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Influence of Innovation Attributes and Communication Channels on New Fertilizer Technology Adoption by Paddy Farmers

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ABSTRACT

Communication is a powerful tool in strengthening agricultural sector. Agriculture plays a vital role in Malaysian economy. Within this sector, Malaysian paddy rice has always been considered as an important commodity which is the main staple food for the nation. Technology adoption would only take place if innovation is driven by farmers' needs. Innovation diffusion technology transfer and adoption are all inter-related facets in increasing crop production. The main purpose of this paper is to enhance the influence of innovation attributes and communication channels towards new fertilizer technologies to increase farm profitability and efficiency. This study is a quantitative approach. Data was collected by using a survey questionnaire. Thirty paddy farmers from granary area Integrated Agriculture Development Authority (IADA) Seberang Perak was involved in this study. The Pilot study was successfully executed in determining the internal reliability consistency of items used. Cronbach's alpha was to measure the consistency strength of instrument. The entire dimension used for this study shows high cronbach's alpha value which indicates high consistency of the instrument employed in this study. It has been concluded on the basis of theoretical framework, which is empirical findings shall potentially be deemed crucial improving insights into various communication strategies necessary for dissemination of successful innovation towards new fertilizer technology development in paddy sector.

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INTRODUCTION

Agriculture consists of several elements that include soil cultivation, rearing animals and crop production. This sector has been proven as an effective medium to overcome self-sufficiency (Hayrol *et al*., 2013). During the economic crises in 2007, Asian countries including Malaysia turned to agriculture as one of the pertinent sectors to generate the main income.

In Malaysia, paddy rice is one of the most important agricultural crops beside oil palm and rubber which is grown in both peninsular and East Malaysia. About 300,500 ha in peninsular Malaysia and 190,000 ha on Borneo Islands are designated for rice production. While, the total annual production of rice stands at 2.51 million metric tons (FAOStat, 2009). Rice cultivation area (rice bowl) is divided into two parts: the irrigated scheme and non-irrigated scheme. Irrigated scheme could achieve higher yield as compared to the non-irrigated scheme (DOA, 2008). The management of the rice production in the rice bowl area is called Integrated Agricultural Development Authority (IADA).

Currently, there are eight IADA namely, i) Muda Agricultural Development Authority (MADA) in Kedah. ii) Kemubu Agricultural Development Authority (KADA) in Kelantan. iii) Kemasin Semerak Project (PKSM) in Kelantan. iv) North-West Selangor Project (PBLS) in Selangor. v) Seberang Perai IADA in Pulau Penang.vi) Kerian Sungai Manik IADA in Perak.vii) Seberang Perak in Perak. viii) KETARA in Besut, Terengganu. According to ministry of agriculture and agro-based industry (MOA), IADA as the main producer, that meets 72% of the demand of this country (MARDI, 2010).

To meet the demand in the country, integration of communication and technology has become one of the main elements to further develop this sector. Various government agencies facilitate the growth and enhancement of the agricultural sector which include Malaysian Agricultural Research Development Institute (MARDI). MARDI was developed in 1969 and Department of Agriculture

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(DOA) was established in 1905. MARDI is responsible for the development of technologies towards rapid advancement in paddy sector, while DOA as one of the main agriculture agencies in Malaysia has fully utilized the communication channels in disseminating valuable agricultural innovations to the farmers.

Innovation is an idea that is new to individuals or unit of adoption (Rogers, 2003) which is meant to enhance the quality of processes or any commodity. Innovation diffusion is a process where innovations are communicated through different communication channels over time among social system. Communication channels are of two types interpersonal communication and mass media. Interpersonal communication consists of two-way communication between two or more individuals. While, mass media include mass medium such as television, radio, internet and Agro-Journals. The communication channels used to diffuse an innovation could increase perceived adoption. Furthermore, there are three main hindrances and challenges in communication on new technologies to the Malaysian agricultural industry such as poor agricultural practices; inefficiencies in information delivery and lack of information on best practices to relevant stakeholders especially farmers. The main reasons for these issues are the lack of poor communication technology (Razaque, 2003). On the other hand the commercialization of agricultural activities, modern farming practices, post-harvest handling, processing and marketing are the main focuses that need to be intensified to boost this industry (Hayrol *et al*., 2010).

