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# The Relationship of Leadership Productivity and Work Environment on Local Labor Productivity

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**Abstract**
Due to its significant impact on national output, socio-economic status, and employment, the oil palm industry plays a significant and vital role in Malaysia. Hence, the labor productivity in oil palm industry is critical in terms of national income and export earnings. However, recently drops in Malaysian oil palm production have been attributed to a shortage of labor, particularly foreign labor, as a result of the movement order of COVID-19 pandemic. Malaysian oil palm smallholders rely solely on local labor at the moment, so measuring local labor productivity is critical. Understanding the level of local labor productivity in relation to provided leadership productivity and work environment are vital. However, there is still a scarcity of research that identifies the specific relationship between leadership productivity and work environment on local labor productivity. Therefore, this paper aimed to investigate the relationship between i) leadership productivity and local labor productivity and ii) work environment local labor productivity. Data was collected from smallholders in the oil palm industry in Sarawak, Malaysia. The study employs partial least squares structural equation modeling (PLS-SEM) to investigate the relationship between i) leadership productivity and ii) work environment on local labor productivity. The findings show that leadership productivity and work environment have a strong positive and significant relationship with local labor productivity. This study has several practical implications for smallholders in the oil palm industry in terms of increasing local labor productivity.
**Keywords**: Local Labor Productivity, Leadership Productivity, Work Environment, Oil Palm, PLS-SEM

## Introduction

Productivity is one of the most important factors affecting economic growth (Wang et al., 2021), profitability Ofori et al (2021), and organization competitiveness (Čechura et al., 2021). Productivity is generally considered to be the efficient utilization of organisational resources and is measured in term of the efficiency of a worker or labor. Laborers are one of organization's most valuable resources, and an organization would be nothing without them.

More rational labor utilization is one of the preconditions for getting high rates of production development, increasing production effectiveness and improving workers' well-being (Maikov, 1972). Labor productivity is one of the key terms that determines an organization's profit and loss. Labor productivity is a subdomain of the overall organization productivity, but organization productivity is heavily reliant on labor productivity. According to Ratna et al (2021), productivity of labor is crucial not only for organization performance but also for sustainable development. Organizations require leadership and leadership behavior plays an important role in the formation of a successful organization. Leadership is a strategy for motivating employees to maximize their full potentials for organization's development and growth. Leadership studies frequently found that leadership has a significant impact on labor productivity (Akparobore & Omosekejimi, 2020; Alenezi et al., 2021; Anggitaningsih & Handriyono, 2019; Asamani et al., 2016; Asrar-ul-Haq & Kuchinke, 2016; Baidi et al., 2020; Halling et al., 2021; Haque et al., 2021; Hussain & Khayat, 2021; Malik et al., 2020; McNeese-Smith, 1995; Ramaswamy et al., 2021; Rehman et al., 2019; Silverthorne & Wang, 2001; Sudarmo et al., 2021; Yan, 2018). Yan (2018) highlights that productivity increase with time under the innovative leadership. While spiritual leadership is strongly recommended by Haque et al (2021) to support work-unit productivity. This type of leadership is regarded as source of intrinsic motivation, which may satisfy an individuals' need in a working environment, thereby increasing work-unit productivity. According to Hussain and Khayat (2021), a leaders who encourages, inspires and motivates their employees to innovate and create change successfully increases their employees' job satisfaction and commitment, which may result in an increased productivity. Leaders that are more employee-focused, providing opportunities for employee involvement, demonstrating flexibility, and employing different motivational approaches, increased employee productivity (Alenezi et al., 2021). Sudarmo et al (2021) also highlight the important of leadership in increasing employee's productivity. Workers' productivity in Nigeria's private and publics sectors, on the other hand, has remained low as a result of poor leadership style (Okafor, 2013). Transformational leadership successfully increased the employees' productivity, whereas authoritarian and transactional leadership have no significant relationship with employees' productivity (Rehman et al., 2019). In addition, the work environment has also been shown to be an important determinant of labor productivity (Alarcon et al., 2021; Anjum et al., 2018; Jaskiewicz & Tulenko, 2012; Kekäläinen et al., 2010; Kim & Choi, 2017; Li et al., 2016; Marchetti et al., 2016; Massoudi & Hamdi, 2017; Nakpodia, 2011; Niemela et al., 2002; Osibanjo et al., 2015; Roelofsen, 2002; Setiyanto & Natalia, 2017; Taiwo, 2010). Working environment that enables people to do their jobs well while also being comfortable is one of the most basic human needs (Roelofsen, 2002). According to Jaskiewicz and Tulenko (2012), workers' productivity is mainly determined by the environment under which they work. When workers are subjected to unacceptable high temperatures in the workplace, their productivity are decreased (Kjellstrom et al., 2009; Li et al., 2016; Marchetti et al., 2016), as heat stress is imposed on their bodies. Previous research has shown that 80% of the issues concerning worker productivity are associated with the type of work environment in which they carry out their given works (Sergio et al., 2013). The preceding discussion demonstrates the impact of a leadership and work environment on labor productivity. To summarize, labor productivity is strongly related to the leaders' personalities, capabilities and competence, as well as the work environment.

