

Wages, Work Experience, and Female Labor Productivity: Evidence from the Tempe Industry in Karang Anyar



Charitin Devi ^{a*}, Nabila ^b, Ariani ^c, Meylin Rahmawati ^d, Ang Hong Loong ^e

^a charitin.devi@borneo.ac.id, Universitas Borneo Tarakan, Indonesia

^b Nabila akubisa764@gmail.com, Universitas Borneo Tarakan, Indonesia

^c ariyanitinsee@gmail.com, Universitas Borneo Tarakan, Indonesia

^d rahmawatimeylin@borneo.ac.id, Universitas Borneo Tarakan, Tarakan, Indonesia

^e angkingsley@ums.edu.my, Universiti Malaysia Sabah, Malaysia

*Corresponding Author: charitin.devi@borneo.ac.id

Receipt: 03 September 2026; Revision: 11 September 2026; Accepted: 19 September 2026

Abstract: This study examines the associations of perceived wage adequacy and work experience with self-reported productivity among female workers in household-scale tempe businesses in Karang Anyar, Tarakan, both individually and jointly. A quantitative cross-sectional survey was conducted among 56 female workers from 14 purposively selected tofu and tempe business units. A census approach was used at the worker level. Data were collected through a four-point Likert questionnaire, complemented by interviews, and analyzed using multiple linear regression in SPSS 29. The findings suggest that wage adequacy and accumulated work experience are important correlates of female workers' self-reported productivity in the studied household-scale tempe industry. Because the study is cross-sectional and all three constructs were measured through respondent perceptions, the findings should be interpreted as associations rather than definitive causal effects. The study contributes localized evidence on women's labor productivity in a micro-scale food-processing industry in North Kalimantan.

Keywords: Wages; Work Experience; Female Workers' Productivity; Tempe Industry.

This is an open access article under the CC-BY-SA license.



INTRODUCTION

Household-scale food-processing businesses provide an important employment space for women, particularly where production relies heavily on manual skills, accumulated practical knowledge, and flexible labor arrangements. In Indonesia, female labor productivity is closely related to human-capital conditions, wage incentives, health, education, gender empowerment, and the characteristics of local industries. Recent evidence shows that wage levels and human-capital investment are relevant to labor productivity, although the magnitude and direction of individual determinants vary across regions and sectors (Baharin et al., 2020; Puspasari & Handayani, 2020; Sari & Oktora, 2021; Restiatun et al., 2024).

Female labor deserves particular attention because women remain unevenly distributed across sectors and employment arrangements. Recent studies of Indonesia indicate that gender inequality, women's empowerment, and wage disparities remain

relevant to women's economic outcomes (Abdurrahman & Tusianti, 2021; Ariani & Sari, 2022; Wahyuni et al., 2025). At the same time, recent evidence indicates that female wage levels can be positively related to female labor productivity at the regional level (Putri & Anas, 2026). These findings support the relevance of examining wage-productivity relationships while recognizing that the relationship may also run in the opposite direction.

Work experience is another potentially important determinant because repeated exposure to production tasks can strengthen practical skills, work familiarity, and task efficiency. Evidence from Indonesian labor-productivity studies consistently indicates that education, experience, health, wages, working conditions, and other human-capital characteristics can shape productivity (Chairunnisa & Juliannisa, 2022; Maharani & Woyanti, 2023; Andriani & Wijaya, 2024; Widiastuti & Marhaeni, 2024). However, findings are not uniform. For example, some sector-specific studies report that wages are significant while experience is not, whereas other studies find experience to be significant. This variation suggests that productivity determinants are context dependent.

Karang Anyar in Tarakan provides a useful micro-level context because household-scale tofu and tempe businesses employ female workers directly in production and related activities. The existing manuscript identifies a clear local research gap: evidence specifically examining female workers in the household-scale tempe industry in North Kalimantan remains limited. Recent Jurnal Ekonomika research has examined labor productivity in the manufacturing industry of North Kalimantan using regional data (Devi et al., 2025), while other work has examined efficiency and labor productivity in Tarakan MSMEs (Devi et al., 2022). However, these studies do not specifically test the relationship between perceived wage adequacy, work experience, and self-reported productivity among female workers in household-scale tempe production.

Accordingly, this study addresses the following research question: to what extent are perceived wage adequacy and work experience associated with self-reported productivity among female workers in household-scale tempe businesses in Karang Anyar, Tarakan? The study contributes by providing micro-level evidence from a female-dominated household industry in North Kalimantan and by explicitly distinguishing perceived measures from objective labor-market measures. This distinction is important because the original questionnaire measured wages, work experience, and productivity through respondents' perceptions rather than through administrative wage records, years-of-service records, or directly observed output.

