

Acceptance of Oil Palm Innovation among Smallholder Farmers in East Malaysia

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Abstract

Palm oil is an important cash crop for Malaysia and determining the factors affecting the diffusion of this cash crop is considered a viable strategy for attracting farmers to take up palm oil farming. Hence, a study to determine acceptance of oil palm innovation is very important as it will provide insights into the factors that influence acceptance, thereby informing the authorities concern of steps to take to improve acceptance. This study measured the influence of palm oil innovation characteristics, the level of knowledge, social system and communication channels towards acceptance of agricultural innovation among smallholder palm oil farmers. Diffusion of Innovation Theory is adopted in formulating the theoretical framework to measure how the palm oil innovation is diffused among the smallholder farming community. This study employed a quantitative approach to obtain data from smallholder farmers in an area in Sarawak, East Malaysia. A survey using questionnaire was used to collect data from ninety nine (99) sampled respondents representing the smallholder palm oil farmers. The questionnaire variables and items were mainly measured using 5-point likert scale. Both inferential and descriptive analysis were used to analyse the data. From the findings, only the characteristics of innovation and communication channels significantly influenced the acceptance of oil palm innovation among the farmers in the East Coast of Malaysia. However, the influence of communication channels was negative. This implies, in diffusing an innovation among traditional farmers, characteristics of the innovation should be the main focus. Meanwhile, the use of communication channels to diffuse innovation, especially radio and new media for development should be geared up as an aspect of development communication. Future research could replicate the study to include other parts of Malaysia in other to compare best practices for oil palm innovation acceptance.

Keywords: Communication Channels, Diffusion of Innovation, Innovation Characteristics, Palm Oil Farmers, Social System

Introduction

Palm Oil is an important cash crop in Malaysia. Determining the factors affecting the diffusion and acceptance of this cash crop is considered to be one of the most important strategies for attracting farmers to take up oil palm farming. The Malaysian government under different leaders have always attached importance to farming, especially cash crop and oil palm in particular. Prime Minister Abdallah Badawi's era witnessed the efforts put in promoting and making farming attractive to the people using the campaign tagline, "Pertanian adalah perniagaan" (Farming is a business). In attracting the people, a systematic diffusing of oil palm and its related innovations are crucial as Malaysia is one of the oil palm exporting countries.

An innovation is a thought, practice, or object taken as new by an individual or other unit of adoption. The diffusion process usually includes both broad communications and relational communication channels. Diffusion is the procedure by which an advancement is conveyed through specific channels over a period among individuals from a social system (Rogers, 2003; Morris & Ogan, 1996; Rogers, 1995). A focal idea in the investigation of advancement is that innovations have properties or qualities, and that these attributes affect diffusion and adoption. Innovations have definite characteristics (relative advantage, compatibility, complexity, trialability, observability) which, as seen by adopters, decide the definitive rate and pattern of adoption (Rogers, 2003).

Communication networks range from conventional to new media of communication. Watermelon farmer's in Kenya use radios, fellow farmers and telephone calls to acquire agricultural information on watermelon production while extension officers, television, mobile text messages, farm magazines and newspapers were the channels which were least used. Radios, fellow farmers and telephone calls had numerous strengths, hence were considered more advantageous by farmers than the other channels (Ogola, 2013). In addition to the attributes of the innovation and communication channels, it is claimed that the value and the social system of the individual is critical to innovation adoption (Daghfous et al., 1999). In the context of palm oil and its relevant innovation, factors affecting the diffusion of this farm produce is very important to be determined (Sahin, 2006; Tanakinjal, Deans & Gray, 2010).

Besides, level of training, degree of guidance on selection of agricultural innovation, imaginativeness, association investment, agrarian information, persuasive exercises and diffusion network had altogether positive associations with role of opinion leadership in dissemination of agricultural advancement (Islam et. al. 2016). Yearly income had no critical positive association with role of opinion leadership in disseminating agricultural development. Likewise, age and family size of the respondents had no noteworthy negative relationship with role of opinion leaders in dissemination of agricultural advancement (Ayoade & Akintonde, 2012).