## Literature Review

### *Labor Productivity*

Labor productivity has become a major concern for all economies because it is the key indicator of economic performance that is closely related to economy's competitiveness, economic growth, and living standards. In general, labor productivity is defined as the total volume of output produced per unit of labor. Previous researchers defined labor productivity in various ways. According to Day et al (2018), labor productivity is an as extent to which workers' effectiveness is degraded while at work. Labor productivity is measured by He and Ji (2021) as the amount of time labor works (i.e., annual working hours and average working months) and their unit wage, which is the average hourly wage. Several previous works on productivity have used value added per worker for measuring labor productivity (Lebedinski & Vandenberghe, 2014; Tang, 2014). Some of the past researchers measured labor productivity as logarithm of real sales per number of employees (Avarmaa et al., 2013; Dimelis & Louri, 2002). While others measured labor productivity through the output per person employed (Cristea et al., 2020). A rise in labor productivity will increase the efficiency of agricultural production in agricultural industry (Vorontsov, 1978). Labor productivity measures are important in analyzing the performance of any economic sector but they are especially important in agriculture, where farmers also behave as entrepreneurs and suppliers of agro-food products. Selim (2012) calculated labor productivity by averaging wage rates for cropping seasons of Aus rice, with female and male wage rates averaging over per day without meal. Labor productivity was calculated by Arouna et al (2021) as the ratio of the grain yield to total labor days required for one hectare of rice production. Labor productivity is more than just a broader measure of efficiency; it is also directly related to net economic value or return on capital, which is a crucial component of a firm's investment behavior.

### *Leadership Productivity and Labor Productivity*

Leadership is the ability to give others vision and focus, correctly defining goals to which others aspire, thereby increasing productivity. The term leadership productivity is defined as a leader who is responsible for the work productivity of his or her team and influences this productivity through his or her performance (Desjardins, 2017). According to the Desjardins (2017), the leadership productivity model consists of three dimensions namely goal orientation, support and time optimization. Goal orientation is a continuous leadership performance required to implement an organization's strategies and operational goals of an organization, which includes goal definition, goal clarification, process acceptance and result acceptance. A productive leader is also one who encourages their employees to achieve their goals. The support dimension of leadership productivity comprises of information, interaction, coaching and feedback. Aside from a clear goal orientation and ideal support of subordinates, a leader can increase productivity by maximizing of their work time. Time optimization requires a leader to think about the impact of his or her achievement on the work time allocation of his or her subordinates. Workload optimization, meeting optimization and scheduling are all components of time optimization. Leadership productivity is significantly related to labor productivity. Previous research showed that leadership has significant impact on the employees performances. Adeniji et al (2020) conducted a survey of 422 Nigerian employees working in selected functional consumer-packaged goods to investigate the relationship between leadership and employee engagement. The leadership was measured in terms of transformational leadership (i.e., leadership that creates positive change for followers by looking out for one another and acting in the best interests of the

group as a whole), transactional leadership (i.e., a supervisory, organisational, and group performance-oriented leader) and laissez-faire (i.e., employees receive little or no direction from their managers). According to the findings of the partial least square path modelling approach indicated that the transformational leadership and transactional leadership have a positive and significant influence on employee engagement. This means that managers have a significant influence on employee behavior, and employee engagement will impact labor productivity. Alaghbari et al (2019) discovered that leadership is one of the top five factors identified as having the greatest impact on construction labor productivity in Yamen.
Hence, we expect that leadership productivity will have significantly positive relationship with local labor productivity. Therefore, we propose the following hypothesis

$H_1$: Leadership productivity positively associated with local labor productivity.