During the 10th Malaysian plan (2011-2015), the government set a target for every paddy farmer which was 10mt/ha, to ensure that a sufficient amount of rice is available and accessible to the population. However the production from the main granary areas in 2011, only achieve an average production of 4.77 mt/ha (Bahiah, *et al*., 2013). One of the main problems could be due to low adoption rate of new technologies that could help to increase yield. There is a need for a close engagement by the local authorities in Malaysia especially the farmers, as their knowledge and awareness on new technology is insufficient (Norhayati, 2009). However, unawareness comes from lack of information (Simone, 2008). Despite the effort of current communication initiatives, adoption and implementation are still limited and demand for further investigation (Grover & Goslar, 1993). Therefore a great deal of effort is needed to ensure that the paddy sector can elevate the economic development of Malaysia. The objective of the present paper is to provide insights on an issue that is still not fully resolved in the innovation diffusion of new technologies among farmers. It also encounters the extent of their perceived adoption on improved technologies to increase crop yield in Malaysian paddy sector. Next section discusses the innovation attributes followed by relative advantage, compatibility, complexity, observability, trialability, interpersonal communication and mass media and its influence on perceived adoption.

Literature review:

1.1 Diffusion of Innovation Theory (DOI):

The diffusion of innovation attracts studies from multidisciplinary perspectives (Carter *et al*., 2001; McGrath & Zell, 2001). The studies mostly stem from Rogers (2003) Diffusion of Innovation (DOI) theory. He defined the diffusion of innovation theory as the process by which an innovation is communicated through certain channels over time among the members of social system. DOI tends to describe the pattern of adoption; explain the mechanism and helps in predicting the success of new innovations adopted (Rogers, 2003). A study conducted by Feelor *et al* (2011), which emphasized the role of social influence and innovation characteristics in the adoption of Integrated Pest Management (IPM) practices by paddy farmers. In his study he stated that during the past decades, the introduction of yield increasing innovations in agricultural production was a key factor in improving productivity. However, research comparing the factors affecting the different innovation diffusion stages-adoption and implementation still limited and demand for further investigation (Grover & Goslar, 1993; Farah & Bahaman, 2013).

1.2 Innovation Attributes:

Attributes of innovation that helps to decrease uncertainty about the innovation and increase rate of adoption. It consists of five characteristics of innovation. i) Relative advantage, ii) Compatibility, iii) Complexity, iv) Trialability, v) Observability. He noted that there is a lack of research on the effect of the perceived characteristics of innovations on the perceived adoption. The theory of perceived attributes is based on the notion that individuals adopt an innovation if they perceive that the innovation adds value, easy to use and compatible with their existing infrastructure. According to Lemuria & Belamger (2005), perceived relative advantage and compatibility are significant elements of adoption. It is suggested that relative advantage, compatibility and ease of use are the most relevant constructs to adoption. Innovation attributes are most measured based on perceptions by potential adopters of the characteristics associated with a particular innovation.

Rogers (2003) defined relative advantage as “the degree to which an innovation is seen as better than the idea it replaces or supersedes” (p229). The elements of relative advantage includes cost and social status motivation aspects of innovation. To increase the possibly adopting innovations and to make relative advantage more effective, direct or

indirect financial payment incentives may be used to support the individuals of a social system in adopting an innovation. Diffusion scholars Rogers have found relative advantage to be one of the best predictors of an innovations perception of adoption. The sub-dimensions of relative advantage include the degree of economic profitability, low initial cost, a decrease discomfort and effort. The relative advantage of an innovation is positively related to adoption and awareness. Furthermore Joo & Kim, (2004); Miller & Meek, (2004); Liao & Lu, (2008) studied the relative advantage of IPM practices found that additional IPM practices benefits such as economic profitability, decreasing production cost and effort saving influence farmers' decision.

Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experience and needs of potential adopters. An innovation can be compatible with social norm, previously introduced ideas and clients need for innovation. If an innovation is incompatible with the grower's social values and beliefs, it will not be adopted as rapidly as an innovation that is compatible. In past studies, compatibility appears to have a significant impact on willingness to adopt and awareness of technologies, for example a study by Sarel & Marmorstein (2003) showed significantly positive relationship between compatibility and perception for adoption. Hence, if an innovation is compatible with an individual needs, then uncertainty will decrease and the awareness and adoption of the innovation will increase. Thus, compatibility is an important part of innovation.

