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The Mediating Effect of Risk Management Strategies on the Relationship Between Attitude Constructs and Sustainability of Banana Production in Southern Philippines

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Abstract: This study determined the mediating effect of risk management practices on the relationship between the attitude of farmers and sustainability of banana production in Southern Philippines, particularly on direct provincial players, including Davao Region, Bukidnon, Digos, North Cotabato, and ARMM area. The research design used in this study was the descriptive correlation that involved 400 banana growers as respondents. The purposive random sampling technique was done in selecting the respondents. Sets of adapted survey questionnaires were used to obtain data from the respondents subjected to content validity and reliability analysis. The data were analyzed using the Mean, Pearson-r, Multiple Regression Analysis, and Medgraph using Sobel z-test. The results revealed that the levels of attitude constructs, sustainable production, and risk-management strategies of banana growers are evident most of the time. Moreover, a significant relationship existed between these variables. A significant partial mediation of risk-management strategies in the relationship between attitude and sustainable production of farmers in Southern Mindanao was proven in the study. Moreover, the study results may contribute to a more comprehensive problem structuring and theory development in confronting the issues in sustainable agriculture.

Keywords: *Risk management strategies, attitude constructs, sustainability, Philippines*

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INTRODUCTION

Introduction Every year, in the third world countries, 25 million people suffer from pesticide poisoning and countries of the South have accounted 99 percent related deaths, even though it uses only 20 percent of the pesticides produced globally and has been seriously threatening the survival of all living organisms on earth (Weinberg, 2008). Moreover, some parts in Southern Philippines experienced mismanagement which is considered a threat to sustainability of banana production. Specifically, in Bukidnon part, there are cases of environmental degradation brought about by operating banana plantations in the area which include reduced water quantity, reduced water quality, reduced aesthetic value of river, and destruction of biodiversity (Tabien, Rola, Carada, & Devibar, 2001). Given the importance of social and environmental factors in every kind of business endeavour, it is clear that the banana industry faces a perennial dilemma on striking a balance in terms of upholding sustainable banana farming. Neither will corporate social responsibility be adequate if it ignores the various disruptive factors that operate in the causality of ill health in relation to massive environmental malpractices (Quijano, 2006). The ultimate objective of the study was to describe and determine the significance of interrelationship among the factors, such as: attitude of farmers, sustainability constructs, and risk-management strategies. Also, the study determined significance of the mediating effect of risk-management

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strategies on the relationship between attitude and sustainability of banana production. The gap in this area of research has been identified due to dearth of information, particularly on sustainable banana farming. There is a need to come up with more empirical studies that are needed in order to provide an evidence on the potential effect of attitude, for example, of banana growers on the sustainability of banana production. Furthermore, since most of the related studies conducted were mostly about wheat farmers and growers (Solazzo, Donati, Arfini, & Petriccione, 2014), except on banana growers and the bulk of the literature are focused on promotion of eco-friendly practices in banana production (Murugi Kahangi, 2008; Rasiah et al., 2009). However, the gap remains as to the analysis on how risk-management practices mediate the relationship between attitude of banana growers and sustainability of banana production. With these scenarios, this study may conňtribute to the realization of the role of grower's attitudes and behavior which can contribute to the formulation of banana growers' policy and agricultural strategy.

LITERATURE REVIEW

Attitude Constructs toward Sustainability

Attitude is the degree of positive or negative impact associated with psychological things. It is one of the principal concepts of modern social psychology approach having three dimensions, namely: cognitive, emotional, and behavior (Pasha Sharifi, 2005). In the agricultural sector, several studies and researches have been conducted on the attitude of farmers to agricultural sustainability programmes, and also its effects on productivity and economy. In the context of Association of Southeast Asian Nations (ASEAN), it has been revealed that countries may improve its labor productivity by focusing on the human capital (Manayan, 2017). These human capital factors captured attitudes and values that are considered vital in the innovation and sustainability process which is also aligned with the concept of innovative agro-ecology in banana farming (Blazy, Carpentier, & Thomas, 2011; Teng, Quoquab, Hussin, & Mohammad, 2016). For example, the study of Karami and Mansoorabadi (2008) compared the attitudes of men and women rice farmers in the villages of Kazeroon County. Their results deduced that women rice farmers' have more positive attitudes toward sustainability than men farmers, and factors such, as education and access to information, are effective on changing the farmers' attitudes toward sustainable agriculture. On the other hand, Afzal, Al-Subaiee, and Mirza (2016) inferred in their study of the attitudes of farmers towards sustainable agriculture in Saudi Arabia that demographic profile, such as age, education, income, has a significant relationship with the farmers' attitude towards sustainable production. Similarly, the study of Bagheri, Fami, Rezvanfar, Asadi, and Yazdani (2008) concluded that the best predictors of rice farmer's attitudes of Hazar district of the Mazandaran province toward the use of sustainable agricultural technologies include educational attainment, contact with agricultural experts, and participation in agricultural extension.