*Work Environment and Labor Productivity*
Working environment are critical in any organization, regardless of its location, industry or size. The primary concerns of workers in the workplace are safe environment free of accidents and violence. According to Ramlall (2003), people strive to work and to stay in organizations that provide positive and good work environment. Briner (2000) defined the work environment as the setting in which people work. The work environment includes job-related characteristics (e.g. task complexity, workload), physical setting (e.g. tools, equipment), extra-organizational setting (work-home relationships) and broader organizational features (e.g. culture) (Briner, 2000). Work environment, according to Sharavasti and Bhola (2015) as working conditions at work that may either facilitate or inhibit workers from working. Greig et al (2021) on the other hand defined work environment as all aspects of work system's design and management that impact the worker's interactions with the place of work. Previous studies have shown that the environment in which workers spend their working lives has a significant impact on productivity. A positive working environment has proved to be associated with a higher job satisfaction which indirectly contributes to better productivity (Kagan et al., 2021). Another study by Islam and Shazali (2011) found an association between a good working environment and increased productivity. A good working environment such as free drinking water, lunch, paid sick and casual leave, and regular payment of wages are important inputs to a labor-intensive manufacturing process, which is positively associated with productivity. Karthik and Kameswara Rao (2019) discovered that working condition is one of the most important factors influencing masonry labor productivity in building construction projects in India. Doloi (2007) conducted research on motivational factors influencing worker productivity in Australian construction industries. According to the results of regression analysis, the most important motivator associated with worker productivity is the basic working environment. Findings from regression analysis revealed that the basic working environment is the most critical motivation factor associated with worker productivity. Poor working conditions, on the other hand, have been linked to low labor productivity. According to the finding of a regression analysis conducted by (Li et al., 2016), a negative working environment reduces construction labor productivity. Their discovery demonstrates that high-temperature environments cause heat stress on the human body, which can reduce labor productivity in the construction industry. The study of Kamaruddin et al (2018) used 366 oil palm plantation workers with structural equation modeling to measures the negative significance of working environment on job satisfaction. The study found that working environment (e.g., plantation is risky and dangerous, dirty and smelly, onerous and

hard) significantly reduces the job satisfaction. Purwanta (2021) discovered that less comfortable work environment caused by higher work area temperatures and a lack of green open space reduced worker productivity in the batik industry.
Based on this discussion, we formulate the following hypothesis:
$H_2$: Work environment positively associated with local labor productivity.

Hypotheses are depicted in Figure 1.

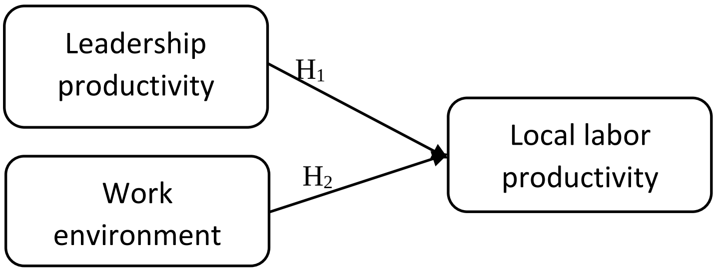


Figure 1. Research framework

**Methodology**
*Participants and data collection procedure*
In this study we used the smallholders in Sarawak who used local labor because Sarawak has the highest total planted area of oil palm in Malaysia (MPIC, 2021). The purposive sampling technique was used to select samples of oil palm smallholders in Sarawak. A total population of oil palm smallholders in Sarawak with local labor are 275. Due to several factors, including a restriction of movement control order and enhance movement control order due to the Covid-19 pandemic and not all oil palm smallholders agreeing to participate in the study. In September 2021, a survey questionnaire was distributed to the 80 smallholders in Sarawak who used local labor in their plantation. The data was gathered using a face-to-face survey questionnaire, which was distributed at the smallholder's plantation and smallholders were guided in answering the questions. Smallholders were asked to circle the response that best describe their level of agreement for each question. Only 56 questionnaires were functional and assigned to be analysed further. The sample size supports the reporting of (Hair Jr et al., 2017), who stated that the PLS-SEM technique works well even on sample sizes of less than 100. Considering this criterion, the sample size of 56 is adequate to allow for estimations. Each of oil palm smallholders participated voluntarily and was informed about the goal of the study. In addition, they were assured that their information would remain confidential throughout the data collection process.

*Measurement Instrument*
The questionnaire comprises of the variables studied in the study. The work environment is measured using four constructs namely topography, types of soil, cleanliness and distance. While the local labor productivity and leadership productivity are measured using seven and twelve measurement items, respectively. The measurement items used for leadership productivity has been adapted from (Desjardins, 2017; Dobbelstein, 2018). The questionnaire was reviewed by an expert to ensure that all the measurement items accurately represented the constructs. A further review was made by several smallholders via pilot study to ensure that the questionnaire could be easily understood. Each of the measurement items in the

questionnaire was measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5).