Complexity is the degree to which an innovation is perceived as relatively difficult to understand or use (Rogers, 2003). New ideas that are simpler to understand by members of a social system are adopted more rapidly than innovations that require the adopter to develop new skills and understanding. A low level of complexity lead to higher adoption rate or complexity increases the rate of rejection (Rogers, 2003; Sarel & Marmorstein, 2003). Following Rogers (2003), Teo's (2003) findings illustrated a negative relationship between complexity and perception of adoption and awareness.

Trialability, on the other hand, refers to the degree to which an innovation may be experimented on a limited basis (Rogers, 2003). For example Rogers (2003) argues that latent adopters, who are invited to experiment an innovation for trials, would feel more comfortable to adopt innovations. However, it is positively related to perception of adoption and awareness. Furthermore, according to Kolodinsky *et al*., (2004) sometimes trialability provides farmers the ability to evaluate innovation benefits. Consequently, if farmers are given the opportunity to try the innovation certain fears of the unknown and inability to use can be reduced.

The last element observability is the degree to which innovations are visible to others (Rogers, 2003; p.16). The results of some ideas are easily observed and communicated to others, whereas some innovations are difficult to observe or to describe with others. Role modeling is the key motivational factor in the adoption and diffusion of technology (Parisot, 1997). Hence, there is a positive relationship between observability and perception for adoption and awareness.

Technology adoption by farmers is crucial to increase agricultural productivity (Shahrina *et al*., 2014; Sobia & Shahrina, 2014). Perceived adoption is the relative ability with which an innovation is adopted by members of a social system (Rogers, 2003). Adoption passes through various stages which include awareness, interest, trial and finally adoption. Awareness refers to when the individuals are exposed to innovation but there is still incomplete information about it. Awareness is the initial step for adoption. Interest leads to an individual to become interested in new ideas and seeks additional information about new technologies. Trial means the individuals would want to make full use of the innovation. And finally the individuals decide to continue the full use of the innovation that is adoption.

Communication permits knowledge and information to be disseminated to stakeholders. With the right communication channel, stakeholders can be educated and valuable information is easily transferred. For information to be useful, the information must be communicated effectively and understood by the intended beneficiaries (FAO, 2003). Communication channels have become the ultimate elements in innovation diffusion process. With the present innovation challenge, more effective and faster communication is essential to adopt new technologies to increase crop production. Effective and efficient communication channels synchronize exchange of activities leading to an improved performance, and increase the rate of adoption (Dwyer *et al*., 1987). Willingness to communicate often refers to openness to communicate relevant information frequently and honestly (Fawcett *et al*., 2007). Hence, integration is a key element in the disciplines of innovations and communications, which aspire to the ideals of coherence and consistency.

However, the importance of communication in innovation diffusion may involve the use of mass media or interpersonal communication channels. On the other hand, "diffusion is a very social process that involves interpersonal relationship" (Rogers, 2003). Thus interpersonal communication channels are more powerful to create or change strong attitude held by an individual. According to Rogers (2003) communication is a process in which participants create and share information with one individual to another in order to reach a mutual understanding.

Rogers's model is one of the most referred to innovation diffusion studies, which outlines four main elements which are the characteristics of innovation, the effectiveness of communication channel, time and social system. Rogers described innovation as an idea or practice as new by an individual. The innovation-diffusion process and the rate of adoption include a time dimension. Innovations are diffused within a community, it is influenced by the social structure of the social system. Smith & Skinner (2002) argued that adoption approaches need to follow the technological level, government level and farm level. It can be concluded that adoption of better technology is expected to be highly profitable and would encourage the transition from traditional to modern agriculture.

Theoretical Framework:

As one of the major goals of literature review is to outline the direction of research and shows the development of knowledge. Based on the literature review the researchers develops a framework for the study. This framework illustrates on Diffusion of Innovation (DOI) theory by Rogers (2003). In this framework innovation attributes (Relative advantage, Compatibility, Complexity, Observability, Trialability) and communication channels (interpersonal communication and mass media) as Independent variables and the perceived adoption as dependent variable. Fig 1 shows the framework of this study.

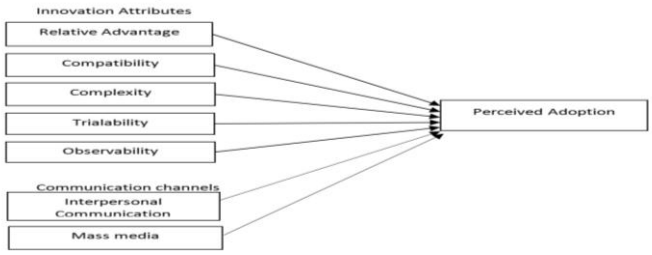

Fig. 1: Research Framework of the study.

