West Science Interdisciplinary Studies
Vol. 02, No. 09, September and 2024: pp. 1823-1832

Effect of Farmer Group Empowerment and Agribusiness Training Program on Productivity and Income of Coffee Farmers in West Java

Ivonne Ayesha[1], Gustami Harahap[2], Darmawan Listya Cahya[3]
[1] Universitas Muhammadiyah Bandung and drivonneayesha@gmail.com
[2] Program Studi Agribisnis, Fakultas Pertanian Universitas Medan Area (UMA) and gustami@staff.uma.ac.id
[3] Universitas Esa Unggul and darmawan@esaunggul.ac.id

ABSTRACT

This study investigates the impact of Farmer Group Empowerment and Agribusiness Training Programs on the Productivity and Income of coffee farmers in West Java. The research utilizes a quantitative approach with a sample of 200 coffee farmers and significantly positively affect ploys Structural Equation Modeling (SEM) with Partial Least Squares (PLS) to analyze the relationships between the key variables. The results indicate that both Farmer Group Empowerment and Agribusiness Training Programs significantly positively affect Productivity and Income. However, Farmer Group Empowerment shows a stronger impact on productivity compared to training programs, emphasizing the importance of collective action in enhancing farming practices. These findings highlight the need for an integrated approach to agricultural development, combining empowerment with technical training to ensure sustainable improvements in farmers' livelihoods. The study provides valuable insights for policymakers and agricultural development practitioners seeking to promote rural development and increase smallholder farmers' productivity and income.

Keywords: *Farmer Group Empowerment, Agribusiness Training, Coffee Farmers, Productivity, Income*

1. INTRODUCTION

Coffee farming in West Java is crucial to the region's agricultural economy, but farmers face challenges in improving productivity and income due to limited access to modern techniques, agribusiness knowledge, and organized support. Sustainable practices, like maintaining soil fertility and using natural predators for pest control, are essential to enhance resilience and productivity amidst climate change [1]. Socioeconomic factors such as the number of coffee trees, farmer experience, and education significantly impact income, as seen in Jambu Sub-district, where these factors accounted for 86.4% of income variation [2]. Entrepreneurial traits, including risk-taking and leadership, are positively linked to improved farm performance, emphasizing the need to foster these skills [3]. Marketing barriers, like price volatility and limited access, can be addressed through e-marketing strategies, though farmers require support for effective implementation [4], [5].

Empowering farmer groups is essential for enhancing their capacity to navigate market demands, increase bargaining power, and implement effective agricultural practices through collective action, knowledge sharing, and tailored agribusiness training programmes. Social capital plays a key role in agricultural innovation by involving community-based farmer groups in research and development, while strengthening local to national networks is crucial for empowerment [6]. Collective action enables farmers to consolidate demand, pool economic power, and overcome market failures, making farmer organisations ideal partners in technology development, as seen in South Africa [7]. Producer organisations also enhance market access and bargaining power, allowing farmers to adapt to dynamic markets and benefit from fair trade practices [8], [9]. Agribusiness training equips coffee farmers with technical skills and business acumen, helping them adopt new technologies and increase productivity [5]. Tools like the Triple Layered Business Model Canvas

integrate economic, environmental, and social values into sustainable business development, although overcoming traditional and cultural barriers remains a challenge for ensuring inclusive farmer empowerment [6].

This study aims to examine the effects of farmer group empowerment and agribusiness training programs on the productivity and revenue of coffee growers in West Java. Although prior studies have underscored the importance of farmer empowerment and training for agricultural success, a gap persists in comprehending the direct impacts of these programs on coffee farming in West Java. This study concentrates on this region to elucidate the potential advantages of empowerment and training initiatives for smallholder farmers, while also offering policy recommendations to improve the general development of the coffee sector.

2. LITERATURE REVIEW

2.1 Farmer Group Empowerment

Empowering farmer groups include providing farmers with the knowledge, skills, and organizational capabilities necessary to improve decision-making, market access, and agricultural output. This empowerment enables farmers to collaboratively address difficulties, get resources, and enhance their negotiating strength [10]. Empowered groups exhibit more resilience and innovation, resulting in enhanced output and revenue [9]. They promote collaboration, financial accessibility, and the integration of contemporary technologies [11]. In coffee cultivation, empowerment enhances managerial efficiency, facilitates knowledge exchange regarding best practices, and strengthens negotiating for superior prices in competitive marketplaces. Research demonstrates that this empowerment markedly enhances the revenue and productivity of coffee producers when facilitated by structured networks and training [6], [8].

