Analysis of Factors Affecting Profit Economic Agglomeration of The Culinary Industry in Madura

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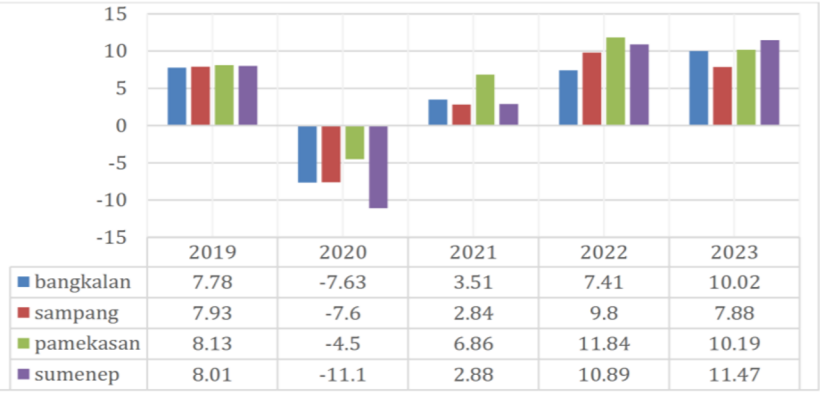
Abstract. This study aims to analyze the factors influencing economic agglomeration in the culinary industry on Madura Island. The variables examined include raw material accessibility, labor skills, production costs, market reach, and rental costs. The study also assesses the contribution of each factor to the formation of traditional culinary industry clusters. A quantitative method was employed using surveys and questionnaires to collect primary data from culinary entrepreneurs in Bangkalan, Sampang, Pamekasan, and Sumenep. Data analysis was conducted using multiple linear regression with natural log transformation to estimate the influence of each variable on agglomeration levels. The results indicate that raw material accessibility, labor skills, production costs, and rental costs significantly affect culinary industry agglomeration. Production costs have a negative effect, while the other variables have a positive effect. Market reach, however, does not have a statistically significant impact. These findings highlight the importance of cost efficiency and local infrastructure support in agglomeration formation, while market expansion remains a secondary consideration in the local Madurese context.

Keywords: Economic Agglomeration, Culinary Industry, Raw Materials, Labor Skills, Production Cost, Rental Cost, Market Reach, Madura.

1 Introduction

Madura Island is a region island in East Java Province that has unique and excellence culture, one of them is in culinary side. Madura has a lot of big potential in culinary industry development, which has developed through public interest in traditional food. This potential strengthened by economic data development in culinary sector that shows about significant growth year by year. These facts indicate that the Madurese culinary has a lot of big potential for developing and for contributing to local economic, such as shown in the data below:

L. Warlina and S. Luckyardi (eds.), *Proceedings of the 9th International Conference on Business, Economics, Social Sciences & Humanities – Economics, Business and Management Track (ICOBEST-EBM 2026)*, Advances in Economics, Business and Management Research 397,
https://doi.org/10.2991/978-94-6239-752-1_26



	2019	2020	2021	2022	2023
bangkalan	7.78	-7.63	3.51	7.41	10.02
sampang	7.93	-7.6	2.84	9.8	7.88
pamekasan	8.13	-4.5	6.86	11.84	10.19
sumenep	8.01	-11.1	2.88	10.89	11.47

Fig. 1. Growth rate of Madura's GRDP, accomodation and food & baverage subsector (2019-2023).
Source: [1]

Madura Island has several kind of unique food and it is found in its various regions in Madura Island, such as shown in the spatial planning documents of each regency. This is shown that there is big potential to develop the culinary industry more organized and centralized in food industry. Not only show richness of raw material and local citizen's creativity, but also show signal in appearing of culinary industry that has development potential becoming dense economic development area. To deeper understand this dynamics, we necessary to see the real situation about knowing the number of the businesses and labor in the culinary sector; also compare the population density level across various regencies in Madura Island. These are the explanation about density level and labor level in the culinary sector, especially in Bangkalan regency and Pamekasan Regency as the fist step for understanding development pattern in culinary industry of that regencies.

The culinary industry agglomeration phenomenon in Madura exhibits interesting characteristics to study deeply. Agglomeration industry is the geography concentration of interconnected companies in specific region, which is able to create collective efficiency through sharing resources, knowledge and infrastructure [2]. In the culinary industry context, agglomeration occurs when food and beverage concentrate in some of locations that has comparative advantages, such as availability of raw materials, market access or infrastructural support [3].