2. Hypotheses:

The following hypotheses will be tested based on the above framework.

H1. There is a positive relationship between innovation attributes and perceived adoption.

H1a. There is a positive relationship between relative advantage and perceived adoption.

H1b. There is a positive relationship between compatibility and perceived adoption.

H1c. There is a positive relationship between complexity and perceived adoption.

H1d. There is a positive relationship between trialability and perceived adoption.

H1e. There is a positive relationship between observability and perceived adoption.

H2. There is a positive relationship between communication channels and perceived adoption.

H2a. There is a positive relationship between interpersonal communication and perceived adoption.

H2b. There is a positive relationship between mass media and perceived adoption.

One of the major goals of literature review is to outline the direction of research and shows the development of knowledge. Based on the literature review the researcher developed a framework of the study. This study examines the influence of innovation attributes and communication channels towards perceived adoption describing new fertilizer technologies in paddy farming amongst farmers to increase paddy production.

3. Research Methodology:

The validity and reliability of the study have been conducted prior to implementing the bigger scale study. Validity is the ability of an instrument to measure what it is intended to measure. In this research work, validity of the instrument was evaluated for content validity and face validity. The content validity of the questionnaire used in this research was determined by literature review. To further validate the instrument, face validity was done during the pilot study. A panel of three experts were approached and appointed with a formal appointment letter. The experts were required to go through the questionnaire and provide feedback for each of the items and scales in the instrument in the remarks column provided. The experts had also provided general comments at the end of the questionnaire with regards to the validity of the instrument on whether it measures what it is supposed to.

The items in the developed questionnaire were measured by using "Likert Scale". The scale used was 1 to 5, where 1 represents Strongly Disagree while 5 is Strongly Agree. Reverse coded items are added to the scale. The questionnaires are provided in a survey form consisting of 10 pages with four sections. The first section consists of questions on demographic information of the respondents while the other section focuses on the respondents towards DOI. All the variables obtained from the theoretical framework are used in this study. A pilot study used as a preparation for conducting full scale study.

Furthermore, it guides researcher to identify issues related to their instruments and respondents.

A pilot study has been conducted that involved 30 respondents from paddy farmers in Seberang Perak. The study employed a convenient sampling method as it is a common practice that a preliminary study of this kind may adopt a minimal sample method (Sekeran, 2009). Thirty (30) respondents were selected from the total population. The scientific priority of any kind of sample method adopted in any social science research is justified by the level which the method can prove the representativeness of the larger population (Simone, 2011). Data had been collected and analyzed which will be discussed in the result section.

4. Results:

The instrument was tested for its internal consistency and the validation of the questionnaire discloses convenient cronbach alpha values. Data from each respondent were analyzed using Social Packages of Social Science (SPSS) to determine its internal reliability consistency score which is cronbach's alpha reliability score. Scores for each variables used in this study are shown in table 1. The Relative advantage dimension consists of seven items was found to be 0.919 in the reliability score. Then compatibility as the second variable was tested in the research study obtained 0.835, complexity obtained 0.785, observability obtained 0.825 trialability obtained 0.703, interpersonal communication 0.832, mass media 0.711 and perceived adoption 0.836. Thus, the average score for all the variables is 0.805. Table 1 show the summary result of the Cronbach's coefficient alpha which was ranged from 0.711 to 0.919. The score of Cronbach's alpha 0.6 is considered to be poor, 0.7 is considered to be acceptable and the score over 0.8 is good (Sekeran, 1992). Therefore, in this study, the instruments used are internal consistent and reliable.

Table 1: Pilot Study Findings On Cronbach's Alpha Score For All Dimensions.

No	Dimensions	Number of Items	Cronbach's alpha score
1	Relative Advantage	7	0.919
2	Compatibility	5	0.835
3	Complexity	6	0.785
4	Observability	5	0.825
5	Trialability	5	0.703
6	Interpersonal communication	12	0.832
7	Mass media	5	0.711
8	Perceived Adoption	5	0.836

5.1. Analysis on the Diffusion of Innovation Components:

4.1.1 Relative Advantage:

Under the Diffusion of Innovation, innovation attribute which is also the first variable for this study, it can be deduced from the descriptive analysis. Table 2 shows the mean and standard deviation for each item. The mean for the seven items of relative advantage ranged from 3.70 to 4.07. The overall mean for relative advantage is 3.84. The item "Using new fertilizer technologies improves the crop quality" scored highest, while the item "Using new fertilizer technologies improve the quality of work I do" and "Using new fertilizer technologies save times" scored the lowest.

