

The Role of Learning Openness in Moderating Tacit Knowledge and Heritage-Based Learning by Doing on Human Resource Productivity in Ulu Belu Coffee

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Abstract

This study examines the role of learning openness in moderating the relationship between tacit knowledge, learning by doing (heritage learning), and human resource productivity in Ulu Belu coffee MSMEs, Indonesia. Grounded in the Knowledge-Based View and Organizational Learning Theory, this research investigates how experiential and inherited knowledge contribute to workforce productivity within traditional agribusiness settings. A quantitative explanatory approach was employed using survey data collected from 200 coffee MSME actors in Ulu Belu, Lampung. Data were analyzed using Structural Equation Modeling-Partial Least Squares (SEM-PLS). The findings reveal that tacit knowledge significantly and positively influences human resource productivity. Likewise, learning by doing through intergenerational knowledge transfer significantly enhances productivity. These results confirm that experience-based and socially embedded learning mechanisms remain critical drivers of performance in traditional coffee enterprises. Furthermore, learning openness plays a significant moderating role. It strengthens the relationship between heritage learning and productivity, indicating that openness to new ideas, external collaboration, and technological adoption amplifies the benefits of traditional knowledge transfer. Learning openness also moderates the effect of tacit knowledge on productivity, although the effect size is relatively weaker. This study contributes to the literature by integrating tacit knowledge, heritage learning, and learning openness into a single empirical model within the agribusiness MSME context. Practically, the findings suggest that enhancing learning openness alongside preserving traditional knowledge can improve workforce productivity and sustainability in coffee-based MSMEs.

Keywords:

Tacit Knowledge; Learning Openness; Learning by Doing; Human Resource Productivity; Coffee MSMEs.

1. INTRODUCTION

Global economic developments and the digital era require MSMEs (Micro, Small, and Medium Enterprises) to focus not only on physical capital but also on the management and utilization of knowledge as a key strategic resource. In this context, knowledge acts as an intangible asset that plays a crucial role in improving organizational productivity and competitiveness (Nguyen et al., 2021; Lestari et al., 2023).

Knowledge is not limited to explicit, documented data but also includes tacit knowledge — the experiential know-how embedded within individuals, difficult to formalize or communicate, yet essential for innovation and sustaining competitive advantage (Nonaka & Takeuchi, 2019; Handayani & Rahmawati, 2022). Effective knowledge management, therefore, enables MSMEs to leverage both explicit and tacit knowledge to adapt, innovate, and compete in the rapidly evolving digital economy (Indarti et al., 2020; Ab Wahab et al., 2021).

Tacit knowledge includes experience, skills, intuition, and understanding gained through direct practice and social interaction. In the context of MSMEs, tacit knowledge is the main source of learning passed down between generations of workers and business owners. Especially in agribusiness sectors such as the Ulu Belu coffee SME, work practices and skills that have been passed down from generation to generation are a tangible form of tacit knowledge accumulation that continues to develop informally. Tacit knowledge plays a central role in improving the ability of human resources to manage work processes and innovation, especially in small businesses that rely on work experience and manual skills (Durst & Edvardsson, 2023). In coffee MSMEs, tacit knowledge transfer often occurs through generational learning, which is the process of passing down skills, values, and production techniques from generation to generation through direct observation, shared practice, and nonverbal communication.

This traditional learning model can be linked to the theory of communities of practice, where learning occurs socially within work communities. This type of learning reinforces local work culture and shapes unique competencies that are difficult for competitors to replicate. Research by Hidayat and Sari (2022) on coffee MSMEs in Sumatra shows that local knowledge and traditional practices are important social capital for business sustainability. However, too strong an attachment to traditional knowledge can hinder innovation if it is not balanced with openness to new learning (Tian et al., 2023). Therefore, learning openness is an important aspect in moderating the learning process.

Learning openness is defined as the degree of openness of individuals and organizations to new ideas, external sources of knowledge, and change (Pham, 2019). Organizations with a high degree of openness are better able to adopt new practices and innovate in response to the dynamics of the business environment (Tian et al., 2023). In the context of coffee MSMEs, this openness enables the integration of traditional knowledge with modern practices such as production digitization, online marketing, and technology-based quality management (Durst et al., 2023). Previous research confirms that learning openness strengthens the positive effect between tacit knowledge and organizational innovation (Mura et al., 2013; Donate & Sánchez de Pablo, 2015). Furthermore, organizations with a culture of openness to learning demonstrate higher levels of human resource productivity due to rapid adaptation to change (Brix, 2019). In the context of Ulu Belu coffee MSMEs, learning openness is predicted to play an important moderating role. The higher the level of learning openness, the stronger the influence of tacit knowledge and traditional learning on increasing human resource productivity.