This paper advances a conceptual model that integrates innovation attributes, communication channels and societal system factors that affect acceptance and diffusion of palm oil agricultural innovations. Understanding the diffusion of palm oil innovation can greatly increase the possibility of attracting more farmers to venture into palm oil farming (Rogers, 2003). It is important to understand the factors affecting diffusion of any innovation in order to help speed up its uptake. In the context of palm oil and its relevant innovation, factors affecting the diffusion of this farm produce is very important to regulate. This study will focus on the influence of the innovation characteristics or attribute of the palm oil, communication channels and societal background on the diffusion and acceptance of the palm oil innovations among smallholder farmers in East Malaysia.

This Study embarks on the following objectives: To determine the level of understanding of palm oil innovation characteristics and the role of social system and communication channels in diffusion of the oil palm agricultural innovation among smallholder oil palm farmers; To measure the influence of palm oil innovation characteristics, social system and communication channels towards acceptance of agricultural innovation among smallholder oil palm farmers.

Literature Review

Innovation Characteristics and diffusion

Senyolo, Long, Thomas and Blok (2018) affirmed that an environmental change dangers and changeability in South Africa and a system to characterize the technological developments is set up dependent on past studies. Meetings with experts are utilized to portray and gather data on accessible advancements. Results demonstrate that Protection Agribusiness, Water Conservation and Seed Assortments that are Dry Spell Tolerant and Early Maturing might be the fit advancements for atmosphere smart agriculture in South Africa, especially for smallholder farmers. Be that as it may, high start-up costs, extra work necessities and the administration intensity related with preservation of agribusiness and water gathering may present issues inside the South African setting. The study provided a preliminary valuation through the investigation of the existing climate-smart agricultural technologies in South Africa.

In modeling the factors affecting farmers' acceptance of innovation in Delta State of Nigeria, Egwu (2015), implemented a multi-stage sampling procedure and simple random sampling for the assortment of 120 respondents. The outcomes showed that the most evident factors that hamper the implementation of agricultural innovation by farmers in Delta State are poor extension services from change agents, climatic, fund/incentives and fear of loss and cost of innovation while factors such as superiority, profitability, simplicity and compatibility of an innovation promote its adoption.

The involvement of selected farmers in New South Wales in applying advanced land management practices and processes was stressed by McKenzie (2011). The results discovered that the application of new practices and requires an ongoing process of innovation and change – something which is too often overlooked when the focus is on the point of 'adoption'. Nevertheless innovation processes being time and resource consuming, and without any guarantee of success, the farmers interviewed were working to implement changes.

Societal factors and diffusion of innovation

The diffusion researches are found to be more focused on socio-economic variables in comparison to agro-ecological variables and farmers' perception (Iqbal et al, 1999; Kafle, 2010). In a related study, Ghane, Samah, Ahmad and Idris (2011) revealed the consequence of collective influence and innovation features in the acceptance of Integrated Pest Management practices by paddy farmers in three provinces of Iran.

Tolba and Mourad (2013) observed that few researches concentrated on the innovation traits instead of the individual factors that help or forestall innovation acknowledgment and spread. Individual factors integrate the role of lead clients and opinion leaders, while social variables are put forward by ambiguity prevention and independence. It is prescribed to recognize the key clusters that would bolster the procedure; including lead clients and opinion pioneers; just as extraordinary clusters that consolidate the two

attributes. Online groups are the current instrument that could be utilized so as to best use the above clusters.

Communication Channels and diffusion of innovation

Past studies have revealed that the role of communication channels is very pertinent in the diffusion process where they are found to be present at every stage. On the basis of this analysis, Siangu (2015) established that communication channels used in the diffusion of innovation were influential in the way the social system received and reacted to innovation. In a related study, Ahmad Fahmi Mahamood, Rosli Mohammed and Mohd Khairie Ahmad (2016) observed that the use of communication technology as the invention in the agricultural information distribution network among farmers is still low, especially among the developing countries. The swift development of communication technology has led to two-way, collaborative and easy-access media network, which previously dynamically dependent on conventional media and agricultural agency. The study is expected to improve the usage of communication technology channel in paddy plantation to increase knowledge on paddy plantation in order to increase rice production.

Kigatiira, Mberia and Wangula (2018) wanted to examine the influence of communication channels used between extension officers and farmers on the acceptance of Irish potato farming. Results of the study showed that the mass media and interpersonal channels of communication used for information exchange between farmers and extension officers improved implementation of Irish potato farming. Additionally, farmers reported that they understood extension information distributed through the communication channels because they created an empowering environment for information interchange.