Table 2: Mean Score And Standard Deviation Of Items Used In Relative Advantage.

Items (Relative advantage)	Mean	Standard Deviation
Using new fertilizer technologies enables to accomplish tasks more quickly.	3.73	0.907
Using new fertilizer technologies improve the quality of work I do.	3.70	0.877
Using new fertilizer technologies improves the crop quality	4.07	0.691
Using new fertilizer technologies increases crop production.	3.87	0.681
I believe using new fertilizer technologies makes it easier to do my work.	3.90	0.662
Using new fertilizer technologies save times.	3.70	0.877
I believe new fertilizer technologies is a positive innovation.	3.97	0.615
Average score	3.84	0.758

5.1.2. Compatibility:

The overall finding shows the range of mean score is 3.53 to 3.73. The total average score for compatibility is 3.63 and the total average standard deviation is 0.805. Hence, this study concludes that respondents are moderate towards compatibility. The item "Using new fertilizer technologies would fit in to my granaries" scored the highest, while the item "Using new fertilizer technologies are completely compatible with my entire current situation" scored the lowest. The detail of the mean score and standard deviation is shown in table 3.

5.1.2. Complexity:

Average mean score for all components in this variable is 2.86 and standard deviation is 0.865 which is shown in table 4. Respondents perceived unfavorable towards items in this variable. The

overall finding shows the range of mean score is 2.43 to 3.20. The item "I believe that it is difficult to get new fertilizer technologies" scored highest, while the item "Using new fertilizer technologies are often frustrating" scored the lowest.

Table 3: Mean Score And Standard Deviation Of Items Used In Compatibility.

Items (Compatibility)	Mean	Standard Deviation
I believe using new fertilizer technologies would be compatible with all aspects of my work.	3.63	0.850
Using new fertilizer technologies are completely compatible with my entire current situation.	3.53	0.776
Using new fertilizer technologies would fit in to my granaries.	3.73	0.785
Using new fertilizer technologies fits in to my work style.	3.63	0.809
I believe using new fertilizer technologies fit in to my work schedule.	3.63	0.809
Average Score	3.63	0.805

Table 4: Mean Score And Standard Deviation Of Items Used In Complexity.

Items (Complexity)	Mean	Standard Deviation
Using new fertilizer technologies requires a lot of mental efforts.	3.07	0.828
My interaction with new fertilizer technologies is not clear and not understandable.	3.03	0.809
Learning to operate new fertilizer technologies is difficult for me.	2.83	0.913
I believe that it is difficult to get new fertilizer technologies.	3.20	0.925
Using new fertilizer technologies are often frustrating.	2.43	0.817
I feel new fertilizer technologies are difficult to operate.	2.57	0.898
Average Score	2.86	0.865

5.1.3. ***Observability:***

Table 5 shows the mean score and standard deviation for each items of observability variable. The mean for these five items of observability ranged from 3.43 to 3.83. The overall mean score for observability is 3.60 and the standard deviation is 0.686 under this variable. The item "I see new fertilizer technologies would benefit in production" scored the highest and the item "I have seen what others do using new fertilizer technologies" scored the lowest. The detail for the items is as below.

Table 5: Mean Score And Standard Deviation Of Items Used In Observability.

Items (Observability)	Mean	Standard Deviation
I see new fertilizer technologies would benefit in production.	3.83	0.592
The new fertilizer technologies are visible in my field.	3.57	0.728
It is easy for me to observe new fertilizer technologies in my farm.	3.47	0.681
I have seen what others do using new fertilizer technologies.	3.43	0.728
I observe new fertilizer technologies are productive.	3.70	0.702
Average score	3.60	0.686

5.1.6. Trialability:

Table 6 shows the mean and standard deviation for each item measuring trialability. The average mean score for all components in this variable is 3.58 while the standard deviation 0.726. The mean for five items of trialability ranged from 3.45 to 3.73. The overall mean of all items for trialability is 3.58. The item "I am permitted to use new fertilizer technologies on a trial basis long enough to see what it could do" scored highest, while the item "I have a great deal of opportunity to try new fertilizer technologies application" scored the lowest.

Table 6: Mean Score And Standard Deviation Of Items Used In Observability.

