

## **STUDY OF VALUE-ADDED SOYBEAN-BASED PROCESSED PRODUCTS IN THREE REGENCIES OF EAST JAVA PROVINCE**

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### **Abstract**

The soybean stock availability in Pasuruan, Jember and Banyuwangi regencies of East Java Province has experienced a very worrying development in the past few years due to decline in production by above 29 per cent. This has implications for the sustainability of the tofu and soybean cake (tempeh craft). Along with the limited availability of raw material, i.e. soybean, the production costs tend to reduce the added value. The purpose of this study was to analyse the added value, the relationship of soybean commodity stock availability and added value, the factors that influence profit, and the added value of the tofu & tempeh craft. Descriptive correlative method with survey and non-probability sampling techniques as well as data collection techniques through in-depth interviews were used for this study. For data analysis, Hayami method, Pearson Product Moment Correlation, and Cobb-Douglas Model Multiple Regression were used. The results of this study revealed that i) the average value added of tofu & tempeh products is IDR 8,608.09 per kilogram of raw materials with an added value ratio of 47.11 per cent; ii) there is a fairly strong positive relationship between the variable stock availability of raw materials and the added value of tofu & tempeh products, iii) the variable of the amount of production, and the price of production have a significant effect on the profit of the tofu & tempeh craft at the real level  $\alpha$ 1 per cent; and 4) variable amount of soybean raw material significantly influences the added value of tofu & tempeh products at the real level of 1 per cent.

**Keywords:** Value Addition, Variable Relationship, Profit, Soybean Stock Availability.

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## Introduction

The significance of the contribution of agricultural sector to economic growth is relatively reduced along with the development of industrial sector, transportation, communication and services, especially in the era of Industrial Revolution 4.0. However, according to Priyono (2019), the agricultural sector in Indonesia is still an economic force to reckon with close to 100 million people or nearly half of the total population working in the sector. Therefore, the Ministry of Agriculture, Indonesia has made various efforts to foster small and medium craft (SME) entrepreneurs to build a strong foundation for supporting the economy. One of the efforts made by the government is to hold agrifacraft management training for small and medium craft actors in collaboration with the Asian Productivity Organization (APO) and Cornell University. Priyono (2019) notes that the food sector is always in demand, especially in Indonesia, where it is a large-scale industry. It is expected that novice farmers and SMEs will continue to innovate in the Indonesian market and also in exports of certain commodities.

Priyono's opinion was strengthened by Sulaiman (2019), who stated that agricultural sector was one of the main drivers of the economic development in Indonesia. Data published by BPS (Badan Pusat Statistik, i.e. the Central Bureau of Statistics) on 6th August 2018 noted that all craft fields grew positively during the second quarter of 2018. The research by Nielsen Company Institute revealed that Indonesia's agricultural progress continued to decline as compared to the Gross Domestic Product growth rate. This decline in agricultural growth is attributed to the dearth of strong commitments from the governments of various periods towards the sector.

Furthermore, Silvana and Fenny (2011) and Nugroho et al. (2018) stated that agro-industry influences the development of aquaculture (on-farm agrifacraft) and other activities in the overall agribusiness system. Agro-industry helps overcome development problems such as unemployment, poverty, equity, etc., besides

creating employment opportunities and drawing in foreign exchange. Agro-industrial development is aimed at strengthening the structure of regional industries in an effort to strengthen national industries, equalise development in regions, expand employment opportunities, increase value addition and dominate the domestic market. And so, agro-industry can encourage the development of agricultural sector through input-output links.

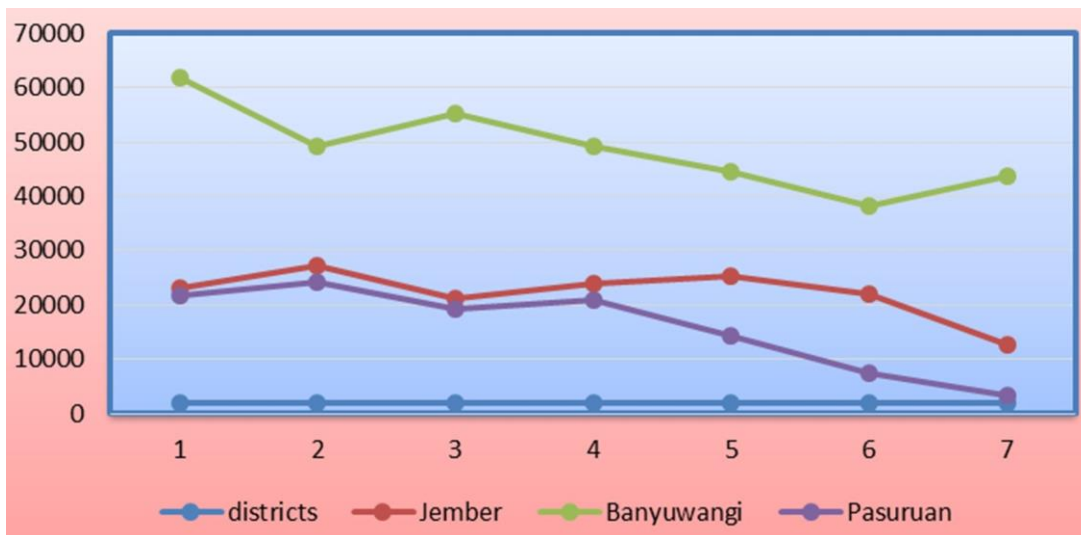
The development of tofu and tempeh agroindustry in Pasuruan, Jember and Banyuwangi regencies stands as evidence of the lack of success of government programmes in the food crop sub-sector, especially soybean commodities. The problems related to production inputs, such as soybean raw materials, have been remaining unsolved. According to the views of Sutrisno (2018) and Ketut and Swastika (2004), the consumption of soybeans in the form of processed food, such as tofu, tempeh, soy sauce, tauco and various forms of snacks has resulted in this condition.

