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Paddy farmer's perception and factors influencing attitude and intention on adoption of organic rice farming

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Abstract

As a staple food, the availability of rice is essential for Indonesian people. It is undoubtable that Green Revolution (GR) has a significant contribution to rice production. However, GR also emerges the detrimental impact, mainly on the environment. The expectation is that organic farming is an appropriate solution for dealing with this issue. On one side, the increased in demand for healthy food implies the organic farming has a good prospect. However, the adoption rate of organic farming is still low among farmers. This study aims at examining the perceptions of paddy farmer and factor affecting attitude and behavioral intention to adopt organic rice farming. This study involved 600 paddy farmers as respondents in Sragen District, Central Java, Indonesia. The study grouped the respondents into two categories, i.e., semi-organic and conventional farmers. The data were collected through a structured questionnaire. The results showed that the perceived usefulness, perceived ease, and environmental concern affected positive and significantly on attitude. Meanwhile, the behavioral intention was influenced significantly by attitude, subjective norm, moral obligation and perceived behavioral control. Conclusively, the perceptions on technology characteristic, environmental concern, moral obligation have a positive impact on attitude and intention to adopt organic rice farming. Therefore, the dissemination of organic rice technology should be accelerated to take the advantages of positive attitudes by changing their mindset toward adopting organic rice farming.

Introduction

Food fulfillment is one of the most fundamental rights and the determinants factor of national security. Some experiences showed that food shortages could lead to national insecurity; mainly related to social, political and destabilized of the country (Suryana *et al.*, 2009). In term of food, the status of rice is critical in Indonesia. Aside from being a staple food, rice becomes a strategic commodity because it provides a source of livelihood for most people in Indonesia.

The role of the Green Revolution (GR) on rice self-sufficiency achievement in Indonesia has no issues. Nevertheless, the GR also generated some detrimental problems due to the application of the agro-chemicals such as chemical fertilizer and pesticide (Sukristiyonubuwono *et al.*, 2011). International Food Policy Research Institute / IFPRI (2002) outlined that environmental destruction was the worst impact of GR. The excessive use of chemo-synthetic inputs has resulted in a harmful impact such as the presence of chemical residues on foods and destruction of land fertility. As reported by Fox (1991) and Buresh *et al.* (2007) the overuse of Nitrogen and Phosphorous fertilizers in paddy fields was very common in Indonesia. Also, the full utilization of insecticides has increased the negative externalities toward the environment (Pretty and Hine, 2005) and human healthiness (Kishi, 2005).

The government has strived to reduce the adverse effect of GR through the promotion of organic farming practice. It was also to respond the phenomenon "back to nature" lifestyle; where people are more concern about the harmful impact of agro-chemical input uses (Jahroh, 2010). In turn, this situation could trigger the increase of organic product's demand, especially for the rice as a staple food. It implies the prospect of organic rice farming is advantageous in the upcoming year in both financial and environmental aspect. Therefore, to support organic farming development,

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the government launched the "Go Organic" program in 2001.

However, it seems the "Go Organic" program was not successful in encouraging farmers' engagement in organic rice farming. For instance, DG of Processing and Marketing of Agricultural Products, MoA (2014) reported the extent of certified organic rice was only 1,542.38 ha. It is shallow compared to the total of rice area in Indonesia, that is, 13.4 million ha. In another word, this indicates the low rate of organic rice farming adoption among farmers.

Some claimed that the low rate of adoption due to the organic farming was relatively new (an innovation). According to Rogers (2003) the adoption of innovation (technology) is about a decision-making process. The perception of farmers toward technology's characteristic is very crucial. Meanwhile, according to Herath (2010), the technology is a technical matter; but the adopter is a human being. Consequently, the adoption process closely relates to human behavior. The social or psychological aspect such as perception, norms, belief, and attitude of people has a crucial role in the adoption process.

