education and employment backgrounds, the use of traditional technology, marketing that is only sold to pensions, less preferred institutional functions, lack of interest participate in government activities and the disappearance of regional cultural features. Efforts are made to maintain the sustainability of the industry by purchasing raw materials wholesale, adding

capital by individual loans, training and internships, machine use, marketing at industrial sites or outlets and improving the function of business groups.

Several methods in multivariate analysis relating to the simplification of data cluster problems with many variables and objects are the principal component analysis (as the initial method), biplot analysis (as graphical analysis), correspondence analysis, and cluster analysis. These analysis can reduce the variables by identifying smaller groups of variables [7].

3. Research Methods

This research is a case study. The population in this study is the community of blacksmith craftsmen in Desa Limbang Jaya I, Kecamatan Tanjung Batu, Kabupaten Ogan Ilir. The sampling technique used is purposive sampling technique. The data used in the form of primary data based on observation and direct interviews or through questionnaires.

The steps in this research are:

1. Identification of the variables studied include factors that can characterize the profile and potential of artisans of the blacksmith; which includes social demography factors that are limited to age, education level, length of time to profession as craftsmen, marital status (also wife profession), average monthly income, and productivity of craftsmen. The productivity studied includes the average number of product produced in 1 month (in kodi units), the average length of working time per day, the average duration of the processing of 1 kodi product, and the price of the product. The identification of variables is accommodated in the form of questionnaire questions. The type of product made determines the wage (income after deducting the raw material) per kodi and also the length of time of workmanship.
2. Quantitative descriptive analysis; to give an overview of the characteristics of the variables.
3. Perform multivariate analysis, i.e. biplot analysis and cluster analysis.
4. Interpretation of results.

4. Results and Discussion

Based on information from the Village Head and his apparatus, there are about 100 - 150 highly productive blacksmiths in the village. Blacksmiths who only cut iron raw materials into standard sizes, or suppliers of raw materials, collectors or containers of products, and also wandering blacksmith (but not permanent, it's means not to bring the family to go wander) are not included as a population of skilled artisans iron. In this case, with Slovin formula obtained a sample of 34 respondents.

The manufacture of blacksmith products through several stages; namely sketching, forging ("memandai"), sharpen, and finishing (smoothing and installation of accessories). All the blacksmiths can perform at every stage. Especially for the manufacture of wooden handles in knives, they usually work together with wooden craftsmen and knife accessories. The selling price and the profit earned depend on the type of product made. The products made are rubber tapping knives, dodos for palm oil, machetes, and various types of knives including kitchen knives. The economics of artisans of blacksmith craftsmen along with the high price of rubber, because the products they produce the majority are used by rubber farmers.

Work as a craftsman is the main job, because the natural conditions are less support for the creation of employment. Iron marking skills are usually obtained from generation to generation from parents. The tools used are still traditional in the form of charcoal stoves and "asahan" for sharpeners, as well as semi-modern tools by using electricity in the form of blowers, grinding machines, and welding machines.

According to the Village Head of Limbang Jaya who is also a blacksmith businessman (he employ several craftsmen with its own brand), Limbang Jaya' blacksmith products are better quality than artificial craftsmen in Medan. But they are lost to compete with products from outside, especially Malaysia. It is viewed from materials and sharpening technology. Table 1 shows statistics descriptive of the respondents.

Tabel 1. Statistics descriptive of the respondents

Variable	Mean	StDev	Minimum	Q1	Median	Q3	Maximum
Age (in years)	41.74	12.78	18.00	31.50	43.00	48.50	67.00
Work experience	22.15	13.50	2.00	9.50	23.00	30.50	50.00
Income (in Rp)	2960294	1389341	1200000	2000000	2750000	3050000	7200000
Number of product (in kodi)	35.76	26.41	10.00	20.00	30.00	40.00	150.00
Work hour per day	7.691	1.206	4.000	7.000	8.000	8.000	10.000
Duration of work (in hours)	6.956	3.207	1.600	5.000	7.000	8.000	20.000
Product price	388529	182610	60000	275000	400000	500000	750000

Based on statistical descriptions, we obtain the average of the variables and quartile limits of the respondents, so that in addition to using a histogram (with curve normal), the statistics descriptive can also be a benchmark in compiling the categories of variables.

Figure 1 is a percentage graph of the composition of respondent categories in terms of social demography factors, productivity, and income.