2.2 Agribusiness Training Programmes

Agribusiness training programs seek to augment farmers' technical, management, and entrepreneurial competencies, equipping them with the necessary tools to operate their farms as companies, thereby enhancing productivity, minimizing expenses, and maximizing profitability [12]. These programs encompass financial management, marketing, value chain analysis, and sustainability practices, ultimately converting conventional agriculture into a more lucrative venture. Training in coffee growing emphasizes yield quality, efficient input utilization, and international marketing tactics [13]. Research indicates that farmers who undergo specialized training attain enhanced productivity and income [14], while also acquiring knowledge about market dynamics and certification processes such as Fair Trade, which can elevate coffee prices [5]. In West Java, where coffee cultivation is essential to the rural economy, these programs advocate for sustainable practices by imparting knowledge on soil management, organic methods, and pest control [15], while also enhancing financial literacy for improved investment decisions.

2.3 The Relationship between Farmer Empowerment, Agribusiness Training, Productivity, and Income

A significant amount of research demonstrates a robust correlation between farmer empowerment, agribusiness training, and enhancements in productivity and revenue.

Empowerment, via improved knowledge, social capital, and resource accessibility, facilitates farmers in adopting more efficient and sustainable practices [16]. Participation in empowered groups fosters innovation and calculated risk-taking among farmers, resulting in increased productivity [10]. Agribusiness training significantly improves smallholder production by delivering technical and business education, enabling farmers to optimize resource utilization and raise crop yields [17]. Research indicates that customized training enhances productivity and earnings [9]. In coffee cultivation, empowerment and training collaboratively enhance production, allowing farmers to optimize harvests and secure improved market conditions [18]. East African farmers engaged in agribusiness training had a 20-30% increase in coffee production and a substantial improvement in income [10], [17]. These findings underscore the necessity of empowering farmers and providing specialized training programs that tackle technical and business difficulties.

2.4 Theoretical Framework

This research approach integrates empowerment and human capital ideas. Empowerment theory emphasizes equipping individuals or groups with resources, opportunities, and skills to enhance their situations (Zimmerman, 2000), whereas human capital theory underscores the role of education and training in augmenting productivity and economic returns (Becker, 1964). Agribusiness training and farmer empowerment are essential for enhancing production and income in West Java's coffee crop sector. Despite available information regarding the advantages of empowerment and training, few research specifically investigates coffee cultivation in this area or employs sophisticated techniques such as Structural Equation Modeling (SEM). This research addresses these deficiencies by examining the direct and indirect impacts of farmer empowerment and agribusiness training through SEM-PLS 3 analysis.