Ibnu and Hutabarat (2012) argued that the ultimate goal of new agricultural technology is its adoption by farmers. However, it was not easy to identify whether the actual adoption would occur in the future. Indeed, measuring the farmers' behavioral intention gives an estimate of their actual behavior. Previous studies in information technology (IT) arena (Ajzen, 1991; Mathieson, 1991; Bhattacherjee, 2000) have attested the behavioral intention could articulate the strength of one's eagerness to perform a particular behavior. Further, the attitude of the farmer on a particular technology also expresses the strength of their favor to accept such technology.

It is a challenge to scrutinize determinant factors influencing the attitude and intention to adopt organic farming. Indeed, identifying the factors should be underpinned by the dominant theory or model. Theory Planned Behavior (TPB) and Technology Acceptance Model (TAM) were used widely to explain behavioral intention in various areas. TPB provides a general model aimed at pre¬dicting and explaining human behavior (Ajzen, 1991; 2011); hence it is deemed suitable as the fundamental theory. Meanwhile, TAM proposed by Davis *et al.* (1989) proved as a valuable means to predict future system adoption. Nevertheless, these theories are still rarely utilized for agricultural technology adoption. Thus, using TPB and TAM could fill the gap of study in adoption intention-behavior among paddy farmers.

The purposes of this study were: (1) to explore farmers' perception toward attitude, behavioral intention and other constructs related to organic rice farming, (2) to determine the factors affecting attitude of farmer on organic rice farming, and (3) to examine the factors affecting the intention to adopt organic rice farming. By assessing these aspects, hopefully, it will give a better insight of farmer behavior that used to provide the recommendation to the government to formulate a strategy for accelerating the adoption of organic farming among paddy farmers in Indonesia.

Materials and methods

The population and area of study

The population of the study is the paddy farmers, which consist of the semi-organic and conventional farmer. The former refers to farmers who have practiced partly of organic farming techniques, but also still use agro-chemical input. Meanwhile, the later entirely uses the agro-chemical input on their farm. The study area is Sragen District, Central Java Province, and the data were collected from May to August 2015. This district was selected as a research site with judgment as to the center of organic rice farming and has a potency to grow steadily. The extent of the organic farming area in this district was 229,57 ha. Besides, Sukristiyonubuwono *et al.* (2011) found that many farmer groups have practiced semi-organic farming. The data of the Agricultural Extension Office of Sragen District (2014) showed the positive growth of semi-organic farming area (17%/year). In such a district, the certified organic rice farmer has existed. However, most of the farmers are the conventional and semi-organic farmers. Since the objective of the study was related to behavioral intention to adopt organic farming; the study excluded the organic farmers and used the semi-organic and conventional farmers instead.

Sampling technique

The selection of respondents followed a multistage sampling method. In the first step, out of eight central rice sub-districts in Sragen District, five sub-districts were randomly selected. Based on the selected sub-districts, two villages from each sub-district were randomly chosen. After the identification of the village, then a general list of both the semi-organic and conventional farmer in each village was compiled as the sampling frame for the study. Finally, the systematic random sampling was applied to determine the respondents; selecting 30 semi-organic and 30 conventional farmers from each of the ten villages. Therefore, the total respondents were 600 farmers consisting of 300 semi-organic

and 300 conventional farmers. Data collection was carried out by face-to-face interviews using a structured questionnaire.

Data measurement

All of the constructs in this study were unobserved or latent. For each construct, some measurement variables (items) represent the construct. Most of the constructs were a component of TAM and TPB model. All items were measured using the Likert-scale with a range of 1 (strongly disagree) to 7 (strongly agree). There were nine constructs measured in this study namely: behavioral intention, attitude, subjective norm, perceived behavioral control, perceived usefulness, perceived ease of use, moral obligation, environmental concern, and perceived risk.

Behavioral intention encompasses all of the motive aspects that influence a behavior and express the effort degree of individual to execute an action or behavior (Fishbein and Ajzen, 1975). Meanwhile, the attitude is defined as "the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Azjen, 1991). It reflects feeling of favorableness or un-favorableness to perform a certain behavior (Taylor and Todd, 1995). The subjective norm refers the perception of individual as to the social insistence to participate or not in the particular behavior (Ajzein, 1991). Further, perceived behavioral control indicates the personals' perceptions of the ease or hardship to execute the behavior (Fishbein and Ajzen, 1975).

