



## Causal model of farmers' intention to engage in sustainable agricultural practices in Nakhon Pathom province, Thailand

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### Abstract

Advanced agricultural technologies have negatively affected both natural resources and the environment in Thailand. Therefore, promoting sustainable agricultural practice among Thai farmers should be a major issue in Thai agricultural policy. Socio-psychological factors considerably influence any intentions within the farmer community to engage in sustainable agricultural practice. The theory of planned behavior and also norm-activation theory can both be used to explain the operation of socio-psychological factors regarding this intention to engage in sustainable agricultural practice. The present study aimed at examining the causal relationship of farmers' intention to engage in sustainable agricultural practices using these theories as specifically applied to farmers operating agricultural household in Nakhon Pathom province of Thailand (from whom randomly selected questionnaire samples were taken). The findings revealed that the intention to engage in sustainable agricultural practices was increased by the awareness of consequences through personal or moral norm, as well as subjective norm and perceived behavioral control. Nevertheless, attitudes had a negative effect on the intention of engaging in sustainable agricultural practices. This paper recommends that raising awareness for the problem of unsustainable agricultural practices, increasing the understanding of how sustainable agricultural practice are implemented among target audiences, and encouraging sustainable farming through influential local group could lead to create farmers' intention and adoption of sustainable agricultural practices.

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### Introduction

Given the prevalence of environmental degradation, sustainable agriculture is nowadays a major public concern. Sustainable agricultural practice has emerged and spread globally as a managerial philosophy and a scheme offering agricultural needs of both present and future generations (Rasul & Thapa, 2004). Minimizing external resources consumption and regenerating available resources in the local

community are the fundamental challenges of sustainable agriculture. Using the environmental-friendly technologies and practices lead to balance with both economic advantage and environmental protection for farmers (Gafsi, Legagneux, Nguyen, & Robin, 2006).

Due to the growth of large-scale agricultural business and the commercialization through contract farming, Thai farmers had to unavoidable adopt labor-saving technologies and highly intensive use of agricultural chemicals with inadequate control. Modern Thai agriculture is now faced with the dilemma of selecting between economic prosperity and environmental conservation.

To optimize the environment and farmers' income, promoting sustainable agricultural practice as a major part of Thai agricultural policy is needed (Jitsangwan, 2001).

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In the past few decades, the theory of planned behavior (TPB) is regarded as a well-grounded model of predicting behavior. The existing studies on the TPB have successfully applied to farmers' intentions to engage in sustainable agricultural practice (Menozzi, Fioravanzi, & Donati, 2015). Sustainable agricultural practice is associated with the consideration of prosocial or altruistic facets (Kimuli, Kasimu, & Sabi, 2018). However, understanding of the factors influencing farmer's practice relating to moral domain is limited (Kaiser, Ranney, Hartig, & Bowler, 1999; Rezaei, Mianaji, & Ganjloo, 2018). Some studies have demonstrated the notable evidences that moral norms can predict the likelihood of intentions to be performed in a moral behavior (i.e., Leonard, Cronan, & Kreie, 2004). Therefore, it is essential to close the gap of the TPB by applying the moral extension, derived from norm-activation theory, in order to improve the prediction of behavior.

This study proposed a socio-psychological mechanism influencing sustainable agricultural practices based on the theory of planned behavior and the theory of norm activation. The objective of the present study was to examine the causal relationship of farmers' intention to engage in sustainable agricultural practices among Thai farmers. The present study chose Nakhon Pathom, a province in the central region of Thailand, as a research setting since it is an intensively arable agricultural area with high agrochemical usage. The results in this setting are expected to provide a socio-psychological mechanism that can promote agricultural practice in a sustainable way for Thai farmers.