The problem of soybean stock availability cannot be separated from competition between the local and imported varieties. Figure 1 shows fluctuation in soybean stocks experienced by Jember, Pasuruan and Banyuwangi regencies, which declined over the eight years from 2015 to 2021, respectively, at -44.70 per cent, -29.42 per cent and -84.19 per cent per year (BPS, 2019). Hence, the government has to import soybean to meet the domestic consumption needs, especially in Pasuruan regency, where the availability is low.

The development of harvested area, production, and productivity of soybeans experienced quite extreme fluctuations in Pasuruan, Jember and Banyuwangi during the period from 2011 to 2017. However, during the 2020-2021 season, the harvested area and production increased significantly except for productivity (Figure 2). This condition is still a concern in the context of domestic food supply, especially for soybeans, because consumption needs tend to increase in the medium and long terms. This condition is in accordance with the results of research by Tahir et al. (2016), Zakaria

**Figure 1**

*Soybean Production Development in Jember, Pasuruan and Banyuwangi Regencies from 2015 - 2021*



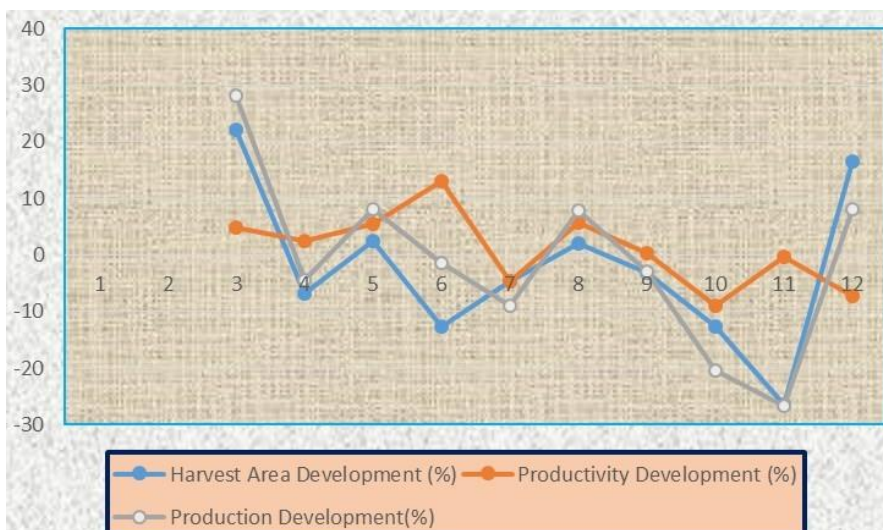
Source: BPS East Java, 2022.

(2016) and Sayaka et al. (2021) that soybean demand continues to increase along with population growth and the development of food and feed industry that uses soybeans as raw material. During the last decade, the demand for soybeans in Indonesia increased by an average of 8.74 per

cent per year, while on the other hand, supply from domestic production continued to decline due to the fall in harvested area. This decline in harvested area is attributed to lower participation of farmers in soybean farming.

**Figure 2**

*Development of Soybean Production in East Java Province for 2012 - 2021*



Source: BPS East Java, 2022

The availability of soybean greatly affects the sustainability of commodity-based agroindustry activities, especially for the tofu and tempeh craft, which incidentally is a compulsory meal in Indonesia. The availability of raw materials will affect the cost of production because input prices are also increasing, particularly in the event of a deficit in the export balance of soybean commodity imports. The next implication is that the craftsman will automatically raise the selling value of craft output and this will affect the previous market price balance. Therefore, the objectives of this study were to analyse 1) the added value of tofu & tempeh craft in Pasuruan, Jember, and Banyuwangi regencies of East Java Province, 2) the relationship of soybean stock availability for each production process to the amount of added value of tofu & tempeh craft, 3) the factors that influence the profits of the tofu & tempeh craft, and 4) the factors that influence the degree of its added value. Indonesia being a developing country, this study intends to provide insight for the policymakers to set up suitable regulations that support food security issues as well as encourage SMEs to innovatively provide value addition for their products.

## Research Methods

This type of research uses a correlative descriptive study that aims to find facts with the right interpretation (Nazir, 1985; Hadi & Fauzi, 2016). This study used survey method (Singarimbun & Efendi, 2005) because the target population was too large and they spread over several remote areas. Research has been ongoing since January 2022 in Jember, Pasuruan and Banyuwangi regencies. The research locations of several sub-districts in the sample districts that have tofu & tempeh production centres are determined by non-probability sampling, considering the non-availability of entire data regarding tofu & tempeh crafters in the study area at the relevant agencies. Therefore, the sample in this study is tofu and tempeh crafters which are determined at a simple random, each totalling 18 and 21 people. Primary data was collected through direct in-depth interviews with respondents guided by a structured questionnaire. The steps of data collection include determining the sampling location, and small and medium enterprises of tofu, and conducting in-depth interviews with the respondents. The sampling locations of Jember, Pasuruan and Banyuwangi regencies are located in the eastern part of Jawa Timur Province as indicated in Figure 3.

**Figure 3**

*The Sampling Location in Eastern Part of Jawa Timur Province*



In order to answer the objectives of the first determination of the magnitude of the added value of the tofu & tempeh craft, the Hayami and Ruttan Method (Ruttan, 1989) (Hadi & Fauzi, 2016) was used. To test the first hypothesis that the activities of the tofu & tempeh processing industry in East Java Province provide value addition, decision criteria are used (Added Value  $\leq 0$ ). Furthermore, for the second determination, one sample t-test is used to see whether the ratio of added value of tofu & tempeh craft is classified as medium or not (Riduwan, 2010; Lestari et al., 2019) with the formulation of statistical hypotheses as follows (Silvana & Fenny, 2011):  $H_0: \mu \leq \mu_0 = 40$  per cent (value added ratio 15 per cent - 40 per cent is a moderate ratio), and  $H_a: \mu > \mu_0 > 40$  per cent (value added ratio  $> 40$  per cent is a high ratio). In order to answer the third objective of determining the relationship between the amount of soybean commodity stock availability and the amount of added value, Pearson Correlation Product Moment technique analysis was used at a significant rate of 5 per cent.