Agglomeration industry theory explains that the geographic concentration of company in the same industry or related industry can create positive externalities; it increases collective competitiveness [4]. In the culinary industry, these externalities can be taken as sharing knowledge about processing technology, joint access raw material suppliers, the efficient distribution networks formation and the creation of labor pooling that enables to do expertise transfer among businessman [5]. Furthermore, agglomeration facilities the spillover effects about product innovation, quality incensement and production process standardization that can enhance the product reputation from one region [6]. According to the distribution data of the culinary industry in Madura that

had been discussed before, there is a strong indication that agglomeration process happens in this sectors in each of level. Spatially, the culinary industry concentration shows uneven pattern across regencies, where some regency shows higher concentration than others.

For clearer understanding about what are the factors driving the agglomeration culinary industry formation in Madura, it is need to do analysis to region's competitive advantage. Some important factors that influence that agglomeration phenomenon, such as raw local material, labor ability, low cost production, easiable market accsess, and low commercial rental costs. The geography condition and Madura's resources in stategies location become the important basic to form of competitive culinary industry ecosystem and sustainable.

2 Literature Review

2.1 Agglomeration

Agglomeration is a collection or concentration of a specific location activities, it is often related to economic activity and industry in the big city. Generally, agglomeration aims to increase the efficiency and capitalize on the geographical industry proximity between company, labor and consumer. Agglomeration economic theory explains that company concentration, individual and economic activities in one geographical location can have significant economic benefits.

2.2 Agglomeration Benefits

Agglomeration provides significant economic benefits through several forms of savings that controbutes to operational efficiency, cost reduction and increase the productivity in the company level and regional levels. Internal saving (economies of scales) is one of the main benefits appear from agglomeration. In this context, company allocation in agglomeration regency can capitalize economies of scale that happens because of volume production incretions. When production increase, cost per product unite tends to decrease due to higher operational efficiency. This is possible through the shared utilization of existing infrastructure, such as network transpotation, logistic system, and other utility. By sharing in the same market, company can have their optimization production process, thereby generating significant low cost saving [7].

Furthermore, agglomeration creates localization benefits (localization economies), especially in several industry sectors. Company concentration is in the one similar sector, like technology sectors, manufactures or creative, possiblle to create innovative supportive ecosystem and collaboration. Companies in the agglomerations area often have benefits from intensive interaction with other company, thether through sharing information, project collaboration, or technology transfer.

Moreover, urbanization economies also play a vital role in creating economic efficiency. Unlike localization, urbanization involves the concentration of various economic sectors within urban areas. This creates positive external effects, such as better access to public infrastructure (transportation, energy, and telecommunications), a large

labor market with diverse skill sets, and other support services such as finance, education, and healthcare.

In addition, agglomeration enables small and new firms to reduce labor and resource costs through labor market pooling. The large labor market in an agglomerated region allows companies to easily find workers that match their specific needs, both in terms of skill sets and cost efficiency.

Furthermore, agglomeration also serves as a hub for the dissemination of knowledge and innovation, which is a key factor in modern economic growth. The spillover process the transfer of knowledge and technology between firms enables companies to access new knowledge without having to invest heavily in research and development.

3 Methodology

This study employs a quantitative approach. This approach is utilized as it aims to systematically and measurably quantify, describe, and verify the influence of various factors on the economic agglomeration gains of the culinary industry in Madura.

The sample for this study was selected based on several criteria, namely: culinary business owners who have been operating for at least one year, are located in areas with a concentration of culinary businesses in Madura, possess information or experience related to factors influencing economic agglomeration (such as raw material accessibility, labor skills, production costs, market reach, and location rental costs), and are willing to participate as respondents in the research. According to Sekaran and Bougie (2016), clear criteria in purposive sampling assist researchers in ensuring that the selected sample provides information that is relevant to and in accordance with the research needs [8]. The size sample determination in this study considers the analysis method used, that is multiple linear regression. In the multiple linear regression, minimal size sample can be determined by using formula:

$$n = 50 + 8k \qquad (1)$$

Where n is the sample size and k is the amount of independent variables. This formula was arranged by Green (1991) as the guideline to determine the minimum sample size for regression analysis [9]. According to the formula, with the amount of independent variable as much five (k = 5), so the ideal sample size is:

$$n = 50 + 8(5) = 90n = 50 + 8(5) = 90n = 50 + 8(5) = 90 \qquad (2)$$

However, by considering the time constrains, resources and fully specified criteria population, sampel size in this study has been set for about 40 respondents. This size is still considered adequate for research exploration, especially when using purposive sampling technic [10].

