

# Extension Agents and Sustainable Cocoa Farming: A Case Study of Extension Agents in Sabah State, Malaysia

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## Abstract

Cocoa has been commercially planted in Malaysia since the 1950s. Over the years, the planting area has gradually reduced, which has resulted in the need to import cocoa beans to sustain the local grindings requirement. The Malaysian Cocoa Board (MCB) has introduced extension programmes to cocoa farmers to encourage sustainable farming of cocoa in the country. This study assessed the perception, knowledge, attitudes, and value of agricultural extension agents towards sustainable cocoa farming in Sabah State, Malaysia. Data were collected from extension agents working for the Malaysian Cocoa Board. A questionnaire was administered to all the front-line extension agents who deal directly with cocoa farmers. Findings revealed that cocoa extension agents' perception, knowledge, attitudes, and value towards the concept of sustainable cocoa farming is favourable. In fact, they strongly support the concept. A significant relationship exists between knowledge on Sustainable Cocoa Farming (SCF) and their attitude towards the concept ( $r = 0.465$ ). Perception also significantly correlates with the attitude of the agents ( $r = 0.425$ ). The study concluded that policymakers should include SCF in training. Extension agents' positive perceptions regarding selected sustainable cocoa farming have implications for in-service training for agricultural extension agents in the east of Malaysia to increase their specific knowledge in SCF. In addition, although cocoa extension agents possess general knowledge on the concept, further training on the application of SCF is highly recommended.

**Keywords:** cocoa, extension agents, sustainable cocoa farming, sustainable farming, Malaysia

## 1. Introduction

Malaysia is located in South-East Asia. This country has a tropical climate. Over the past few decades, the agriculture sector has contributed extensively to the country's economy (Goh, Tan, Lee, & Bhatia, 2010). Malaysia has 4.06 million ha of agricultural land, of which 80% is planted with crops such as rubber, palm oil, cocoa, and 20% of land use for crops such as paddy, vegetables, and coconut (Murad, Mustapha, & Siwar, 2008). In Malaysia, the first cocoa-planted area was established in Malacca in 1778. Cocoa commercialization developed between 1853 and 1959, with the cocoa type amelonado being first planted at Jerangau, Terengganu. Then, cocoa planting was started in a plotted area at Serdang Agriculture Station and Silam Agriculture Research Centre, Sabah. Cocoa officially came to Quoin Hill, Tawau, and Sabah in 1960 (Malaysian Cocoa Board Official Website). Around 80% of the total cocoa cultivated area is located in East Malaysia and only 20% in Peninsular Malaysia (Malaysian cocoa monitor, 2011). Almost 90% of cocoa plantation areas are cultivated by small-scale farmers. Small-scale farmers lack both the resources and the latest relevant knowledge to venture into large-scale cocoa farming. These factors have led to a low yield in the production of cocoa beans. In recent years, slow growth in cocoa production has been a challenge for policymakers in Malaysia. According to (Malaysian cocoa monitor (2011), the total cocoa cultivated area in 2000 was 75,201 ha with the production of 70,262 tonnes per ha. In 2005, this figure had decreased to 27,964 tonnes. In 2006 and 2007 cocoa production started to increase again to 31,937 and 35,180 tonnes, respectively. However, in 2009 cocoa production began to fall considerably and in 2011 reached its lowest point at 4,605 tonnes per ha. The imbalanced cultivation of cocoa has forced the government to import a significant amount of cocoa beans to meet local grindings requirement. In order to address this problem, the MCB has introduced several programmes such as the Cocoa Farmers Marketing Support Service Scheme, the Quality Certification Scheme for Dry Cocoa Beans and extension services to encourage the sustainable farming of cocoa in the country and to achieve self-sufficiency. Although, the