The raw material availability is measured by the difference between the quantity of soybean input procurement when needed and the quantity that should be present in each ideal production process. The X variable represents the raw material availability, while the Y variable represents the added value of the tofu & tempeh processing activities. To direct the course of this research, a hypothesis was formulated as follows:  $H_0: r = 0$ , which denotes no relationship between the availability of raw material stock and the added value, and  $H_a: r \neq 0$ , which indicates a relationship between the availability of soybean and the added value. To determine whether the correlation coefficient obtained can be used to generalise or represent the population, the significance test of the t-test was used.

In order to answer the third objective of determining the factors that affect the profits of the tofu & tempeh craft, a Cobb-Douglas profit function model was used and transformed into a natural logarithmic model (ln) (Gujarati, 2003). The model used in this study is as follows:

$$Y = b_0 X_1^{b_1} X_2^{b_2} X_3^{b_3} \dots X_8^{b_8}$$

Based on the function of these equations, the model was developed into a multiple linear regression form by transforming the equation into a

natural logarithmic form so that the estimated equation was obtained as follows:

$$\ln y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 \dots b_8 \ln X_8$$

Where:

Y = Profits from tofu and tempeh processing industry activities (IDR/Production Process)

$b_0$  = Constant

$b_1$ - $b_8$  = Regression coefficient of independent variables

$X_1$  = Price of Tofu and Tempeh Products (IDR /kg)

$X_2$  = Total Production (Kg)

$X_3$  = Cost of Production (Rp/Production Process)

$X_4$  = Fixed costs (IDR /Production Process)

$X_5$  = Total Production (IDR /Production Process),

$X_6$  = Production price (IDR/Kg)

$X_7$  = Production Capacity (Kg/Production Process),

$X_8$  = Business experience (years).

The F-statistic test was carried out to find out whether all the independent variables included in the model had a simultaneous effect on the dependent by making a null hypothesis ( $H_0$ ) and an alternative hypothesis ( $H_a$ ) as follows:  $H_0: \beta_1 = \beta_2 = \beta_3 = \dots = \beta_8 = 0$ , and  $H_a: \beta_1 \neq \beta_2 \neq \beta_3 \neq \dots, \neq \beta_8 \neq 0$  or there is at least one  $\beta_i \neq 0$ . The critical F value is based on the magnitude of  $\alpha$  and df where the magnitude is determined by the numerator ( $k_1$ ) and df for the denominator ( $n-k$ ). The t-statistical test was used to analyse how far the influence of one independent variable individually explains the variation of the dependent variable (Widarjono, 2010). Then the decision-making criteria were formulated as follows: If the t-count value > t-table value, then  $H_0$  rejects or accepts  $H_a$ , i.e. statistically the independent variable significantly affects the dependent variable, and if the t-count value  $\leq$  t-table value, then  $H_0$  accepts or rejects  $H_a$ , i.e. statistically the independent variables do not significantly affect the dependent variable. Furthermore, to answer the fourth objective regarding the factors that influence the value addition of tofu and tempeh craft business, the following multiple linear regression equation model was used (Engko, 2008 in Lestari et al., 2019):  $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$ , description: Y = dependent variable (Value Added) (Rp/kg),  $X_1$  = Amount of Soybean raw material (kg),  $X_2$  = Price of Tofu and Tempeh (IDR/kg), and  $X_3$  = Contribution of Other Inputs (IDR/kg),  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  = Regression coefficient, and  $e$  = error or value residue.

## Results and Discussion

**Value Addition:** Value addition is the added value/price of raw materials that are processed at one or more stages, eventually giving the product a higher selling price. The purpose of this analysis is to measure the value added to soybean commodities by turning it into per kilogram of tofu & tempeh in

one production process. This value-added analysis is done using the analysis tools according to Ruttan (1989) and Hadi & Fauzi (2016). It can be seen that the value added to the processed product (IDR/kilogram of raw material) is the total revenue (Rp/kg of raw materials) reduced by intermediate costs, namely the cost of raw materials and other input costs that support the production process in addition to labour costs (IDR/kilogram of raw materials).

The value added to tofu & tempeh craft can be enjoyed by employers/producers and workers, respectively, in the form of profits and wages. Value-added analysis is carried out to determine the value addition and remuneration for activities related to production - from the procurement of raw materials to processed products in the form of tofu & tempeh. Therefore, several components are used for calculating added value, including prices of tofu & tempeh commodities, raw materials, and various auxiliary materials such as yeast, vinegar, wood fuel, plastic bags, and banana leaves.

In addition to the added value calculated using the Hayami and Ruttan formula, it can also determine the ratio of value addition per product, calculate labour benefits per kilogram of raw material, determine the share of labour per value-added, calculate profits by reducing value added in return for labour, and the rate of profit per value added. Likewise, using the Hayami and Ruttan approach (Ruttan, 1989), compensation for factors of production margin (the difference between the value of the product and per kilogram of raw materials) can be calculated, besides determining direct labour income obtained by means of labour benefits per kilogram margin, contribution of other inputs per margin and the company's profit margin per kilogram. Details of the calculation of added value and its derivatives of the activities of the tofu & tempeh craft activities at the three regencies are presented in Table 1.