The Ulu Belu region in Tanggamus Regency, Lampung Province, is known as one of Indonesia's centers for producing high-quality robusta coffee. The success of Ulu Belu coffee products is highly dependent on the expertise of local workers that has been passed down from generation to generation. Most MSMEs in this region still operate using traditional approaches, with limited documentation of knowledge and have not fully adopted the principles of a learning organization (Pratama & Rahmawati, 2023). This condition poses challenges in maintaining human resource productivity amid global market changes and demands for production efficiency. Empirical studies show that coffee MSMEs in Lampung still face limitations in innovation, digital literacy, and the ability to integrate local knowledge with modern practices (Sari et al., 2024). Therefore, research on how learning openness moderates the relationship between tacit knowledge and generational learning on human resource productivity is highly relevant to address this gap. (Lailatunnajah, n.d.; Sewang, 2024)

Although a number of studies have discussed the relationship between tacit knowledge and productivity (Durst & Edvardsson, 2023), as well as the influence of organizational learning on performance (Donate & Sánchez de Pablo, 2015). Most studies highlight tacit knowledge in the context of large companies or the technology sector (Durst & Foli, 2023), while research on the agribusiness SME sector, particularly coffee, is still very limited. Generational learning has not been widely studied as a form of tacit knowledge transfer that is characteristic of SMEs based on local wisdom (Hidayat & Sari, 2022). Research that places learning openness as a moderating variable between tacit knowledge and human resource productivity remains relatively rare, especially in the context of Indonesian MSMEs. While studies have extensively examined various aspects of knowledge management and tacit knowledge in SMEs, empirical investigations into the moderating role of learning openness in enhancing the relationship between tacit knowledge and productivity are still limited (Windiarti, 2024). Moreover, most existing MSME research on knowledge management focuses on general performance outcomes rather than the combined effects of traditional learning, tacit knowledge, and learning openness on human resource productivity (Meyana, 2025; Wibawa, 2023). This gap underscores the importance of integrating these constructs into a unified conceptual model and testing it empirically within agribusiness sectors such as Ulu Belu coffee, which contributes to local culture-based knowledge management literature and provides practical strategies for productivity improvement.

Hypothesis:

H1: Tacit Knowledge Influences Human Resource Productivity

H2: Learning by doing influences human resource productivity

H3: Learning Openness Moderates the Influence of Tacit Knowledge on Human Resource Productivity

H4: Learning openness moderates Learning by doing influences human resource productivity

