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Effect of Technology innovation on Performance of Small Scale Coffee Enterprises In Mexico

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Abstract

The vast majority of Mexican coffee, and particularly organic coffee, is grown by small farmers in the southern-most states of Chiapas and Oaxaca. These two states also happen to be the poorest in the country, and not coincidentally, have the largest indigenous populations. Coffee is a significant export crop in Mexico and contributes to around of US$ 153.4 million annually. In Mexico, among one of the most largely populated countries in North America, land parcels are extremely little, balancing only a few acres. The coffee industry in Mexico is controlled by smallholder coffee manufacturers, with an average of 170 coffee trees each. The earning of the Farmers from the farm outpus depends largely on the leve of production. Thus, conducting a study to examine the methods or approaches that can be used to increase productivity or performance is significant. Access to technology and better infrastructure for Mexican's millions of smallscale farmers will enable them to progress to commercial scale production and thus improve food security and the overall country revenue. This formed the basis to conduct the study to examine whether technology has an impact on performance of small scale coffee enterprises in Mexico. The explanatory research design was utilized in the study. The target population included small scale farmers in Chiapas and Oaxaca. The results of the study indicated that technological innovation is positively and significanyly related to performance of small scale coffee enterprises in Mexico. The results implied that a unit increase in the technological innovation will increase the performance of small scale coffee enterprises in Mexico by 0.0931. Thus, technologica innovation is one of the fundamanetal factors that need to be taken with much seriousness. The study concluded that technology is one of the fundamental factors that is immprocing the priodctivity of the coffee production in Mexico. The study concluded that farmers need to e helped to advance to the modern technology in farmring. The study recommended that farmers need to adopt the modern technology. Today's farming regularly makes use of innovative modern technologies such as robotics, temperature level and also moisture sensors, airborne photos, and GPS technology is crititcal in enhcing the productivity. The strudy recommended that government and other agricultural stakeholders need to emphasize on improving the farmers with financial literacy and education of the best technology to adapt.

Keyword: *Technology, innovation, Performance, Small Scale Coffee Enterprises, Chiapas Oaxaca, Mexico*

1.1 Background of the Study

Coffee production is one of the key contributors to the economy of Mexico. Most of the rural people in the country rely majorly on the production of the product to sustain themselves (Bathfield, Gasselin, López-Ridaura & Vandame, 2017). The production of coffee is significant and helps in the process of poverty alleviation in the country. Sustainability factors of the coffee produce is one of the top priorities and strategies are taken by the government as well as other agricultural stakeholders (Barham, Callenes, Gitter, Lewis & Weber, 2018). The sustainability approaches give an agreed structure to focus on investment as well as drive performance in the direction of the targets (Grewatsch & Kleindienst, 2017). According to Dimitrov and Jain (2014), the adoption of modern technology and enhancement of production strategies are critical in enhancing the performance of coffee farmers. The sustainability aspects are assumed to satisfy the needs of the present generation without endangering future generations' ability to satisfy their demands (). According to Jena, Chichaibelu, Stellmacher and Grote (2014), Ayuya, Gido, Bett, Lagat, Kahi as well as Bauer (2015), Grewatsch and also Kleindienst (2017), Chiputwa, Spielman and also Qaim (2015), Tefera, Bijman and Slingerland (2017) and also Gathura (2016) the parts of sustainability aspects consist of administration aspect, technological factor marketing strategy of the products. The vast majority of Mexican coffee, and particularly organic coffee, is grown by small farmers in the southern-most states of Chiapas and Oaxaca. These two states also happen to be the poorest in the country, and not coincidentally, have the largest indigenous populations.