**Table 1***The Added Value of Tofu & Tempeh Craft Obtained through the Hayami and Ruttan Approach*

S. No.	Output, Input, Price*	Value	Formulation
1	Production yield (kilogram /production process)	119.03	A
2	Raw Material (IDR / production process)	37.03	B
3	Labour (Man-day)	1.52	C
4	Conversion factor (1 / 2)	3.21	A / B = M
5	Labour coefficient (3 / 2)	0.04	C / B = N
6	Product price (IDR / Kilogram)	5,683.78	D
7	Average wage (IDR / Man day)	39,729.73	E
<b>Income</b>			
8	Price of raw materials (IDR / Kilogram)	7,545.95	F
9	Other input contributions (IDR / Kilogram)	2,117.04	G
10	Product value (4x6) (Rp / Kilogram)	18,271.08	M x D = K
11	a. Added value (10-9-8) (IDR / Kilogram)	8,608.09	K - F - G = L
	b. Value added ratio (11.a / 10) ( per cent)	47.11	(L / K) per cent = H per cent
12	a. Employee benefits (5x7) (IDR / Kilogram)	1,627.61	N x E = P
	b. The share of labour (12.a. / 11.a.) ( per cent)	18.91	(P / L) per cent = Q per cent
13	a. Benefits (11a - 12.a)	6,980.48	L - P = R
	b. Profit rate (13.a / 11a) ( per cent)	81.09	(R / L) per cent = O per cent
<b>Reply to Service for Production Factors **</b>			
14	Margin (IDR/Kilogram) (10 - 8)	10,725.14	K - F = S
15	Direct Labour Income (12a/14)x 100 per cent	15.18	(P / S) x 100 per cent = T
16	Other input contributions (9 / 14) x 100 per cent	19.74	(G / S) x 100 per cent = U
17	Company profit (13a / 14) x 100 per cent	65.09	(R / S) x 100 per cent = V

Note: \*) = In Once Production Process (Hayami and Ruttan, 1989 in Hadi and Nurul, 2016)

\*\*) = Rewards for capital and management

Source: Primary Data Processed, 2022

The average added value obtained is IDR 8,608.09 per kilogram of raw material. This means that each kilogram of raw materials used in the production process of tofu & tempeh can provide an added value of IDR 8,608.09. The added value in the study area is still higher than the added value of tofu crafts, according to the results of the research done by Styawan, Darwanto and Waluyati (2016) in Sleman regency which only reached IDR 5,602.4/ kg. Likewise, the added value of tofu & tempeh craft in this study area was higher than the added value of the results of research conducted by Sorga et al. (2013) in Deli Serdang regency. The added value of processing soybeans into tempeh in Deli Serdang regency is Rp 8,103.1, and tofu is IDR 7,833.71. The difference in value depends on the output and input prices of raw materials and other supporting materials.

Table 1 shows that the value-added ratio of tofu & tempeh craft in the study area is 47.11 per cent per kilogram. When compared with the ratio of value-added results of research conducted by Sorga et al. (2013) in Deli Serdang Regency, the value-added ratio of soybean processing to tempeh and tofu was smaller, which was 53.79 per cent and 50.56 per cent respectively, even though the magnitude of the added value of the tofu & tempeh craft in this research location was higher. This

phenomenon can occur due to the following factors: 1) Assuming that the values of products are the same, the difference is caused by higher raw material prices and other input costs in the study area compared to Deli Serdang Regency; and 2) assuming that the price of raw materials and other input costs of the sample crafters of the two study sites and the average number of processed products per kg are the same, then the price of the product per unit applies in the study area is lower than Deli Serdang Regency.

Meanwhile, although the ratio of the added value of tofu and tempeh craft in the study area was lower compared to Deli Serdang, Parigi Maotong and Medan cities which reached more than 50 per cent, it was still higher (47.11 per cent) when compared with the results of Pratama, Salmiah, and Lily's research (2016) in Asam Kumbang village, Medan Selayang district for the tofu craft (19.74 per cent), the research results of tempeh ole (Lestari et al., 2019) which achieved a value-added ratio of 34.65 per cent, as well as the results of Akbar's research (2018) which achieved a value-added ratio of tempeh crafts in the Sunday Market of DKI Jakarta by 24 per cent. The value-added ratio of the tofu & tempeh craft in the research location is moderate as per the results of the one-sample t-test presented in Table 2.

**Table 2**

*Results of the Uni One Sample T-Test in Tofu & Tempeh craft in Jember, Banyuwangi and Pasuruan Regencies in 2022*

Test Value = 40						
	t	df	Sig. (2-tailed)	Mean Difference	90 per cent Confidence Interval of the Difference	
					Lower	Upper
VA-R	.108 <sup>ns</sup>	36	.915	.27027	-3.9516	4.4921

Note: ns = Non-Significant at the real level  $\alpha$ 1 per cent, mo = 40 per cent

Source: Primary Data Processed, 2022.



One sample t-test results, as shown in Table 2, show that a significance value of  $0.915 > 0.05$ ,  $H_0$  is accepted, which means that the ratio of the added value generated from the tofu & tempeh craft is not significantly different from the standard value-added ratio has been set (= 40 per cent). The statistical test shows that the ratio of the added value of tofu & tempeh craft at the research location is relatively high. This is because statistically compared to the standard value-added ratio of 40 per cent, the average mathematical value-added ratio is 47.11 per cent. According to Silvana & Fenny (2011) and Hubeis (1997), the value-added ratio is low if the ratio is below or equal to 15 per cent. If the value-added ratio is between 15 - 40 per cent, it is classified as moderate, and if the percentage is more than or equal to 40 per cent, it is classified as high.

**Conversion Factor:** The conversion factor value is calculated on the basis of the division between the quantity of product from each kilogram of raw material during each production process. The conversion factor value obtained in the tofu & tempeh craft business at the research location is 3.21, which means that an average of 3.21 kg of product would be made using one kg of soybean. This conversion factor is classified as high when compared to the results of research by Lestari et al. (2019), who analysed the value of soybean as a raw material for tempeh in Force Lor village of Tambakromo district in Pati regency and only reached 1.7 kg. As per the results of Wiyono and Rukavina's research (Wiyono & Baksh, 2015) on tofu business in Parigi Mautong village, the conversion factor only reached 0.56 kg. If the two conversion factors in the results of this previous study can be explained, the intensity of the production process of the tofu & tempeh craft in the research location is found to be far more intensive.

**Labour Coefficient and Labour Benefits:** The use of labour in the tofu & tempeh craft business is in line with its capacity to produce the commodity. The labour coefficient is obtained from the labour allocation (man-day) per kg of raw material in each production process. Table 1 shows that the labour

coefficient is 0.04 man-day/kg of raw material, which means that 0.04 man-day is needed for one kilogram of raw material. The magnitude of the coefficient of labour is relatively low when compared to the results of previous studies that reached 0.05 and 0.09 and even 0.19 - 0.48. This phenomenon indicates that the level of labour productivity in the study of tofu & craft at the research location tends to be higher than in other places.