*Demographic*
Most smallholders in the oil palm industry are between the ages of 46 and 65. 21.4% of oil palm smallholders are between the ages of 46 and 55, with 35.7% are between the ages of 56 to 65. Furthermore, majority of oil palm smallholders are male (85.7%), with only 14.3% female smallholders. Almost half of smallholders (46.4%) have only a primary school education, 25% have a secondary school qualification, 17.9% have no schooling, 7.1% have a bachelor's degree (7.1%) and the remaining 3.6% have a diploma. Smallholder experience ranges from 5 to 10 years for 46.4% of smallholders. While 35.7% of smallholders with less than 5 years of experience and 17.9% of smallholders with 11 to 15 years of experience. Furthermore, 42.9% of smallholders have 4 to 6 employees, 41.1% have 1 to 3 employees, and the remaining smallholders have more than 6 employees. The majority of the oil palm smallholders (64.29%) have 2 to 4 acres of land available for oil palm cultivation and 60.98% of smallholders could obtain 2 to 4 tonnes of fresh fruit bunches within a month. In addition, the findings of this study also show that nearly half of smallholders (49.02%) set aside RM1000 to RM2000 per month to care for their oil palm plantations.

*Data Analysis*
The PLS-SEM technique was applied to the data using Smart PLS version 3.2.9 software. This technique is preferred over covariance-based SEM if the distribution of the data is nonnormal. The multivariate skewness of Mardia was used to validate the presence of multivariate nonnormal distribution ($p<0.05$) (Loperfido, 2020). The research framework in this study represents the hierarchical latent variable model with reflective-formative, Type II model, as depicted in Figure 2. The hierarchical latent variable model was performed in three steps. The first step involves the evaluation of reflective measurement model of lower-order constructs; the second step involves the evaluation of formative measurement model of higher-order constructs; and finally, the evaluation of structural model. The disjoint two-stage approach with Mode B and path weighting scheme proposed by Sarstedt et al (2019) was used to specify and estimate the hierarchical latent variable models. This approach is divided into two stages namely stage one and stage two disjoint two-stage approach. In the reflective measurement model of lower-order constructs, we evaluated the internal consistency reliability, convergent validity and discriminant validity. In the formative measurement model of higher-order constructs, we evaluated the collinearity, outer weight and statistical significance, whereas, in the structural model, we evaluated the path coefficient significance and relevance, predictive relevance ($Q^2$) and $PLS_{predict}$.