Risk-Management in Agriculture

According to the World Bank (2005), agricultural risks involve variables, such as natural adversities (for example, pests and diseases), climatic factors not within the control of agricultural producers, and adverse changes in both input and output prices. The effect of risk and uncertainty is more significant in developing countries due to market imperfections, asymmetric information, and poor communication networks (Fufa & Hassan, 2003). Farming activities are subject to a wide range of risks due to biological, physical, and economic environment in which farming operates. Most of these risks are specific to agriculture and they affect the overall production and economic efficiency of agricultural production system. In the study of (Almadani, 2014) on wheat farmers' risk-management strategy, the results revealed that the factors such as, geographical location, education level, and information resources, have a considerable exploratory power for the farmers' risk attitude and perceptions of risk and risk-management. Also, socio-economic factors such as, off-farm work, farm land, and availability of farm labor, had a considerable relationship with the farmers' perceptions on risk management strategy.

Sustainable Banana Production

Sustainable agriculture is considered by some researchers to mean environmental, economic and social sustainability, and is used to describe a wide variety of practices (Rigby & Cáceres, 2001; Wheeler, 2005). In the Southern Philippines, most of the large banana players have joined the ISO 9000 series. The most prominent in terms of environmental sustainability compliance are the ISO 14001 certification requirements. In terms of social responsibility, the SA 8000 (Social Accountability) is the certification requirement, while GLOBAL GAP (Good Agricultural Practices) is the certification requirement, especially for plantations that are declared "organic" producers (Tabien et al., 2001).

Economic: The first indicator is the economic sustainability which could be expressed as economic well-being. It is a dimension of Sustainability that investigates the problems and possibilities of managing Man-Made Capital at a sustainable level (Spangenberg, 2002; Wu, 2016). Examples of man-made capital include money, machines, and automobiles. Economic well-being also includes the individual's concerns of debt accumulation, earning pressures, and work-life balance (Sheth, Sethia, & Srinivas, 2011).

Socio-territorial: The second indicator is the socio-territorial which could be expressed as social well-being. It investigates the problems and possibilities of managing Human Capital at a sustainable level. Spangenberg (2002) defines human capital as the "intra-personal qualities of human beings". Examples of human capital include labour, education, and welfare. Therefore, social well-being describes the quality of life factor. The social dimension has been measured by the unemployment rate, education, housing, crime rate, etc (United Nations, 2001).

Ago-ecological: The third indicator is the agro-ecological which could be regarded as environmental well-being which is also a dimension of Sustainability that investigates the problems and possibilities of managing Natural Capital at a sustainable level. Spangenberg (2002) defines environmental capital as "the sum of all bio-geological processes and the elements involved in them". Examples of natural capital include animals, vegetation, and water. Therefore, environmental well-being describes the effect of environmental change on human life and other life forms (Sheth et al., 2011).

Correlation Between Measures

Sustainability includes the interplay of the three factors, namely: agro-ecological, economic sustainability, and socio-territorial, and that these dimensions are suggested to be given equal considerations (Grieller & Littig, 2004). Moreover, in the contemporary definition, the concept of sustainability is being expanded into sustainable development. This view has been accepted universally and acknowledged by researchers, economists, and governments due to demands of productions with the projected increase in the global population, and that theres a need to protect the natural resources for the benefit of future generation (Breitschuh, 2003). Hence, the correlation among sustainability indicators shall be taken into consideration, namely: Attitude and Sustainability of Banana production, Attitude and Risk-Management, and Risk-Management and Sustainability.

RESEARCH MODEL

Figure 1 shows the conceptual model showing the relationships of the variables. The independent variable is the attitude construct which has six indicators, namely: environmental protection, economic, management, sustainable agricultural practices, likelihood, and system of sustainable agriculture.