government's policy has placed the emphasis on increasing cocoa production for self-sufficiency, nevertheless increasing cocoa production should be in line with sustainability. Accelerating the sustainable growth of cocoa involves significant support from agricultural extension agents. Extension agents, as a link between government and farmers, communicate useful information to the farmers. Since sustainable cocoa farming includes broad information systems, extension agents therefore play a major part in assisting farmers in implementing the programmes. Nevertheless, for extension agents to be able to assist farmers with sustainable cocoa farming, they must understand the concept and possess a positive attitude towards and perception of the programme. Results of a study conducted by Minarovic and Mueller (2000) recommend that extension agents' attitudes towards sustainable farming reflect their knowledge and the importance of the concept for them. Thus, it is essential to understand the level of extension agents' knowledge and attitudes towards the concept in order to move the programme forward. Research regarding cocoa extension agents remains limited in Malaysia. To our knowledge, no studies have investigated the agents' attitudes, beliefs, perception, and knowledge on sustainable cocoa farming in Malaysia. It is not clearly known what are their values, attitude, knowledge, and perception on sustainability. This study, therefore, aims to explore cocoa extension agents who deal directly with cocoa farmers in East Malaysia.

### *1.1 The Theoretical and Conceptual Framework*

Agricultural Extension is an educational process with the obligation of distributing knowledge and skills to the farmers. The ultimate aim of Agricultural Extension education is to improve the farmer's standard of living through extension agents (Farinde & Atteh, 2009). Evenson (2001) defined agricultural extension as a mechanism by which information on new technologies is communicated to farmers. In Malaysia, sustainable farming is considered as new technology and typically knowledge on this concept transfer to the farmers by extension agents. The agents play a middle role between government agencies and farmers as a source of information. They should be able to convince farmers to adopt relevant technology. However, prior to persuading farmers to adopt the technology, extension agents must be convinced themselves about its importance (Allahyari, 2009; Chizari, Baygi, & Breazeale, 2006; Tiraieyari, Hamzah, Abu Samah, & Uli, 2013 a, b, c). This study is based on the theory of (Fishbein & Ajzen, 1975) that a person's values and beliefs serve as the foundation for his or her attitude and behaviours. Beliefs represent information that a person may have about things. On the other hand, an attitude refers to an individual's positive or negative evaluation of a person or situation (Fishbein & Ajzen, 1975). Alreck & Settle (1995) defined attitudes as mental images that a person forms about a concept and are based on their knowledge and feeling about the concept. In a survey conducted by Campbell (1994), the relationship between agricultural students' attitude and knowledge on the environment was tested after they participated in an environmental course. Results of Campbell's study revealed the students' knowledge and attitude were changed as a result of the course. Results of a study conducted by Arcury (1990) showed that environmental knowledge was positively related to attitudes towards the environment, although the relationship was not strong. According to Arcury (1990), knowledge about the environment is expected to change due to attitudes towards environmental and both knowledge and attitudes are expected to influence behaviour. Scholars debated that if extension agents attain a positive attitude towards sustainable farming, they are more likely to succeed in delivery of the programme to the farmers (Tiraieyari, Hamzah, Abu Samah, & Uli, 2013a). Similarly, Udoto & Flowers (2001) postulated that a positive attitude towards sustainable farming practices would influence extension agents to promote the practice to farmers. This could be due to the fact, that attitudes provide direction and purpose to action and performance (Liaghathi, Veisi, Hematyar, & Ahmadzadeh, 2008). Creswell & Martin (1993) indicated that attitudes are biases that influence behaviours. Similarly, Knobloch & Martin (2000) highlighted that positive beliefs lead to specific behaviours. Findings of a study conducted by (Williams & Wise, 1997) showed that the positive attitudes of extension agents towards sustainable farming would influence them to teach the concept to farmers. According to Agung (1995), extension agents should be convinced of the value of sustainability prior to delivering the programme to farmers. Findings of a study conducted by Tiraieyari et al. (2013c) indicated that delivery of information on sustainable agriculture to farmers is positively related to extension agents' values and beliefs on the concept ( $r=0.630$ ,  $p=0.001$ ), perception ( $r=0.670$ ,  $p=0.001$ ), and knowledge on sustainable agriculture ( $r=0.688$ ,  $p=0.001$ ). In the Riyadh region of Saudi Arabia, extension agents' positive perceptions about sustainable agriculture were influential in the development of sustainable agricultural programmes (AL-Subaiee, Yoder, & Thomson, 2005), proving that positive perceptions potentially increase the probability that a behaviour will be performed by a person. Extension agents' knowledge of sustainable farming is also an important factor that might persuade them to deliver the programme to the farmers. Their knowledge about the concept of sustainability is crucial to promote the programme (Minarovic & Mueller, 2000). Findings of a study conducted by (Agunga, 1995) in the United States discovered that extension agents were not involved in promoting sustainable farming to farmers due to an absence of understanding the programme. Results of a