Theoretical Framework

Rogers (1962, 2003) Diffusion of Innovation Theory will be used to formulate the research framework for this study. The theory explains how innovations and ideas spread across the populations. The diffusion of innovation theory analyses how the social members adopt the new innovative ideas and how they made the decision towards it. In real life situations the adaptability of the culture played a very relevant role where ever the theory was applied. Rogers proposed four elements of diffusion of innovations they are:

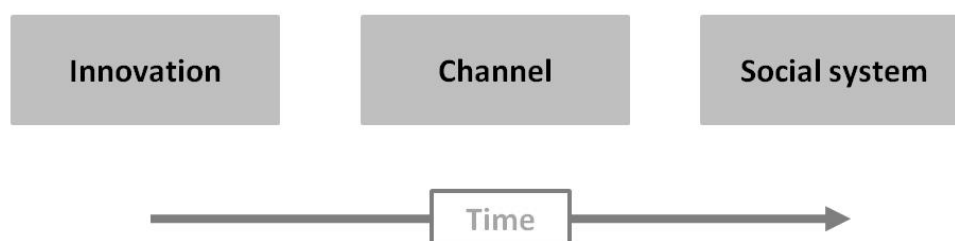


Figure 1: Elements of Diffusion of Innovations

Innovations – an idea, practice, or object perceived as new by an individual. It can also be an impulse to do something new or bring some social change.

Communication Channel – The communication channels take the messages from one individual to another. It is through the channel of communication the Innovations spreads across the people. It can take any form like word of mouth, SMS, any sort of literary form etc.

Time – It refers to the length of time, which takes from the people to get adopted to the innovations in a society. It is the time people take to get used to new ideas. For an example consider mobile phones it took a while to get spread among the people when it is introduced in the market.

Social System – Interrelated network group joint together to solve the problems for a common goal. Social system refers to all kinds of components, which construct the society like religion, institutions, groups of people etc. Rogers' four main components that impact the spread of new ideas rely profoundly on human capital. Inventors must consider various cultures and communities to predict how, why and at what rate new ideas and technology will be adopted. By engaging with these stereotypes, the inventor can utilize their experiences with a prototype in order to guide further development. The impact of Rogers' innovation characteristics on adoption of an innovation can be considered in terms of:

Relative advantage – is the degree to which the innovation is perceived as better than the idea it supersedes.

Compatibility – is the degree to which the innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters.

Complexity (simplicity) – is the degree to which the innovation is perceived as difficult to understand and use.

Observability – is the degree to which the results of the innovation are visible to others.

Trialability – is the degree to which the innovation may be experimented with on a limited basis.

Conceptual Framework and Hypothesis

The diffusion of innovation theory is suitable to be used in this study. In the context of this study, the theory can be used as a guide to evaluate the impact and the role of communication channels for the dissemination of palm oil innovation among the farmers who have ventured into the palm oil industry. The various communication channels will be studied to evaluate their influence towards the diffusion of oil palm innovation. The traditional and new media thus will be studied to understand their effects on the diffusion of oil palm and its related products and services among the youth. Hence, the effects of Television, Radio, Newspaper and the New Media on diffusion of oil palm will be measured.

In addition, the characteristics of palm oil innovations will be studied to see their influence on the diffusion and acceptance of palm oil. The five characteristics put forward by Rogers, viz. Relative advantage, trialability, compatibility, observability and complexity will be studied to evaluate their effect on diffusion of the oil palm innovation.

Since the study is conducted among smallholder farmers, who live in a social system, it is compelling to study the effects of their social environment on the diffusion of the oil palm innovation. This will add more insight in understanding the factors that influence the diffusion of the oil palm and its related products and services among the farmers who, largely, are tied to their social environment. Based on the above review of literature and theoretical framework, we hypothesized that:

Hypothesis one

Innovation characteristics have a significant influence on the diffusion of oil palm innovation among smallhold farmers.

Hypothesis two

Communication channels have a significant influence on the diffusion of oil palm innovation among smallhold farmers.

Hypothesis three:

Social system has a significant influence on the diffusion of oil palm innovation among smallhold farmers.

Research Methodology

This study employed a quantitative approach to obtain data from smallhold farmers in an area in Sarawak, East Malaysia. A survey using questionnaire was used to collect data from ninety nine (99) sampled respondents representing the smallholder oil palm farmers. Prior to the actual data collection, a pilot study involving 30 respondents was conducted to test and fine tune the questionnaire.