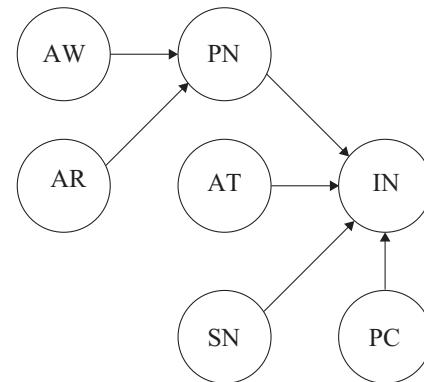
## Literature Review

The theory of planned behavior has been additionally developed from the theory of reasoned action done by Ajzen and Fishbein (1980), which is widely used in socio-psychological researches in order to examine the determinant of attitude on particular behavior. The rationality of this theory revolves around the behavioral intention as a proximal predictors of certain behavior. Behavioral intention is in turn affected by (1) attitude toward behavior involving behavioral belief derived from one's evaluation and decisions about positive or negative outcomes (2) subjective norms toward behavior is the perception of the norms and conventions toward expectation or social demands derived from normative belief, especially beliefs from within the household membership, and (3) perceived behavioral control is the perception of the difficulty to perform behavior resulting from one's belief that may support or restrain certain behaviors (Kidwell & Jewell, 2003). So far, much research in several contexts has been conducted to explore these determinants on farmers' intention. Attitude, subjective norms, and perceived behavioral control were found to positively impact farmers' intention to adopt sustainable practices (i.e., Menozzi et al., 2015; Terano, Mohamed, Shamsudin, & Latif, 2015; Yamano, Rajendran, & Malabayabas, 2013).

Norm-activation theory by Schwartz (1977) can be regarded as one of the most generally used to investigate the pro-environmental behaviors by using the three key

dimensions (ascription of responsibility, awareness of consequences, and personal norms) in various settings (Fang, Chiang, Ng, & Lo, 2019). Both an awareness of harmful consequences and an acceptance of responsibility will define the likelihood of personal norms to prevent harmful outcomes. An individual's obligation to act to collective benefits of others and sacrifice of their own interest, which refers to altruistic behavior (Clark, Kotchen, & Moore, 2003). Conventional agriculture is a behavior that has negatively affected on others and also natural resources and the environment. Creating a personal connection to the environment is a better way to promote sustainable agricultural practice.

Based upon the above theories, the theoretical research framework and hypothesized relationship could be drawn. This study hypothesized that greater attitude towards sustainable agricultural practice (AT), subjective norm about sustainable agricultural practice (SN), and perceived behavioral control of sustainable agricultural practice (PC) would be significant determinants of farmers' intention to engage in sustainable agricultural practices (IN). Also, the present study expected that greater ascription of responsibility about unsustainable agricultural practice (AR), and awareness of consequences about unsustainable agricultural practice (AW) would have positive indirect effects on farmers' intention to engage in sustainable agricultural practices through personal norm about sustainable agricultural practice (PN). Research conceptual framework of the present study was as shown in Figure 1.



**Figure 1** Research conceptual framework

## Methodology

Participants in this study were drawn from a list of 38,874 registered farming households collected by the Department of Agricultural Extension, Ministry of Agriculture and Cooperatives, Thailand (2017). Obtaining the sample size from the formula of Krejcie and Morgan (1970), 380 farmers over the aged of 20 years, currently residing in the central-region province of Nakhon Pathom, Thailand, were asked to complete the questionnaires. One representative of the household was

interviewed. Participants were recruited by Multi-stage sampling from seven districts in the province. The selected districts were then divided into sub-districts, and the sub-districts were chosen. Next, two villages were also randomly selected from within each sub-district. Finally, the samples were proportionally randomly chosen from each village.

Participants completed a self-reporting questionnaire using 4-scale items of socio-psychological factors and intention to engage in sustainable agricultural practices. Four scales of each item included “strongly disagree”, “disagree”, “agree” and “strongly agree”. Questions asked in each item were displayed in Table 1. Structural equation modeling (SEM) was conducted to investigate the causal model.

## Results and Discussion

Most of the samples (52.4%) were males, of whom 59.6 percent were aged 50 years and over, and the average age was 53.06 years. About two-third of the samples had completed

primary school level of education. The average monthly household income of the sample was about 14,700 Thai Baht and an average household size was 4 persons. About 62.6 percent of the samples were household head, with higher experience in agricultural practice (27.8 years of experience at average). The average household agricultural land size was 11 rai (4.24 acres), and nearly half of sample’s household had practiced monoculture, which was producing a single crop at a time. The findings revealed that the samples had intention to engage in sustainable agricultural practice at the high level with a mean of 15.82 out of total 20 score and standard deviation of 2.59.