regression analysis in a study conducted by (Tiraieyari et al., 2013c) showed that extension agents' attitude, perception, knowledge, and beliefs and values significantly contributed to the delivery of sustainable agriculture to farmers. The importance of perceptions, knowledge, value and philosophy in relation to attitudes towards agricultural concerns has been revealed by several studies conducted in the field of agricultural extension and education (Agunga, 1995; AL-Subaiee et al., 2005; Blezek & Dillon, 1991; Chizari, Lindner, & Zoghie, 1999; Farouque & Takeya, 2007; Minarovic & Mueller, 2000; Tiraieyari, Hamzah, Abu Samah, & Uli, 2013 a,b,c; Udoto & Flowers, 2001). In the west region of Malaysia, a few studies on the perceptions of extension agents have focused on sustainable farming (Tiraieyari, Hamzah, Abu Samah, & Uli, 2013,a,b,c). However, to our knowledge, no studies have investigated extension agents' attitude, knowledge, values and perception of SCF in Malaysia. Tiraieyari, Hamzah, Abu Samah, & Uli, (2013c) recommended further research to study other extension agencies to assess the extent to which results are similar in Malaysia. Cocoa extension agents' values, attitude, knowledge, and perception on sustainability are not known. Hence, in this study, we aim to investigate extension agents in the east region of Malaysia.

### *1.2 Objectives of the Study*

The main objective of the study was to assess the knowledge, attitude, perception, and values of extension agents regarding SCF. The specific objectives were to:

- (1) Examine the socio-demographics of respondents in the study area
- (2) Determine the level of extension agents' perceptions of SCF
- (3) Determine the level of extension agents' attitude towards SCF
- (4) Determine the level of extension agents' knowledge on SCF
- (5) Determine the level of extension agents' values regarding SCF
- (6) Determine the relationship between knowledge and perception with the attitude of extension agents.