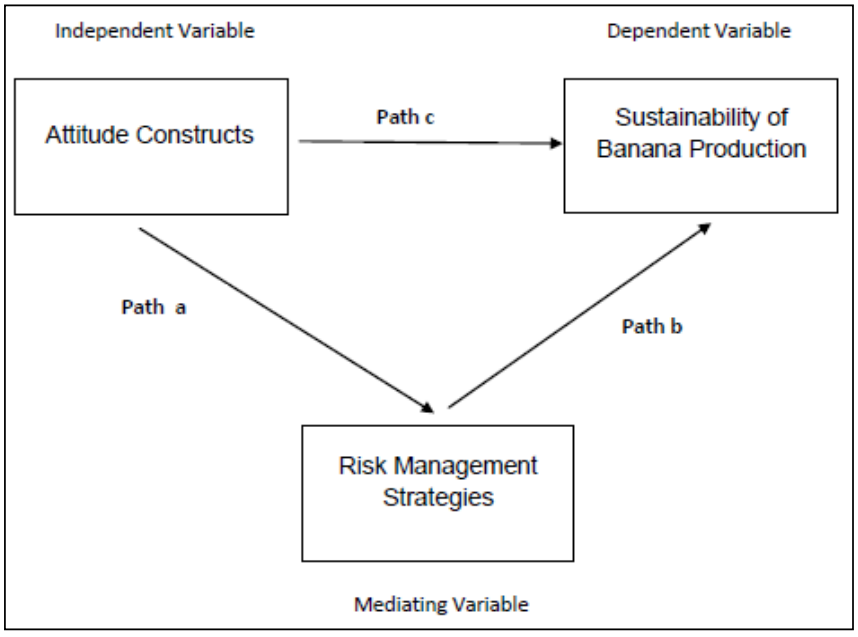

Figure 1 *Conceptual Framework Showing the Variables of the Study*

DATA ANALYSIS

Materials and Method

Three sets of survey questionnaires were used in obtaining data from the respondents which are adapted from previous studies. To ensure the accuracy of measurements, the questionnaires were subjected to content validity and reliability analysis. The attitude scale is adapted from the study of Liaghati, Veisi, Hematyar, and Ahmadzadeh (2008). The risk-management questionnaire is adapted from the study of Akcaoz, Ozcatalbas, and Kizilay (2009). The sustainability of banana production scale is adapted from Zahm, Viaux, Vilain, Girardin, and Mouchet (2008). The questionnaire follows a structured Likert Scale that has five levels of measurement: 1 (Strongly Disagree) to 5 (Strongly Agree), and has 3 subscales, namely: agro-ecological, socio-territorial, and economic sustainability. This study utilized the descriptive-correlational research design. Descriptive statistics were used to measure and obtain the information concerning the current condition of the context of the study Shuttleworth (2008). In this study, it determined the levels of attitude, risk-management practices, and sustainability of banana production among banana growers. Moreover, the mediating effect of risk-management practices on the relationship between attitude of farmers and sustainability of banana production was investigated. The Regression Analysis was used to measure the influence of attitudes and risk-management practices on sustainability of banana production, while the Medgraph using Sobel *z*-test was employed to determine the mediating magnitude or effect of risk-management practices on the hypothesized connection between attitude of farmers and sustainability of banana production.

Level of Attitude of the Banana Growers

The results show that environmental protection has the highest mean value of 4.27 which is described as very high. Meanwhile, the environmental protection is followed by attitude in economic (4.18) and management (4.15), which are described as high. On the other hand, the lowest mean of all attitude constructs is in the system of sustainable agriculture with a value of 4.00, more particularly, in the beliefs of farmers on the implementation of sustainable practices in the field of agriculture will be more advantageous for farmers who are into raising crops and livestock. Also, in the aspect of using resources that are considered non-renewable and consideration of biological cycles, it has been revealed that these aspects are very important in the system of sustainable farming agriculture (3.99).

Level of Sustainable Production among Banana Growers

The results revealed that the highest mean for agro-ecological aspect with a mean score of 4.06 described as high, particularly in specific aspects, such as ecological buffer zones (4.29), natural heritage protection measures (4.30), fertilization (4.30), protection of soil resource (4.34), and protection of water resource (4.37), as shown in Appendix A. Meanwhile, the lowest mean in the sustainable production construct is the economic sustainability with a value of 4.07, also described as high. In particular, it has high mean values in the aspects of taking into account the income being earned per worker in contrast to the minimum wage as per national standards (4.25), economic specialization rate (4.10), and financial independence or autonomy (4.02).