According to Davis (1989), perceived of usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her productivity". While, perceived ease of use is described as "the extent to which a person trusts that utilizing a certain system would be free of effort". Further, moral obligation is referred to the degree in which an individual's sense of responsibility to commit (or not) morally (or immorally) when deal with an ethical situation (Beck and Ajzen, 1991). In addition, environmental concern is meant as" altruism toward other human being to incorporate both self interest or egoism, and concern with other species or the biosphere itself" (Stern *et al.*, 1993). Lastly, perceived risk refers to "the one's perception of the uncertainty and adverse consequence of desired outcome" (Fu *et al.*, 2006).

The measurement variables of those constructs were adapted from previous studies such as Ibnu and Hutabarat (2012), Guido *et al.* (2010), Davis (1989), Moore and Benbasat (1991), Spark and Sheperd (1992), Taylor and Todd (1995), Yu *et al.* (2005), Verbeke and Vackier (2005), Fu *et al.* (2006), Yi *et al.* (2006), Ryan and Splash (2008), and Magistris and Gracia (2008).

Data analysis and model specification

Data were analyzed descriptively and inferentially. The descriptive analysis employed the mean score and standard deviation for all of the constructs. The higher mean score was assumed, the higher perception of the constructs in question. The mean score level of perception was categorized as follows: 1.00-3.00 (low), 3.01-5.00 (moderate), and 5.01-7.00 (high). The categories followed a simple formula proposed by Azman *et al.* (2013).

Meanwhile, the inferential statistical test was performed to examine the factors affecting attitude (AT) and behavioral intention (BI) using multilinear regression. There are two models for each farmer type, i.e., semi-organic and conventional farmer. The research model was arranged based on the components of TPB (perceived behavioral control,

Table 1. Mean score and the level of perception of semi-organic and conventional farmers

Code	Constructs	Semi-organic		Conventional	
		mean	level	mean	level
PU	Perceived usefulness	5.879	high	5.378	high
PEU	Perceived ease	5.711	high	4.996	moderate
AT	Attitude	6.000	high	5.452	high
PR	Perceived risk	2.520	low	3.320	moderate
EN	Environmental concern	6.015	high	5.487	high
PBC	Perceived behavior control	5.554	high	4.606	moderate
SN	Subjective norm	5.643	high	4.935	moderate
MO	Moral obligation	5.934	high	5.296	high
IN	Intention	5.843	high	4.923	moderate

Table 2. Mean, standard deviation and t- independent sample test for all of constructs

Code	Constructs	Semi-organic		Conventional		t-value
		mean	SD	mean	SD	
PU	Perceived usefulness	5.879	0.376	5.378	0.900	10.660**
PEU	Perceived ease	5.711	0.595	4.996	1.185	9.334**
AT	Attitude	6.000	0.441	5.452	0.959	9.002**
PR	Perceived risk	2.520	0.627	3.320	1.211	-10. 159**
EN	Environmental concern	6.015	0.448	5.487	0.829	9.708**
PBC	Perceived behavior control	5.554	0.592	4.606	1.116	13.001**
SN	Subjective norm	5.643	0.570	4.935	1.723	9.416**
MO	Moral obligation	5.934	0.557	5.296	0.909	10.361**
IN	Intention	5.843	0.543	4.923	1.125	12.759**

Note:** p<0.001

subjective norm, attitude) and TAM (perceived usefulness, perceived ease of use) and additional constructs which have relevance to this study. Each variable/construct was developed by averaging the response to forecast the value of the dependent variable (Pour, 2003).