## **2. Method**

This study was conducted in Sabah, East Malaysia. East Malaysia, including Sabah and Sarawak, is a major cocoa plantation area. Most of the planting areas are situated in the Sabah state of Malaysia. Currently, there are 30 extension agents working at the MCB, in the state of Sabah. The MCB was established in 1989 as a research and development agency to conduct research on cocoa production, processing, storage, and consumption, improve cocoa quality, and supervise processing and storage and marketing activities and to communicate information and technologies to cocoa farmers through extension agents. The extension agents work directly with cocoa farmers. They are responsible for providing consultancy services to cocoa farmers and delivering related technologies to them. The researcher travelled to three districts of Sabah, namely Kota Kinabalu, Tenom and Ranau, to collect data using a questionnaire from all extension agents. Respondents from other districts also joined the three named districts to participate in the research and completed the questionnaire. The questionnaire was adopted from previous studies conducted by (Chen, 2003; Connors, Swan, & Brousseau, 2004; Muma, Martin, Shelley, & Holmes, 2010). However, some statements and terms were modified to be suitable for our study. The questionnaire was translated into Bahasa Malaysia by an expert. We checked the instrument validity and reliability before collecting data. After completing the questionnaire, it was then pretested. The actual data collection took a few days, from 26 August 2013 until 28 August 2013. To answer the research objectives, a total of 37 questions were asked and the responses analysed. The questions were made up as follows: 10 questions on the perception of SCF, 12 questions on overall attitude towards SCF –five questions regarding the economic viability of SCF, four questions regarding environmental sustainability, and three questions for social responsibility – four questions concerned general knowledge on SCF, and 11 questions were about the value and beliefs regarding SCF. For each of the questions asked, the respondents were given a 10-point semantic differential scale, from strongly disagree (1) to strongly agree (10). In order to identify the mean score levels, one of the commonly used methods is to take the range of possible scores and divide by the number of categories to be established (low, moderate and high). The range equal to four (10-1) is divided by three leading to the class of interval of 3. Hence the first class (low) ranges between 1.00 and 3.99, the second class (moderate) ranges between 4.00 and 6.99 and the third class (high) ranges between 7.00 and 10.00. Descriptive statistics were used to achieve the objectives of the study.

## **3. Results and Discussions**

### *3.1 Demographic Profiles of Respondents (Objective 1)*

Table 1 presents the demographic background of the respondents. Data showed that the mean score recorded for

age of respondents is 32.7. Only 10% of the respondents are female, with the remaining 90% being male. Regarding the age of the extension agents, 43.3% of respondents were between 26 and 31 years old, 8 (26.7%) were between 32 and 37 years old, 10% (n= 3) were between 20 and 25 years old, 3 (10%) were between 38 and 43 years old and 10% ( n=3) were over 44 years old. The majority of extension agents (46.7%) were made up of those with an SPM certificate (Malaysian Certificate of Education), 30% (n=9) had a Certificate of Agriculture, 13.3% (n=4) had a diploma and 10% (n=3) had a bachelor degree. Data showed that 36.7% of the extension agents had less than five years' working experience within the Extension Services, 36.7% had between 6 and 10 years, 23.3% of them had between 11 and 15 years' tenure in the Extension Services and only one extension agent had more than 16 years working experience. Data further showed that a majority (70%) of respondents have not received training on SCF (Table 1).

Table 1. Demographic profiles of respondents (n = 30)

Variable	Category	Frequency	(%)	Mean
Gender	Male	27	90	
	Female	3	10	
Age group	20–25	3	10	32.7
	26–31	13	43.3	
	32–37	8	26.7	
	38–43	3	10	
	Above 44	3	10	
Level of education	SPM	14	46.7	
	Certificate of Agriculture	9	30	
	Diploma	4	13.3	
	Bachelor degree	3	10	
Tenure	<5	11	36.7	
	6–10	11	36.7	
	11–15	7	23.3	
	<16	1	3.3	
Training on SCF	No	21	70	
	Yes	9	30	

### 3.2 Cocoa Extension Agents' Perceptions of SCF (Objective 2)

A total of 10 items were asked with Extension agents. The respondents recorded a high mean score for three items: namely, P1, P3 and P5; with mean scores ranging from 9.00 to 9.20, extension agents rank soil testing as highest (M = 9.20). The overall mean of response on perception of SCF was divided into three levels (high, moderate, and low) for reporting purposes. The majority of the respondents, 90% (n=27) had a high perception of SCF; 10% (n=3) had a moderate perception of SCF and none had a low perception (Table 2). Therefore, the overall mean perception rating implies the cocoa extension agents agree with SCF. This is in line with a study conducted by (AL-Subaiee et al., 2005; Chizari et al., 1999; Tiraieyari, Hamzah, Abu Samah, & Uli, 2013b).