In this culinary industry agglomeration study, multiple regression analysis technic used for examining relationship between five independent variable to one independent variable. This study uses logarithmic transformation in multiple regression analysis for addressing difference scale between independent variable and dependent. The use of logarithms can help to normalize data and decrease the large impact scales, thereby

analysis become more stable and the result easier to interpret. The regression model used in this study is:

$$Log\ Y = \beta_0 + \beta_1\ log\ X_1 + \beta_2 log\ X_2 + \beta_3\ log\ X_3 + \beta_4\ log\ X_4 + \beta_5\ log\ X_5 + \epsilon \quad (3)$$

Where:
Y: Culinary industry agglomeration
β_0: Constant (intercept)
β_1, β_2, β_3, β_4, β_5: Regression coefficients for each independent variable
X_1: Accessibility of raw material sources
X_2: Labor skills
X_3: Production costs
X_4: Market reach
X_5: Rental costs
ϵ: Error

4 Results

This study uses a multiple linear regression model with a natural logarithmic (ln) transformation of the independent variables. This model, known as a log-linear model, allows the coefficients to be interpreted as elasticities, namely the percentage change in the dependent variable due to a 1% change in the independent variable. The following are the estimated results of the regression model:

Table 1. Regression model estimation results.

Variables	Coefficients	Std. Error	t-Test	p- value	95% Confidence Interval
Raw Materials (X1)	0.00388	0.00097	4.02	0.000	0.00191 – 0.00585
Labor Skills (X2)	0.00237	0.00037	6.47	0.000	0.00162 – 0.00311
Production Costs (X3)	-0.01329	0.00239	-5.55	0.000	-0.01817 – -0.00841
Market Range (X4)	-0.00115	0.00070	-1.64	0.111	-0.00257 – 0.00028
Rental Costs (X5)	0.02651	0.00822	3.23	0.003	0.00975 – 0.04326
Konstanta	0.94487	0.01477	63.99	0.000	0.91476 – 0.97499

The regression result shows four from five independent variable have a significant effect on the dependent variable that is the agglomerations economic culinary industry level in Madura. The Raw Material Variable (X_1) has a positive coefficient of 0.00388 and is statistically significant (p-value = 0.000), that shows easier access to the raw material, so that higher the tendency for businessman to center allocation. The Labor Skills Variable (X_2) also indicates positive impact and significance influence with the coefficient 0.00237 (p-value = 0.000), which indicates the availability of skilled labor is one of the main interest of businessman for choosing location in agglomeration industry. This finding is in line with the labor pooling theory from Marshall [4].

The Cost Production Variable (X_3) shows significant negative impact, with the coefficient -0.01329 and p-value 0.000. The result of that analysis indicates higher production cost expensed by the businessman, than smaller possibility culinary businessman to join in agglomeration industry, because the efficiency of cost become the main comparison in choosing business location. The Rental Costs Variable (X_5) also shows significance impact with the positive coefficient around 0.02651 (p-value = 0.003). it means, although the rent cost is high, businessman is still choosing that location because it is considered strategic or economically beneficial, such as consumer access, infrastructure, or public facilities. The analysis aligns with agglomeration theory regarding agglomeration benefit accepted, because of the neat location factor to market and economic facilities.

The Market Reach Variable (X_4) shows a non-significant influence to economic aggleration with the coefficient around -0.00115 and p-value around 0.111 (> 0.05). analytically, it is concluded that the impact is not strong enough for having great impact to dependent variable. The variable analysis of market reachment shows that in the context of culinary industry in Madura, that variable does not become dominant impact to arrange agglomeration yet, the possibility is because local culinary business more on the immediate lical market or other locational benefits.

The multiple linear regression model obtained from the estimation result can be formulated in the from of equation, as follows:

$$Y = 0.94487 + 0.00388 \cdot X_1 + 0.00237 \cdot X_2 - 0.01329 \cdot X_3 - 0.00115 \cdot X_4 + 0.02651 \cdot X_5 + \varepsilon \qquad (4)$$

This equation shows that the changing in every independent variable (in the linear scale) will affect to the changing of dependent variable value, by the assumption that other variable stay consistent (ceteris paribus). Coefficient from every variable describes both direction and big effect to the level of economic agglomeration. Based on the all of regression, it can be concluded that Raw Material variable, Labor Skill, Cost Production and Rent Cost have significance impact to agglomeration of economic culinary industry in Madura. Production Cost Variable have big negative impact, it shows the impotence of cost efficiency in business cluster formation. Conversely, the Market Reach does not have significance impact in this model. Generally, these findings assert that production factor and cost still become the priority determinants in agglomeration, meanwhile external factor such as market access remain complementary.

The normality test results for the regression model's residuals, with 40 observations indicate the probability value of Skewness around 0.0817. This value higher than significance level of 0.05, it means there is not strong evidence for refusing zero hypotheses that data have normal skewness (slope). The value probability of Kurtosis around 0.8365 also higher from 0.05, it shows that kurtosis (sharpness) normal residual distribution. The combined result from skewness test and kurtosis show value of chi-square in 3.32 with probability around 0.1902. The combined value probability of this is in 0.05, that means over all we cannot deny zero hypothesis that residual distribution is normal. Thus, it can be concluded that normality assumption fulfills from this regression model.