The model specification was formulated in the multiple linear regressions written as follows:

$$AT = \beta_0 + \beta_1 PU + \beta_2 PEU + \beta_3 EN + \mu$$
$$BI = \beta_0 + \beta_4 AT + \beta_5 SN + \beta_6 PBC + \beta_7 MO + \beta_8 PR + \mu$$

Where:

AT	= Attitude
BI	= Behavioral intention
PU	= Perceived usefulness
PEU	= Perceived ease use
EN	= Environmental concern
SN	= Subjective norm
PBC	= Perceived behavioral control
MO	= Moral obligation
PR	= Perceived risk
μ	= error term

Referred to the model specification, the sign of the coefficient in each of the independent variables is estimated to be: $\beta 1$ to $\beta 7 > 0$, and $\beta 8 < 0$. It means that the PU, EN, PEU are hypothesized affecting positively toward attitude. Further, AT, SN, PBC, and MO are also hypothesized to have a positive impact on behavioral intention. The exceptional is for PR which as expected has a negative impact toward behavioral intention since farmers usually are risk averters.

The significance test is employed to examine the goodness of the model. There are two types of such significance test, i.e., F-test and t-test. F-test is used to determine whether a significant relationship exists between the dependent variable and the set of all the independent variables. The F-test is referred to as the test for overall significance. Meanwhile, the t-test is used to determine whether each of the independent variables is significant individually; the testing includes each of the independent variables in the model.

Also, by investigating the multicollinearity problem could be done by looking at the value of the Variance Inflation Factor (VIF). In statistical term, the VIF quantifies the severity of multicollinearity in multiple linear regression analysis. Everitt (1996) asserted that a VIF value less than 10 indicates the absence of multicollinearity cases in the regression equation model.

In this study, before performing the regression analysis, an independent t-test was required to examine whether the mean score of entire constructs is different between semi-organic and conventional farmer. The significance of the independent t-test indicates that the two groups' distribution is independent; hence, produce two separate models. Factor analysis was performed to determine the measurement variables; to identify those that have a significant contribution to the construct. The selected measurement variables (items) of each construct then were calculated to obtain the mean score for conducting the regression analysis.

Results and discussion

Farmers' perception of organic farming attributes

As aforementioned, in the current study, there are nine constructs proposed related to organic farming practice. The result showed that the mean score toward

Table 3. Goodness of data for semi-organic and conventional farmers

Constructs	Semi-organic				Conventional			
	Factor loading	KMO*	Eigen values	CA	Factor loading	KMO*	Eigen values	CA
PU	0.525-0.715	0.800	2.599	0.727	0.595-0.873	0.934	5.503	0.917
AT	0.626-0.755	0.760	2.506	0.750	0.792-0.902	0.838	3.705	0.907
PR	0.591-0.747	0.799	2.780	0.754	0.791-0.875	0.882	4.682	0.916
EN	0.536-0.778	0.766	2.343	0.689	0.695-0.878	0.839	3.277	0.864
IN	0.632-0.863	0.850	3.149	0.851	0.778-0.899	0.819	3.630	0.904
PEU	0.842-0.933	0.908	4.700	0.852	0.863-0.933	0.908	4.700	0.944
MO	0.719-0.856	0.782	3.246	0.785	0.719-0.800	0.782	3.246	0.854
SN	0.736-0.900	0.918	5.741	0.800	0.736-0.900	0.918	5.741	0.941
PBC	0.604-0.863	0.907	4.992	0.824	0.604-0.863	0.907	4.992	0.910

* Bartlett's test indicates p <0.001

organic farming for all the constructs was higher for the semi-organic farmer than the conventional farmer, except for perceived risk (see Table 1). It is not surprising because the semi-organic farmer has experienced practicing organic farming technology partly. This familiarity will profoundly influence the lower perception of semi-organic farmer toward the risk. Further, the score of the standard deviation of semi-organic was lower than the conventional farmer. This result implies the perception of semi-organic farmer towards the construct is more stable or shows less dispersion than the conventional one.

Based on Table 1, it seems that the perception level of rice farmers toward organic farming is relatively high (for semi-organic) and moderate to high (conventional farmer). Exceptionally, for perceived risk construct the perception of the semi-organic farmer is low and moderate for the conventional farmer. Environmental concern achieved the highest mean score in both of farmers' type (6.015 vs. 5.487). In general, the data suggests that the paddy farmers have a positive perception toward organic farming.