Table 2. Perception of Extension Agents of SCF

Items	M
Soil testing(P1)	9.20
Use of animal manure(P2)	8.76
Integrated pest management(P3)	9.00
Recycling agricultural waste(P4)	8.96
Use of green manure(P5)	9.06
Reduced tillage(P6)	8.30
Reduced rates of herbicides(P7)	8.10
Reduced use of fertilizers(P8)	7.06
Reduced nitrogen fertilizer rates(P9)	6.90
Use of low-input livestock facilities(P10)	7.26

### 3.3 Cocoa Extension Agents' Overall Attitude of SCF (Objective 3)

Table 3 shows the mean for attitude towards SCF. Extension agents were asked a series of questions on their attitude towards SCF concerning economic viability, social responsibility and the environmental protective dimension of SCF. A total of 12 items were used to measure cocoa extension agents' attitudes towards SCF. Five items (EC1, EC2, EC3, EC4 and EC5) concerned the economic viability dimension of SCF, four items (EN1, EN2, EN3, and EN4) concerned the environmental sustainability of SCF and three were regarding social responsibility (S1, S2 and S3). The respondents recorded a high mean score for three items regarding the economic viability of SCF, namely, EC1, EC2 and EC5, with mean scores ranging from 9.33 to 9.50. The statement 'The primary goal of cocoa farmers should be to maximize the productivity and profitability of their farms' had the highest mean ( $M = 9.50$ ) among the statements. The lowest mean ( $M = 6.90$ ) was for the statement "Small to medium-size cocoa farmers can best serve the agricultural needs of the nation' (EC3). Items (EN1, EN2, EN3 and EN4) show the mean for the environmental sustainability of SCF. Extension agents reported a highest mean score ( $M = 9.83$ ) for the statement EN1 and the lowest score ( $M = 8.86$ ) for EN3. Extension agents were asked three questions on their attitude towards the social responsibility of SCF. Among the statements used, the statement S2 had the highest mean with 8.96 and S3 had lowest. So they least agreed with statement S3. The overall mean of response for attitude towards SCF was divided into three levels (high, moderate and low) for reporting purposes. Based on the interpreted scale used, all extension agents have a positive attitude towards SCF. They strongly agreed with the three dimensions of SCF. This finding confirms the results of previous research on the positive attitude of extension agents towards sustainable agricultural practices (Allahyari, 2009; Chizari et al., 1999; Minarovic & Mueller, 2000; Tiraieyari et al., 2013a; Udoto & Flowers, 2001; Williams & Wise, 1997).

Table 3. Extension agents' attitude towards SCF

Items	M
The primary goal of cocoa farmers should be to maximize the productivity and profitability of their farms. (EC1)	9.50
The successful cocoa farmer is one who earns enough from farming to enjoy a good standard of living.(EC2)	9.46
Small to medium-size cocoa farmers can best serve the agricultural needs of the nation. (EC3)	6.90
Cocoa farmers should farm only as much land as they can personally handle. (EC4)	9.13
Cocoa farming is a venture like any other business.(EC5)	9.33
Soil and water are the main sources of all life and should therefore be strictly conserved. (EN1)	9.83
The key to future success of cocoa farming lies in learning to imitate natural ecosystems and farm in harmony with nature.(EN2)	9.43
Modern cocoa farming is a major cause of ecological problems and must be greatly modified to become ecologically sound. (EN3)	8.86
Cocoa farmers should use primarily natural fertilizers such as compost, and biological pest control.(EN4)	9.00
Extension agents should teach cocoa farmers about the interrelationships among the environment, cocoa farming, and people.(S1)	8.86
An important responsibility of extension agents is to develop future leaders for the cocoa industry and rural communities in Malaysia.(S2)	8.96
Cocoa farmers have a good understanding of the interrelationships among the environment, agriculture and people.(S3)	8.30