The transformation towards more intensified coffee systems boosts the use of input efficiently and minimizes wastage. For agroforestry systems, both the forestry (shade tree) as well as the agricultural components (e.g., input usage, trimming or weeding techniques) are expected to influence the performance and also the financial performance of the coffee plantation as well as studies ought to mirror both at the same time. A recent research study by Cerda et al. (2016) observed a communication between shade and also input management, confirming the demand to include both dimensions in comprehensive financial evaluations. The technological factor is an essential strategy that needs to be taken with much consideration knowing that technology is transforming all the sectors in an economy (Bacon, Méndez & Fox, 2018). Developing sustainable strategies and policies that enable the farmers to have advanced machinery and equipment to gain a competitive advantage is essential (Dimitrov & Jain, 2014). Tefera, Bijman and Slingerland (2017) revealed that inadequate provision of coffee production supplies and unique coffee breeds had been a factor that has reduced the financial performance. Organizations need to have strategies to retain competent employees.

The financial performance of small-scale coffee enterprises in Mexico has been low compared to other coffee producers in the world, such as Vietnam, Colombia and Brazil (Shumeta & D'Haese, 2018). The financial performance reflects the implementation of strategies that give a competitive advantage over other firms (). Besides, the financial performance of small-scale coffee enterprises is influenced by both internal and external factors (Kamuti & Omwenga (2017). The organization has control over internal factors, while in the external factors, the company has no control over them, such as government intervention, competition and technological change (Kariu, 2017). The market prices of the coffee produced in Mexico has been insignificant. According to Tefera, Bijman snd Slingerland (2017), poor infrastructure in the coffee-growing regions, inadequate research conducted and poor market development in the coffee production sectors have been a significant factor that has contributed to poor financial performance of the farm produce in many

countries. Also, Jena, Chichaibelu, Stellmacher and Grote (2014) reported that most of the top roasters and buyers of coffee expressed concerns about the deteriorating quality and reliability of the supply of Mexican coffee. It is estimated that over 125 million individuals worldwide are dependent on coffee for their incomes. However, because it is a seasonal plant, it is not easy to switch to a choice when prices go to today's levels.

The effects of the present circumstance differ; however, in most cases, rates do not even cover the expenses of production. The effects can be summarized in three classifications. The financial weak point of the coffee sector in creating nations today has actually had actually a. severe effect on research as well as expansion. Monetary cuts, in some cases, of nature to seriously. Influence study ability has actually been troubled several of the producing countries' vital study. Institutions such as the Coffee Research Study Foundation in Kenya as well as Cenicafe in Colombia. The value of such institutions is not just their location in coffee-growing locations yet their. Prospective to show producing-country top priorities. Economic restraints dealing with such. Institutions are felt in numerous methods. An example is the principle of an international study network. Advertised by the International Coffee Organization (ICO) to permit institutions to generate. Countries to share study outcomes, for avoiding duplication and speeding up the.

This has shown hard to start operationally, probably as an outcome of resource cuts.A study conducted by Donovan and Poole (2014) noted that most coffee farmers had expressed dissatisfaction over the poor prices and declining market share in the global market. Some of the farmers are moving from the planting of the coffee to other products such as maize and sorghum. Some of the farmers claim the output value is insignificant compared to the inputs. The poverty level of most of the farmers who practice coffee farming in the country has been on the rise. This decline in the quality of the product might be due to the application of outdated technology in farming, ploughuing and even harvesting. Thus, conducting of the study is important to both the farmers and other agricultural stakeholders in the country. The best strategies that can be used to heighten are expected to be deduced based on the findings of the study. Thus, conducting the study was important and it was expected to benefit the majority.

1.2 Statement of the Problem

The cost of production of the coffee farmers in Mexico has been high. Most of the farnmers compain they have been reporting lose now and then (Bacon, Méndez & Fox, 2018). The overall output of the coffee in the country has been low compared to other producers such as Brazil, Vietnam, Colombia and India (Barham, Callenes, Gitter, Lewis & Weber, 2018). The final products of the coffee from the country have been having low market prices compared to the coffee from other countries and this has led to loss making among many farmers. This has led to some of the farmers start uprooting the coffe products and replacing them with other products such as maize and sorghum. A report by Blackmore, Keeley, Pyburn, Mangus, Chen and Yuhui (2017) noted that poor infrastructure in the coffee-growing regions, inadequate research conducted and poor market development in the coffee production sectors have been a significant factor that has contributed to poor financial performance. Also, Jena, Chichaibelu, Stellmacher and Grote (2014) reported that most of the top roasters and buyers of Mexican Coffee had expressed concerns about the deteriorating quality.