Meanwhile, the result of the independent t-test demonstrated that mean score for entire constructs of the semi-organic and conventional farmer were significant at level 0.001 (refer to Table 2). This finding indicates the two types of farmers are different. Accordingly, this warrants the need to perform regression analysis for semi-organic and conventional farmers using separate model.

Further, it entails conducting a factor analysis for all of the constructs before executing the regression. The results show that for both semi-organic and conventional farmer, the Eigenvalues are higher than 1 (i.e., 2.343-5.741) as can be seen in Table 3. Meanwhile, the Kaiser-Meyer-Olkin (KMO) score is also above 0.5 (i.e., 0.760-0.918) with Bartlett's test of sphericity < 0.001. Also, the internal reliability analysis of the constructs represented by Cronbach Alpha (CA) demonstrates the values are higher than 0.7, except for EN (semi-organic case). Although, the CA value of EN is nearly 0.7, it remained because other indicators met the requirement. Besides, EN is an essential construct in term of pro-environmental behavior. In general, the two types of farmers fulfilled all the data goodness requirements.

After performing the factor analysis, some selected measurement variables (items) forms each of the constructs. The chosen measurement variables are then calculated to find the mean score of the construct. After that, the regression analysis is run using the mean scores of the constructs.

Factors affecting the attitude of organic farming

Table 4 presents the result of the regression analysis of factors affecting attitude in both semi-organic and conventional farmers. The result demonstrates that PU, EN, and PEU have a significant positive influence on attitude toward organic farming. For the two farmer types, the high positive of PU, PEU, and EN will significantly improve toward farmers' attitude on organic farming practice. The strongest determinant of attitude for the semi-organic farmer is EN (β=0.387), followed by PU (β=0.273) and PEU (β=0.172), respectively. Meanwhile, for the conventional farmer, the primary determinant is PU (β=0.553), then EN (β=0.370) and PEU (β=0.107). This result also confirms the hypothesis that PU, PEU, and EN have a significant impact on AT.

Table 4 shows the statistical analysis results based on the equation model of factors affecting the attitude to adopt organic farming written as follows:

$$AT_{semi} = 1.061 + 0.273\ PU + 0.172\ PEU + 0.387\ EN + \mu \quad (1)$$

$$AT_{conv.} = -0.09 + 0.107\ PEU + 0.553\ PU + 0.370\ EN + \mu \quad (2)$$

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Table 4. The analysis result of factors affecting attitude for semi-organic and conventional farmers

Constructs	Semi-organic				Conventional			
	Coefficient	t-stat.	Prob.	VIF	Coefficient	t-stat.	Prob.	VIF
Constanta	1.061	3.251	0.001	-	-.090	-.468	.640	-
PU	.273	4.339	0.000**	1.592	.553	9.713	0.000**	2.493
EN	.387	8.166	0.000**	1.277	.370	8.301	0.000**	1.820
PEU	.172	4.551	0.000**	1.435	.107	2.942	0.004**	2.493
	R^2= 0.465 Prob. (F stat.)= 0.000 F-stat. = 85.658				R^2= 0.756% Prob. (F-stat.)= 0.000 F-stat. = 309.256			

Note : ** p< 0.01

The equations (1 and 2) are in line with the proposed model specifications. Moreover, the t-statistic values (individual test) exhibits that PU, PEU, and EN are significant at level 0.01 (refer to Table 4). Meanwhile, the F-test also confirms that all of the constructs simultaneously affect the attitude at level 0.01. The Coefficient determination (R^2) of equation (2) is higher than (1), i.e., 0.756 vs.0.465. The result implies that PU, PEU, and EN explain 75.6% variation in the attitude of the conventional farmer. While for the semi-organic farmer, the three constructs only describe 46.5% variation of attitude. In another word, other variables excluded from the model explained 24.2% and 53% variation in attitude for both the conventional and semi-organic farmers respectively. Thus, the model specification of attitude for the conventional farmer (equation 2) provides better explanation compared to the semi-organic farmer (equation 1).