Referring to Table 1, 99 respondents of palm oil smallholders were involved in this study. Most of the respondents were in the 51 to 60 years (34.3%) age range and this is followed by those age aged 41 to 50 years (31.3%). This shows that most of the smallholders involved in the agricultural sector are older people. The number of male smallholders (85.9%) are more than female smallholders (14.1%). Based on the level of education, most of the smallholder farmers in the palm oil sector, had only primary level education (36.4%) and this is followed by those with middle school (21.2%) and G.C.E (21.2%) qualifications respectively. In terms of employment, the majority (85.9%) of the respondents were smallholder oil palm farmers. The monthly income of most (40.4%) of the respondents was below RM 1,500.00

The data was analysed using SPSS and the analysis included both descriptive and inferential analysis. For the descriptive analysis, mean and standard deviation were used, while multiple linear regression was used for the inferential statistics.

Table 1
Demographic Background of Respondents

Category	Frequency	Percentage (%)
Age		
Below 20	1	1.0
21-30	5	5.1
31-40	9	9.1
41-50	31	31.3
51-60	34	34.3
Above 60	19	19.2
Gender		
Male	85	85.9
Female	14	14.1
Education		
No Schooling	12	12.1
Primary School	36	36.4
Middle School	21	21.2
G.C.E	21	21.2
A' Level	6	6.1
Diploma	1	1.0
Bachelors	2	2.0
Monthly Income (RM)		
Below 1500	40	40.4
1501-2000	23	23.2
2001-3000	18	18.2
3001-4000	14	14.1
4001-5000	1	1.0
Above 5000	3	3.0

n =99

Findings and Discussions

This section is divided into two parts. The first part presents the descriptive data of the study consisting of means and standard deviations of each of the items under the variables. The second part presents the inferential analysis.

Social System

Table 2 shows the social background of the palm oil smallholders. The statement, "if the person who brought a reform in the village was highly respected, it would be more easily accepted by the villagers" was highly agreed (Mean=4.16, SD=0.60) by most of the respondents. This is followed by the statements, "The smallholder oil palm plantation farmers in this village are easy to accept something new if it is beneficial" (mean=4.15, SD=0.72) and "If the innovation is related to the work or activity we are doing now, it is easier to accept" (mean=4.15, SD=0.68). Nevertheless, the mean scores for social system are all high.

Table 2
Social System

Items	Mean*	SD
The smallholder oil palm plantation farmers in this village are easy to accept something new if it is beneficial	4.15	0.72
If the innovation is related to the work or activity we are doing now, it is easier to accept	4.15	0.68
Our residence is not too far away, so it's easier if any information / new idea is to be delivered/diffused	4.12	0.79
If the person who brought a reform in the village was highly respected, it would be more easily accepted by the villagers"	4.16	0.60
We will make a joint decision if we want to try new technologies such as the use of trimming machinery and spraying techniques	4.09	0.69

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Characteristics of Innovation

The means and standard deviation of the attributes or characteristics of innovation as agreed upon by the smallholder farmers are presented in the following lines.

Relative advantage

Table 3 shows the relative advantage of an innovation as agreed by the smallholder farmers. The statement, "I will adopt an innovation if it can help increase my income" was highly agreed (Mean=4.25, SD=0.66) by most of the respondents. This is followed by the statements, "I support any innovation if it can support me to diversify my income" (mean=4.18, SD=0.63) and "I will support an innovation if it can minimize my workforce" (mean=4.17, SD=0.66). As in the case of social system, the mean scores for relative advantage are also high.

Table 3
Relative Advantage

Items	Mean*	SD
Any form of innovation introduced should help facilitate my work	4.16	0.74
I will use the pruning machinery if it does not involve high cost	4.15	0.68
Any innovation should benefit me in terms of quality of agricultural produce.	4.17	0.62
I will adopt an innovation if it can help increase my income	4.25	0.66
I support any innovation if it can support me to diversify my income	4.18	0.63
I will support an innovation if it can minimize my workforce	4.17	0.66

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Compatibility

Table 4 shows the compatibility of an innovation in relation to its diffusion as agreed by the smallholder farmers. The statement, “I will adopt a poisoning techniques if poison safety measures are clearly stated” was highly agreed (Mean=4.37, SD=0.65) by most of the respondents. This is followed by the statements, “I will use a pruning machinery if the pruning will not be damaged” (mean=4.32, SD=0.65) and “I will adopt a trimming machine if it helps speed up the harvest” (mean=4.11, SD=0.65). From the table, it is evident that the mean scores for relative compatibility are all high.