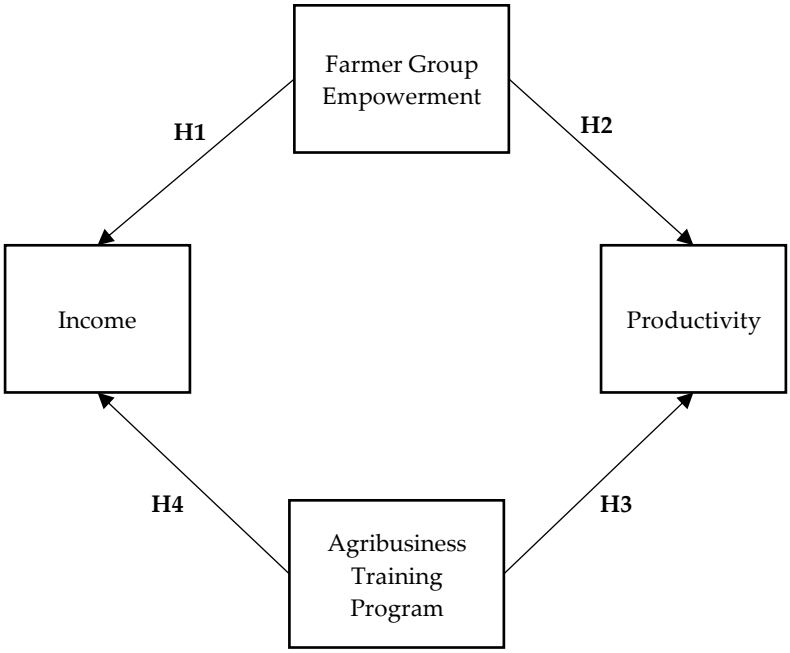

Figure 1. Conceptual Framework

3. METHODS

3.1 Research Design

The research used a quantitative approach centered on the statistical analysis of numerical data to ascertain correlations among farmer group empowerment, agribusiness training, production, and income, facilitating objective measurement and hypothesis testing. A cross-sectional survey design was employed to gather data at a particular time point from a substantial sample of coffee farmers in West Java, accurately reflecting their feelings of empowerment and involvement in training programs. The population comprises coffee farmers from diverse districts in West Java, and a stratified random sampling method was employed to guarantee accurate representation, incorporating farmers from various regions and differing productivity levels, thereby augmenting the generalizability of the results. Two hundred coffee farmers were chosen as responders, with the sample size established by Structural Equation Modeling (SEM) criteria, which stipulate a minimum of 150 for dependable outcomes [19]. The chosen farmers were categorized according to criteria such farm size, years of agricultural experience, and involvement in farmer groups, enabling the collection of varied insights on empowerment and training programs.

3.2 Data Collection Instrument

The study's primary data were gathered through a standardized questionnaire designed to assess farmer group empowerment, agribusiness training programs, production, and income, utilizing responses on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). A content validity assessment was performed with agricultural specialists from West Java to enhance the items, and pilot research involving 20 coffee growers evaluated the clarity and functioning of the questions. Reliability was verified by Cronbach's Alpha, with all variables surpassing the 0.7 benchmark. The data collection occurred over two months, with trained field assistants conducting the study in multiple coffee-growing regions. Participants were apprised of the study's objective, and agreement was secured prior to involvement. Completed surveys were verified for completeness prior to data input.

3.3 Data Analysis Techniques

The data were evaluated utilizing Structural Equation Modeling (SEM) with Partial Least Squares (PLS-3) software, which is proficient in examining various variables and their interrelations within intricate models. PLS-SEM was selected for its capacity to accommodate small-to-medium sample sizes and its versatility with both formative and reflective measurement models [20]. The analysis entailed assessing the measurement model to evaluate the relationships among latent constructs (farmer group empowerment, agribusiness training, productivity, and income) and their indicators, while testing reliability and validity through composite reliability, convergent validity (average variance extracted, AVE), and discriminant validity (Fornell-Larcker criterion). The structural model subsequently evaluated the proposed relationships between independent variables (farmer group empowerment and agribusiness training) and dependent variables (productivity and income), with significance determined through path coefficients, p-values, and R-squared (R^2) values for explanatory efficacy. A bootstrapping approach utilizing 5,000 subsamples assessed the significance of path coefficients, hence assuring reliable estimations of standard errors and p-values. The model's goodness of fit was assessed using markers including the Standardized Root Mean Square Residual (SRMR) and Normed Fit Index (NFI).

4. RESULTS AND DISCUSSION

4.1 Demographic Characteristics of Respondents

The demographic profile of the respondents, based on data from 200 coffee farmers in West Java, provides essential context for the study's results. Age distribution is as follows: 20% are 18-30 years, 30% are 31-40 years, 25% are 41-50 years, 15% are 51-60 years, and 10% are over 60, with 55% in their productive years (31-50). In terms of education, 5% have no formal education, 25% completed primary education, 40% have secondary education, 22.5% have high school education, and 7.5% hold higher degrees, indicating that 67.5% have at least secondary education. Regarding farm size, 35% have less than 1 hectare, 45% have 1-2 hectares, and 20% own more than 2 hectares, typical of smallholders. Experience levels show that 15% have less than 5 years, 32.5% have 5-10 years, 35% have 10-20 years, and 17.5% have over 20 years, reflecting a relatively experienced group. Membership in farmer groups is significant, with 70% of respondents participating, highlighting the importance of empowerment. Additionally, 65% have participated in agribusiness training programmes, likely enhancing their farming practices. Lastly, annual incomes reveal that 25% earn less than IDR 30 million, 40% earn between IDR 30 million and IDR 60 million, 20% earn between IDR 60 million and IDR 90 million, and 15% earn more than IDR 90 million, with most reporting a modest income of IDR 30 million to IDR 60 million.