Extent of Risk-Management Strategies

The highest means are the aspects of record-keeping (4.31), spraying and drenching for diseases and pests (4.16), gathering market information (4.12), and planning expenditures (4.12). Meanwhile, the overall mean is 3.90 which is described as high.

Relationship between Attitude Construct and Sustainable Production

The overall *r*-value of .693 that has a *p*-value of < 0.05 signified the rejection of the null hypothesis. To interpret this, it is suspected that between the factors attitude constructs and sustainable production, a significant relationship is established. This implies that the banana grower's attitude is correlated with sustainable production. More specifically, result reveals that all indicators of attitude constructs are positively correlated with sustainable production, since the *p*-value is < 0.05 and the overall *r*-value is .545 on environmental protection, .652 on economic, .443 on management, .447 on sustainable agricultural practices, .529 on likelihood, and .485 on system of sustainable agriculture. Data show the positive association of the two variables.

Relationship between Risk-Management Strategies and Sustainable Production

In particular, it revealed that the indicators of sustainable production and risk-management strategies pose a statistically significant and direct relationship. This is supported with the *p*-value that is less than .05, and with *r*-value of .688 on agro-ecological, .663 on socio-territorial, and .519 on economic sustainability.

The overall results reflect that risk-management strategies are positively correlated with sustainable production since the overall *r*-value is .706 with a *p*-value < .05, hence rejecting the null hypothesis. This implies that the increase in risk-management strategies would also likely increase the sustainable production of the banana growers.

Relationship between Attitude Construct and Risk-Management Strategies

The results show that the overall values reveal a positive and significant relationship between attitude and risk-management strategies ($r = .611$, $p < .05$). More specifically, all of the indicators of attitude correlate positively with risk-management strategies, namely environmental protection ($r = .425$, $p < .05$), economic ($r = .544$, $p < .05$), management ($r = .403$, $p < .05$), sustainable agricultural practices ($r = .422$, $p < .05$), likelihood ($r = .485$, $p < .05$), and system of sustainable agriculture ($r = .505$, $p < .05$). Hence, the null hypothesis is rejected.

On the Mediating Effect of Risk-Management Strategies

Table 1 *DATA ENTRY FOR THE DIFFERENT PATHS*

Independent Variable (IV) Attitude Construct	
Dependent Variable (DV) Sustainable Production	
Mediating Variable (MV) Risk-Management Strategies	
Steps	
1. Path C (IV and DV)	
Sustainable Production on Attitude Construct	
B (Unstandardized regression coefficient	.657
e (Standard error)	.033
Significance	.000
2. Path B (MV and DV)	
Sustainable Production on Risk-Management Strategies	
B (Unstandardized regression coefficient	.513
e (Standard Error)	.025
Significance	.000
3. Path A (IV and MV)	
Risk-Management Strategies on Attitude Construct	
B (Unstandardized regression coefficient	.797
e (Standard Error)	.050
Significance	.000
4. Combined Influence of MV and IV on DV	
Sustainable Production regress on Risk-Management and Attitude Constructs	
Risk-Management:	
B (Unstandardized regression coefficient)	.328
SE (Standard Error)	.028
Beta (Standardized regression coefficient)	.451
Part Correlation	.357
Attitude Constructs:	
Beta (Standardized regression coefficient)	.395
Part Correlation	.330
Total R Square	.779

In Table 1 is the regression analysis on the mediating effect of risk-management strategies on the association between attitude and sustainable production. The data in this table were used as input to the medgraph. As evident in the study of (Baron & Kenny, 1986), there are three steps to consider for treating a third variable as the mediator. In Table 1, the Steps 1 to 3 are presented and categorized. In Step 1 (Path c), it is shown that the relationship between attitude, the Independent Variable (IV) and sustainable production, the Dependent Variable (DV) is significant. In Step 2 (Path a), attitude (IV) and risk-management strategies, the mediator (MV) are suspected to be having a significant relationship. In Step 3, risk-management strategies (MV) is suspected to be having a significant relationship with sustainable production. In Step 4 the combined effect of attitude and risk-management strategies on sustainable production revealed a significant value.

According to Jose (2003), to comply with the requirement of triangulation, a medgraph shall be used to analyze the level of mediation among variables, which includes Sobel Test. This type of test is intended for the measurement of mediation effect in terms of the level of significance. At the final step, if the independent variable's effect on the dependent variable yields a non-significant result, the full-mediation can be achieved. It can be suspected that the mediating variable is responsible for all of the effects. A partial mediation can be suspected if the regression coefficients are reduced substantially but remain significant at the final step. Further, it can be said that the MV mediates partly the IV; however, the other effects may be attributable to other variables exclusive of the model. In this particular case, the effect of the IV (attitude) on DV (sustainable production) is weakened as shown in the lowered beta value after controlling MV (risk-management strategies), hence, showing a still significant relationship which implies a partial mediation.