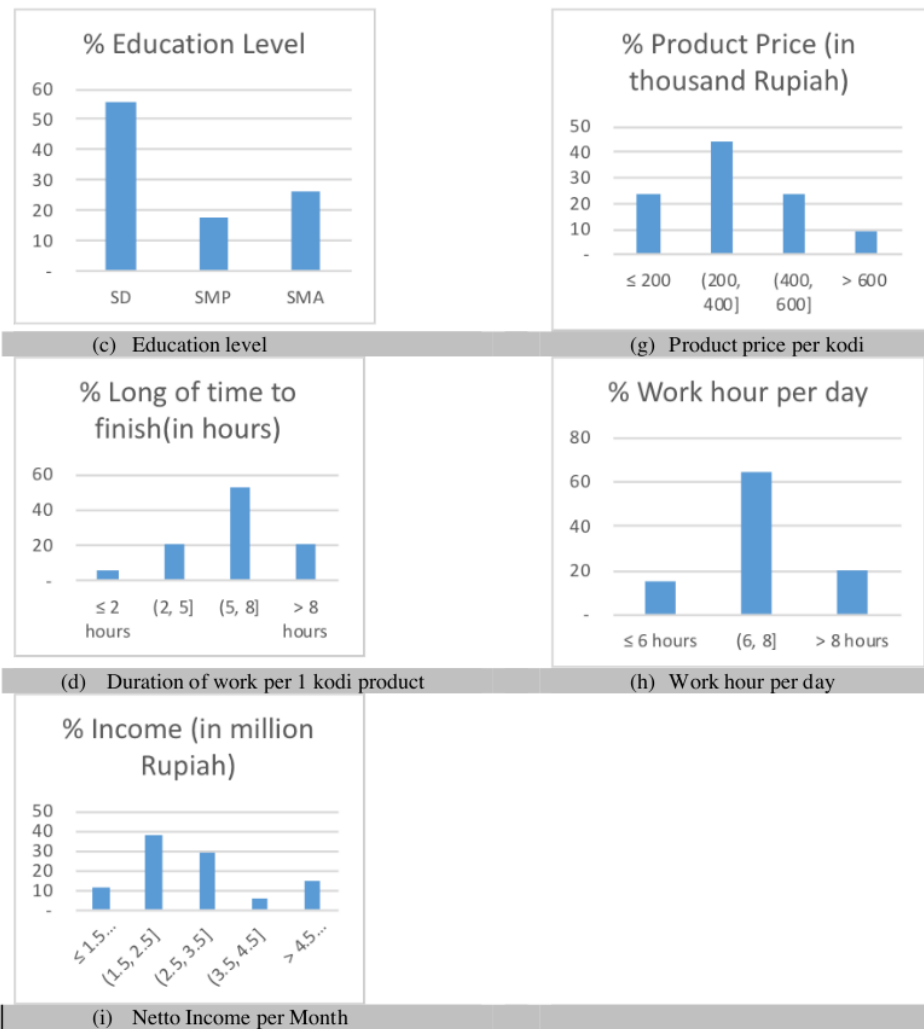


Figure 1. Percentage of respondent composition based on (a) - (i)

According to Figure 1, the majority of respondents are 25-55 years old (79%), with age ranges (25, 35], (35, 45], and (45,55] respectively 26%, 24% and 29%. The 82% of respondents are married, with 82% of their wives working as songket weavers. Single status who has a high net income per month is 18%.

Respondents had low education, namely elementary level (56%). The majority of them have undergone the profession as craftsmen for 20-30 years (29%), even > 30 years (24%). Their product yields are average of ≤25 kodi per month (47%), with their product prices are Rp 200,000-Rp 400,000, - per kodi. Working hours per day from craftsmen are mostly full day, which are 6-8 hours (65%). The duration of workmanship of 1 kodi product is ranged from 5-8 hours (53%). The monthly net income of the respondents is average Rp 1,500,000 until Rp 2,500,000 (about 38%) and even up to Rp 3,500,000 (29% of the respondents).

Based on value of variables from 34 respondents, it can be formed a data matrix. Since the units of the variables are different, the data matrix is standardized, so the principal component analysis is done by using the correlation matrix. The correlation between variables can be seen in Table 2.

Table 2. Correlations among variables

	Edu.	Ages	Work Exp.	Income	Number of product	Work day	Duration of work
Ages	-0.302						
Work experience	-0.311	0.845					
Income	0.043	-0.082	-0.148				
Number of product	0.272	-0.009	-0.028	0.180			
Work hour/day	0.267	0.083	0.195	0.269	0.206		
Duration of work	-0.111	-0.019	0.072	-	-0.623	0.083	
				0.062			
Product price	0.082	-0.290	-0.166	0.410	-0.282	0.044	0.161

Description: The coefficient in bold states there is a fairly close correlation between 2 variables.