4.2 Measurement Model Results

The measuring model is evaluated to confirm the reliability and validity of the constructs in the research. The assessment encompasses the examination of loading factors, Cronbach's Alpha, composite reliability, and average variance extracted (AVE). These metrics are crucial for assessing the extent to which the observed variables (indicators) accurately reflect the latent constructs: Farmer Group Empowerment, Agribusiness Training Programme, Productivity, and Income.

Table 1. Measurement Model

Variable	Code	Loading Factor	Cronbach's Alpha	Composite Reliability	Average Variant Extracted
Farmer Group Empowerment	FGE.1	0.811	0.887	0.901	0.607
	FGE.2	0.834			
	FGE.3	0.852			
	FGE.4	0.835			
	FGE.5	0.751			
Agribusiness Training Program	ATP.1	0.879	0.830	0.867	0.637
	ATP.2	0.786			
	ATP.3	0.862			
	ATP.4	0.736			
Productivity	PDT.1	0.883	0.869	0.895	0.656
	PDT.2	0.815			
	PDT.3	0.747			
	PDT.4	0.875			
	PDT.5	0.776			
Income	INC.1	0.744	0.884	0.921	0.779
	INC.2	0.708			
	INC.3	0.866			
	INC.4	0.742			
	INC.5	0.763			
	INC.6	0.774			

Source: Data Processing Results (2024)

The measurement model analysis shows that all constructs—Farmer Group Empowerment, Agribusiness Training Programme, Productivity, and Income—are measured reliably and validly, with Cronbach's Alpha and composite reliability values exceeding 0.7 and Average Variance Extracted (AVE) values greater than 0.5. Discriminant validity was assessed using the Fornell-

Larcker criterion, confirming that each construct captures unique variance, as the square root of the AVE for each construct is greater than its correlations with others. Relevant data, including the square root of AVE and correlations, are presented in a table.

Table 2. Discriminant Validity

	ATP	PDT	FGE	INC
Agribusiness Training Program	0.861			
Productivity	0.748	0.837		
Farmer Group Empowerment	0.515	0.755	0.758	
Income	0.868	0.547	0.672	0.881

Source: Data Processing Results (2024)

The diagonal values, or the square root of AVE, represent the amount of variance each construct explains within itself compared to the variance it shares with other constructs. For discriminant validity to be confirmed, the square root of AVE (diagonal values) must be greater than the correlations with other constructs (off-diagonal values). For the Agribusiness Training Program (ATP), the square root of AVE is 0.861, exceeding its correlations with Productivity (0.748), Farmer Group Empowerment (0.515), and Income (0.868), indicating good discriminant validity except for its high correlation with Income, which may need further exploration. Productivity (PDT) has a square root of AVE of 0.837, greater than its correlations with other constructs, confirming its discriminant validity. Similarly, Farmer Group Empowerment (FGE) shows a square root of AVE of 0.758, which is higher than its correlations with ATP, PDT, and Income, supporting its discriminant validity. Income (INC) has a square root of AVE of 0.881, suggesting good discriminant validity, although its high correlation with ATP (0.868) indicates some potential overlap between the constructs. Correlations between other constructs are lower and do not pose a threat to discriminant validity.

4.3 Model Fit

The assessment of model fit indicates how well the proposed structural equation model (SEM) fits the observed data. In this study, the model fit was evaluated using several key indicators, including the Standardized Root Mean Square Residual (SRMR), d_ULS, d_G, Chi-Square, and the Normed Fit Index (NFI).