Using the Sobel *Z*-test, the partial mediation region is not sufficiently large. The result revealed that the mediating effect of risk-management strategy translates a more conservative impact in terms of sustainable banana farming. It is conservative in the sense that it fully accounts the economic aspects, factors of production in banana farming towards achieving sustainable banana farming. However, the partial mediation also translates that of the total effect; almost 60 percent are attributable to other factors which are not covered in the model.

Furthermore, the high predictability of the regression models indicates that a high proportion of the variation of the dependent variables is accounted by the attitude constructs. This result has been supported by Allen, Van Dusen, Lundy, and Gliessman (1991); Blazy et al. (2011); Wheeler (2005). Attitudinal factors interact with sustainable banana farming.

The Sobel *z*-value of 9.439407 yielded a *p*-value less than 0.05, hence significant partial mediation occurred. It has been revealed that the inclusion of risk-management (MV) strategies has reduced the relationship between attitude (IV) and sustainable production (DV).

It could be seen in the graph that .693 is reduced to .395 in the subsequent regression. The 95% confidence interval conclusively tells that significant mediation has occurred. It yielded a small standard error (se) of .027 obtained by subtracting lower limit (.20714) from the upper limit (.31570) and dividing the difference with 3.92 (constant). The value in se represents the precision of the estimate. Hence, a relatively small value se means is equivalent to a more precise estimate.

The effect size (.397) measures how much of the effect of attitude (IV) on sustainable production (DV) can be attributed to the indirect path (IV to MV to DV). The total effect (.693) is the raw correlation between attitude (IV) and sustainable production (DV). The direct effect (.395) is the size of the correlation between attitude (IV) and sustainable production (DV) with risk-management strategies (MV) included in the regression. Basically, there are two paths in the regression models: path "a" represents the path between IV and MV and "b" means the path between MV and DV. These two paths determine the original correlation between the IV and the DV which has indirect effect which proceeds through the mediator, then to the DV (a*b). The ratio index is 39.7 percent. This is computed by dividing the indirect effect (.276) by the total effect (.693). Results revealed that the total effect of the IV on the DV, the effect that goes through the MV, is 39.7%. Consequently, the total effect which is directly or partly mediated by other variables revealed an effect of 60.3%.

Figure 2 presents the paths among the independent variable, mediator, and dependent variable. With the use of Baron and Kenny (1986) steps in testing mediation of risk-management practices, the researcher proved that mediation is significant and there is partial mediation. First in regression, the independent variable (attitude) affects the mediator (risk-management practices) at beta coefficient of 0.611 and the relationship is significant at *p*-value equal to 0. Second regression, the independent variable (attitude) affects the dependent variable (sustainable production) at beta coefficient

of 0.693 and the relationship is significant at *p*-value equal to 0. Third regression, for the mediation to hold, the mediator (risk-management strategies) affects the dependent variable (sustainable production) at beta coefficient value of 0.706 and the relationship is significant at *p*-value equal to 0. Lastly, the dependent variable (sustainable production) is regressed on both independent variable (attitude) and the mediator (risk-management strategies). Since the coefficient of the attitude has been reduced from .693 to 0.395, but still significant, partial mediation of risk-management practices in the relationship between attitude and sustainable production is achieved.