Table 4

Compatibility

Items	Mean *	SD
Using the pruning machinery for fruit harvesting is ideal for attracting young people	4.08	0.77
I will adopt a trimming machine if it helps speed up the harvest	4.11	0.65
I will use a pruning machinery if the pruning will not be damaged	4.32	0.65
Using the latest poisoning technology is appropriate to attract young people	4.01	0.63
I will adopt a poisoning technique if it helps in speeding up the pesticide spraying	4.04	0.65
I will adopt a poisoning techniques if poison safety measures are clearly stated	4.37	0.65

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Complexity (simplicity)

Table 5 shows the complexity of an innovation in relation to its diffusion as agreed by the smallholder farmers. The statement, “I will adopt a new technology in farming if it is not hard for me to understand and use” was somehow agreed (Mean=3.76, SD=0.82) by most of the respondents. This is followed by the statements, “I do not have difficulties in using the trimming machine for my farming activities” (mean=3.75, SD=0.77) and “I do not have difficulties in using pesticide spraying machine on my crop” (mean=3.72, SD=0.77). From the table, it is evident that the mean scores for complexity are mostly high.

Table 5

Complexity (simplicity)

Items	Mean	SD
I do not have difficulties in accessing any palm oil innovation	3.66	0.93
I do not have to bother to find the latest information on palm oil innovation	3.67	0.80
I will adopt a new technology in farming if it is not hard for me to understand and use	3.76	0.82
I do not have difficulties in using the trimming machine for my farming activities	3.75	0.77
I do not have difficulties in using pesticide spraying machine on my crop	3.72	0.77

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Trialability

Table 6 shows the trialability characteristic of an innovation in relation to its diffusion as agreed by the smallholder farmers. The statement, “I have no problem engaging in oil palm farming because my family is also involved” was somehow agreed (Mean=4.06, SD=0.73) by most of the respondents. This is followed by the statements, “My involvement in the oil palm sector made me interested in becoming a farmer” (mean=3.98, SD=0.68) and “I am daring in trying new things related to oil palm agriculture innovation” (mean=3.97, SD=0.65). From the table, it is evident that the mean scores for complexity are all high.

Table 6

Trialability

Items	Mean*	SD
My involvement in the oil palm sector made me interested in becoming a farmer	3.98	0.68
I can explore many career opportunities in the oil palm industry	3.93	0.66
I am daring in trying new things related to oil palm agriculture innovation	3.97	0.65
There are many job opportunities in this sector and not just a planter.	3.96	0.71
I have no problem engaging in oil palm farming because my family is also involved	4.06	0.73

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Observability

Table 7 shows the observability attribute of an innovation in relation to its diffusion as agreed by the smallholder farmers. The statement, "I see many smallholders of oil palm earn good income in this sector" was somehow agreed (Mean=4.09, SD=0.64) by most of the respondents. This is followed by the statements, "I am involved in oil palm agriculture as this sector is a major contributor to national income (mean=4.02, SD=0.59)" and "Overall, this new technology is very valuable to me" (mean=3.94, SD=0.74). From the table, it is evident that the mean scores for observability are all high.

Table 7

Observability

Items	Mean	SD
I see many smallholders of oil palm earn good income in this sector	4.09	0.64
Before trying new things, I'll do a detailed study first	3.92	0.70
I am involved in oil palm agriculture as this sector is a major contributor to national income	4.02	0.59
After using the latest pesticide technique my harvest has increased	3.93	0.69
Overall, this new technology is very valuable to me	3.94	0.74

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Communication Channels

In this study communication channels comprise of interpersonal communication, conventional media and new media

Interpersonal Communication

Table 8 presents the mean and standard deviation of the items under interpersonal communication. The statement, "I often deal with related institutions to get the latest information and the best ways from planting to harvesting" was highly agreed (Mean=3.74, SD=0.86) by most of the respondents. This is followed by the statements, "I often ask advice from farmers / entrepreneurs who have succeeded on how to succeed like them (mean=3.68, SD=0.90)" and "I'm willing to share new ideas with youth and residents here" (mean=3.67, SD=0.86). From the table, it is evident that only four items achieved the high mean score.