Table 3. Model Fit Results Test

	Saturated Model	Estimated Model
SRMR	0.073	0.073
d_ULS	0.729	0.729
d_G	0.354	0.354
Chi-Square	389.612	389.612
NFI	0.768	0.768

Source: Process Data Analysis (2024)

The Standardized Root Mean Square Residual (SRMR) for both models is 0.073, which measures the difference between the observed and predicted correlation matrices. Since an SRMR value below 0.08 is considered a good fit, the 0.073 value indicates that the models fit the data well. The squared Euclidean distance (d_ULS) for both models is 0.729, a relatively small value, suggesting a good fit by measuring the discrepancy between the observed and implied covariance matrices. The geodesic distance (d_G) is 0.354 for both models, also indicating minimal discrepancy between the observed and model-implied covariance matrices, reinforcing the good fit. The Chi-Square value for both models is 389.612, used to assess model fit relative to degrees of freedom. While the Chi-Square test can be sensitive in large samples, it should be interpreted alongside other indices like SRMR and

NFI, as its significance alone may not fully reflect the model fit. Finally, the Normed Fit Index (NFI) for both models is 0.768, which compares the model's chi-square value to that of a null model. Although an NFI closer to 1.0 indicates a better fit, the 0.768 value suggests an acceptable but not ideal fit, indicating that the model moderately explains the covariance between variables.

Table 4. Coefficient Model

	R Square	Q2
Productivity	0.478	0.464
Income	0.478	0.464

Source: Data Processing Results (2024)

The R^2 value for both Productivity and Income is 0.478, indicating that 47.8% of the variance in each is explained by the independent variables, likely including farmer group empowerment and agribusiness training programs. In social sciences, an R^2 value between 0.3 and 0.6 is considered moderate, meaning the model has reasonable explanatory power but still leaves more than half of the variance unexplained. This suggests that while the model accounts for a significant portion of the variance in both Productivity and Income, there is still room for improvement. The Q^2 value for both Productivity and Income is 0.464, reflecting the model's predictive relevance. Calculated through blindfolding, Q^2 assesses how well the model predicts unseen data. A value of 0.464 suggests moderate predictive relevance, meaning the model is capable of predicting nearly half of the variation in Productivity and Income based on the independent variables. This is a strong indication of the model's predictive performance.

4.4 Hypothesis Testing

The hypothesis testing in this study was conducted using Structural Equation Modeling (SEM) with Partial Least Squares (PLS). The analysis examines the relationships between independent variables (Job Satisfaction, Job Stress, and Social Support) and the dependent variable (Employee Mental Health). Hypothesis testing results are evaluated based on the Original Sample (O), Sample Mean (M), Standard Deviation (STDEV), T-statistics, and P-values. The significance of the relationships is determined by T-statistics (greater than 1.96 for a 95% confidence level) and P-values (below 0.05 indicates statistical significance).

Table 5. Hypothesis Testing

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values
Farmer Group Empowerment -> Productivity	0.519	0.519	0.059	8.352	0.000
Farmer Group Empowerment -> Income	0.355	0.355	0.055	6.649	0.000
Agribusiness Training Program-> Productivity	0.277	0.277	0.049	2.448	0.000
Agribusiness Training Program -> Income	0.234	0.237	0.049	2.438	0.000

Source: Process Data Analysis (2024)

The relationship between Farmer Group Empowerment and Productivity has a coefficient of 0.519, meaning a unit increase in Farmer Group Empowerment leads to a 0.519-unit increase in Productivity. The T-statistic of 8.352, well above the critical value of 1.96, and a P-value of 0.000 indicate that this effect is statistically significant. Similarly, the relationship between Farmer Group Empowerment and Income has a coefficient of 0.355, with a T-statistic of 6.649 and a P-value of 0.000,

showing a moderate yet significant positive effect on Income. For the Agribusiness Training Program, the coefficient for its impact on Productivity is 0.277, with a T-statistic of 2.448 and a P-value of 0.000, confirming a significant, albeit moderate, positive effect on Productivity. Finally, the Agribusiness Training Program also positively affects Income with a coefficient of 0.234, a T-statistic of 2.438, and a P-value of 0.000, indicating a moderate but statistically significant effect on Income.

Discussion

The findings of this study provide valuable insights into the role of Farmer Group Empowerment and Agribusiness Training Programs in improving the Productivity and Income of coffee farmers in West Java. Both constructs have been shown to have a statistically significant positive impact on the key outcome variables, indicating the effectiveness of these interventions in promoting agricultural development.