The significant positive impact of perceived usefulness (PU) on attitude (AT) is because the farmers are optimistic that the price of organic rice will increase. Furthermore, the farmers believe that the advantage of organic farming will outweigh the disadvantage. Other studies have attested that PU is a good predictor of attitude. Chen *et al.* (2002) revealed that PU influenced the attitude of the online consumer. Also, Kleijnen *et al.* (2004) claimed PU had an impact on consumer attitude on acceptance of wireless finance. A similar finding also has been revealed by Wu and Chen (2005) and Chen *et al.* (2007) which elaborated on online tax and e-toll collection service adoption.

Furthermore, the perceived ease of use (PEU) also has a significant impact on attitude. For instance, Ibnu and Hutabarat (2012) revealed PEU had a significant effect on attitude in the case of agricultural technology adoption. Another study conducted by Wichadee (2015) found the PEU of Learning Management System (LMS) had a positive correlation with the attitude toward LMS. Also, Juniwati *et al.* (2014) and Yulihasri (2011) have proven that PEU significantly affected attitude toward online shopping.

As expected, the newly construct added in the model, that is, environmental concern (EN) has a significant effect on the attitude of both semi-organic and conventional farmer. This finding is analogous with Honkanen *et al.* (2006) that the issue of environmental and animal welfare exhibited a substantial impact on attitudes toward organic food. Their study suggested that the more awareness of people on the environmental issue, the more they develop a positive attitude towards organic food. Meanwhile, another study by Fransson and Gorling (1999) revealed the EN could point to both particular attitudes or on intention directly, even more, general attitude or value orientation.

The frequently emerging problem of OLS estimation is multicollinearity. However, the variance inflation factor (VIF) value helps in its detection in the model. The results of data analysis for both the semi-organic and conventional farmer showed that the VIF values of all independent variables are below 10. In another word, there is no multicollinearity among the independent variables in the model proposed.

Factors affecting behavioral intention

Table 5 presents the results of the regression analysis as to factors affecting behavioral intention for the semi-organic farmer and the conventional farmer. In general, there is a similar result for both farmer types (the semi-organic and conventional farmers). Behavioral intention (BI) is positive and significantly affected by attitude (AT), moral obligation (MO), perceived behavior (PB), and subjective norm (SN). Meanwhile, PR demonstrated no significant effect on BI for both semi-organic and conventional farmers.

Based on the regression coefficient, it appears that AT (0.395) is the strongest determinant of behavioral intention (BI) for the semi-organic, while MO (0.348) is the most powerful for the conventional farmer. The results also support the hypothesis that AT, PBC, SN, MO have a positive impact on BI. Meanwhile, the rest hypothesis, PR has a negative and significant impact on BI is not supported.

Table 5. Result of analysis factors affecting intention for semi-organic and conventional farmer.

Constructs	Semi-organic				Conventional			
	Coefficient	t-stat.	Prob.	VIF	Coefficient	t-stat.	Prob.	VIF
Constanta	.054	.148	0.882	-	-.065	-.206	.837	-
AT	.395	6.654	0.000**	1.591	.116	2.170	0.031*	2.511
PR	.019	.516	0.606	1.232	-0.50	-1.490	0.137	1.560
MO	.125	2.801	0.005**	1.723	.348	6.488	0.000**	2.261
SN	.235	5.032	0.000**	1.655	.304	6.111	0.000**	3.299
PB	.235	4.763	0.000**	1.988	.256	5.427	0.000**	2.642
	R^2= .569 Probability (F stat)= 0.000 F-stat = 77.539				R^2= .756 Probability (F-stat)= 0.000 F-stat = 182.156			