Items (Trialability)	Mean	Standard Deviation
Before deciding whether to use new fertilizer technologies application, I am able to properly try them out.	3.67	0.606
New fertilizer technologies are available to me adequately test run various practices.	3.53	0.730
I am permitted to use new fertilizer technologies on a trial basis long enough to see what it could do.	3.73	0.828
I have a great deal of opportunity to try new fertilizer technologies application.	3.45	0.736
I know where I can go to satisfactory try out various uses of new fertilizer technologies.	3.50	0.731
Average score	3.58	0.726

5.2. Communication Channels:

5.2.1. Interpersonal communication:

Table 7 shows the mean score and standard deviation for each items of the interpersonal communication variable. However, the overall finding shows the range of mean scores 3.73 to 4.10. the average mean score for interpersonal communication is 3.71. The item "I provide a lot of

information that needs" scored highest, while the item "I come up with a lot of new ideas and suggestions" scored the lowest. The detail of the mean score and standard deviation is shown below.

Table 7: Mean Score And Standard Deviation Of Items Used In Interpersonal Communication.

Items (Interpersonal communication)	Mean	Standard Deviation
I openly share knowledge and opinions with collaboration partner.	3.83	0.913
I answer questions thoroughly enough.	4.03	0.669
I provide a lot of information that needs.	4.10	0.607
I come up with a lot of new ideas and suggestions.	3.27	0.640
I am innovative.	3.63	0.615
I have a lot of knowledge about what kinds of competencies exist in my network.	3.43	0.728
The language I use is clear and easy to understand.	3.93	0.521
I share personal information with my neighbor.	3.83	0.699
I have invited my partners to informal meetings and gathering.	3.48	0.871
I use convincing arguments in reasoning opinions.	3.37	0.765
I am honest with others about my thoughts and feelings.	3.63	0.850
I believe that communication is productive.	4.03	0.765
Average score	3.71	0.720

5.2.2. Mass Media:

Table 8 shows the average mean score and standard deviation for each item measuring mass media variable. The majority of the items score higher than average mean value. The mean for five items of mass media ranged from 2.97 to 3.83. The overall mean of this dimension shows with the total average score is 3.5 and the total standard deviation is 0.773. The item "I believe broadcasted agriculture program helps me through workshop and seminars" scored the highest, while the item "I cannot understand the information through print media" scores the lowest. The detail for the items is as below.

Table 8: mean score and standard deviation of items used in mass media.

Items (Mass media)	Mean	Standard Deviation
I believe information from radio and television is highly accessible for me.	3.67	0.661
The constraint affecting the information dissemination is power failure and timing.	3.62	0.677
I believe broadcasted agriculture program helps me through workshop and seminars.	3.83	0.699
I cannot understand the information through print media.	2.97	0.765
I am not able to read written documents.	3.37	1.066
Average score	3.50	0.773

5.2.3. Perceived Adoption:

Average mean score for all components in this variable is 3.82, while the standard deviation score is 0.723 which is shown in table 9. The overall finding shows the range of mean score is 3.60 to 3.97. The item "I eager to adopt new fertilizer technologies" scored highest, while the item "I feel like I am overly dependent on fertilizer technologies" scored lowest. The detail of the mean score and standard deviation is shown below.

Table 9: Mean Score And Standard Deviation Of Items Used In Perceived Adoption.

Items (Perceived adoption)	Mean	Standard Deviation
Technologies give me more control over my daily life.	3.87	0.629
I know new fertilizer technologies will make my life easier.	3.90	0.662
I enjoy figuring out how to use new fertilizer technologies.	3.77	0.626
I feel like I am overly dependent on fertilizer technologies.	3.60	0.968
I eager to adopt new fertilizer technologies.	3.97	0.731
Average Score	3.82	0.723

5. Conclusion:

The pilot study was successfully executed in determining the internal reliability consistency of items used. Cronbach's alpha values were used to measure the consistency strength of the instrument. The entire dimension used for this study shows high Cronbach's alpha value which indicates high consistency of the instrument employed in this study. Therefore, findings from this preliminary study conclude that the instruments used to measure the variables in this study contain sufficient internal reliability consistency and validity to be used in the full scale study.

Preliminary results from this pilot study shows various outcomes and findings in all variables used to measure innovation attributes, communication channels and perceived adoption. Nevertheless, the data observed was on preliminary stage obtained from pilot study. A larger data from full scale study which involves more respondents throughout

different geographical and demographical areas are required to answer the research questions and fulfill the objectives of the overall research.

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