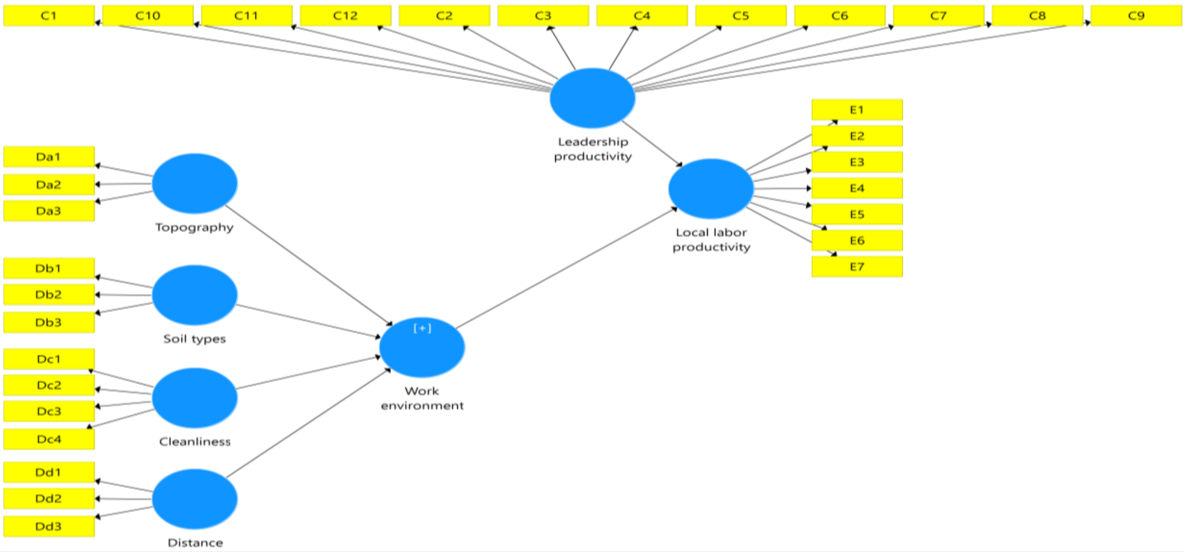


Figure 2. Hierarchical latent variable model

The reflective measurement model evaluated the internal consistency reliability, convergent validity and discriminant validity. The internal consistency reliability was assessed using items loadings, Cronbach's alpha (CA), reliability metric ($\rho_A$) and composite reliability (CR), and convergent validity was assessed using average variance extracted (AVE). The results of reliability and convergent validity reports in Table 1 and, as seen from the results, the individual item loadings are higher than 0.708, which meets the benchmark given by (Hair et al., 2019), except for items E3, E4, E5, E6, E7, Da3, Db1, Dc2 and all leadership productivity construct (except for item C2). The CA, $\rho_A$ and CR estimates of each construct were all above the standard threshold of 0.7 (Hair Jr et al., 2020; Sarstedt et al., 2019), except for soil types. While, with the exceptional of local labor productivity and leadership productivity, the AVE estimates of all constructs were all greater than 0.5, which meets the cut-off point given by (Hair Jr et al., 2020). Table 2 shows the internal consistency reliability and convergent validity of a new model after removing the items E6 and Db1, which have the lowest loadings from local labor productivity and soil type, respectively. Each construct's CA, $\rho_A$ and CR estimates were all greater than 0.7, while its AVE estimates were all greater than 0.5 except for leadership productivity (see Table 2 for details). The process of removing the item with the lowest loading is repeated until the model achieves an AVE value of 0.5 for leadership productivity construct. Table 3 shows the internal consistency reliability and convergent validity of a new model after removing the items C12, C11, C5, C4, C10 and C3. Each construct's CA, $\rho_A$ and CR estimates were all greater than 0.7, while its AVE estimates were all greater than 0.5. This indicates that the model meets the requirement for internal consistency reliability and convergent validity (see Table 3 for details).

Table 1
*Reflective measurement model results*

| Construct | Item | Loadings | CA | $\rho_A$ | CR | AVE |
|---|---|---|---|---|---|---|
| Local labor productivity | E1 | 0.867 | 0.828 | 0.862 | 0.871 | 0.496 |
| | E2 | 0.817 | | | | |
| | E3 | 0.629 | | | | |
| | E4 | 0.645 | | | | |
| | E5 | 0.634 | | | | |
| | E6 | 0.600 | | | | |
| | E7 | 0.691 | | | | |
| Work Environment | | | | | | |
| Topography | Da1 | 0.869 | 0.700 | 0.833 | 0.830 | 0.629 |
| | Da2 | 0.907 | | | | |
| | Da3 | 0.557 | | | | |
| Soil types | Db1 | -0.429 | 0.431 | 0.469 | 0.504 | 0.514 |
| | Db2 | 0.804 | | | | |
| | Db3 | 0.843 | | | | |
| Cleanliness | Dc1 | 0.770 | 0.836 | 0.932 | 0.865 | 0.625 |
| | Dc2 | 0.509 | | | | |
| | Dc3 | 0.917 | | | | |
| | Dc4 | 0.900 | | | | |
| Distance | Dd1 | 0.938 | 0.916 | 0.921 | 0.947 | 0.856 |
| | Dd2 | 0.914 | | | | |
| | Dd3 | 0.925 | | | | |
| Leadership Productivity | C1 | 0.574 | 0.787 | 0.820 | 0.832 | 0.304 |
| | C2 | 0.808 | | | | |
| | C3 | 0.605 | | | | |
| | C4 | 0.464 | | | | |
| | C5 | 0.399 | | | | |
| | C6 | 0.547 | | | | |
| | C7 | 0.705 | | | | |
| | C8 | 0.582 | | | | |
| | C9 | 0.348 | | | | |
| | C10 | 0.567 | | | | |
| | C11 | 0.440 | | | | |
| | C12 | 0.389 | | | | |