Note : ** p< 0.01; * p< 0.05

Based on the result of analysis shown in Table 5, the equations below describe the factors influencing the behavioral intention to adopt organic farming:

$$BI_{semi} = 0.054 + 0.395\ AT + 0.235\ SN + 0.235\ PB + 0.12\ MO + 0.019\ PR + \mu \quad (3)$$

$$BI_{conv.} = -0.065 + 0.116\ AT + 0.304\ SN + 0.256\ PB + 0.348\ MO - 0.050\ PR + \mu \quad (4)$$

The value of t-statistic exhibits that for the semi-organic farmer; the constructs which are a significant impact on BI at level 0.01 are AT, MO, PB, and SN. While, for the conventional farmer, it shows a similar result except for AT that has merely significant at level 0.05. Further, PR is not significant at both levels. F-test also demonstrates that at least one or all of the independent variables affect the BI significantly at level 0.01. In another word, the model is "good" or fit to predict the influence of the independent variables (AT, MO, PR, SN, and PBC) toward the BI.

In term of coefficient determination, the analysis result exhibits that R^2 of equation 4 (conventional) is higher than equation 3 (semi-organic), i.e., 0.756 vs.0.569. This result means that AT, PR, MO, PB, and SN explained 75.6% variation of BI for the conventional farmer. While for the semi-organic farmer, the constructs explain only 56.90% variation in BI. In another word, other constructs excluded from the model explained 24.42% and 43.1% variation of BI for both farmer types (conventional and semi-organic). Similar to factors affecting AT, the equation model of BI demonstrated that the explanatory power of the conventional farmer model is better than the semi-organic.

Moreover, concerning the multicollinearity issue, the result of the analysis in both semi-organic and conventional model indicates the VIF value of independent variables falls within the range of 1.232 – 3.499. Thus, all VIF values are lower than the rule of thumb (<10). In another word, there is no multicollinearity problem in both equation models.

The attitude is consistently and significantly influences the behavioral intention in both semi-organic and conventional farmer. This finding is congruent with the study of Ibnu and Hutabarat (2012) that attested attitude was the most crucial determinant of a farmer's intention to adopt paddy cultivation technology. A study by Menozzi *et al.* (2015) also revealed that farmer's attitude positively affected their intention to adopt sustainability practice. Further, Maichum *et al.* (2017) claimed that environmental attitude has a substantial effect on purchase intention of green product.

Studies in a different field also support the impact of attitude toward intention; for instance, Chen *et al.* (2007) exposed a positive relationship between attitude and intention to use electronic toll collection (ETC). Furthermore, Lee (2009) mentioned that attitude was the primary determinant of online banking acceptance. Study of Wang and Liu (2009) also demonstrated that attitude had a positive influence on the intention of railway internet ticketing acceptance. The other studies claimed that attitude significantly influenced the intention to adopt mobile banking (Puschel *et al.*, 2010; Aboelmaged and Gebba, 2013). Meanwhile, Suki and Suki (2011) approved that attitude was a primary factor that affected the subscriber's intention to use 3 G mobile service.

This study also finds that moral obligation (MO) has a significant impact on BI. The reason is the farmer the farmer's concern about health. They feel obligated to practice organic farming to protect their family's health. By practicing organic farming, farmers anticipate producing healthier rice. The significance of MO or norm toward intention is congruent with the study of Poskus (2015) that recommended the addition of moral norm would strengthen the predictors of behavioral intention. Also, Haines *et al.* (2007) attested that the moral obligation was significantly related to noble intention.

Further, Shin and Hancer (2016) found that the moral norm was a determinant of consumers' local food purchase intention. Poskus (2015) attested that the moral norm is a strong predictor of behavioral intention of recycling. It is also harmonious with the study of Chan and Bishop (2013) and Donald *et al.* (2014) as well. The other studies unclosed that moral and personal norms were also had a significant influence on the purchase intentions of organic food; even concerning actual purchase (Arvola *et al.*, 2008; Gleim *et al.*, 2013). Hence, these results support what Harland *et al.* (1999) claimed that adding moral norm to the TPB variables would significantly increase the explanatory power.

