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Understanding and facilitating sustainable agricultural practice: A comprehensive analysis of adoption behaviour among Malaysian paddy farmers

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ABSTRACT

With the increased stress on sustainability and food security, in addition, the need toward halting environmental deprivation has focused attention on Individual farmers subjectively perceive the attributes of SAP and their subsequent benefits. Qualifying this knowledge is important, but past efforts have largely been unsystematic. This research paradigm purpose is to observe the influence of Malaysian paddy farmer's adoption intention towards sustainable agriculture.This systematic study assesses the structure of perceived Awareness of sustainable agricultural practices. A convenient sampling technique was used to select the sample. A total of 132 questionnaires was distributed to Malaysian Paddy farmers, around the Malaysian state which was used for data analysis. The result from the structural analysis suggests that the results of confirmatory factor analysis indicate that the most robust. Moreover, technology-aided communication described as moderates the relationships between Attitude, subjective Norm, Perceived behavioral control and intention.Overall, findings of this study extend the understanding, to link noneconomic benefits to profitability to the attribute of relative advantage. Our work represents a guide to assist change agents to evaluate farmer perceptions at different locations systematically. This structured method will help effectively to design and promote sustainable agriculture and other green agricultural innovations. Discussions and implications for Malaysian paddy farmers, limitations, and suggestions for future research are also delivered in the line of this research study.

1. Introduction

The Green Revolution has radically boosted the paddy yield both in Latin America as well as Asia and shows a strong indication of the perspective of farming technologies in enhancing the public's lifestyles particularly in the evolving world (Pray, 1981). Certainly, it has turned out to be the foundation of provision for the Green Revolution in Asia by some charitable groups and foundations. Prosperous agronomic transformation worldwide has been mainly ascribed towards the enhancement of farm technologies like water conservation, and improved soil, seeds, and fertilizers (Adnan et al., 2017d; Johnston and Kilby, 1975; Kherallah et al., 2002; Mellor, 1976). The adoption of the stated technologies offers chances for increasing both the agricultural incomes and productivity (Feder et al., 1985). In the setting of emerging countries, the impact of improved technologies towards the farming productivity is properly recognized (Sunding and Zilberman, 2001). Hence, these improved technologies help to reduce the environmental pollution. The world-wide apprehension about deteriorating environmental conditions requires ecological nutritional goods that contribute towards a sustainable environment (Kumar et al., 2016). Although the current nutrition manufacture scheme faces the contest of increasing food making to feed the world population, it is deprived of negotiating the environment (Adnan et al., 2017b; Jennings et al., 2016).

Uncertainty about unsustainable farming practices has controlled to the dispersion of the intonation about green agricultural innovations (Veisi, 2012). Rendering to Magnani and Tubb (2012), green agricultural innovations are the reactions to conventional applies such as synthetic fertilizer and chemical fertilizer,which form trade-offs among efficiency and environmental impairment. To modify these compromises, a number of green agricultural innovations have been industrialized or wrapped. The purpose to decrease this dependence on exterior farmhouse efforts, though, refining soil, water, and environmental excellence. This is cause fewer environmental injury and aid to uphold long-term farm efficiency. Green agricultural innovations are sustainable technologies which reduce the environmental pollution and lift the poverty among farmers (UNAPCAEM, 2009). Examples of such

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environmental-based innovations include a cluster of sustainable agricultural practices (SAPs), precision farming technologies, enhanced nutrient management and water-related systems (Adnan et al., 2017e; ; Hrubovcak et al., 1999). With the overall cultivation practices, food production, and its impact on the environment, it is indispensable that farmers should adopt efficient innovations that intensify productivity and reduce environmental damage (Jalil, 2010; Jennings et al., 2016). One of the most recent empirically proven technologies that are considered vital for efficient production is "Sustainable Agricultural Practices" (SAP) (Kottegoda et al., 2011). With its innovation, production, and profitability graph showing a major proliferation, and with its efficient usage, it has helped in reducing environmental damages. SAP is easy to use and is widely available to paddy farmers and agriculturalists in Malaysia (Chiew and Shimada, 2013). The adoption of SAP also gives sustainable environment (Adnan et al., 2017d). Even though the innovation of SAP gets promoted and endorsed by governmental extension agencies, an extensive research suggests that the adoption amongst farmers is stumpy (Adnan et al., 2017d; de Lauwere et al., 2012). Assuming the existing low adoption rate, it is beneficial to discover whether these farmers essentially have an intent to adopt SAP (Adnan et al., 2017d; Salleh et al., 2013). A brief knowledge and a thorough understanding of the factors which determine the intention to utilize SAP might help policy makers design policy initiatives to improve the feasibility of the adoption rates for this modernisation (Chua and Oh, 2011; Martey et al., 2014). Consequently, this paper has two research questions. Firstly, how durable is the intention of agriculturalists and farmers in Malaysia to use SAP? Secondly, what are the factors that determine their intentions and target to utilize this innovation?