Table 2
*Reflective measurement model results (after deleted E6, Db1 and C9)*

| Construct | Item | Loadings | CA | $\rho_A$ | CR | AVE |
|---|---|---|---|---|---|---|
| Local labor productivity | E1 | 0.877 | 0.813 | 0.848 | 0.866 | 0.524 |
| | E2 | 0.816 | | | | |
| | E3 | 0.637 | | | | |
| | E4 | 0.678 | | | | |
| | E5 | 0.608 | | | | |
| | E7 | 0.688 | | | | |
| Work Environment | | | | | | |
| Topography | Da1 | 0.869 | 0.700 | 0.831 | 0.831 | 0.630 |
| | Da2 | 0.906 | | | | |
| | Da3 | 0.559 | | | | |
| Soil types | Db2 | 0.950 | 0.785 | 0.939 | 0.897 | 0.814 |
| | Db3 | 0.852 | | | | |
| Cleanliness | Dc1 | 0.770 | 0.836 | 0.942 | 0.865 | 0.626 |
| | Dc2 | 0.512 | | | | |
| | Dc3 | 0.913 | | | | |
| | Dc4 | 0.903 | | | | |
| Distance | Dd1 | 0.938 | 0.916 | 0.921 | 0.947 | 0.856 |
| | Dd2 | 0.914 | | | | |
| | Dd3 | 0.924 | | | | |
| Leadership Productivity | C1 | 0.587 | 0.783 | 0.817 | 0.832 | 0.321 |
| | C2 | 0.816 | | | | |
| | C3 | 0.608 | | | | |
| | C4 | 0.479 | | | | |
| | C5 | 0.398 | | | | |
| | C6 | 0.556 | | | | |
| | C7 | 0.710 | | | | |
| | C8 | 0.563 | | | | |
| | C10 | 0.556 | | | | |
| | C11 | 0.417 | | | | |
| | C12 | 0.383 | | | | |

Table 3
*Reflective measurement model results (after deleted E6, Db1, C9, C12, C11, C5, C4, C10, C3)*

| Construct | Item | Loadings | CA | $\rho_A$ | CR | AVE |
|---|---|---|---|---|---|---|
| Local labor productivity | E1 | 0.878 | 0.813 | 0.851 | 0.866 | 0.524 |
| | E2 | 0.817 | | | | |
| | E3 | 0.639 | | | | |
| | E4 | 0.674 | | | | |
| | E5 | 0.603 | | | | |
| | E7 | 0.691 | | | | |
| Work Environment | | | | | | |
| Topography | Da1 | 0.869 | 0.700 | 0.828 | 0.831 | 0.630 |
| | Da2 | 0.905 | | | | |
| | Da3 | 0.560 | | | | |
| Soil types | Db2 | 0.950 | 0.745 | 0.939 | 0.897 | 0.814 |
| | Db3 | 0.852 | | | | |
| Cleanliness | Dc1 | 0.770 | 0.836 | 0.942 | 0.865 | 0.626 |
| | Dc2 | 0.512 | | | | |
| | Dc3 | 0.913 | | | | |
| | Dc4 | 0.903 | | | | |
| Distance | Dd1 | 0.938 | 0.916 | 0.920 | 0.947 | 0.856 |
| | Dd2 | 0.914 | | | | |
| | Dd3 | 0.924 | | | | |
| Leadership Productivity | C1 | 0.611 | 0.748 | 0.776 | 0.833 | 0.504 |
| | C2 | 0.830 | | | | |
| | C6 | 0.635 | | | | |
| | C7 | 0.795 | | | | |
| | C8 | 0.599 | | | | |

The Fornell Larcker Criterion and Heterotrait-Monotrait (HTMT) ratio were used to assess discriminant validity. As shown in Table 4, the results show that the square root of AVE (cross-diagonal values) of each construct was higher than the correlation with other constructs (off-diagonal values) (Fornell & Larcker, 1981; Raza et al., 2017). The HTMT result is reported in Table 5 and the finding show that all the constructs are below the cut-off of 0.850, which corresponds to the cut-off value given by Henseler et al. (2015). Based on these two criteria discussed above, the model can be said to have met the requirements of discriminant validity.

Table 4
*Fornell-Larcker Criterion*

| | Cleanliness | Distance | Leadership productivity | Local labor productivity | Soil types | Topography |
|---|---|---|---|---|---|---|
| Cleanliness | **0.791** | | | | | |
| Distance | -0.631 | **0.925** | | | | |
| Leadership productivity | -0.543 | 0.510 | **0.710** | | | |
| Local labor productivity | -0.527 | 0.617 | 0.632 | **0.724** | | |
| Soil types | -0.213 | 0.270 | 0.306 | 0.425 | **0.902** | |
| Topography | -0.726 | 0.613 | 0.439 | 0.472 | 0.133 | **0.794** |

Table 5
*HTMT Ratio*

| | Cleanliness | Distance | Leadership productivity | Local labor productivity | Soil types | Topography |
|---|---|---|---|---|---|---|
| Cleanliness | | | | | | |
| Distance | 0.554 | | | | | |
| Leadership productivity | 0.618 | 0.621 | | | | |
| Local labor productivity | 0.486 | 0.711 | 0.772 | | | |
| Soil types | 0.192 | 0.300 | 0.414 | 0.484 | | |
| Topography | 0.814 | 0.772 | 0.578 | 0.603 | 0.301 | |

The formative measurement model results are summarised in Table 6, where the collinearity, outer weight and statistical significance are displayed. As shown in Table 6, the results shows that the topography, soil types, cleanliness and distance are not negatively affected by collinearity, as the model analysis produces VIF values lower than the standard threshold of 5 (Hair et al., 2017). The result also shows that, the four lower-order constructs have a pronounced (topography: 2.328; soil types: 1.091; cleanliness: 2.415; distance: 1.888) and significant ($p < 0.05$) effect on work environment.