The application of the modern technology in farming is the turn around strategy that is being used by farmers to increase productivity. The coffee top quality assessment is necessary for ther purpose of competing in the market. The personnel growth segments to increase productibvity based on

the technology include contnoud trsinijng of yhe emplyees. Modern technology has actually availed coffeehouse with mobile printers that integrate with the farmers. This enables coffee shops to use order information straight from purchases to dish tags. integrated mobile printers serve to enhance order accuracy. This has led to the consumers to shift their allegiance and start using coffee products from other countries. In addition, it was reported the price of the coffee products is hig compared to the price of the coffee from other coutries. The coffee farnmers have defended the increase in price as a result of the increase in the cost of production. Thus, it was important to conduct the study and develop a strategy or provide a deductiikn thaty can be imitated by the farmers to bounce back to making of the profits.

However, the performance of the coffee sector has stopped working to live up to expectations, defined by a number of years of stagnancy and reduced yields. In reaction, Mexico's ministry of agriculture (SAGARPA) has actually suggested that producers take on a collection of lasting monitoring practices (SMPs) in order to enhance physical conditions on coffee plots (AMECAFE, 2011). Practices thought about to be a high priority include remodeling coffee tree supplies, applying plant food, adopting soil preservation procedures as well as managing color degrees. Depending upon a plot's initial physical state, it is estimated that a full restoration cycle needs the execution of SMPs for in between 7 as well as twelve years. The information about elements that influence the performance of small scale coffee enterprises in Mexico remained scanty. This formed the basis of the current study.

1.3 Research Objective

i. The study sought to determine the effect of technology innovation on performance of small scale coffee enterprises in Mexico

1.4 Hypothesis Testing

i. Technology innovation has no significant effect on performance of small scale coffee enterprises in Mexico

2.0 LITERATURE REVIEW

2.1 Technology Acceptance model

The study was based on Technology Acceptance model. The proponent of the Technology Acceptance Model (TAM) was Fred Davis in 1989. The model shows that companies should adopt modern technology to cope with the changing environment. However, the acceptability of the technology is determined by two main factors: perceived usefulness and perceived ease of use (Lee, Kozar & Larsen, 2003). Perceived usefulness is defined as being the degree to which a person believes that the use of a system will improve his performance. Perceived ease of use refers to the degree to which a person believes that the use of a system will be effortless.

Technology Acceptance Model postulates that the behavioral intention of an individual determines the recognition of the technology in an organization (Hu, Chau, Sheng & Tam, 1999). According to Chuttur (2009), the attitude of an individual is not the only factor that determines the use of a system but is also based on the impact that it may have on the performance. A firm's general performance is the variation between the worth supplied to the customers and also the expense outlay for creating that worth. According to Donaldson, Ishii and Sheppard (2004), worth chain analysis aids firms evaluate efficiency in three locations; First, by recognizing where their earnings comes from as well as having a clear view of what it takes to run their interior procedures; Second

of all, by identifying chances for creating and suffering remarkable, separated items and also finally recognizing the engagements that exist as well as linked expenses among exterior clients.

Therefore, even if an employee does not welcome the introduced technology, the probability that he or she will use it is high if he or she perceives that the system will improve the performance at work. Therefore, the model will inform the variable of a technological factor in the current study. This is based on the fact that the technological factor is the acceptance of new technology in the system. The adoption of modern systems shows that the elements of production are to change toward advanced technology. Thus, the introduction of the technique depends on the user's perceived usefulness, which is a function of ease of use and perceived quality and is explained in the model, which makes it applicable to the current study.

2.2 Technological Innovation and Financial Performance

Coffee is a significant export crop in Mexico and contributes to around of US$ 153.4 million annually (Bray, Sanchez & Murphy, 2016). In Mexico, among one of the most largely populated countries in North America, land parcels are extremely little, balancing only a few acres. The coffee industry in Mexico is controlled by concerning 1,657,000 smallholder coffee manufacturers, with an average of 170 coffee trees each. A lot of these families live off subsistence farming, and also therefore provide concern to food plants. Because their earnings from coffee sales are restricted by their production degree, discovering methods to improve their returns might make coffee an extra attractive crop choice and may aid small-scale farmers move out of subsistence farming into a lot more profitable tasks (Campos, Velázquez & McCall, 2014).