Over a period of time, researchers and scientists have shown a significant interest towards investigating agricultural technology adoption and its factors affecting the environment (Adesina and Baidu-Forson, 1995; Chua and Oh, 2011). A vast number of studies on the adoption decision in the agriculture industry have been carried out throughout the world (Reimer et al., 2012). In the environment of developed countries, several technologies have been tested and examined, which have helped in shaping the various factors affecting the adoption decision (Borges, 2015; Läpple and Kelley, 2013). Conversely, in developing countries, the construction of the agriculture decision process in the acceptance of innovation is unproductively understood (Sambodo, 2007; Tey, 2013). Along with that, within developing countries, most of the studies on the adoption of innovations in agriculture are usually based on a random utility framework (Borges et al., 2014). Most of the research and studies focus on explaining how characteristics of the innovation and observable socioeconomic characteristics influence farmers and agriculturists' decisions (Borges et al., 2014). Such socioeconomic features take account of age, gender, enlightenment, and educational level and farm size (Reimer et al., 2012). These studies generally analyze only authentic adoption behavior, rather than the intention to adopt SAP. Another study suggests that there was a slight understanding of the psychological paradigms underlying a farmer's decision (Borges, 2015). Indeed, (Reimer et al., 2012) observed a rising interest in socio-psychological methods to study adoption decisions and factors. This recent interest has been prompted by a growing dissatisfaction with the random utility models of adoption behavior. For example, a recent meta-analysis (Borges et al., 2014) suggests that the variables utilized in the random utility models of adoption behavior were habitually insignificant. The above findings were also supported by the research of Knowler and Bradshaw (2007) and Prokopy et al. (2008) even though these concluding studies were not restricted to random utility models. Both analyses also found that the variables used to explain the farmer's adoption decisions, such as socioeconomic characteristics, are inclined to be insignificant.The purposes of this research were dual. First, to classify the effect of attitude, subjective norm, and perceived behavioral control on the intention of agronomists towards the usage of better SAP. Second, to know the role of agronomists' opinions as drivers of their attitude, subjective norm, and perceived behavioral control.

Despite the significance of attitude, subjective norm, perceived usefulness, perceived ease of use perceived awareness and perceived behavioral control. in creating an intention, they have not been studied in the context of Malaysian Paddy farmers. An inadequate amount of studies has measured the consequence of farmers intention towards the adoption of SAP. Though, the inquiry rests the same: will incorporating technology-aided communication in the domain of Malaysian paddy farmers will help increase paddy farmers intention to adopt SAP?It is the principal problem that this learning addresses and the foremost objective were to scrutinize the influence towards the adoption of SAP.We also wanted to know if technology-aided communication takes as a part of moderation between attitude, subjective norm and perceived behavioral control and paddy farmers intention.

This research also covers the adoption of agricultural innovations by means of psychological ideas from the TPB and TAM to discover the aspects that effect agronomists' decisions to use SAP. Furthermore, as far as the researchers know, it is the initial research that practices the TPB in the framework of Malaysian paddy farmers. Hansson claimed that research centered on the TPB offers the added awareness into the agronomists' behavior. So, this research is predicted to offer strategy developers with an understanding of the core psychological aspects that affect the usage of upgraded SAP. These visions can be used to regulate present strategies and to advance new strategy initiatives to encourage the implementation and usage of this practice by agronomists. The remaining part of this research consists of 5 core sections. The "Literature review" section gives the comprehensive research directly related to the extended theory of planned behavior. Based on this review research, the conceptual framework, as well as hypotheses, are suggested in the "Theoretical framework" and "Research hypotheses" segments.

2. Literature review

2.1. Adoption of agricultural innovations technologies

The adoption of agriculture innovation technology changes has already been recognized as a critical element of financial growth and productivity (Ohkawa et al., 2015; Ruttan, 2000).The rapid adoption of new agriculture-related technologies has a positive impact on growth in agronomic productivity and guaranteed food security (Bruegel, 2011). The adoption of innovations in terms of green technology has also transformed the way farm households consider the employment choices (Bruegel, 2011). Particularly, labour-saving technologies have permitted farm household adherents to increase their income by pursuing off-farm services (Singha and Mishra, 2015). However, innovation is a new idea or practice by an individual (Rogers, 2010). It can be labeled as the application of knowledge for the real-world. According to Ohkawa et al. (2005), 'agricultural innovation is considered as an important and necessary component in the development of agricultural activities. Innovation may be new varieties of seeds or new types of pesticides or fertilizers for adoption which results in the enhancement of the yield of the crop for an upcoming scenario'. For instance, in the context of farming, adoption of technology allows paddy farmers to become more efficient or to do something that was not possible before that which can increase the farm's productivity. To benefit from technology, it needs to be successfully linked with the country's overall development objectives and applied to solve socio-economic problems (Singha and Mishra, 2015). It is not necessary for all the profitable technologies to be adopted since barriers to practice new technologies and the unavailability of a market for environmental attributes associated new technology can limit their effectiveness. In this research study, the researchers are highlighting the adoption of SAP (SAP).

2.2. Measuring progress towards sustainability

The issue of sustainability is not only a subject of describing