LITERATURE REVIEW

Human Capital Theory views workers as an important form of investment in the production process. Schultz (1961) and Becker (1964) explain that human capital

includes education, skills, training, and work experience, which can improve individual productivity and income. Mincer (1974) also emphasizes the relationship between education, work experience, and earnings. In the tempe industry, work experience is relevant because longer experience can improve workers' skills, efficiency, and ability to carry out production activities. Therefore, female workers with more work experience are expected to have higher productivity.

Labor participation theory explains that individuals allocate their time between market work, household activities, and leisure. Becker's (1965) time allocation model suggests that wages are one of the economic factors considered in making decisions about work. For female workers, wages are particularly relevant because working decisions may involve a trade-off between income from employment and household responsibilities. In the tempe industry, women are involved not only in production but also in quality control, packaging, and marketing. Therefore, wages can be an important factor related to their participation and work performance.

Productivity refers to the ability to produce output using available resources efficiently. Sinungan (2003) defines productivity as the relationship between the results produced and the resources used in the production process. In this study, labor productivity is considered the most relevant measure because the tempe production process relies heavily on workers' skills, accuracy, experience, and motivation. These factors are important in determining the efficiency and output of the production process.

Efficiency theory is also relevant because productivity reflects the ability to obtain maximum output from available inputs or to produce a given level of output using minimum resources. Farrell (1957) distinguishes technical efficiency and allocative efficiency. In small-scale tempe industries, the use of relatively simple technology and dependence on manual labor make worker skills and experience important for improving production efficiency. More experienced workers may perform tasks more accurately, reduce production errors, and use raw materials more efficiently.

The economic empowerment of women provides an additional perspective for understanding female workers' involvement in the tempe industry. Sen (1999), Nussbaum (2000), and Kabeer (1999) view empowerment as the process of increasing women's ability to access resources, make decisions, and achieve better economic outcomes. Participation in productive activities can provide women with income, skills, work networks, and greater economic independence. In the tempe industry, the involvement of female workers therefore has implications not only for productivity but also for household economic welfare.

Previous studies support the relationship between the variables examined in this study. Amrita and Herlambang (2018) found that work experience had a positive and

significant effect on the productivity of female workers in a household industry. Orlian and Ratna (2019) found that wages significantly affected the productivity of female workers in the pinang-splitting business. Wardhani and Puspitawati (2014) also showed that female workers contributed significantly to productivity and income in fruit agroindustry. Meanwhile, Wahyudi et al. (2024) and Reflika (2024) found that women's participation in the tofu and tempe industries contributed to household economic welfare and income.

Based on the theories and previous findings, wages and work experience are expected to be related to the productivity of female workers in the tempe industry. Therefore, the hypotheses of this study are:

H1: It is hypothesized that female workers' wages and work experience have a partial effect on the productivity level of female workers in the tempeh industry in Karang Anyar.

H2: It is hypothesized that female workers' wages and work experience have a simultaneous effect on the productivity level of female workers in the tempeh industry in Karang Anyar.

METHOD

Research Design

This study uses a quantitative cross-sectional survey design. Data were collected from female workers employed in selected household-scale tofu and tempe businesses in Karang Anyar, Tarakan City, North Kalimantan, Indonesia. The original manuscript describes the study as causal-associative; in this revision, the terminology is changed to cross-sectional associative because the data were collected at one point in time and therefore do not establish temporal precedence or causality.

Population and Sample

The population comprised 56 female workers in 14 selected tofu and tempe business units. The business units were purposively selected because female workers constituted the majority of their workforce. All 56 eligible female workers were included using a saturated sampling/census approach. Thus, the unit of analysis is the individual female worker, not the business unit.

Data Collection

The study used primary data collected directly from female workers in the selected tempe industry. Primary data were considered appropriate because the study required information directly related to workers' wages, work experience, and productivity. Data were collected through questionnaires, interviews, and literature study. The questionnaire was used as the main instrument for obtaining information

from respondents, while interviews were conducted to obtain additional information related to the research variables. Literature study was used to obtain supporting information from relevant books, journals, and other references. The questionnaire used a four-point Likert scale, ranging from 1 to 4, with 1 representing strongly disagree and 4 representing strongly agree. The questionnaire measured respondents' perceptions of wages, work experience, and productivity.

The study consisted of two independent variables and one dependent variable. Female workers' wages (X_1) were measured through indicators related to the suitability of wages to workload, adequacy of wages for daily needs, wages as a source of work motivation, punctuality of payment, and transparency of the wage system. Work experience (X_2) represented the experience and skills acquired by female workers through their involvement in the production process. Meanwhile, female workers' productivity (Y) represented the ability of workers to carry out production activities effectively and efficiently. All perception-based variables were measured using the four-point Likert scale.