Andrade, Makunde, Ricardo, Menomussanga, Alvaro and Gruneberg (2017) conducted a study on the factors influencing the survival of sweet potato vines in Thailand. The study mainly looked at the impact technology advancement, competency of farmers and fertilizes used on production. The outcome showed technollgy advancement, competency of farmers and types of fertilizes were critical in determining the survival of sweet potato vines in Thailand. The study concluded that risk assessment, allocation of funds to emergencies, farmers' competency and types of fertilizers were positive and significant in determining the survival of sweet potato vines in Thailand. The application of the modern technology in farming is the turn around strategy that is being used by farmers to increase productivity. The coffee top quality assessment is necessary for ther purpose of competing in the market. The personnel growth segments to increase productibvity based on the technology include contnoud trsinijng of yhe emplyees. The study concluded that modern modern technology has actually availed coffeehouse with mobile printers that integrate with the farmers. This enables coffee shops to use order information straight from purchases to dish tags. integrated mobile printers serve to enhance order accuracy.

Subhan (2016) conducted a study to examine the impact of innovation on firm performance in the case of small and medium enterprises (SMEs) in Pakistan. The targeted population was 411 small and medium enterprises (SMEs) in Pakistan; however, only 69 small and medium enterprises (SMEs) were used as the sample size. The study's findings established that product innovation and process innovation were positive and significantly related to the financial performance of small and medium enterprises (SMEs) in Pakistan. However, the performance of the coffee sector has stopped working to live up to expectations, defined by a number of years of stagnancy and reduced yields. In reaction, Mexico's ministry of agriculture (SAGARPA) has actually suggested that producers take on a collection of lasting monitoring practices (SMPs) in order to enhance physical conditions on coffee plots (AMECAFE, 2011). Practices thought about to be a high priority include

remodeling coffee tree supplies, applying plant food, adopting soil preservation procedures as well as managing color degrees. Depending upon a plot's initial physical state, it is estimated that a full restoration cycle needs the execution of SMPs for in between 7 as well as twelve years.

Coffee rust has actually been tormenting farmers throughout the world given that the 19th century when the illness brought about the desertion of coffee as a business plant in Ceylon (now Sri Lanka (Donovan & Poole, 2014). Additionally Central American and Mexican coffee farmers have had several encounters with coffee rust given that the 1970s, several of these escalating right into serious upsurges. Nonetheless, the most current one has revealed to be the most serious epidemic ever before experienced in the region. In 2013, the scenario was taken into consideration so major that Honduras, Guatemala as well as Costa Rica stated nationwide. The application of the modern technology in farming is the turn around strategy that is being used by farmers to increase productivity. The coffee top quality assessment is necessary for ther purpose of competing in the market. The personnel growth segments to increase productibvity based on the technology include contnoud trsinijng of yhe emplyees. The study concluded that modern modern technology has actually availed coffeehouse with mobile printers that integrate with the farmers. This enables coffee shops to use order information straight from purchases to dish tags. integrated mobile printers serve to enhance order accuracy.

Schmidt, Zanini, Korzenowski, Schmidt and Benchimol (2018) looked for to assess the sustainability practices in small and medium-sized coffee farming ventures in Southern Brazil. The variables of interest were to identify the primary methods of sustainability, consisting of the values and also openness, training, risk identification, working environment, modern technology and worth enhancement. A set of questions was used to gather the information. Based upon the analysis, it was observed that worths and transparency, training, threat identification, working environment, technology as well as value enhancement were all crucial variables that boosted the sustainability. The research study recommended that the small and also medium-sized coffee farming enterprises in Southern Brazil embrace value and also transparency, train workers, look for the possible risks, establish a desirable working environment and also advance to the contemporary technology for sustainability. A firm's general performance is the variation between the worth supplied to the customers and also the expense outlay for creating that worth. According to Donaldson, Ishii and Sheppard (2004), worth chain analysis aids firms evaluate efficiency in three locations; First, by recognizing where their earnings comes from as well as having a clear view of what it takes to run their interior procedures; Second of all, by identifying chances for creating and suffering remarkable, separated items and also finally recognizing the engagements that exist as well as linked expenses among exterior clients.