Table 8

Interpersonal Communication

Items	Mean*	SD
My friends often tell me about the use of the latest technology in this field	3.53	0.92
I'm willing to share new ideas with youth and residents here	3.67	0.86
I also communicate my expertise to youth in this area in terms of planting methods and harvesting using the latest method	3.62	0.88
I often receive information from families regarding new innovation in this field	3.63	0.85
I often ask advice from farmers / entrepreneurs who have succeeded on how to succeed like them	3.68	0.90
I often deal with related institutions to get the latest information and the best ways from planting to harvesting	3.74	0.86
Residents in this village often share ideas if there is information about oil palm	3.66	0.91
Village leadership is the most important organization that encourages me to venture into this sector	3.56	0.92
Successful farmers in this area have encouraged me to diversify my income sources through the agriculture sector	3.64	0.94

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Conventional Media

Table 9 presents the mean and standard deviation of the items under conventional media. The statement, "I read pamphlets / magazines issued by agricultural agencies for information on innovation" was highly agreed (Mean=3.71, SD=1.21) by most of the respondents. This is followed by the statements, "I watch television to find out about the palm oil industry. (mean=3.63, SD=0.88)" and "The success news of farmers published in the press prompted me to be involved in this sector" (mean=3.59, SD=0.85). From the table, it is evident that only one item achieved a high mean score.

Table 9

Conventional Media

Items	Mean	SD
I read the press to find out the latest innovations in the palm oil industry	3.35	1.04
I read pamphlets / magazines issued by agricultural agencies for information on innovation	3.71	1.21
The success news of farmers published in the press prompted me to be involved in this sector.	3.59	0.85
I listen to the radio to find out about the palm oil industry	3.56	0.93
Radio interviews with farmers who have been successful have encouraged my interest to take the opportunity in this field	3.58	0.97
I watch television to find out about the palm oil industry	3.63	0.88
The amount of information shown through television prompted me to try the latest spraying techniques and fruit pruning machinery	3.59	0.96

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

New Media

Table 10 presents the mean and standard deviation of the items under new media. The statement, "The Internet makes it easier for me to get new ideas related to oil palm" was the highest (Mean=3.05, SD=1.31) though average, among the items. This is followed by the statements, "The new media is my main source of information on the oil palm industry (mean=3.03, SD=1.27)" and "I trust information regarding the latest developments of oil palm posted via social media" (mean=3.00, SD=1.33). From the table, it is evident that all the items for new media scored an average mean.

Table 10
New Media

Items	Mean	SD
I have read palm oil innovation through social media (Facebook, twitter, Instagram)	2.99	1.28
The Internet makes it easier for me to get new ideas related to oil palm	3.05	1.31
I trust information regarding the latest developments of oil palm posted via social media	3.00	1.33
The new media is my main source of information on the oil palm industry	3.03	1.27
I often receive information about palm oil via WhatsApp	2.84	1.29
I also use YouTube if I want more information on the method of pesticide spraying and fruit plucking	2.93	1.30
I get some information regarding trimming machinery and pesticide spraying through the website before buying it	2.88	1.23
I use blogs to get information on oil palm innovation	2.89	2.27
I share many activities relating to oil palm sector in social media	2.88	1.24

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Acceptance of Innovation

Table 11 presents the mean and standard deviation of the items under acceptance of innovation. The statement, "To encourage acceptance spare parts of farming machinery should be easy to obtain." was highly agreed (Mean=4.22, SD=0.66) by most of the respondents. This is followed by the statements, "If crop yields can increase, I have no hesitation in accepting any new palm oil innovation" (mean=4.21, SD=0.69)" and "The innovation should be cheap and profitable" (mean=4.21, SD=0.69). From the table, it is evident that only all the items under acceptance of innovation achieved a high mean score.