Data Analysis

The collected data were analyzed using SPSS version 29. The analysis consisted of descriptive analysis, validity and reliability testing, classical assumption testing, and hypothesis testing. Validity testing was conducted to determine whether the questionnaire items appropriately measured the intended variables, while reliability testing was used to assess the consistency of the research instrument.

Before conducting the regression analysis, classical assumption tests were performed, including the normality test, multicollinearity test, and heteroscedasticity test. These tests were conducted to determine whether the regression model met the necessary statistical assumptions.

The relationship between wages, work experience, and productivity was analyzed using multiple linear regression with the following model:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + e \dots \dots \dots (1)$$

Where Y represents female workers' productivity, X_1 represents wages, X_2 represents work experience, α represents the constant, β_1 and β_2 represent the regression coefficients, and e represents the error term.

Hypothesis testing was conducted using the t-test to examine the partial effects of wages and work experience on productivity and the F-test to examine their simultaneous effect. The coefficient of determination (Adjusted R^2) was also used to determine the proportion of variation in female workers' productivity that could be explained by the independent variables. The study used a 5% significance level ($\alpha = 0.05$). The research framework and analysis procedure were designed to test the two

hypotheses concerning the partial and simultaneous effects of wages and work experience on female workers' productivity.

ANALYSIS AND DISCUSSION

Respondent and measurement profile

The study includes 56 female workers from 14 household-scale tofu and tempe business units. All respondents completed the perception-based questionnaire. The measurement structure consists of five wage-adequacy indicators, a work-experience construct reflecting accumulated experience and skills, and a self-reported productivity construct reflecting effectiveness and efficiency in production activities.

Validity and reliability

The questionnaire was tested for validity and reliability before the regression analysis. With 56 respondents, the critical r -value was 0.263 at the 5% significance level. All 15 questionnaire items had correlation coefficients above the critical value and were therefore considered valid.

Table 1. Validity test results

Variable	Item	Pearson r	r -table	Conclusion
Wages (X1)	X1.1	0.318	0.263	Valid
	X1.2	0.524	0.263	Valid
	X1.3	0.535	0.263	Valid
	X1.4	0.469	0.263	Valid
	X1.5	0.636	0.263	Valid
Work experience (X2)	X2.1	0.570	0.263	Valid
	X2.2	0.463	0.263	Valid
	X2.3	0.530	0.263	Valid
	X2.4	0.505	0.263	Valid
	X2.5	0.480	0.263	Valid
Productivity (Y)	Y.1	0.448	0.263	Valid
	Y.2	0.352	0.263	Valid
	Y.3	0.496	0.263	Valid
	Y.4	0.403	0.263	Valid
	Y.5	0.408	0.263	Valid

Source: Primary data processed by researchers, 2026.

Table 2. Reliability test results

All Cronbach's Alpha coefficients exceeded 0.60, indicating acceptable internal consistency of the three constructs.

Variable	Cronbach's Alpha	Threshold	Conclusion
Wages (X1)	0.680	0.60	Reliable
Work experience (X2)	0.648	0.60	Reliable
Productivity (Y)	0.757	0.60	Reliable

Source: Primary data processed by researchers, 2026.

Classical Assumption Tests

Before estimating the multiple linear regression model, normality, multicollinearity, and heteroscedasticity tests were conducted. The results indicate that the regression model satisfied the required classical assumptions.

Table 3. Normality test (One-Sample Kolmogorov-Smirnov)

Test	N	Test statistic	Asymp. Sig. (2-tailed)	Conclusion
One-Sample Kolmogorov-Smirnov	56	0.103	0.200	Normal

Source: Primary data processed by researchers, 2026.

Table 4. Multicollinearity test

Variable	Tolerance	VIF	Conclusion
Wages (X1)	0.993	1.007	No multicollinearity
Work experience (X2)	0.993	1.007	No multicollinearity

Source: Primary data processed by researchers, 2026.

Table 5. Heteroscedasticity test (Glejser)

Variable	B	T	Sig.	Conclusion
Wages (X1)	0.120	1.720	0.091	No heteroscedasticity
Work experience (X2)	-0.042	-0.697	0.489	No heteroscedasticity

Source: Primary data processed by researchers, 2026.