Shinogi, Krishnankutty, Krishnanw, Srivastava, Gills and also Balakrishnan (2017) considered the impact of empowerment on survival The researcher focused on the smallholder vegetable farmers in India. Especially, the researcher was concentrated on farmers of coffee, tea as well as pyrethrum. The research study style that was embraced was informative due to the fact that the hypothesis was examined. Based on the end results of the examination, it was found that smallholder vegetable farmers' empowerment through training on how to do financial savings for the unforeseen market shocks, providing credit history, as well as assisting to join the cooperatives increased the farmers' survival. The study concluded that all the stakeholders in the country need to create mechanisms to icreae the level of technology.

3.0 REASERCH METHODOLOGY

The explanatory research design was utilized in the study. The explanatory design was deemed ideal for the study, considering that the researcher aimed at explaining the casual relationship of the variables. The explanatory research design is suitable when the researcher wants to understand an issue better and come up with new ideas. The target population included small scale farmers in Chiapas and Oaxaca

4.0 RESEARCH FINDINGS

The discusiinin nin this section include the correlation analysis and regression analsysios. The correlatiin analysis was used to examine the association between varibales while regression analysis was used to show the relationship between the variables.

4.1 Correlation analysis

Correlation analysis is used to examine the association between variables. A strong correlations shows that as one of the variable increase the other variable will also increase. In situations where the correlation is negative, it implies that when on the variable increase, the other variable will decrease.

Table 1: Correlation Analysis

		Performance	**Sustainability Strategies**
Performamce	Pearson Correlation	1.000	. 1019**
	Sig. (2-tailed)		0.000
Technology innovation	Pearson Correlation	.1019**	1.000

The correlation results presented in Table showed that the technology innovation is positively and significantly associated with performace. The correlation results depicted an increase in the sustainbality strategies by a unit will lead to the increase of the performce by 1019 units. The importance of determining the correlation of variables is that it examines the kind of the relationship that is existing within the variables. The correlation outcome is one of the key factors in explaining a variables. Correlation evaluation is a statistical method utilized to review the stamina of organization between two measurable variables. In many cases, the researcher is much more concerned with establishing whether the independent variables associate with the reliant variable. The correlation coefficient is gauged on a scale that differs from + 1 with 0 to - 1. When one variable increase as the various other increases the connection declares. On the other side, when among the variable declines as the other variable increases, then there is a negative organization. There is no organization when the coefficient is 0.

4.2 Regression Analysis

The regression analysis is used to examuine the relationship between the variables. In most of the analysis, the regression analysis include model fitness, analysis of variable and regression analsysis. Each of the potent element of the regression analysis is discuseed comprehensively belo.

Table 2: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.191a	0.207	0.196	0.0391

Bsed on the results presented in Table 1, the sustainability strategy (technology innovation) was found to be significant in explaining performance of small scale coffee enterprises in Mexico. This claim was supported the the coefficient of determination which is also known as R (squared) which indicated that 20.7% of the variations in the performance of small scale coffee enterprises in Mexico is explained by the sustainability stragety adopted which is technological innovation.The analysis of variance examined whether the technological innovation is significant in determining the performance of small scale coffee enterprises in Mexico.

Table 3: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.031	2	6.0155	3.153	.000b
	Residual	1.908	1	1.908		
	Total	16.939	3			

The results in Table 3indicate that the overall model was statistically significant. The results indicated that technological innovation was a good predictor in explaining the performance of small scale coffee enterprises in Mexico. This was supported by an F statistic of 3.153 and the reported p-value of 0.000, which was less than the conventional probability significance level of 0.05. The results indicated that farmers need to engage more in technological innovation to increase the farm output. This can be enhanced by increasing the technologiac innovation within the farms. Technical advancement is an extensive idea of innovation. While technology is an instead well-defined principle, it has a wide significance to many people, and also specifically various understanding in the scholastic as well as company world.