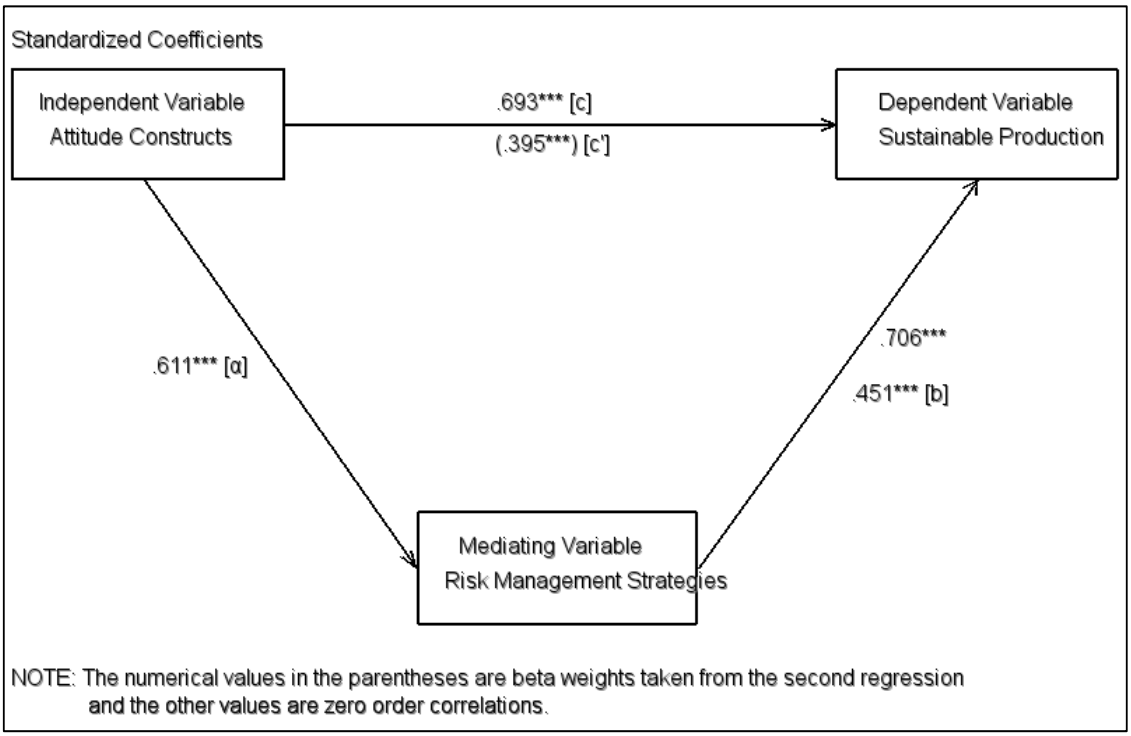

Figure 2 *Regression Paths Among 3 Variables*

Table 2 *RESULTS OF MEDIATION*

Significance of Mediation			Significant
Sobel *z*-value		9.439407	*p* = <0.000001
95% Symmetrical Confidence Interval			
Lower		.201714	
Upper		.31570	
Unstandardized indirect effect			
a*b		.26142	
Se		.02769	
Effect size Measures			
Standardized Coefficients			
Total:	.693		
Direct:	.395		
Indirect:	.276		
Indirect to Total Ratio:	.397		

In Table 2, the Sobel's *z*-value of 9.439407 has a probability value of 0.000 significance which is lower than 0.05 level of significance. Hence, significant mediation is determined and hypothesis 1 is rejected. There is a significant mediation of risk-management strategies in the relationship between attitude and sustainable production of banana

grower's in Southern Mindanao. Since it is only partial mediation, it could not totally claim that risk-management strategies was the very reason how attitude can influence sustainable production of banana growers. This indicates that risk-management strategies can be one of the reasons how attitude can influence sustainable production.

DISCUSSION

The findings of this study confirm the assumptions about the mediating effect of risk-management strategies on the relationship between attitude and sustainable production of Banana growers. Although the risk-management strategies only have partial mediation, it means that not all can be explained by the mediator on the influence of attitude on sustainable production. Moreover, the findings provide evidence that the consideration of attitude of banana growers in sustainable farming is relevant for research on sustainable production in agriculture. The banana growers believed the idea that attitude is important for sustainable production. In effect, the banana growers exhibit a high level of attitude, high-level risk-management strategies, and a high level of sustainable production. It generally indicates that there is a significant relationship between attitude, risk-management strategies, and sustainable production.

CONCLUSION

Since a partial mediation has been revealed on the risk-management strategies effect on the association between attitude and sustainable production of Banana growers, the propositions of Ajzen (2001), Fishbein and Ajzen (1975), and Falconer (2000) are, therefore, validated in terms of the significant relationship among the attitude constructs, risk-management strategies, and sustainable banana production. Finally, the persons attitude is directly related to sustainability which is manifested in the level of interest in pursuing sustainable agriculture. This concept is supported by Sharfman and Fernando (2008), wherein it improved environmental risk-management due to better risk-management or resource utilization.

Hence, the mediation analysis suggests that Banana growers must strengthen their risk-management strategies in order to achieve better productivity of yield. Finally, future studies toward examining other variables that can possibly mediate the relationship between attitude and sustainable production will be of utmost importance to the research community.

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