The results from hypothesis testing show that Farmer Group Empowerment has a strong positive effect on Productivity ($\beta = 0.519$, $p < 0.001$) and a moderate positive effect on Income ($\beta = 0.355$, $p < 0.001$). This demonstrates that empowering farmers through organized groups not only enhances their ability to adopt better farming practices but also improves their market access and decision-making capacity. These findings align with previous research suggesting that empowered farmer groups are more resilient and better equipped to face agricultural challenges [6], [8]–[11]. The strong effect on productivity further emphasizes the importance of collective action, which facilitates knowledge-sharing, resource access, and increased bargaining power. This ultimately allows farmers to increase yields and negotiate better terms in the market, resulting in higher productivity.

Similarly, Agribusiness Training Programs have shown a moderate positive effect on both Productivity ($\beta = 0.277$, $p < 0.001$) and Income ($\beta = 0.234$, $p < 0.001$). This indicates that training programs focused on agribusiness principles, such as financial management, marketing strategies, and value chain optimization, are essential in transforming traditional farming into a more business-oriented approach. The significant positive impact of training programs on productivity suggests that equipping farmers with technical and managerial skills improves their efficiency and output. These findings are consistent with prior studies that highlight the importance of targeted training programs in boosting the productivity and profitability of smallholder farmers [5], [12]–[15]. However, the effect of agribusiness training on income, while significant, is smaller compared to its impact on productivity, implying that while technical training is crucial, other factors such as market dynamics and external economic conditions may also influence income levels.

When comparing the effects of Farmer Group Empowerment and Agribusiness Training Programs, it is evident that empowerment through farmer groups has a stronger effect on productivity compared to the training programs. This suggests that fostering social capital, collective decision-making, and cooperation among farmers are key drivers of increased agricultural productivity. The relatively stronger effect of Farmer Group Empowerment on productivity can be attributed to the fact that organized groups enable farmers to pool resources, share risks, and collectively address challenges, resulting in more efficient and productive farming practices. This is supported by the literature, which highlights the role of farmer groups in facilitating innovation, resource-sharing, and market access [9], [10], [16]–[18].

However, it is important to note that both empowerment and training programs work synergistically to improve Income and Productivity. The significant impact of both interventions on these outcomes highlights the need for an integrated approach that combines empowerment with technical training to achieve sustainable improvements in the livelihoods of coffee farmers. Empowered farmers who also receive technical and business training are more likely to adopt innovative practices, improve their productivity, and secure better income opportunities. This integrated approach aligns with previous research indicating that the combination of empowerment and training leads to more sustainable agricultural success [10], [16], [17].

Despite the positive findings, the study also highlights areas for further research and improvement. While both interventions significantly improve productivity and income, the moderate R^2 values (0.478 for both productivity and income) suggest that other factors not captured in this model may also contribute to these outcomes. For instance, external market conditions, access to credit, and environmental factors may also play a role in influencing the income and productivity of coffee farmers. Future research could explore these additional factors to gain a more comprehensive understanding of the determinants of agricultural success.

CONCLUSION

This study concludes that Farmer Group Empowerment and Agribusiness Training Programs are critical drivers of increased Productivity and Income for coffee farmers in West Java. The significant positive effect of empowerment on productivity underscores the value of collective decision-making, resource-sharing, and social capital among farmers. Additionally, agribusiness training programs equip farmers with the necessary skills to improve farm management, optimize resources, and engage in profitable market activities. Both interventions, when combined, offer a robust approach to improving agricultural outcomes and ensuring sustainable livelihoods. However, further research should consider other influencing factors such as market dynamics and environmental challenges to provide a more comprehensive understanding of income generation and productivity in the agricultural sector. This study's insights are crucial for developing policies and programs that enhance the effectiveness of agricultural empowerment and training initiatives.

REFERENCES

[1] M. R. A. Noponen *et al.*, "Environmental Sustainability—Farming in the Anthropocene," in *The craft and science of coffee*, Elsevier, 2017, pp. 81–107.

[2] I. Istianah, D. Hastuti, and R. Prabowo, "Faktor-faktor yang mempengaruhi tingkat pendapatan petani kopi (Coffea sp)(Studi kasus di Kecamatan Jambu Kabupaten Semarang)," *Mediagro*, vol. 11, no. 2, 2015.