Table 4: Regressions of Coefficient

Model		Unstandardized Coefficients	Standardized Coefficients			
		B	Std. Error	Beta	t	Sig.
1	(Constant)	0.0194	0.0201		0.965	0.3136
	Technological Innovation	0.0931	0.0150	0.169	6.21	0.004

The results presented in Table 4 indicate that the technologica innovation is positively and significanyly related to performance of small scale coffee enterprises in Mexico. The results implied that a unit increase in the technological innovation will increase the performance of small scale coffee enterprises in Mexico by 0.0931. Thus, technologica innovation is one of the fundamanetal factors that need to be taken with much seriousness. A technological innovation is a brand-new or better product or procedure whose technological qualities are significantly various from previously. Applied technological product advancements are brand-new items (product technologies) or procedures in application (process advancements) that have been offered market.

The results are in agreem,ent with the findings of Bacon, Méndezand Fox (2018) who noted that technological innovation and strategy have a strong positive relationship with the tea industry's profitability. Further, Blackmore, Keeley, Pyburn, Mangus, Chen and Yuhui (2017) reported that technology innovation has positive and significant effect on performance.

4.3 Hypothesis Testing

The hypothesis to be tested was technology innovation has no significant effect on performance of small scale coffee enterprises in Mexico

The hypothesis was determined using the p-value as presented in Table 4. The acceptance/rejection criterion was that, if the p value is less than 0.05, we reject the null hypothesis (Ho) but if it is more than 0.05, the Ho is not rejected. Based on the results presented in Table 4 the p-value was 0.004. The null hypothesis was thus rejected. Therefore, technology innovation has significant effect on performance of small scale coffee enterprises in Mexico

5.0 CONCLUSION

The study concluded that technology is one of the fundamental factors that is immprocing the priodctivity of the coffee production in Mexico. The study noted there exist an important association between coffee value enhancement and also net earnings. The value addition which was increased by the advancement in the technology has increased the production and farmers are yielding more. The coffee worth addition measures based upon the research were coffee mixing, coffee brandings, coffee bagging, coffee flavor and coffee packing. The technology in farmring entails the substacial mincraese on the quality of the coffee. The study concluded that employees need to be trained on the usage of the modern technology. The application of the modern technology in farming is the turn around strategy that is being used by farmers to increase productivity. The coffee top quality assessment is necessary for ther purpose of competing in the

market. The personnel growth segments to increase productibvity based on the technology include contnoud trsinijng of yhe emplyees. The study concluded that modern modern technology has actually availed coffeehouse with mobile printers that integrate with the farmers. This enables coffee shops to use order information straight from purchases to dish tags. integrated mobile printers serve to enhance order accuracy which is essential to customer complete satisfaction.

6.0 RECCOMMENDATIONS

The study recommended that farmers need to adopt modern technology. Today's farming regularly makes use of innovative modern technologies such as robotics, temperature level and also moisture sensors, airborne photos, and GPS technology. These innovative gadgets and precision agriculture and robotic systems enable businesses to be much more profitable, reliable, more secure and extra environmentally friendly. The process of technological advancement needs to be advanced among the farmers. The study recommended that the government and other agricultural stakeholders emphasize improving the farmers with financial literacy and education of the best technology to adapt. One of the crucial goals of technology advancement is to improve coffee production among farmers.

REFERENCES

Bacon, C. M., Méndez, V. E., & Fox, J. A. (2018). Cultivating sustainable coffee: persistent paradoxes. *Confronting the Coffee Crisis: Fair Trade, Sustainable Livelihoods and Ecosystems in Mexico and Central America. MIT Press, Cambridge, MA*, 337-372.

Bacon, C. M., Sundstrom, W. A., Gómez, M. E. F., Méndez, V. E., Santos, R., Goldoftas, B., & Dougherty, I. (2014). Explaining the 'hungry farmer paradox': Smallholders and fair trade cooperatives navigate seasonality and change in Nicaragua's corn and coffee markets. *Global Environmental Change*, *25*, 133-149.