The structural model results are summarised in Table 7, where the path coefficient significance and relevance, coefficient of determination ($R^2$), predictive relevance ($Q^2$) and $PLS_{predict}$ are displayed. As shown in Table 7, both hypotheses were supported. Leadership productivity was found to have a significant positive effect on local labor productivity ($\beta$ = 0.357, $t$-stat = 3.416, $p$-value = 0.001). Work environment was found to have a significant positive effect on local labor productivity ($\beta$ = 0.463, $t$-stat = 4.748, $p$-value = 0.000). These findings confirmed that both leadership productivity and work environment play important factors in increasing local labor productivity. Among these two factors, work environment has the greatest influenced on local labor productivity, as verified by the highest $\beta$ value, 0.463.

Following the reporting of the path coefficients and their significance, the analysis proceeds to assess the model's predictive ability by evaluating in-sample and out-of-sample prediction using $R^2$, $Q^2$ and $PLS_{predict}$, respectively. The model explains 53.9% of the variation in local labor productivity ($R^2$=0.539), and the $R^2$ value of local labor productivity is considered moderate (Hair et al., 2011). Table 7 also suggests that the model has predictive power with a $Q^2$ value of 0.256, which is greater than zero (Chin, 1998). Finally, to determine the model's out-of-sample predictive power, a $PLS_{predict}$ analysis was performed and the results are shown in Table 8. As shown in Table 8, $Q^2_{predict}$ statistics of PLS model outperformed the Linear Regression Model (LM) (Hair Jr et al., 2020), so the prediction errors of both models were evaluated. The root mean square error (RMSE) is the most widely used and accepted prediction statistic (Hair Jr et al., 2020). The results show that the PLS RMSE values for local labor productivity construct are smaller than the LM values, indicating that the model has a high predictive power (Hair Jr et al., 2020). As a result, the $R^2$, $Q^2$ and $PLS_{predict}$ values show that the model has sufficient in-sample and out-of-sample predictive power (Hair Jr et al., 2020).

Table 6
*Formative measurement model results*

| Higher-order construct | Lower-order constructs | VIF | Outer weight | *p*-value |
|---|---|---|---|---|
| Work environment | Topography | 2.328 | 0.301 | 0.000 |
| | Soil types | 1.091 | 0.268 | 0.000 |
| | Cleanliness | 2.415 | -0.335 | 0.000 |
| | Distance | 1.888 | 0.391 | 0.000 |

Table 7
*Structural model results*

| Hypotheses | Structural Path | Beta ($\beta$) | *t*-stat | *p*-value | Decision |
|---|---|---|---|---|---|
| $H_1$ | Leadership productivity ➔ Local labor productivity | 0.357 | 3.416 | 0.001 | Supported |
| $H_2$ | Work environment ➔ Local labor productivity | 0.463 | 4.748 | 0.000 | Supported |
| Construct | | | | $R^2$ | $Q^2$ |
| Local labor productivity | | | | 0.539 | 0.256 |

Table 8
*$PLS_{predict}$ results.*

| Local labor productivity | RMSE | | $Q^2_{predict}$ | |
|---|---|---|---|---|
| | PLS | LM | PLS | LM |
| E1 | 0.528 | 0.559 | 0.530 | 0.472 |
| E2 | 0.579 | 0.640 | 0.226 | 0.055 |
| E3 | 0.676 | 0.685 | 0.164 | 0.140 |
| E4 | 0.751 | 0.813 | 0.173 | 0.030 |
| E5 | 0.716 | 0.863 | 0.073 | -0.347 |
| E7 | 0.686 | 0.792 | 0.240 | -0.013 |

Note: RMSE: Root Mean Square; PLS: Partial Least Square; LM: Linear Regression Model