The multicollinerity test results indicate no issue between independent variable and high VIF in lnx2 of 2.33 (tolerance 0.429) and mean VIF total 1.77, all of them are under the threshold of 10, also tolerance up 0.1. The assumption of non multicollinerity fulfill well, so that coefficient regression estimation more stable and interpretation of independent variable effect to dependent more accurate also reliable.

The result of Breusch-Pagan/Cook-Weisberg test shows Chi-square 0.3 with Prob > chi2 of 0.5812, higher than 0.05. Therefore, zero hypothesis of homoscedasticity is not rejected, that means there is no heteroscedasticity and constanct residual varians. The assumption of homoscedasticity fulfill well, ensuring that error standart coefficient is not bias and inference static can be reliable.

The F test result shows value 13.20 with p-value <0.05, refusing zero hypothesis. Thus, independent variable simultanly give significance impact to y: all model are strong and are able to use.

The t test (Partial impact) indicates X1 (Raw material): Coefficient +0.00388, p=0.000 (positive significance); X2 (Labor Skill): coefficient +0.00237, p=0.000 (positive significance); X3 (Cost Production): coefficient -0.01329, p=0.000 (negative significance, strong impact |t|=5.55); X4 (Market Reach): p=0.111 (not significance); X5 (Rent Cost): coefficient +0.02651, p=0.003 (positive significance). Significance Constanta (t=63.99). In this case, Model Ability R^2=0.7803 means 78.03% y variation explained model, with RMSE=0.0019 shows accurate prediction and high precision.

4.1 The Influence of Raw Material Accessibility to Economic Agglomeration Culinary Industry Beneficial in Madura

Accessibility raw material gives significance positive impact to economic agglomeration culinary industry in Madura (hypothesis 1 accepted), with the major distance 2-6 km from resources such as seafood center in Sumenep and Pamekasan. This creates transportation cost efficiency, shares suppliers and economies of scale through high volume buying, as mentioned in Weber Location Theory which minimize transportation cost [11].

4.2 The Influence of Labor Skill to Agglomeration Economic Culinary Industry Beneficial in Madura

Labor Skill give positive significance influence (hypothesis 2 accepted), with high productivity ratio (16.67-33.33) in Bangkalan-Pamekasan for traditional seafood processed. Agglomeration facilitate about labor pooling knowledge transfer via labor mobility and matching skills, increase efficiency collectively.

4.3 The Influence of Cost Production to Agglomeration Economic Culinary Industry Beneficial in Madura

Cost production give significance negative impct (hypothesis 3 accepted), ranging IDR 336.000 - IDR 132 million, where cost increasing pushed to relocation although mitigation agglomeration via cost sharing and innovation spillover. This consistency with limited economies of scale if it is up input.

4.4 The Influence of Market Reach to Agglomeration Economic Culinary Industry Beneficial in Madura

Market Reach does not give significance influence to the benefit of agglomeration (hypothesis 4 rejected). Most of businesses still focus on the local market although several of them are reached national until international market. This is shown that culinary industry in Madura relies on local consumer loyalty and value of culinary culture than market expanse. In the context of agglomeration, the benefit more appears through branding destination culinary area and phenomenon of cross-selling between business in one location.

4.5 The Influence of Rent Cost to Agglomeration Economic Culinary Industry Beneficial in Madura

Rent Cost give significance positive impact (hypothesis 5 refused because it's opposite direction). High rent in strategic location is viewed as investment because it gives visibility, consumer traffic and agglomeration premium. This is difference from the Bid Rent Theory prediction.

5 Conclusion and Recommendation

This study is done to identify and analyze economic agglomeration influence factors in culinary industry in Madura. Five main variable tests in regression model multiple linear is: accessibility of raw material, labor skill, cost production, market reach, and rent cost. According to analysis result and static test, it results can be concluded as follows: 1. Accessibility of Raw Material: accessibility of raw material give positive influence and significance to agglomeration culinary industry in Madura; 2. Labor Skill: labor skill also give positive impact and significance to agglomeration; 3. Production Cost gives negative influence and significance to agglomeration; 4. Market Reach Variable

does not give significance to agglomeration culinary industry form in Madura; 5. Rent Cost shows positive influence and significance to agglomeration.

The advice for local government is to develop cluster strong strategy culinary industry integratically. These strategic steps include reparation of supporting infrastructure such as road access, electricity, and clean water, also build main market and cold storage facilities to strengthen the chain of raw material suppliers. Otherwise, the implementation of labor skill training traditional culinary basis competition regularly is needed, especially create reliable human resource.

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