Based on Table 2, there is low correlation among the level of education with work experience and the income level. Age is positively correlated closely with work experience. Income is most related to product prices, with a correlation of +0.41. The number of products is negatively correlated quite closely with the length of workmanship per kodi.

Correlations among variables and relative relationships between objects (respondents) and variables can be seen from biplot which is a graphical representation of the group of variables studied, as in Figure 2. This biplot can only represents variance of the data with goodness of fit as 50.6%, so biplot is not enough to represent information. It can also be seen from the length of the segment of the variable lines that are not the same length. Since the first four principle components (PC) have a goodness of fit 82% (> 75%), so PC analysis results can be used.

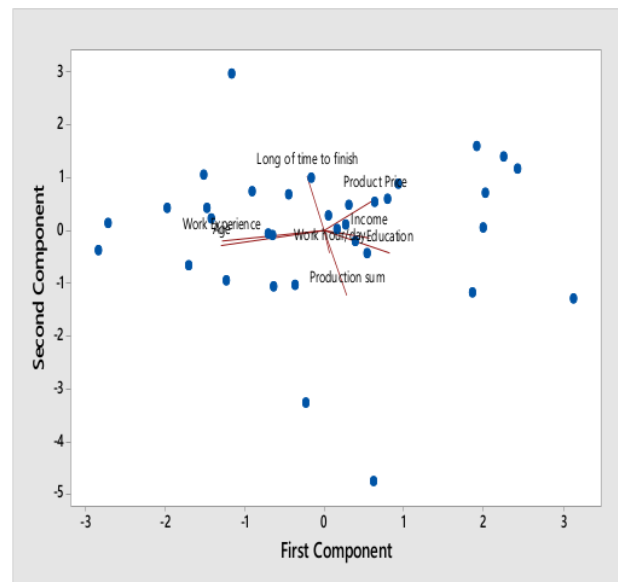


Figure 2. Biplot of relationship among objects with variables

The eigenvectors obtained from the correlation matrix can be seen in Table 3.

Table 3. The coefficient value of the principle components

Variable	PC1	PC2
Education	0.371	-0.233
Age (in years)	-0.587	-0.156
Work experience	-0.583	-0.104
Income (Rp)	0.255	-0.070
Number of product (in kodi)	0.127	-0.660
Work Hour per day	0.030	-0.224
Duration of work (in hours)	-0.097	0.557
Product price	0.292	0.332

Based on Table 3, the dominant variables representing the principle components of the biplot are age, work experience, number of products, and duration of product work.

Based on Figure 2, respondents whose age is old has a high working period (work experience) and low education. In this case, the profession as craftsmen started from the teenage years. Working hours of craftsmen in the day is quite high, but the effect is not significant enough to increase the number of products produced (low positive effect or correlation), and does not affect the decrease in the duration of workmanship for 1 kodi of product.

Income depends only on the price of the product, but not on the number of products. This can be due to the product being produced at various prices. The higher the price of the product, the greater the profit.

If the number of products produced is high, it will require higher processing time and is not affected by working hours/days. Because the average working hours / days of the craftsmen is 6-8 hours (all day).

If the average working hours in a day is high, then it should be able to decrease the duration of processing 1 kodi of product becomes shorter and the number of products produced in 1 month more, so as to increase revenue. If it is analyzed based on observations, answers to questionnaires, and direct interviews, it is influenced by work culture, dependence on raw material and capital availability, lack of appropriate targeted craftsmanship, and marketing dependence on collectors. They market their products so they can earn money to meet their daily needs. Furthermore, it affects the entrepreneurial spirit and low performance.

Cluster analysis is a technique used to classify objects or cases (respondents) into groups that are relatively homogeneous and have similar characteristics. Figure 3 and Figure 4 below are dendrograms of cluster analysis results with a complete linkage method of the respondents.

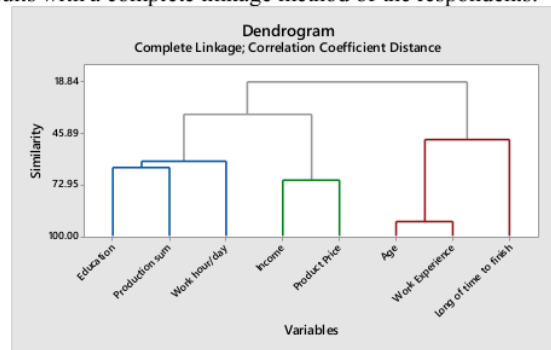


Figure 3. Dendrogram on cluster analysis of variables

Based on Figure 3, there are 3 clusters of variables formed. If they are viewed from the meaning of the problem, then clusters can be interpreted as: cluster 1 is characterized by income and product price variables; cluster 2 is characterized by age and work experience variables; and cluster 3 has relatively no informative features although work hour/day is related to production sum. The results of cluster analysis of observations are as in Table 4 to Table 6.