Barham, B. L., Callenes, M., Gitter, S., Lewis, J., & Weber, J. (2018). Fair trade/organic coffee, rural livelihoods, and the "agrarian question": Southern Mexican coffee families in transition. *World Development*, *39*(1), 134-145.

Bathfield, B., Gasselin, P., López-Ridaura, S., & Vandame, R. (2017). A flexibility framework to understand the adaptation of small coffee and honey producers facing market shocks. *The Geographical Journal*, *179*(4), 356-368.

Blackmore, E., Keeley, J., Pyburn, R., Mangus, E., Chen, L., & Yuhui, Q. (2017). *Pro-poor certification: Assessing the benefits of sustainability certification for small-scale farmers in Asia*. International Institute for Environment and Development (UK).

Bray, D. B., Sanchez, J. L. P., & Murphy, E. C. (2016). Social dimensions of organic coffee production in Mexico: lessons for eco-labeling initiatives. *Society & Natural Resources*, *15*(5), 429-446.

Campos, M., Velázquez, A., & McCall, M. (2014). Adaptation strategies to climatic variability: A case study of small-scale farmers in rural Mexico. *Land Use Policy*, *38*, 533-540.

Dimitrov, V. & Jain, P. C. (2014). The Value-Relevance of Changes in Financial Leverage beyond Growth in Assets and GAAP Earnings. *Journal of Accounting, Auditing & Finance*, 23(2), 191-222.

Donovan, J., & Poole, N. (2014). Changing asset endowments and smallholder participation in higher value markets: Evidence from certified coffee producers in Nicaragua. *Food Policy*, *44*, 1-13.

Eakin, H., Tucker, C., & Castellanos, E. (2016). Responding to the coffee crisis: a pilot study of farmers' adaptations in Mexico, Guatemala and Honduras. *Geographical Journal*, *172*(2), 156-171.

Eakin, H., Winkels, A., & Sendzimir, J. (2019). Nested vulnerability: exploring cross-scale linkages and vulnerability teleconnections in Mexican and Vietnamese coffee systems. *Environmental Science & Policy*, *12*(4), 398-412.

Elliott, R. J., Siu, T. K., & Chan, L. (2008). A PDE approach for risk measures for derivatives with regime switching. *Annals of Finance*, *4*(1), 55-74.

Gaitán-Cremaschi, D., Van Evert, F. K., Jansen, D. M., Meuwissen, M. P., & Oude Lansink, A. G. (2018). Assessing the sustainability performance of coffee farms in Vietnam: a social profit inefficiency approach. *Sustainability*, *10*(11), 4227.

Hafeez, K., Malak, N. & Zhang, Y. (2007). Outsourcing non-core assets and competences of a firm using analytic hierarchy process. *Computers & Operations Research*, *34*(12), 3592-3608.

Jena, P. R., Chichaibelu, B. B., Stellmacher, T., & Grote, U. (2016). The impact of coffee certification on small-scale producers' livelihoods: a case study from the Jimma Zone, Ethiopia. *Agricultural economics*, *43*(4), 429-440.

Jezeer, R. E., Santos, M. J., Boot, R. G., Junginger, M., & Verweij, P. A. (2018). Effects of shade and human resource management on economic performance of small-scale Peruvian coffee systems. *Agricultural Systems*, *162*, 179-190.

Peppard, J., & Rylander, A. (2010). From value chain to value network:: Insights for mobile operators. *European management journal*, *24*(2-3), 128-141.

Pinto, L. F. G., Gardner, T., McDermott, C. L., & Ayub, K. O. L. (2014). Group certification supports an increase in the diversity of sustainable agriculture network–rainforest alliance certified coffee producers in Brazil. *Ecological Economics*, *107*, 59-64.

Poole, N., Gauthier, R., & Mizrahi, A. (2017). Rural poverty in Mexico: assets and livelihood strategies among the Mayas of Yucatán. *International Journal of Agricultural Sustainability*, *5*(4), 315-330.