The structural equation model testing displayed the influence of socio-psychological factors on intention to engage in sustainable agricultural practice, which was a function of personal norm, attitude, subjective norm and perceived behavioral control (Table 2). The fit statistics of the proposed model were acceptable ( $\chi^2 = 102.037$ ,  $df = 129$ ,  $p = 0.962$ ,  $GFI = 0.977$ ,  $AGFI = 0.951$ ,  $RMSEA = 0.000$ ,  $RMR = 0.015$ ).

**Table 1** Items of socio-psychological factors and intention to engage in sustainable agricultural practices

Factors	Items
AW	I am aware that agricultural chemical use may destroy the environment in the long term. I am aware that flame weeding will create global warming. I am aware that mono-cropping may affect the soil fertility.
AR	I realize that reducing agricultural chemical may create environmental protection. I realize that crop rotation may protect soil quality. I realize that organic farming may generate a better environment.
PN	I devote great importance to organic fertilizer. I devote great importance to practice agricultural production in a sustainable way. I devote great importance to natural resource and environmental protection.
AT	I agree with sustainable agricultural practice. I support the concept of sustainable environmental development. If the government promotes the sustainable agricultural practice in the area, I will change my agricultural practice to be more sustainable way.
SN	I think that my family, neighbor and community members may support or agree with me to practice agriculture in a sustainable way. If my neighbor and community members use organic fertilizer, I will follow them. I think that my family, neighbor and community members may support me to use resistant varieties.
PC	I think it is easy to use biological control agents. I think it is easy to reduce agricultural chemicals. I think it is easy to use organic suppliers.
IN	I intent to reduce the agricultural chemical usage. I intent to practice mono-cropping. I intent to not practice flame weeding. I intent to promote sustainable agricultural practice to others. I intent to practice sustainable agricultural practice in the long term.

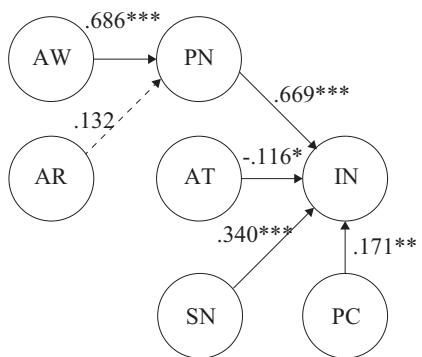
**Table 2** Direct, indirect, and total effect of causal variables on affected variable in the model of an intention to engage in sustainable agricultural practice

Variable	n = 380					
	TE	PN		IN	IE	DE
	TE	IE	DE	TE	IE	DE
AW	.686***	-	.686***	.459***	.459***	-
AR	.132	-	.132	.088	.088	-
PN	-	-	-	.669***	-	.669***
AT	-	-	-	-.116*	-	-.116*
SN	-	-	-	.340***	-	.340***
PC	-	-	-	.171**	-	.171**

Note: TE = Total Effect, IE = Indirect Effect, DE = Direct Effect.

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

Figure 2 presents the tested model: it was found that awareness of consequences about unsustainable agricultural practice (AW) strongly increased the level of personal norm about sustainable agricultural practice (PN) ( $\beta = .686, p < .001$ ). The impact of AW on intention to engage in sustainable agricultural practice (IN) has been shown to be mediated by PN ( $\beta = .459, p < .001$ ). Results also indicated that PN has been considered a key factor contributing to predicting IN. PN demonstrated the strongest relationship with IN ( $\beta = .669, p < .001$ ). The findings highlight the importance of norm-activation theory that can be applied for explaining this relationship. The individual's personal norm can be activated by raising the awareness of negative environmental consequences, in turn, leading to positive intention to cooperate in pro-environmental behavior. Consistent empirical evidence has supported this relationship. This is in accordance with the research by Nordlund and Garvill (2003) where personal norm mediates the effects of awareness of negative environmental consequences of car traffic on willingness to reduce personal car use. The findings are in line with the notion that moral domain should be included in the studies of environmental attitude theories, which are based on the theory of planned behavior (Kaiser et al., 1999).



**Figure 2** Tested causal model of intention to engage in sustainable agricultural practice

Note: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ . The statistically insignificant relationship is in dotted line.

Nevertheless, no support was found for the relationship between ascription to responsibility about unsustainable agricultural practice (AR) and PN ( $\beta = .132, p > .05$ ) and the moderating roles of PN on the relationship between AR and IN ( $\beta = .088, p > .05$ ). A plausible explanation of this finding is that responsibility feeling to act prosocially is uneasy. It may be hard for one to feel personally responsible for the problems (Groot, 2008). The consequences of their action may be regarded as far from being ideal. Farmers' management decisions may be led by complex calculation which is based mainly on how to maximize revenue and profitability rather than how to manage their resources sustainably (Aerni, 2010).