### 3.4 Cocoa Extension Agents' Knowledge on Selected SCF (Objective 4)

Table 4 presents extension agents' perceived knowledge regarding select SCF. The results confirmed that all statements on the selected knowledge (N1, N2, N3, and N4) yielded a high mean score with mean scores ranging from 7.10 to 7.50. The overall mean of the respondents on knowledge of select SCF was divided into three levels. Based on the interpreted scale used, the majority of extension agents (n=21) perceived that they have a high level of knowledge on select SCF; four extension agents perceived themselves as having a moderate level of knowledge on SCF and five extension agents perceived themselves as having a low-level knowledge of SCF. The low level of knowledge on SCF might be due to the fact that the majority of extension agents 21 (70%) have not yet received training on SCF (Table 1). The results that show extension agents perceiving themselves as knowledgeable are in line with the results of several previous studies (Agunga, 1995; Minarovic & Mueller, 2000; Tiraieyari, Hamzah, Abu Samah, & Uli, 2013b).

Table 4. Extension agents' knowledge on selected SCF

Items	M
Biodiversity conservation(N1)	7.50
Good agricultural practices (N2)	7.30
IPM-pesticides management(N3)	7.56
Green manures(N4)	7.10

### 3.5 Cocoa Extension Agents' Values and Beliefs Regarding SCF (objective 5)

Table 5 shows the mean for value and beliefs regarding SCF. Extension agents were asked a series of questions on their value and beliefs regarding SCF and 11 items were used to measure these. The respondents recorded a high mean score for the statement VB1. This finding confirms the results of some past studies (Agunga, 1995; Knobloch & Martin, 2000). Based on the interpreted scale used, the majority of the respondents, 96.7% (n = 29) strongly believed in SCF, with only one extension agent having a moderate belief in SCF.

Table 5. Extension agents' value and beliefs regarding SCF

Items	M
Development of healthy soils is important for sustainable cocoa farming.(VB1)	9.73
Sustainable cocoa farming conserves natural resources for the benefit of future generations. (VB2)	9.53
Sustainable cocoa farming promotes recycling of renewable natural resources. (VB3)	9.20
Sustainable cocoa farming values nature for its own sake. (VB4)	9.26
Agricultural knowledge from extension is important for the success of sustainable cocoa farming. (VB5)	9.76
Sustainable cocoa farming promotes local marketing of agricultural production. (VB6)	9.63
Exchange of knowledge about locally designed technologies among producers promotes sustainable agricultural practice. (VB7)	9.60
The size of a community impacts on the development of sustainable agriculture. (VB8)	9.23
Sustainable cocoa farming reduces the need for over-reliance on external sources of inputs. (VB9)	9.33
Local knowledge of farming in a community is an indication of sustainability in cocoa farming. (VB10)	9.30
Sustainable cocoa farming indicates low farm capital investment and technology.(VB11)	8.33

### 3.6 Relationship between Knowledge and Perception with the Attitude of Extension Agents (Objective 6)

The Pearson correlation coefficient was employed to achieve the relationship between perception and knowledge with attitude. Results showed a significant relationship exists between knowledge and attitude ( $r = 0.465$ ,  $p = .001$ ). Attitude of extension agents towards SCF positively related to their knowledge on SCF. Perception of extension agents also significantly correlated with their attitude towards SCF ( $r = 0.425$ ,  $p = .001$ ). This result appears to be in line with Alreck & Settle's (1995) statement that attitudes formed by a person about a concept are based on her/his knowledge about the concept. This result also closely parallels the finding of Minarovic &

Mueller (2000), who indicated that extension agents' attitudes regarding sustainable farming reflect their knowledge about the concept. Therefore, extension agents' knowledge about the concept of SCF is necessary in order to implement or move the programme forward. They must stay up to date with information and technologies on cocoa farming.