The residuals were normally distributed because the Kolmogorov-Smirnov significance value was 0.200 (>0.05). Both independent variables had tolerance values of 0.993 and VIF values of 1.007, indicating no multicollinearity. The Glejser significance values were 0.091 for wages and 0.489 for work experience, both above 0.05, indicating no heteroscedasticity. Thus, the classical assumptions for multiple linear regression were satisfied.

Multiple Linear Regression Results

Based on the results of the multiple linear regression analysis, the regression equation is as follows:

$$Y = 6.358 + 0.295X_1 + 0.345X_2 + e \dots \dots \dots (2)$$

The equation indicates that the regression coefficient for female workers' wages is 0.295, while the coefficient for work experience is 0.345. Both coefficients are positive, indicating that higher wages and greater work experience are associated with higher levels of female workers' productivity. The coefficient of work experience is

higher than that of wages, suggesting that work experience has a relatively stronger contribution to productivity in the research model.

The Effect of Wages on Female Workers' Productivity

The partial test results show that female workers' wages have a positive and significant effect on productivity. The t-statistic is 2.387, which is greater than the t-table value of 1.674, with a significance value of $0.021 < 0.05$. Therefore, the hypothesis regarding the effect of wages on productivity is accepted.

This finding indicates that wages are not only compensation for work but may also serve as an economic factor associated with workers' motivation and performance. This result is consistent with Labor Participation Theory, particularly Becker's (1965) time allocation model, which views individuals' time as a resource allocated among different activities based on the economic value of time. From this perspective, wages are one of the economic considerations influencing the allocation of time between market and non-market activities.

In the context of the tempe industry in Karang Anyar, wages that are perceived as appropriate to workers' workload and needs may provide an economic incentive to maintain or improve work performance. This finding is also consistent with Orlian and Ratna (2019), who found that wages had a significant effect on the productivity of female workers in the pinang-splitting business. Therefore, the present finding provides further empirical evidence that wages are an important factor associated with female workers' productivity in household industries.

The Effect of Work Experience on Female Workers' Productivity

Work experience also has a positive and significant effect on female workers' productivity. The partial test produces a t-statistic of 3.182, which is greater than the t-table value of 1.674, with a significance value of $0.002 < 0.05$. Therefore, the hypothesis concerning the effect of work experience on productivity is accepted.

The regression coefficient of work experience is 0.345, indicating a positive relationship between work experience and productivity. This finding is consistent with Human Capital Theory, which views knowledge, skills, and experience as forms of capital that can improve an individual's productive capacity. Mincer (1974) also places work experience as an important component in the accumulation of human capital and its relationship with economic outcomes.

In this study, work experience is particularly important because tempe production requires practical skills, accuracy, speed, and familiarity with production procedures. As workers gain more experience, they have greater opportunities to understand work procedures and develop the skills required to perform their tasks efficiently. This result is consistent with Amrita and Herlambang (2018), who found

that work experience had a positive and significant effect on the productivity of female workers in a household industry.

Interestingly, the coefficient of work experience (0.345) is higher than the coefficient of wages (0.295). This suggests that, within the research model, work experience has a relatively stronger contribution to productivity than wages. This finding highlights the importance of practical skills and accumulated experience in tempe production, where production activities still rely substantially on workers' skills.

The Simultaneous Effect of Wages and Work Experience

The simultaneous test indicates that wages and work experience jointly have a significant effect on female workers' productivity. The F-statistic is 17.703, with a significance value of $0.000 < 0.05$. Therefore, the hypothesis concerning the simultaneous effect of wages and work experience is accepted.

This finding indicates that female workers' productivity in the tempe industry cannot be explained by a single factor. Wages may function as an economic incentive related to motivation and work effort, while work experience contributes through the development of skills, work familiarity, and efficiency. Thus, the two variables have complementary roles in explaining female workers' productivity.

The Adjusted R^2 value of 0.378 indicates that wages and work experience jointly explain 37.8% of the variation in female workers' productivity, while the remaining 62.2% is explained by other factors outside the research model.

This result suggests that although wages and work experience are significant factors, they are not the only determinants of female workers' productivity. Other factors, such as skills, working conditions, production technology, individual characteristics, and other business-related factors, may also contribute to productivity. Therefore, improving productivity in the tempe industry may require not only appropriate wage policies and the development of workers' experience but also attention to other factors affecting the production process.