Somewhat unexpectedly, IN was surprisingly directly negatively affected by attitudes toward sustainable agricultural practice (AT) ( $\beta = -.116, p < .05$ ). One plausible reason for this could be that Thai farmers who reported positive attitude towards practicing sustainable agriculture but they need to invest in new inputs, change their management, and achieve new knowledge and skills, before these capacities are ready for applying in sustainable agricultural practice. These extra resources and planning are required before their intention is implemented, which may be regarded as obstacles for market-oriented farming, leading to provide the negative relationship between attitude and behavioral intention (Parminter & Perkins, 1997).

Subjective norm about sustainable agricultural practice (SN) was direct predictive of greater IN ( $\beta = .340, p < .001$ ). The finding confirmed the important role of social pressure and the opinion of others on individuals' behavioral intention. Subjective norm refers to an individual's perception about the specific behavior, which is influenced by the judgment of significant others. This may be caused by characteristics of rural Thai community where the collective society is found in common. Underlying this link is the concept of social capital which is reflected in rural Thai inherited ways of living in terms of trust, norms, and networks (Chinvarasopak, 2015). The opinions of important referent group could affect Thai farmer behavioral intention through the formal or informal advice or through the social pressure (Rose, Keating, & Morris, 2018).

Perceived behavioral control of sustainable agricultural practice (PC) had positive direct impact on IN ( $\beta = .171, p < .01$ ). A possible explanation might be that if farmers perceived they can control over their own resources or be able to perform (internal control) and it is easy to perform the behavior (external control), they have intention to practice sustainable agriculture (Kidwell & Jewell, 2003). The perception of how difficult or easy to practice depends on internal and external obstacles or opportunities, for instance, personal abilities, knowledge, economic resources, and infrastructure facilities (Kidwell & Jewell, 2003; Zeweld, Van Huylenbroeck, Tesfay, & Speelman, 2017). A possible explanation for Thai context is that local Thai farmers are familiar with practiced traditional farming which is developed and enriched through their knowledge of local agro-ecology and environmentally sustainable ways of farming for hundred years from generation to generation. To adopt the sustainable agricultural practice, Thai farmers may regard such practices as not difficult to perform and be able to control of the behavior (Thai Organic Trade Association, 2011).

According to the theory of planned behavior, intention can be seen as one's position on a subjective probability aspect related to a linkage between individual and actual behavior (Ajzen & Fishbein, 1980). Behavioral intention is regarded as the precursor leading up to a certain behavior (Armitage & Connor, 2000). The present study assessed the level of IN and found that Thai farmers intend to engage sustainable agricultural practice at the high level (15.82 out of 20). Therefore, it can be assumed that higher IN generates higher chance to practice sustainable agriculture, which was

confirmed by empirical findings achieved from multiple studies in the area of environmental psychology that higher behavioral intention generates higher chance to perform a given behavior (Trivedi, Patel, & Acharya, 2018; Wee et al., 2014).

## Conclusion and Recommendations

It can be concluded that Thai farmers have the intention to engage in sustainable agricultural practices in the high level. The intention to engage in sustainable agricultural practices was increased by the awareness of consequences through personal or moral norm, as well as subjective norm and perceived behavioral control. Nevertheless, attitudes had a negative affect on the intention of engaging in sustainable agricultural practices. These findings in the present study denote that an integrated theory of planned behavior and norm-activation model can best explain the intention to engage in sustainable agricultural practices.

According to the findings of the present study, policy-related recommendations should be proposed. First, a national campaign should be encouraged to generate awareness of harmful consequences of conventional agricultural practices: in the short term by focusing on public affairs, and in the long term by focusing on education. Second, increase the understanding of how sustainable agricultural practice are implemented among target audiences. Demonstration plot of sustainable agricultural practices could be developed, but need to be easy, visible, and feasible through influential messages. Third, an intervention should encourage sustainable farming through influential local group in order to generate social pressure upon farmers. Trained influential local group could play a vital role in putting farmers' intention toward sustainable agriculture practice.

## Conflict of Interest

There is no conflict of interest.

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