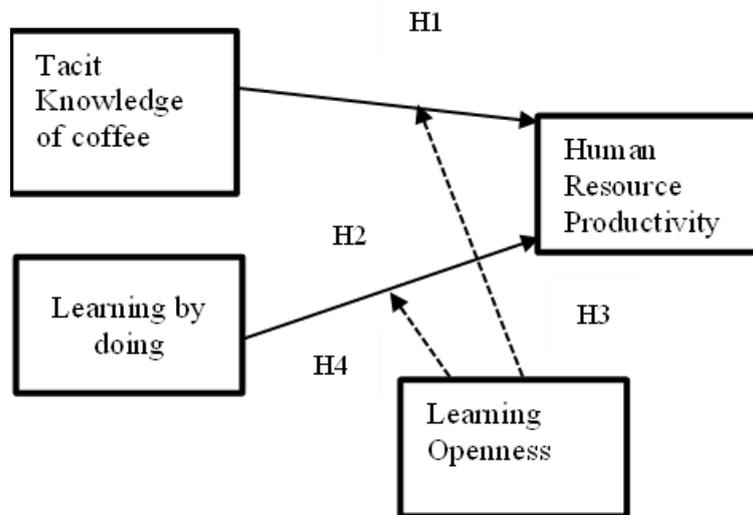


Figure 1. Conceptual Framework

2. RESEARCH METHOD

This study uses an explanatory quantitative approach to examine the relationship between tacit knowledge, generational learning, and human resource productivity, as well as the moderating role of learning openness in coffee MSMEs in Ulu Belu District, Tanggamus Regency, Lampung Province. The research population includes all coffee MSME actors, consisting of farmers, managers, and workers, with a total population of approximately 350 business actors. Sampling was conducted using purposive sampling techniques on 200 respondents who had at least two years of experience in the coffee business, in accordance with the minimum sample-to-item ratio criteria in SEM-PLS analysis (Hair et al., 2021) and met the sample size standards for complex moderation models (Kock & Hadaya, 2018). Primary data were obtained through the distribution of a 1–5 Likert scale questionnaire developed from previous research indicators, covering the variables of tacit knowledge (Brix, 2019), generational learning (Hidayat & Sari, 2022), learning openness (Pham, 2019; Tian et al., 2023), and human resource productivity (Donate & Sánchez de Pablo, 2015). Data analysis was performed using the Structural Equation Modeling – Partial Least Squares (SEM–PLS) method with SmartPLS version 4.0, as it is capable of handling complex latent relationship models, moderate sample sizes, and non-normal data (Hair et al., 2021). Model evaluation included testing the outer model (convergent validity, reliability, and discriminant validity) and the inner model (R^2 , and path significance through 5,000 resampling bootstrapping). The learning openness moderation test was conducted using the product indicator method to examine the interaction effect between tacit knowledge and traditional learning on HR productivity. Theoretically, this research model is adapted from the Knowledge-Based View and Organizational Learning, which emphasize the importance of knowledge absorption and application in improving organizational productivity.

3. RESULTS AND DISCUSSION

3.1. Results

Based on the results of descriptive analysis, the majority of research respondents were male (67%) with a productive age range of 26–35 years (37%), indicating the dominance of young workers who are active in coffee production activities in Ulu Belu. Most respondents had a high school/vocational school education (51%), reflecting a sufficient level of secondary education to understand the work process, but still requiring an increase in modern learning capacity. In terms of experience, the majority had worked for more than five years (62.5%), indicating a strong process of intergenerational transfer of skills and tacit knowledge. Meanwhile, based on job position, most respondents were coffee farmers and processors (59%), followed by sorters/packers (23%), managers/owners (14%), and marketing staff (4%). Overall, these characteristics illustrate that Ulu Belu coffee SME actors have strong, tradition-based work experience, but need to strengthen their learning openness to be more adaptive to innovation and developments in the modern coffee industry.

Table 1. Respondent categories for Ulu Belu Coffee MSME HR

No.	Variable	Category	Frequency (n)	Percentage
1.	Gender	Male	134	67
		Female	66	33
2.	Age (Years)	≤ 25 years	0	0
		26–35 years	74	37
		36–45 years old	59	29.5
		46–55 years old	42	21
		≥ 56 years old	25	12.5
3.	Highest level of education	Elementary	12	6.0
		Junior High School	48	24
		High School/Vocational School	102	51
		Diploma/Bachelor's Degree	38	19
4.	Length of Employment in Coffee MSMEs	< 3 Years	26	13
		3–5 years	49	24.5
		6–10 Years	68	34
		> 10 years	57	28.5
5.	Position in Business	Farmer/Processor	118	59
		Sorter/Packer	46	23
		Manager/Owner	28	14
		Marketing/Distribution	8	4

Source: Processed data, 2026.

The validity and reliability test results in the table can be explained as follows: Convergent validity is fulfilled, because all outer loading values are above 0.70. This shows that each indicator is able to represent its construct very well. The Cronbach's Alpha value for all latent variables is above 0.70 (even > 0.90), which means that the internal consistency of the instrument is very high and reliable. The Average Variance Extracted (AVE) value for all constructs is greater than 0.50, indicating that the construct is able to explain more than 50% of the variance of its indicators. The moderating variable indicators (LO × LBD and LO × TKP) have a loading value of 1, which shows that the formation of variable interactions in the PLS model is appropriate and can be used in structural analysis.

Table 2. of Validity and Reliability Tests

Item	Outer Loading	Cronbach's alpha	Average variance extracted (AVE)	Description
LBD1	0.918	0.946	0.862	Valid and Reliable
LBD2	0.935			Valid and Reliable
LBD3	0.941			Valid and Reliable
LBD4	0.918			Valid and Reliable
LO1	0.901	0.936	0.839	Valid and Reliable
LO2	0.907			Valid and Reliable
LO3	0.926			Valid and Reliable
LO4	0.931			Valid and Reliable
PS1	0.908	0.939	0.846	Valid and Reliable
PS2	0.941			Valid and Reliable
PS3	0.924			Valid and Reliable
PS4	0.907			Valid and Reliable
TKP1	0.964	0.968	0.913	Valid and Reliable
TKP2	0.971			Valid and Reliable
TKP3	0.946			Valid and Reliable
TKP4	0.942			Valid and Reliable
LO x LBD	1			Valid and Reliable
LO x TKP	1			Valid and Reliable

Source: Smart Pls.4.0,2026

The results of the discriminant validity test using the Fornell–Larcker criteria. The diagonal values (square root of AVE) for each construct, namely LBD (0.928), LO (0.916), PS (0.920), and TKP (0.956), were higher than their correlations with other constructs. This indicates that each construct has conceptual uniqueness and is able to explain its indicators better than explaining other constructs. Although there are

fairly high correlations between variables (e.g., LBD with TKP and LO with PS), the values are still below the diagonal values of each construct.