**Labour Benefits:** Table 1 above shows that workers in the tofu & tempeh craft business in the study location received an average wage of IDR. 39,729.73 per working day. If the labour coefficient is 0.04, then the average labour force of the tofu & tempeh craft business is IDR 1,627.61 per kilogram of raw material. If compared with the results of previous studies, it can be noted that the labour compensation per kilogram of raw material in this research location is classified as moderate. As per the results of previous studies, labour benefits ranged below IDR 1,000 per kg while some reached IDR 3,157.35 per kg. This phenomenon shows that the level of labour benefits is relatively more incentive in research location than outside in valuing the workforce.

The above interpretation is also supported by the results of the analysis shown in Table 1 that the share of labour measured from the ratio of labour benefits to value added per kilogram is only 18.91 per cent. When compared with the results of previous studies, conditions at this research location are much lower as the ratio of labour reaches above 30 per cent. This shows that outside the research location, the expenditure of tofu & tempeh craft business for labour costs is far more wasteful. Likewise, it can be stressed that the level of labour productivity in the tofu & tempeh craft business at the research location is higher than in other regions.

**Crafts Business Benefits:** The profit of the tofu & tempeh craft business results from the value-added reduction in exchange for labour per kg of each production process. Table 1 shows that the profit of the tofu & craft business in this research location is

IDR 6,980.48 per kg with a profit level reaching 81.09 per cent of the added value. This condition, when compared with the results of previous research, is relatively high.

**Reply to Service for Production Factors:** Based on the analysis of added value in Table 1, it can be said that the margin as a result of the reduction in value-added with the price of soybean raw materials is as much as 10,725.14 per kilogram of raw materials. The magnitude of the value of this margin, when compared with the results of previous studies, is still greater even though some are close to it (IDR 10,087). Meanwhile, direct labour income in the study is 18.18 per cent of the margin and this is quite high when compared to the results of previous studies that reached under 10 per cent. Table 1 displays that the contribution of other inputs in the research location is moderate at 19.74 per cent; when compared with the results of previous studies, the value of the contribution of other inputs in this study is classified as moderate. The results of previous studies revealed that the other input contributions reached around 10 per cent and around 36 per cent in some cases. Meanwhile, the company's profit in the tofu & tempeh craft business in the study area reached

65.09 per cent and is classified as moderate when compared to the results of the upstream research. The previous research results showed company profits reaching 52 per cent and in some cases, 83 per cent. This indicates that the business process of tofu & tempeh in the research location is more ideal compared to the results of other studies in terms of the use and management of labour, management of the use of raw materials and contribution of other inputs.

**Relationship between the Stock Availability of Soybean Commodities and Added Value:** To test the hypothesis of the relationship between raw material availability and added value, the Pearson Product-Moment Correlation was tested at a significant rate of 5 per cent. The quantity of raw material availability is measured by the difference between the amount of soybean input procurement when needed and the quantity of soybean that should be present in each ideal production process. The X variable represents the quantity of soybean material availability, while the Y variable represents the added value of the tofu & tempeh processing activities. The results of the correlation test are presented in Table 3.

**Table 3**

*Correlation Test Results between the Quantity of Availability of Raw Material Stocks and the Amount of Added Value in the Tofu and Tempeh Craft*

		X <sub>1</sub>	X <sub>2</sub>
X <sub>1</sub>	Pearson Correlation	1	.408**
	Sig. (2-tailed)		.012
	N	37	37
X <sub>2</sub>	Pearson Correlation	.408**	1
	Sig. (2-tailed)	.012	
	N	37	37

Note: r-statistics > r-table (significant at α5 per cent real rate)

Source: Primary Data Processed, 2020.

Table 3 proves the hypothesis that the availability of soybean commodities has a positive relationship with the magnitude of added value of tofu and tempeh business activities in East Java Province. This condition shows that there is a positive relationship between the two variables measured by the relationship level which is quite strong as Dixon & Jr (1991) argued. The phenomenon of this relationship is a reasonable relationship because the added value derived from revenue (product value) is reduced by intermediate cost (price of raw materials + contribution of other inputs). This means that the price of raw materials is very much determined by its availability in the market. If the craftsmen face difficulty in sourcing it, the price will go up, which in turn, has implications for the lower value added.

To prove whether the correlation coefficient obtained can be used to generalise or represent the population, it is necessary to do further testing with the significance test of the t-test. Test results of the significance of the relationship between the two variables indicated by the decision criteria, namely 1) t-count (2.89) > t-table (1.68), and 2) when viewed from the significance (Sig.), it was revealed that the value Sig. (0.012) < 0.05. This means that the correlation coefficient can be used to generalise or represent the objective conditions of the population (Dixon & Jr, 1991). These results reveal that the availability of soybean raw material stock at the research location will affect the added value of all tofu & tempeh crafters. These results reveal that the availability of raw material stocks at the research location will affect the added value of all tofu & tempeh producers. The significance of the results of this analysis is felt by the craftsmen in the study area, given the decreasing trend in stock availability. Several factors contributed to this fall, such as the encouragement of farmers to substitute soybean farming branches in the third Planting Season (PS III) with dragon fruit, shallot, corn, tobacco, papaya and Siamese orange as revealed in the research conducted by Hazmi, Sutiarto, and Hadi (2018) in the southern part of Banyuwangi regency. Farmers reasoned that farming dragon

fruit and Siamese oranges is more economically promising than soybeans. Soybean farming is considered to have many obstacles; until now, there has been no protection from the government regarding input and output prices. Regulations from the Ministry of Agriculture have not been fully supported by the Regional government or in other words, the commitment between the Central and Regional governments has not yet found a harmonious form, except for the Pasuruan Regency Government. Here, the Regional government has supported the Central government's policy by providing free soybean seeds to farmers to encourage soybean cultivation.