Table 11

Acceptance of Innovation

Items	Mean	SD
I accept innovation if the product is obtained in the market.	4.05	0.75
I accept the innovation if it is cheap and profitable.	4.21	0.69
To encourage acceptance spare parts of farming machinery innovation should be easy to obtain.	4.22	0.66
If crop yields can increase, I have no hesitation in accepting any new palm oil innovation	4.21	0.69
The innovations that are introduced should be able to diversify my income in agriculture	4.19	0.70
I will accept a new technology if there is demand and market value	4.12	0.76

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

General mean score of the variables

Table 12 shows the general mean of each of the variable used in the study. The results show that the highest mean is relative advantage (Mean=4.18, SD=0.56), followed by innovation acceptance (Mean = 4.17, SD = 0.61). The lowest mean score is the respondent's agreement regarding new media factors (Mean = 2.94, SD = 1.20). Overall, except the communication channels, all the variables affecting the acceptance of oil palm innovation among the smallholder farmers revealed high means indicating that they play important role in the acceptance of the oil palm innovation among the farmers.

Table 12

General Mean of the Variables

Items	Mean	SD
Social system	4.13	0.56
Relative advantage	4.18	0.56
Compatibility	4.16	0.49
Complexity	3.71	0.71
Trialability	3.98	0.54
Observation	3.98	0.55
Interpersonal communication	3.63	0.75
Conventional communication	3.57	0.91
New Media	2.94	1.20
Innovation acceptance	4.17	0.61

*Strongly Disagree (1), Disagree (2), Somehow Agree (3), Agree (4), Strongly Agree (5)

*Low (1 - 2.32), Average (2.33 - 3.66), High (3.67 – 5)

Factors influencing acceptance of innovation

A multiple regression analysis was conducted to determine and measure the factors that influence acceptance of innovation. Based on Table 13, the influence of social system, level of knowledge, characteristics of innovation and communication channels account for 51.9 percent of the variance inherent in innovation acceptance. This suggests that the model of innovation acceptance is moderately high in explaining the influence of the variables on the palm oil innovation acceptance among the smallholder oil palm farmers.

Table 13

Results of the Multiple Regressions Analysis

	B	Nilai-t	Sig.	Adjusted R ²	F	Sig.
(Constant)	0.375	0.801	0.425			
Social system	0.155	1.457	0.148	0.519	27.486	0.000
Level of Knowledge	0.065	0.583	0.501			
Innovation characteristics	0.927	5.756	0.000			
Communication channel	-0.358	-3.729	0.000			

Dependent Variable: Acceptance of Innovation

Note : Significance level at 0.01

Moreover, the value of the F model showed significant statistical influence ($F = 27.486$, $p < .000$). This demonstrates that the built model in determining important factors influencing acceptance of innovation is valid. Therefore, the null hypothesis was rejected due to the fact that there was strong statistical evidence to conclude that the model for innovation acceptance based on social background, level of knowledge, innovation characteristics and communication channels influence oil palm farmers to engage in oil palm farming, is valid.

Based on the findings, social background ($\beta = .155$, $p > .01$) and level of knowledge ($\beta = .065$, $p > .05$) are insignificant. While the characteristics of innovation have positive and significant influence ($\beta = .927$, $< .05$), communication channel have negative and significant influence ($\beta = -.358$, $< .01$).

Therefore, the null hypothesis was rejected as there was strong statistical evidence to conclude that innovation acceptance was based on social background, level of knowledge, innovation characteristics and communication channels in influencing farmers to participate in the oil palm sector. However, it can be concluded that the characteristics of innovation and the communication channels are the only factors that significantly influence the acceptance of the oil palm innovation. Unlike characteristics of innovation, which positively influence innovation acceptance, the influence of communication channels was negative.

To get a further insight into the data (Table 14), a multiple regression of all the dimensions with acceptance of innovation was carried out. Interestingly only trialability ($\beta = 0.397$, $\text{sig} = 0.000$) and compatibility ($\beta = 0.334$, $\text{sig} = 0.000$) were significant, with a substantial beta and t value effects.

Table 14
Beta and t values of the Dimensions

Dimensions	Beta	T	Sig.
Conventional Media	-.129	-1.267	.209
New Media	.089	.869	.387
Interpersonal Communication	-.152	-1.598	.114
Observability	.025	.252	.802
Trialability	.397	4.016	.000
Complexity	-.005	-.066	.948
Compatibility	.334	3.979	.000
Relative advantage	.063	.642	.523
Social system	.090	.824	.412

This study has achieved its objectives by determining and measuring the factors that influence innovation acceptance among rural smallholder farmers. Taken together, these findings provide some of the strongest evidence to date regarding the significance of the factors influencing acceptance of agricultural innovation, especially among smallholder farmers.