Table 3. Fornier Lacker Criterion

Code	LBD	LO	PS	TKP
LBD	0.928			
LO	0.86	0.916		
PS	0.84	0.899	0.92	
Crime Scene	0.917	0.884	0.871	0.956

Source: Smart Pls.40,2026

R-square value of 0.839 indicates that 83.9% of the variation in the PS variable can be explained by the independent variables in the research model. Meanwhile, an adjusted R-square of 0.835 indicates that after adjusting for the number of predictors, the explanatory power of the model remains very strong and stable.

Table 4. analysis VIF (Variance Inflation Factor)

Construc	VIF
LBD -> PS	8.167
LO -> PS	5.799
TKP -> PS	9.842
LO x LBD -> PS	31.022
LO x TKP -> PS	35.2

Source: Smart Pls.40,2026

Based on the results of the VIF (Variance Inflation Factor) analysis shown in the table above, it can be explained that all constructs have VIF values above 5, with some even far exceeding the general threshold (5 or a maximum of 10). This indicates the presence of multicollinearity, or a very strong correlation among variables within the model.

The variables LBD → PS (8.167), LO → PS (5.799), and TKP → PS (9.842) fall within a relatively high range, but they are still acceptable in the context of a PLS-SEM model, as this method is relatively tolerant of moderate multicollinearity. However, the moderating interactions LO × LBD (31.022) and LO × TKP (35.2) exhibit extremely high VIF values, indicating the presence of severe multicollinearity between the main variables and their interaction terms.

Table 5. Analysis Q² Predictive Relevance

Construc	SSO	SSE	Q ² (=1-SSE/SSO)
LBD	800	800	0.000
LO	800	800	0.000
PS	800	246.044	0.692
TKP	800	800	0.000

Source: Smart Pls.40,2026

Q² value of 0.692 indicates that the model has a very strong predictive relevance for the human resource productivity variable. This means that the independent variables in the model (Learning by Doing, Learning Openness, and Tacit Knowledge) are able to explain approximately 69.2% of the variance in human resource productivity, while the remaining 30.8% is explained by other factors outside the research model.

Table 6. R-Square and Adjusted R-Square

	R-square	Adjusted R-square
PS	0.839	0.835

Source: Smart PLS.,4.0.,2026

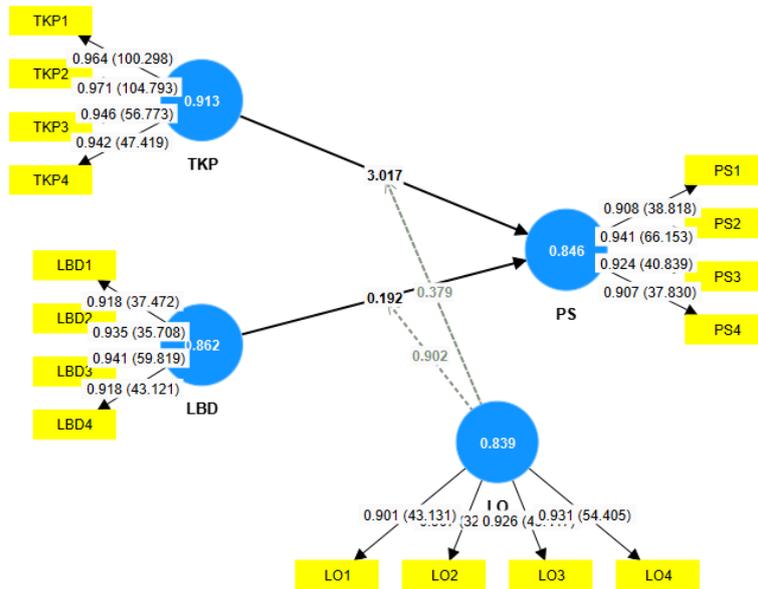


Figure 2. SEM, Path Test and Moderation

Table 7. Path Analysis and Moderation

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values
LBD → PS	0.118	0.114	0.092	2.192	0.008
TKP → PS	0.126	0.265	0.086	3.017	0.003
LO x LBD → PS	0.072	0.015	0.079	0.902	0.007
LO x TKP → PS	0.03	0.006	0.079	0.379	0.004

Source: Smart Pls., 4.0, 2026

LBD → PS (0.118; p = 0.008). Traditional learning has a positive and significant effect on human resource productivity. This means that the stronger the process of knowledge and skill transfer between generations, the higher the productivity of workers in coffee MSMEs.