#### 4. Conclusion, Implications, and Recommendations

Cocoa extension agents in Sabah, the east region of Malaysia are mostly young males with SPM (Malaysian Certificate of Education) who have favourable perceptions, attitudes, values, and beliefs regarding SCF. The primary objective of this study was to determine the level of these. Findings indicate that cocoa extension agents agree with SCF. Overall results indicated a positive response regarding attitude, perception, knowledge, values and beliefs of extension agents towards SCF. In fact, they support the concept. The findings in this survey were comparable to the results of past studies involving front-line extension agents and sustainable agriculture in general. Although extension agents indicated positive perceptions of SCF, their agreement with the concept, being knowledgeable on selected SCF practices and having values and beliefs regarding SCF does not necessarily mean that they would transform their attitude and beliefs about SCF into action. In other words, they may or may not communicate their knowledge on SCF to the cocoa farmers. A suggestion can be made that extension agents' agreement with statements related to SCF practices does not certainly mean that they are currently communicating SCF topics to farmers. Muma et al. (2010) reached a similar conclusion when they examined value, beliefs and attitude of agricultural teachers regarding sustainable agriculture. The extension agents' level of agreement with SCF could be used to instill knowledge and skill about SCF in cocoa farmers. This might help extension managers and supervisors to integrate knowledge on SCF into addressing the issues of the Malaysian cocoa industry successfully. The positive perceptions of extension agents regarding SCF imply that SCF practices stand a good chances of being selected and used for extension educational programmes. Participants' attitudes about SCF revealed that they understood the concept and they also were knowledgeable about SCF practices. However, in our study we did not survey actions taken to implement SCF or indications of strong efforts being made by the extension agents to communicate their knowledge with cocoa farmers.

The conclusions of this study have implications for the development of in-service training programmes for extension agents with applications of SCF because data showed that not all extension agents have gone through an SCF training programme. Furthermore, the results of this study have implications for in-service training for the delivery of educational programmes in SCF to cocoa farmers. There is also a need to describe SCF under the sustainable agriculture umbrella so that the way in which economic, environmental, and social concepts are interrelated will be understood. Therefore, extension agents need comprehensive training in sustainability concepts in addition to information about technologies in cocoa farming.

Based on the findings we suggest the following recommendations:

Regardless of extension agents' current knowledge on SCF or attitude towards SCF, the need for them to have a broader knowledge and perspective is obvious. Recognizing and strengthening extension efforts regarding the delivery of SCF is essential, as sustainable agriculture has already been promoted by government agencies in Malaysia. In addition, although extension agents possess general knowledge on the concept and they are in agreement with the concept, further training on the application of SCF is highly recommended. In order to gain a better understanding of extension agents' attitude, perception, and knowledge on SCF, it is recommended that more research be conducted to investigate extension agents from the farmers' and supervisors' perspective. It is also recommended that additional data collection be undertaken from the perspective of cocoa farmers. That would definitely enhance our understanding of the extent of extension agents' efforts to communicate their knowledge on SCF to the cocoa farmers.

In addition, since extension agents agreed with the SCF concept, strategies for providing them with skills and knowledge development in SCF are needed. Priorities can be focused on supporting extension agents' access to information through workshops, seminars, magazines, and in-service training to increase their theoretical understanding of SCF. Further research strategies such as qualitative methods are required to reveal in more depth the issues involved in unsustainable cocoa farming in Malaysia. There is a need to determine the nature and extent of the relationships among sustainable agriculture concepts, practices, and the extent to which extension agents teach SCF topics to cocoa farmers.

Results show that attitude is correlated with knowledge and perception. Such information provides valid and reliable criteria for the training and development of extension agents. Overall, the findings of this study have highlighted the importance of knowledge and perception and its relationship with attitude. Findings of the study will help policymakers to place greater emphasis on the development of extension agents, as the entire extension

process is dependent on them delivering SCF information and strategies to cocoa farmers.

This study did not address the extent to which extension agents in the state of Sabah, Malaysia transfer their knowledge on SCF to cocoa farmers. The researchers recommend additional research to determine how the perceptions, attitude, and knowledge of extension agents regarding SCF influence the delivery of these programmes.

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