The farmers attested to the importance of the Internet as they agreed that the Internet makes it easier for them to get new ideas related to oil palm. However, it did not have positive influence on their acceptance of the oil palm agriculture innovation. From the variables, only the characteristics of innovation and communication channels significantly influenced the acceptance of oil palm innovation among the farmers in the East Coast of Malaysia. The findings are in line with Mannan and Nordin (2014) that innovation attributes and new technologies adoption are inter-related and play an important role in increasing paddy production and paddy quality.

However, unlike characteristics of innovation, which positively influenced innovation acceptance, the influence of communication channels was negative. This is in contrast with other studies which have indicated the influence of communication technology channels in diffusing innovative farming techniques (Mahamood et al., 2016; Siangu, 2015). Moreover, over the years, communication technologies have been found to influence diffusion of innovation (Morris & Ogan, 1996).

Furthermore, this might be due to the fact that the available communication channels did not provide the farmers with agricultural innovation, rather mainly for entertainment or general news. The age group of the farmers who are mainly above 40 years of age and do not use new media as compared to the younger generation might have limited their information source for agricultural innovation. Furthermore, the lack of education and low income might be among the stumbling blocks to getting access to information on agriculture innovation via communication channels both conventional and new media. A large number of the farmers have only primary to secondary education coupled with their low household income, hence impeding access to vital agriculture innovation information. This finding is consistent with IFLA (2017) in its development report on the obstacles to information access among farmers concluded that although a tremendous amount of open data and useful information exists online, farmers in less developed countries lack the education and ICT skills needed to access innovative agricultural techniques for sustainable living.

Despite the fact that social system did not have significant influence on acceptance of innovation among the farmers as revealed from the findings, nevertheless, it is still an important factor for the farmers as it scored a high mean. This is an indication that social system, in one way or the other, plays an important role in bringing about innovative changes in agriculture among the smallholder farmers. Daghfous et al. (1999) claimed that the value and the social system of the individual is critical to innovation adoption. In addition, understanding the social system can greatly increase diffusion and the possibility of attracting many people to venture into such innovation (Rogers, 2003).

Going deeper into the data, only trialability and compatibility dimensions of innovation characteristics had significant influence on acceptance of innovation. Both dimensions had a substantial beta and t value effects. It is not surprising that the smallholder farmers accept innovation that can be tried and consistent or compatible with their way of lives. This is not surprising considering the societal and educational background of the farmers. This finding is consistent with the findings of Egwu (2015) in relation to the positive influence of compatibility on acceptance of farming innovation. The results of Egwu's study showed that compatibility promote the adoption of a farming innovation. However, the finding did not concur with that of Farquharson et al (2013) where relative advantage (incentive) is the predominant characteristic, with observability also being important.

Unlike the two dimensions, conventional media, new media and interpersonal communication channels did not have a positive effect on acceptance of innovation among the farmers. The fact that these communication channels did not significantly influence their acceptance of innovation, could mean the farmers were not exposed to these communication channels or did not use these channels to get information on farming innovation. In contrast to the findings of this study, watermelon farmers in Kenya used radio and interpersonal communication channels among fellow farmers to acquire information about agricultural innovation (Ogola, 2013)

Moreover, their knowledge of agricultural innovation did not also have any influence on their acceptance of such innovation. Likewise, the societal background of the farmers did not influence their acceptance of agricultural innovation. This could be due to the societal environment, which is low in education and income.

Conclusion

In conclusion, it is obvious from the study that, in promoting a farming innovation in a rural setting, much importance should be put on the innovation characteristics, especially, trialability and compatibility. Farmers, especially those living in rural areas of developing countries as this study shows, due to their low level of education and low income, tend to give face value to innovation. The use of communication channels for development should be geared up as an aspect of development communication. This is a missed opportunity as farmers, especially their children, nowadays do have social media account and innovative ways of farming could be diffused to the farmers via the social media apps. Studies have shown the influence of communication technology channels in diffusing innovative farming techniques. If researchers and policy makers could contribute to this effort through the creation of new opportunities, not only would an enabling environment for innovation be created, but also opportunities for sustainability. In sum, our findings provide strong support for the premise that importance should be attached to fostering of ongoing agricultural innovation with regard to the factors that bring about acceptance of such innovations and enhance both agricultural productivity and sustainability.

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