Table 6. Results of Multiple Linear Regression Analysis

Variable	Coefficient	t / F	Sig.	Conclusion
Wages (X_1)	0,295	2.387	0.021	significant
Work Experience (X_2)	0,345	3.182	0.002	significant
F-statistic	-	17.703	0.000	Significant
Adjusted R^2	-	-	-	37.8%

Source: Processed by researchers, 2026

CONCLUSION

This study concludes that female workers wages and work experience have significant effects on the productivity of female workers in the tempe industry in Karang Anyar. Wages have a positive and significant partial effect on productivity,

indicating that an appropriate, adequate, and timely wage system can support workers' motivation and performance. This finding is consistent with the labor participation perspective of Becker (1965), which considers wages as an economic factor in individuals' allocation of time between work and other activities. It also supports the finding of Orlian and Ratna (2019), who reported that wages significantly affected the productivity of female workers in the pinang-splitting business.

Work experience also has a positive and significant effect on productivity. The finding indicates that accumulated work experience can improve workers' skills, efficiency, accuracy, and ability to perform production activities. This result is consistent with Human Capital Theory, which views experience and skills as important components of human capital that can increase productive capacity. The finding also supports Amrita and Herlambang (2018), who found a positive and significant relationship between work experience and the productivity of female workers in a household industry.

Furthermore, wages and work experience simultaneously have a significant effect on female workers' productivity. The two variables jointly explain 37.8% of the variation in productivity, while the remaining 62.2% is associated with other factors outside the research model. This finding suggests that productivity is influenced by both economic incentives and workers accumulated skills and experience. Therefore, improving productivity in the tempe industry requires attention not only to the wage system but also to the development and retention of experienced workers.

Based on these findings, tempe business owners are encouraged to maintain a fair, transparent, and timely wage system and to create a supportive working environment that can encourage workers to maintain and improve their productivity. Business owners are also encouraged to facilitate the transfer of practical skills and knowledge from experienced workers to newer workers. For government agencies and other relevant institutions, skills training and assistance for female workers and small-scale tempe businesses may help improve productivity. Future research should consider additional factors, such as education, working hours, production technology, age, and work motivation, to provide a more comprehensive explanation of female workers' productivity.

REFERENCES

- Amrita, N. D. A., & Herlambang, P. G. D. (2018). Analisis produktivitas tenaga kerja wanita pada industri rumah tangga canang sari. *Jurnal Ekonomi Pembangunan*, 7(2), 1–15.
- Becker, G. S. (1964). Human capital: A theoretical and empirical analysis, with special reference to education. National Bureau of Economic Research.

- Becker, G. S. (1965). A theory of the allocation of time. *The Economic Journal*, 75(299), 493–517. <https://doi.org/10.2307/2228949>
- Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A (General)*, 120(3), 253–281. <https://doi.org/10.2307/2343100>
- Ghozali, I. (2016). Aplikasi analisis multivariate dengan program IBM SPSS 23 (8th ed.). Badan Penerbit Universitas Diponegoro.
- Kabeer, N. (1999). Resources, agency, achievements: Reflections on the measurement of women's empowerment. *Development and Change*, 30(3), 435–464. <https://doi.org/10.1111/1467-7660.00125>
- Mahendra, A. D., & Woyanti, N. (2014). Pengaruh pendidikan, upah, jenis kelamin, usia, dan pengalaman kerja terhadap produktivitas tenaga kerja (Studi di industri kecil tempe di Kota Semarang). *Diponegoro Journal of Economics*, 3(1), 1–11.
- Mincer, J. (1974). Schooling, experience, and earnings. *National Bureau of Economic Research*.
- Nussbaum, M. C. (2000). *Women and human development: The capabilities approach*. Cambridge University Press.
- Orlian, M., & Ratna. (2019). Faktor-faktor yang mempengaruhi produktivitas tenaga kerja perempuan pada usaha belah pinang. *Jurnal Ekonomi Regional Unimal*, 2(2), 1–12.
- Reflika, E. (2024). Partisipasi perempuan dalam penguatan ekonomi keluarga melalui home industry (Studi kasus home industry pembuatan tempe di Desa Rejomulyo, Kecamatan Metro Selatan, Kota Metro). *Jurnal Ekonomi dan Bisnis*, 10(1), 1–15.
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17.
- Sen, A. (1999). *Development as freedom*. Oxford University Press.
- Sinungan, M. (2003). *Produktivitas: Apa dan bagaimana* (2nd ed.). Bumi Aksara.
- Wahyudi, Yusni, Hamidsyukrie, Z. M., & Masyhuri, S. (2024). Perempuan pekerja industri tahu tempe di Desa Sikur, Kecamatan Sikur, Kabupaten Lombok Timur. *Jurnal Ilmu Sosial dan Humaniora*, 13(1), 1–14.
- Wardhani, R. M., & Puspitawati, I. R. (2014). Analisis keterlibatan tenaga kerja wanita dalam usaha agroindustri buah di Kabupaten Madiun. *Jurnal Agribisnis*, 8(1), 49–64.