[3] E. D. Martauli, "The connection of entrepreneurship characteristics and business performance of arabika coffee farmers," *SOCA J. Sos. Ekon. Pertan.*, vol. 14, no. 2, p. 339, 2020.

[4] Y. Faradillah, S. I. A. Saany, and Y. A. B. El-Ebiary, "E-Marketing and challenges among Indonesian coffee farmers," in *2019 International Conference of Computer Science and Information Technology (ICoSNIKOM)*, IEEE, 2019, pp. 1–5.

[5] C. Furqon, M. Sultan, and F. Wijaya, "Business development of coffee farmers group using triple layered business model canvas," *J. Bus. Econ. Rev.*, vol. 4, no. 4, pp. 163–170, 2019.

[6] W. Heemskerk and B. Wennink, "Building social capital for agricultural innovation: experiences with farmer groups in Sub-Saharan Africa," 2004.

[7] D. Carney and C. J. Van Rooyen, "Empowering small farmers through collective action: the case of technology development and transfer," *Agrekon*, vol. 35, no. 4, pp. 332–335, 1996.

[8] G. Onumah, J. Davis, U. Kleih, and F. Proctor, "Empowering smallholder farmers in markets: Changing agricultural marketing systems and innovative responses by producer organizations," 2007.

[9] N. Sirdey and B. Lallau, "How do producer organisations enhance farmers' empowerment in the context of fair trade certification?," *Oxford Dev. Stud.*, vol. 48, no. 2, pp. 166–180, 2020.

[10] S. Ningsih and A. Prathama, "Empowerment Of Farmers Through The Independent Farmers Program In Baureno District, Bojonegoro Regency," *DIA J. Adm. Publik*, vol. 19, no. 1, pp. 362–375, 2021.

[11] G. Ton, K. de Grip, F. Lançon, G. E. Onumah, and F. J. Proctor, "Empowering smallholder farmers in markets: Strengthening the advocacy capacities of national farmer organisations through collaborative research," *Food Secur.*, vol. 6, pp. 261–273, 2014.

[12] S. W. Kalule, B. Mugonola, and D. Ongeng, "The student enterprise scheme for agribusiness innovation: A University-based training model for nurturing entrepreneurial mind-sets amongst African youths," 2017.

[13] L. Jassogne *et al.*, "Redesigning Delivery: Boosting Adoption of Coffee Management Practices in Uganda. The climate smart investment pathway approach and the farmer segmentation tool," 2017.

[14] S. Narayana, M. A. Mahmud, and P. Babu, "The impact on training of farmers training centers on farmer's productivity: the case of Dire Teyara and Sofi Woredas-Harari Region-Ethiopia.," *Int. J. Agric. Innov. Res.*, vol. 3, pp. 1506–1511, 2015.

[15] S. Lemeilleur, J. Subervie, A. E. Presoto, R. S. Piao, and M. S. M. Saes, "Coffee farmers' incentives to comply with sustainability standards," 2020.

[16] D. M. Wambua, S. N. Ndirangu, L. K. Njeru, and B. M. Gichimu, "Effects of recommended improved crop

technologies and socio-economic factors on coffee profitability among smallholder farmers in Embu County, Kenya," *African J. Agric. Res.*, vol. 14, pp. 1957–1966, 2019.

[17] E. Tinsley and N. Agapitova, *Private sector solutions to helping smallholders succeed: Social enterprise business models in the agriculture sector*. World Bank, 2018.

[18] E. Kiptot and S. Franzel, "Developing sustainable farmer-to-farmer extension: Experiences from the volunteer farmer–trainer approach in Kenya," *Int. J. Agric. Sustain.*, vol. 17, no. 6, pp. 401–412, 2019.

[19] J. F. Hair, C. M. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modelling (PLS-SEM). 2e Edition*. USA: SAGE Publications, 2017.

[20] J. F. Hair, J. J. Risher, M. Sarstedt, and C. M. Ringle, "The Results of PLS-SEM Article information," *Eur. Bus. Rev.*, vol. 31, no. 1, 2018, doi: https://doi.org/10.1108/ EBR-11-2018-0203.