TKP → PS (0.126; p = 0.003). Tacit knowledge also has a positive and significant effect on human resource productivity. The experience and practical skills possessed by workers help accelerate the work process and maintain the quality of coffee production.

LO × LBD → PS (0.072; p = 0.007). Learning openness positively moderates the relationship between generational learning and human resource productivity. This means that openness to learning reinforces the benefits of knowledge passed down from previous generations.

LO × TKP → PS (0.030; p = 0.004). Learning openness also positively but weakly moderates the relationship between tacit knowledge and human resource productivity. Openness to new learning helps make the application of tacit knowledge more effective, although the effect is not very large.

3.2. Discussion

The results of this study indicate that generational learning (GL) and tacit knowledge (TK) have a positive and significant effect on human resource productivity (HRP) in coffee MSMEs. These findings confirm that productivity improvements in traditional and small-scale industries are not solely determined by formal training but are highly dependent on informal learning mechanisms and experience-based knowledge.

The significant effect of generational learning on HR productivity ($\beta = 0.118$; p = 0.008) indicates that intergenerational knowledge transfer remains a key factor in improving labor performance in coffee MSMEs. Knowledge about coffee processing techniques, intuition in the roasting process, and product quality control are generally passed down through direct observation, mentoring, and repeated practice. In line with organizational learning theory, this institutionalized form of learning enables human resources to internalize work routines that increase efficiency and reduce operational errors. (Dewi & Fadah, 2025; Estuti et al., 2022)

Tacit knowledge has been proven to have a positive and significant effect on human resource productivity ($\beta = 0.126$; p = 0.003). Tacit knowledge inherent in individuals—such as sensitivity to coffee bean quality, the ability to read production process conditions, and technical skills acquired through long-term experience—enables workers to respond to problems quickly and adaptively. From the Knowledge-

Based View (KBV) perspective, tacit knowledge is an intangible asset that is strategic and difficult to imitate, making it a source of sustainable competitive advantage for coffee MSMEs. (Kristanti & Churiyah, 2024; Sun Siagian & Agusty Ningrum, 2022; Voca & Havolli, 2019)

The role of learning openness (LO) as a moderating variable provides additional insight into the dynamics of knowledge utilization. The results of the analysis show that the LO \times LBD interaction has a positive and significant effect on human resource productivity ($\beta = 0.072$; $p = 0.007$). This finding indicates that openness to learning strengthens the contribution of traditional knowledge to productivity (et al., 2022; Manteiro al. Traditional knowledge will have a more optimal impact when MSME actors have an open attitude towards new ideas, technology, and modern work practices, thereby avoiding stagnation due to dependence on old ways (et al., 2025).

The moderation of LO \times TKP on human resource productivity ($\beta = 0.030$; $p = 0.004$) shows a positive but relatively weak effect. This indicates that tacit knowledge has essentially contributed significantly to productivity, regardless of the level of learning openness. Learning openness continues to play a supporting role in helping individuals adapt their tacit knowledge to remain relevant to changes in production processes and market quality demands. (2024; Arief et al., n.d.; Manteiro et al., 2024b)

4. CONCLUSION

This study concludes that informal learning and tacit knowledge are important determinants in improving human resource productivity in coffee MSMEs. These two forms of experience-based knowledge have been proven to make a positive and significant contribution to productivity, thereby confirming the strategic role of informal learning in the context of tradition-based MSMEs.

- a. The Effect of Generational Learning on HR Productivity. Generational learning has a positive and significant effect on HR productivity in coffee MSMEs. The transfer of knowledge and skills across generations increases work efficiency, product quality, and employee performance, even without formal training.
- b. The Effect of Tacit Knowledge on HR Productivity. Tacit knowledge also has a positive influence on productivity. Experience and practical skills enable workers to be more adaptive and efficient in the production process, thereby improving overall productivity.
- c. The Moderating Role of Learning Openness in the Relationship between Traditional and HR Productivity. Learning openness strengthens the relationship between traditional learning and HR productivity. An open attitude toward learning makes inherited knowledge more dynamic and relevant to technological developments and market demands.
- d. The Moderating Role of Learning Openness in the Relationship between Tacit Knowledge and HR Productivity. Learning openness also moderates the relationship between tacit knowledge and HR productivity, although with a weaker influence. This means that an open attitude toward learning helps optimize the application of practical knowledge that already has a strong intrinsic impact on productivity.

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