**Conclusion and discussion**

In order to increase the production of oil palm industry, the determinants of local labor productivity must be investigated. Based on the PLS-SEM analysis, it can be confirmed and summarized that the work environment is the most important factor influencing local labor productivity, implying that a better work environment will increase local labor productivity. This result is consistent with the result obtained by Putri et al (2017), who revealed that the work environment has the strongest effect on workers' productivity compared to the work relationship and work willingness in their study of employees' productivity in rubber industry. Niemela et al (2002) also confirmed that the increased labor productivity in a storage building was most likely due to a combination of work environment factors such as lower contaminant concentrations, better thermal climate and better lighting conditions. Furthermore, previous research also shown that creating a positive and providing a good work environment increases labor productivity (Alarcon et al., 2021; Anjum et al., 2018; Elisabeth et al., 2020; Marchetti et al., 2016; Massoudi & Hamdi, 2017; Osibanjo et al., 2015; Roelofsen, 2002; Setiyanto & Natalia, 2017). Laborers are found to be more productive in a conducive work environment. That is, the level of labor productivity is determined by the level of comfort derived from the work environment. Employee well-being is ensured by a conducive work environment, which in turn allows them to give their all to their roles, which may result in higher productivity (Akinyele, 2010). A good working environment can have an impact on laborers both psychologically and physically (Elisabeth et al., 2020). Labor productivity, on the other hand, cannot be maximized in unfavorable working environments are unfavorable. That is, if laborers are dissatisfied with their working environment, it will definitely affect their productivity. Leadership productivity was also identified as having a positive impact on local labor productivity. In this context, it means that the smallholder leadership styles, such as smallholders who provide information, constructive feedback and coaching to local labor, influenced local labor behavior, thereby increasing their productivity. Past studies also shown that various leadership styles increases labor productivity (Akparobore & Omosekejimi, 2020; Akpoviroro et al., 2018; Alenezi et al., 2021; Anggitaningsih & Handriyono, 2019; Asamani et al., 2016; Baidi et al., 2020; Halling et al., 2021; Haque et al., 2021; Hussain & Khayat, 2021; Malik et al., 2020; Ramaswamy et al., 2021; Rehman et al., 2019; Sudarmo et al., 2021). An effective leadership ensures proper monitoring and control over workers in order to successful completion of the tasks. Workers benefits from effective leadership because it gives them motivation, energy, confidence, and courage, which improves their competency and increases their productivity (Rehman et al., 2019). A great leaders are those who encourage and motivate their followers to achieve more than expected and boost their employees' confidence by assisting them in developing high-level standards and values (Akparobore & Omosekejimi, 2020). The physical work environment of laborers in the oil palm industry can have a variety of effects on their ability to complete tasks. Smallholders should be aware of the significance of the nature of motivation in terms of a pleasant working environment, as this can encouraged laborers to work and behave optimally. A pleasant working environment and a great leader are among the most effective methods of motivating labor to work hard and efficiently. The better the work environment and leadership styles, the higher the local labor productivity. Therefore, oil palm smallholders will need to work on improving their plantation's working environment as well as their leadership skills to continue motivating and encouraging local laborers.

Two crucial factors, the work environment and leadership, both of which have the potential to increase labour motivation, are explicitly emphasized compared to previous research, which frequently relied on indicators like land-labour ratio by job category and region (Azman Ismail et.al 2015) to gauge production levels. These looks at how productive leadership and a positive work environment can encourage teamwork among labourer. By examining these factors, the study aims to provide insights into improving labour productivity within the palm oil sector.

The current study has some limitation that need to be addressed in future studies. To begin, the sample size used in this study is considered small, with only 56 smallholders (20%)

included out of 275 smallholders with local labor. Second, the sample is limited to smallholders in Sarawak, which has less heterogeneity, so the results cannot be generalized to Malaysia. To obtain a clearer picture of local labor productivity in Malaysia's oil palm industry and to generalization of the findings of factors that influence the productivity of local labor, future research should increase the number of sample size of smallholders and include other states that represent four regions in Peninsular Malaysia: the northern region, east coast region, central region, and southern region, as well as Sabah. Third, this study chose to focus on the viewpoint of smallholders. Other users' perspective, such as local laborers, are ignored, so future research should include their perspectives as well. Fourth, while this study concentrated solely on the leadership productivity, future research could also broaden the conceptual model by combining it with other leadership models, such as transformational or spiritual leadership.
Finally, the work environment in this study was measured using four dimensions: topography, soil types, plantation cleanliness, and distance. These four dimensions are related to the physical environment. Future research may take into account occupational health, occupational safety, and appropriate equipment or technology. These dimensions are thought to be closely related to the oil palm industry's working environment. This is due to the oil palm industry's reputation for being dangerous, dirty, dark, and lacking in mechanization and technology.

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