Furthermore, the phenomenon of decreasing stock availability that occurred in Banyuwangi regency was not as severe as in Pasuruan and Jember regencies. Although the supply of raw materials in Banyuwangi regency has fluctuated, it has increased quite significantly in the 2020-2021 period. This was because of the strong efforts made by the local government of Banyuwangi Regency to support the initiatives of the Central government in realising national food security, especially for soybean commodities. Even though many farmers have switched to dragon fruit and Siamese oranges in the southern part, those in the northern part still maintain soybean crops due to very conducive agro-climatic conditions, especially in the sub-districts of Kabat, Ketapang, Kalipuro and Wongsorejo.

#### **Factors that Influence the Profit Level**

Table 4 reveals that the factors that simultaneously (full-model) influence the level of profit in the business of tofu & tempeh in the study location are Raw Material Prices (X1), Costs of Supporting Materials (X2), and Costs Labour Wages (X3), Fixed Costs (X4), Total Production (X5), Production Price (X6), Production Capacity (X7), and Business Experience (X8). This condition can be shown by the large F-count (= 6.66) > F-table (= 3.18) at a significance level of  $\alpha$  1 per cent. The results of the multiple linear regression

analysis, as in Table 4 below, can be formulated in the form of a regression equation of the Cobb-

Douglas profit function of the tofu & tempeh craft business in the study area as follows:

$$\ln Y = -2.292 - 0.018 \ln X_1 - 0.213 \ln X_2 - 0.081 \ln X_3 - 0.027 \ln X_4 + 0.525 \ln X_5 + 0.703 \ln X_6 + 0.255 \ln X_7 - 0.177 \ln X_8$$

Mathematically, it can be formulated with the Cobb-Douglas profit function of the tofu & tempeh craft business as follows:

$$Y = 0.1010 X_1^{-0.018} X_2^{-0.213} X_3^{-0.081} X_4^{-0.027} X_5^{0.525} X_6^{0.703} X_7^{0.255} X_8^{-0.177}$$

Furthermore, in terms of the coefficient of determination (R<sup>2</sup>) which is 0.656, it shows that the independent variables entered into the model can explain the variation of the dependent variable well around 65.60 per cent, while 34.40 per cent is explained by other variables outside the model. Meanwhile, in terms of the Adjusted-R<sup>2</sup> determination coefficient value, which is the adjusted R<sup>2</sup> coefficient value and has actually been

freed from the influence of free degrees, the determination value is 0.557 and can be said to be high enough. In the opinion of Rietveld and Sunaryanto (1994) in cross-section data, generally, a lower R<sup>2</sup> (0.3 - 0.8) will be obtained when compared to the time series data, which is between 0.7 - 1.0. In the case of social research, the Adjusted-R<sup>2</sup> coefficient of determination is said to be already high if the value is between 0.4 - 0.6.

**Table 4**

*Results of Analysis of Factors Affecting Profitability in the Tofu & Tempeh Craft Business in Jember, Banyuwangi and Pasuruan Regencies in 2022*

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-2.292	2.136		-1.073 <sup>ns</sup>	.292
X1 ((Raw material costs)	-.018	.086	-.026	-.212 <sup>ns</sup>	.834
X2 (Cost of Supporting Materials)	-.213	.187	-.239	-1.139 <sup>ns</sup>	.265
X3 (Labour Wage Costs)	-.081	.267	-.071	-.303 <sup>ns</sup>	.764
X4 (Fixed Costs)	-.027	.155	-.034	-.175 <sup>ns</sup>	.862
X5 (Total Production)	.525	.187	1.449	2.804 <sup>***</sup>	.009
X6 (Production Price)	.703	.191	1.695	3.672 <sup>***</sup>	.001
X7 (Production Capacity)	.255	.337	.267	.756 <sup>ns</sup>	.456
X8 (Business Experience)	-.177	.149	-.153	-1.186 <sup>ns</sup>	.246

*Note:* F-Statistics = 6.664; R<sup>2</sup> = 0.656, Adjusted-R<sup>2</sup> = 0.557; ns = Non Significant at significant level α10 per cent; and \*\*\* = significant at the real level of α1 per cent

*Source:* Primary data processed, 2022

As per Table 4, each independent variable on the dependent can be explained as follows:

### 1) Cost of soybean raw material ( $X_1$ )

The value of the regression coefficient for soybean raw material variable ( $X_1$ ) is -0.018 which indicates that a 1 per cent increase in soybean material costs can decrease the profits of tofu & tempeh business by 0.018 per cent assuming other factors in the *ceteris paribus* model, but the level of influence is non-significant. This denotes that the price hike of raw materials tends to have an impact on the non-significant decrease in the profit levels. The results are different from the outcomes of the study conducted by Styawan et al. (2016), which shows that the value of raw material prices significantly influences the profit of the tofu industry in Sleman regency. The significant difference between the two results is that the research in Sleman relies solely on tofu craft activities, whereas this study includes tofu and tempeh craft activities where the cost of production is different. In addition, another contributing factor is the price of soybeans in 2016 in Sleman regency which has gone up from IDR 6,500 to IDR 8,000 per kilogram (Saputra et al., 2016), while the range of soybean prices in the study location is between IDR 6,500 - Rp. 8,000 per kilogram (an average of IDR 7,500 per kilogram).

### 2) Cost of supporting materials ( $X_2$ )

Several expenditures are incurred by tofu & tempeh craft at the research location, including yeast, vinegar, firewood, plastic bags, and paper, and hence the average amount of expenditure is IDR 61,621.04 per production process. The results of the regression analysis partially revealed that the regression coefficient value is -0.213, which indicates that if the cost of auxiliary materials is increased by 1 per cent, the profits of the tofu & tempeh business will tend to decrease by 0.213 per cent assuming other factors in the *ceteris paribus* model at the real level  $\alpha$ 10 per cent. This can occur

because the average cost of supporting materials increases physically and the necessity of a large amount hardly occurs. It is also known that researchers rarely enter this variable in the equation model and tend to ignore it because the amount of the cost is relatively small and the effect is ascertained to be unreal.