Table 4. Numbers of Observations and average distance from centroid

Number of observations	Within cluster sum of squares	Average distance from centroid	Maximum distance from centroid	
Cluster1	14	48.2012	1.75526	3.56189
Cluster2	11	68.7610	2.38247	3.98700
Cluster3	7	33.0952	2.10862	3.23410
Cluster4	2	2.9325	1.21090	1.21090

Table 5. Cluster centroid

Variable	Cluster1	Cluster2	Cluster3	Cluster4
Education	-0.709156	0.005918	0.99049	1.46481
Age	0.015122	0.710660	-1.23115	0.29456
Work experience	-0.100840	0.904931	-1.30190	0.28540
Income	-0.256757	-0.102288	0.76891	-0.33130
Production sum	-0.312945	-0.166648	-0.02355	3.18959
Work hour/day	-0.632270	0.745962	0.01916	0.25604
Long of time to finish	-0.104279	0.334047	0.14292	-1.60755
Product price	-0.160143	0.102641	0.64955	-1.71694

Based on Figure 4, there are 4 clusters of respondents that can be formed. The numbers of observations in each cluster can be seen in Table 4.

Based on Table 5, cluster 1 consisted of the most (respondent) objects is characterized by the lowest education and work hour variables values, and also had low income, production sum and work hour. So, cluster 1 is dominantly characterized by craftsmen whose productivity is low. Cluster 2 consisting of 11 respondents is characterized by high age, work experience, and work hour variables. While cluster 3 is characterized by the lowest age and work experience variables and highest income. Cluster 4 consisting of 2 respondents is characterized by highest education and production sum variables, but lowest long of time to finish product and product price variables. So, cluster 4 can be interpreted as a cluster of minority craftsmen who has special skills to work on products in large quantities, but have a low price and the fastest processing time.

Based on Table 6, cluster 4 is very different from other clusters.

Table 6. Distances between cluster centroids

	Cluster1	Cluster2	Cluster3	Cluster4
Cluster1	0.00000	2.05247	2.85681	4.76437
Cluster2	2.05247	0.00000	3.35462	4.61766
Cluster3	2.85681	3.35462	0.00000	5.03265
Cluster4	4.76437	4.61766	5.03265	0.00000

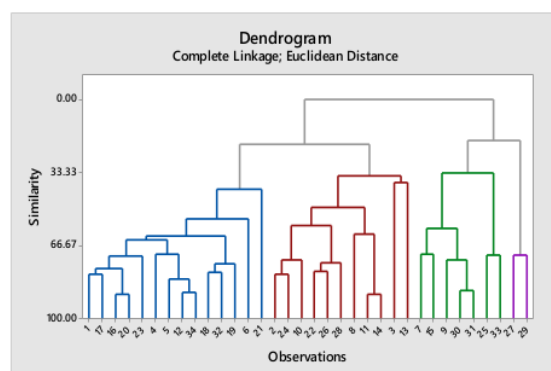


Figure 4. Dendrogram on cluster analysis of observations

5. Conclusion

From the result we can conclude that Artisan blacksmith in Desa Limbang Jaya I majority of 25-55 years old, married status with majority of his wife work as songket weavers. Craftsmen are also mostly low-educated, that is elementary level and have undergone the profession as craftsmen for 20-30 years. The product yields an average of 25 kodi per month with working hours per day 6-8 hours and the duration of the work of 1 kodi of product is average 5-8 hours. The monthly net income of the average craftsmen is less than Rp 3,500,000.

The result of a biplot analysis with a representative level of 50.6% indicates that the income of the craftsmen depends only on the price of the product, but not on the number of products. If the number of products produced is high, it will require longer processing time and is not related to working hours/days. Old-age artisans have a high work experience and low education. Working hours of craftsmen in the day is quite high (all day), but the effect is not significant enough to increase the number of products produced (low positive effect).

The result of the cluster analysis obtained by the majority of craftsmen profiles of high age have high work experience as well, and have the highest work day, but lower income. While most of the craftsmen have low productivity features. Only a small percentage of craftsmen whose age and work experience are low but they have higher income.

6 Acknowledgment

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