Regarding the subjective norm (SN), farmers reveal that their family and other farmers are essential people influencing them to practice organic farming. The role of SN against behavior intention also is supported by previous studies. For instance, some studies found that SN and reference groups have a positive correlation with purchase intention and actual purchase of green products (Welsch *et al.*, 2009; Liu *et al.*, 2012; Eze *et al.*, 2013). Meanwhile, the study of Liao *et al.* (2007) claimed that SN was a powerful predictor of behavioral intention to adopt online-service. The other studies also argued that SN positively affected e-payment acceptance and also internet banking (Gu *et al.*, 2009; Puschel *et al.*, 2010). Further, Aboelmaged and Gebba (2013) also approved a significant impact of SN toward mobile banking acceptance.

Regarding perceived behavior control (PBC) the study found that farmers can confidently practice organic farming. They have enough knowledge and skill to perform such farming. The significance of PBC in this study on BI is congruent with the study of Shin and Hancer (2016) that suggested PBC was the determinant of consumers' intention to purchase local food. Other studies also revealed that PBC had a significant and positive impact on intention and actual purchase of green products (Ma *et al.*, 2012; Wang *et al.*, 2014). The study of Menozzi *et al.* (2015) found that PBC was determinant for farmer's intention to implement private sustainability practice.

Interestingly, the perceived risk (PR) has a different sign for both farmer types (semi-organic and conventional farmer). In the case of the semi-organic farmer, PR exhibits a positive and non-significant impact toward behavioral intention. In contrast, for conventional farmer PR, non-significant adverse effect towards BI. The insignificance of PR is because farmers do not consider organic farming as a risky business. Farmers are used to encountering the risk since they have had a long experience in rice farming. This finding might be different with the study of Hall *et al.* (2009) that suggested the perceived risk is one of the critical factors that influenced the adoption of sustainable floriculture practices.

Conclusion

The study describes farmers' perception and factor affecting attitude and intention towards organic rice farming adoption. In general, the perception of rice farmers toward organic farming was relatively high and positive. The score of perception towards all of the constructs showed that semi-organic farmer had a higher score than conventional, except for perceived risk. Also, the independent t-test confirmed the mean of perception among the two farmer types was significantly different.

The analysis results showed that the perception of the usefulness, environmental concern and perceived ease of use affect positively and significantly on the attitude toward organic farming. The positive effect of three constructs against the attitude demonstrated they played a significant role in shaping the positive or negative view of farmers on organic farming practice. In turn, it would lead the farmers' behavior toward organic farming adoption process.

In term of factors affecting intention, four constructs namely the attitude, subjective norm, moral obligation, and perceived behavior contribute significantly to both semi-organic and conventional farmer. Meanwhile, the perceived risk does not affect behavioral intention. The positive effect of these constructs on behavioral intention demonstrates they are very crucial in the decision process to adopt or reject the organic farming practice.

Interestingly, the new constructs added namely environmental concern and moral obligation have a significant impact on the model. It indicates that for pro-environmental behavior (organic farming) the role of two constructs is essential. In another word, in association with organic farming adoption also requires the involvement of the human being mindset in decision making.

Succinctly, the models used in this study can explain quite well the factors affecting both attitude and behavioral intention among paddy farmers toward organic farming practice. Statistic criteria testing and econometric parameter indicate and support the finding of the study. The value of R-squared, F-statistic, and t-statistics demonstrated the statistical criteria. One of the other hands, the results of multicollinearity test examines the econometric criteria. In sum, the conventional farmer model is somewhat better than the semi-organic model based on the statistical criteria.

Given the significance of attitude on the behavioral intention of the farmers, the finding recommends that the government should design a program that can build a favorable attitude towards organic farming among farmers. The government needs to convince farmers that organic farming gives them more benefit. Further, the significance of environmental concern and moral obligation implies that psychological aspect plays an essential role in the adoption process. Therefore, it requires additional effort to boost the awareness of sustainable agricultural development and a healthy lifestyle among farmers. The study therefore strongly recommends continuous support for the farmer through the breakthrough program, such as "Go Green" or "Go Organic" campaign and intensive training as wells as the improvement of education for the farmer.

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