### 3) Labour wage costs ( $X_3$ )

Partially, the regression coefficient value of labour wage cost is -0,081 with t-value (-0.303) < t-table (1.30) at the real level of  $\alpha$ 10 per cent. This means that the variable cost of labour wages has a non-significant effect on the profits of the tofu & tempeh business in this research location. This non-significant condition occurs because the average tofu & tempeh crafters in the study area use more labour in the family than outside. So, even though there is an increase in labour wages, it will not have much effect on total labour costs, which will not greatly affect the fall in profit. This phenomenon of using independent variables is not in accordance with the results of the study by Styawan, et al. (2016), which is significant at the  $\alpha$ 10 per cent level. The results of the study further elaborate that if there is an increase in the wages for workers outside the family, it is expected that work productivity can increase tofu production and profit. This occurs because labour costs are incurred for workers outside the family, while labour within the family is not counted as a cost.

### 4) Fixed Costs ( $X_4$ )

Variable fixed costs in the study area had a non-significant effect on the profits of the tofu & tempeh craft business. The value of the regression coefficient indicates that an increase in fixed costs by 1 per cent resulted in a 0.027 per cent decline in business profit assuming other factors are constant. This is a non-significant condition because the average tofu & tempeh crafters in the study area include the costs of renting operational places, depreciation of equipment, electricity for

lights and water machines, etc. The size also does not have much impact on the profits of the handicraft business. Since some lighting crafters became part of kitchen lighting and a few do not use water machines, especially tempeh crafters, the tool depreciation incurs a meagre cost of IDR 500 per production process.

### 5) Total Production ( $X_5$ )

The regression coefficient value of the total production produced is 0.525 with a significance of 0.009 ( $\alpha = 1$  per cent) which indicates that this independent variable has a significant effect on the profits of the tofu & tempeh craft business at the research location. Partially, the level of significance can be shown by the results of the regression analysis with t-statistics (2.804) > t-table (1.420) at the  $\alpha 1$  per cent significance level. The value of the regression coefficient can be interpreted as follows: if the amount of tofu & tempeh production is increased by 1 per cent, the implication will be an increase in profits by 0.525 per cent. Augmented production can increase the value of revenue and ultimately the profit levels.

### 6) Production Price ( $X_6$ )

The regression coefficient value of the price of tofu & tempeh production is 0.703 with a significance of 0.001, indicating that the variable price has a very significant effect on the profit at the research location. The significance of the production cost here is lower than that of the study conducted by Styawan et al. (2016) in Sleman Regency, due to an increase in tofu profit, which was 0.970 per cent for a 1 per cent increase in production cost. This condition was caused by the relatively high price of tofu in Sleman Regency when compared to the study area. This is consistent with the reality on the ground that the price of tofu was IDR 250/city when the price of soybean was Rp. 6,800 per kilogram. But, due to an increase in soybean prices to IDR 7,200 - IDR 8,000 per kilogram, the producers of tofu earn as much as Rp. 400 per box (Saputra et al., 2016).

### 7) Production Capacity ( $X_7$ )

The results of the partial regression analysis revealed that the variable production capacity had a non-significant effect on the significance level of  $\alpha 10$  per cent. Although this independent variable has a non-significant effect, production capacity is very important in the production process. The greater the production capacity, the higher the profit rate and vice versa. The non-significance of this free verifiable condition to the profits of the tofu & tempeh business in this research location is due to the variation in production capacity between the observation samples and the relatively low number of sample observations. In addition, another cause is the insertion of two types of production, i.e. tofu & tempeh, into one analysis value, which results in a disruption or bias in explaining the effect on the benefits obtained individually. The above phenomenon is not in accordance with the results of the study of Styawan et al. (2016), which revealed that if this production capacity increases, the amount of processed soybean raw material will also increase. This increase in production capacity is directly proportional to the number of tofu products produced and will be followed by an increase in profits.

### 8) Business Experience ( $X_8$ )

The results of the regression analysis partially revealed that the regression coefficient of business experience was -0.177, i.e. if the craftsman's age is increased by 1 per cent, the profitability of the tofu & tempeh business would tend to decrease by 0.177 per cent, but the effect was not significant. The phenomenon of the relationship between the two dependent and independent variables is in accordance with the results of the study of Styawan et al. (2016) in Sleman regency, but it statistically showed significant at  $\alpha 5$  per cent level. The decline in profits is closely related to the age of the tofu craftsman. Tofu craftsmen in Sleman Regency as well as in this research location have quite a long business experience ranging from 2 - 40 years with an average of 10.7 years. In Sleman regency, as the age of craftsmen goes up, it tends to reduce the

amount of tofu production in large quantities and results in reduced profits (Styawan et al., 2016). Second, the long experience of trying tofu & tempeh crafters in this research location makes some craftsmen less motivated to optimise their craft business. This is driven by a sense of boredom at work because they are certain about the profit obtained according to the quantity of raw materials used in the production process. The implication is that the enthusiasm of the crafters in managing their business is declining and it has a further impact on the declining quality and quantity of production due to production failure.

### Factors Affecting Added Value

Based on Table 5, variables such as quantity of raw material ( $X_1$ ), production price ( $X_2$ ), and contribution of other inputs ( $X_3$ ), together have a significant effect on the added value of tofu & tempeh craft business. This is indicated by the value of F-statistics ( $10.80 > F$ -table (5.21) at the

significant level  $\alpha 1$  per cent. Meanwhile, the determination coefficient value is  $R^2$  0.495, which denotes that 49.50 per cent of the added value of tofu & tempeh is influenced by factors like quantity of raw material, production price, and other input contributions, while the rest of 50.50 per cent is determined by factors outside the model. Meanwhile, as shown in Table 5, the value of the  $R^2$  coefficient has been adjusted and has actually been freed from the influence of free degrees; the determination value of 0.450 can be said to be high enough because the value is between 0.4 – 0.6 (Rietveld & Sunaryanto, 1994). From the results of the multiple regression analysis in Table 5, an equation of the added value function of the tofu & tempeh craft business in the study area can be formulated as follows:

$\ln Y = 2.286 + 0.465 \ln X_1 + 0.268 \ln X_2 - 0.125 \ln X_3$  and it can be mathematically formulated using the Cobb-Douglas value-added function of the tofu & tempeh craft business as follows:

$$Y = 9.8355X_1^{0.018} X_2^{0.268} X_3^{-0.125}$$

**Table 5**

*Results of Analysis of Factors Affecting the Added Value of the Tofu & Tempeh Craft Business in Jember, Banyuwangi and Pasuruan in 2022*

Model	Unstandardised Coefficients		Standardised	t	Sig.
	B	Std. Error	Coefficients Beta		
(Constant)	2.286	2.329		.982 ns	.333
1 X1 (Amount of Raw Material)	.465	.108	.629	4.311***	.000
X2 (Production Price)	.268	.177	.222	1.509ns	.141
X3 (Other Input Contribution)	-.125	.124	-.153	-1.002 ns	.323

*Note:* F-count = 10.801;  $R^2$  = 0.495, Adjusted- $R^2$  = 0.450; ns = Non Significant at significant level  $\alpha 10$  per cent; and \*\*\* = significant at the real level of  $\alpha 1$  per cent

*Source:* Primary data processed, 2022.

From Table 5, each independent variable on the dependent variable can be described as follows:

### 1) Amount of Raw Soybean (X1)

The regression coefficient value of the quantity of soybean is 0.465, which indicates that if the quantity of raw material rises by 1 per cent, the added value of the tofu & tempeh craft business will increase by 0.465 per cent assuming other variables *ceteris paribus*. The phenomenon of this relationship is statistically very significant as indicated by t-statistics (4,311) > t-table (2.42) at the  $\alpha$ 1 per cent significance level. This condition occurs because the quantity of raw material determines the quantity of tofu & tempeh to be produced, even though this variable is part of the intermediate cost that can reduce the added value. The upsurge in the cost of raw materials is still lower than the increase in the quantity of production. This denotes that more raw materials can augment production and have implications on revenue, subsequently increasing its added value. The condition of the phenomenon is different from the results of the study by Lestari et al. (2019), which shows an inverse relationship between the quantity of raw material and the extent of added value even though it is statistically non-significant. This is due to the increase in quantity of raw material which is not proportional to the quantity of tempeh produced. If the quantity of tempeh produced is low, the conversion factor will also be low so that it will reduce the tempeh output value.

### 2) Total Production Prices (X2)

The regression coefficient value of tofu & tempeh production cost is 0.268 which shows that if the production cost rises by 1 per cent, the added value of the tofu & tempeh business will increase by 0.268 per cent assuming other variables *ceteris paribus*. The phenomenon of the relationship is statistically non-significant which is shown by t-statistics (1.509) > t-table (2.42) at the  $\alpha$ 10 per cent significance level. This condition occurs because

the high cost of tofu & tempeh production will increase the value of output, subsequently escalating the added value - the higher the price of production, the more the implication of the value of revenue (total revenue) as well as the added value. The results of research conducted by Lestari et al. (2019) show that the independent variable of tempeh price has a very significant effect on added value. T-test results prove that the price of tempeh has a t-statistics (21.210) > t-table (1.693), which shows that the price has a significant effect on the added value of tempeh. The difference in the results of t-test on the product price variable to the value-added variable between the two studies is due to the high price of Pati regency tempeh than its average price in the study area.

### 3) Cost of other input contributions (X2)

The regression coefficient of the cost of other input contributions is -0.125, which indicates that if the cost of the contribution of other inputs increases by 1 per cent, *ceteris paribus*, the added value will decrease by 0.125 per cent and vice versa. The greater the contribution of other inputs with a fixed output value, the lower the added value of tofu & tempeh craft. This is because the added value is calculated from the output value by deducting the contribution of other inputs and the raw material cost. The results of research conducted by Lestari et al. (2019) show that the independent variable contribution of other inputs has a very significant effect on the added value. T-test results prove that the price of tempeh has a t-statistics (3,413) > t-table (1,693) which shows that the contribution of other inputs significantly affects the added value of tempeh. The results of the t-test on the product price variable against this value-added variable between the two research results show a difference because the average cost of the contribution of other inputs in Pati regency is higher than the average cost in the study location that reaches up to IDR 99,146.72 per production process.



## Conclusion

The average added value of the tempeh craft business in the study area is IDR 8,608.09 per kilogram of raw materials with a ratio of added value per kilogram of 47.11 per cent (relatively high). Furthermore, the conversion factor value obtained is 3.21 with a labour coefficient of 0.04 and an average labour benefit of IDR 1,627.61 per kilogram of raw materials. The profits of the tempeh craft business reached IDR 6,980.48 per kg with a profit rate of 81.09 per cent of the added value and the company's profit reached 65.09 per cent. Furthermore, there is a fairly strong positive relationship between the variable stock availability of raw materials with the added value of tempeh & tofu craft business. This is a reasonable relationship because the amount of added value derived from the value of the product is reduced by the intermediate cost (price of raw materials + contribution of other inputs).

Simultaneously (full-model), the factors that are suspected to influence the profitability of tempeh tofu handicraft business in the study area are raw material price (X1), supporting material costs (X2),

labour wage costs (X3), fixed costs (X4), total production (X5), production price (X6), production capacity (X7), and business experience (X8). But partially, the number of production variables (X5) and production prices (X6) significantly influence the level of profit in the business of crafts at the real level  $\alpha$ 1 per cent, while other variables have no significant effect. Simultaneously, the variable amount of soybean raw material (X1), production price (X2), and the contribution of other inputs (X3) together have a significant effect on the added value of tempeh tofu craft business with an Adjusted-R2 determination coefficient value of 0.450. Partially, only the quantity of soybean (X1) has a significant effect on the added value of tempeh-tofu business at 1 per cent level and other variables have no significant effect.

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## Author's Contribution:

Syamsul Hadi: Conceived and presented idea, designed the methodology, conceptualisation, formal analysis, and drafting of paper

Bagus Setya Rintyarna: Conceptualisation, formal analysis, and drafting of paper

Fitriana Dina Rizkina, Risa Martha Muliasari, and Anisa Nurina Aulia: Carried out the survey and performed validation.

All authors provided critical feedback and helped shape the research, analysis and manuscript.

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