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FACTORS MOTIVATING THE ADOPTION OF GEOGRAPHICAL INDICATION-BASED QUALITY STANDARDS AMONG ROBUSTA COFFEE FARMERS IN INDONESIA

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ABSTRACT

Robusta coffee is one of the superior commodities of the Temanggung Regency. As the quality of a coffee determines its market competitiveness, geographical indications (GIs) are one of the quality standards used in coffee cultivation and post-harvest processing to indicate the quality of a good Robusta coffee. However, most Robusta coffee farmers in Indonesia do not practice the production methods required to meet these standards. Therefore, the produced coffee does not meet the quality standards of consumers. As such, this study aimed to analyse the factors that may motivate or dissuade farmers from adopting GI-based quality standards for Robusta coffee in Temanggung Regency. A descriptive method; specifically, a survey; was used for data collection. This data was then analysed using the partial least squares (PLS) method. The findings of this study revealed that, while knowledge did not motivate the adoption of GI standards, optimising collaboration between farmers and relevant associations may increase the adoption of GI-based quality standards among Robusta coffee farmers in Temanggung Regency.

Keywords: geographical indications, motivational factors, farmer, robusta coffee

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1. INTRODUCTION

Coffee is a strategic and important commodity that plays a vital role in the economic growth of Indonesia. As it is a superior export commodity, it is a source of welfare for farmers, basic industrial material production, job opportunities, and regional development (Community Protection Geographical Indication of Robusta Temanggung Coffee, 2015). The two main varieties

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of coffee that are cultivated and produced in Indonesia are Robusta (90%) and Arabica (10%). Indonesia has 1,242,8 thousand hectares of land that is suitable for coffee plantations (2020). Of this number, 1,220,9 thousand hectares (98.23%) is dominated by public (smallholder) plantations. In 2020 alone, these small holders plantations produced a combined total of 745.3 thousand tons of coffee (BPS-Statistic Indonesia, 2020).

Coffee is the main commodity of Temanggung Regency in Central Java, Indonesia. In 2019, coffee was cultivated on more than 15,539,48 hectares, with Robusta coffee cultivated on 13,694,89 hectares of land (Statistics of Temanggung Regency, 2020a) to produce 8,728,39 tons of coffee, an average productivity of more than 8.7 ton/ha (Statistics of Temanggung Regency, 2020b). Robusta coffee from Temanggung Regency has high potential for agribusiness development, especially if combined with expansion programmes, productivity and quality improvements, and expanding downstream industries. This is because Robusta coffee has the potential to be developed into a specialty coffee, with a competitive advantage, if its unique taste is strengthened (Community Protection Geographical Indication of Robusta Temanggung Coffee, 2015).

Geographical indications (GIs) can improve the quality and competitiveness of a product. This is because GIs can be used to institute potential resources by region (Giovannucci et al., 2009). As coffee producing regions have special economic value in the market, using these regional names as coffee brands is an effective strategy that requires management (Teuber, 2010). A geographical indication protection (GIP) license was applied for Temanggung Robusta coffee in 2015 and approved by the Ministry of Law and Human Rights of the Republic of Indonesia in 2016. This was because coffee that is cultivated and processed using good quality standards has high economic value, a more favourable price point, and can compete better in the market. Temanggung Regency has to protect the brand of its coffee commodity, namely Robusta Temanggung Coffee. This refers to its GI-based quality standards; such as its physical characteristics, taste, cultivation techniques as well as its harvesting and processing methods.

The GI-based quality standards of Robusta Temanggung Coffee are certified by the Ministry of Law and Human Rights of the Republic of Indonesia as the coffee produced in this region has a unique taste due to geographic factors and human resource interventions surrounding its cultivation and processing. There are many benefits to obtaining a GIP license for geographically indicated products. Based on the literature, this includes legal protections, increasing the marketability of a product both in and out of the country, improving the competitiveness of a product from a specific region, increasing the economic growth of said region, receiving the same treatment in GIs protection and marketing to the world, and preventing competition with fake products. Through the efforts of the local government, Robusta Temanggung Coffee obtained a Certificate of Geographical Indication Protection from the Ministry of Law and Human Rights of the Republic of Indonesia in 2015. At presents, efforts continue to meet the quality standards listed in the GI protection book of Robusta Temanggung Coffee. However, most of the unroasted coffee beans produced does not meet the quality standards outlined in the GI protection book. This is because the coffee beans come in a variety of qualities due to varying cultivation, harvesting, and post-harvest processing methods. Furthermore, harvesting and post-harvest processes are not standardised and have not been set. For example, there are many differences in the drying, picking, and skinning methods that may damage the taste and quality of the coffee. As such, low quality harvesting methods and post-harvest processes result in low quality coffee that buyers do not value.

Studies indicate that there is low adoption of good agricultural practices, harvest standards, and post-harvest standards that meet the GI-based quality standards of Robusta coffee production among farmers in Temanggung (Setyowati et al., 2020). The adoption of these standards is important as high-quality coffee is more appreciated and competitive in the market. It also increases its marketability at a national and international level. Furthermore, the adoption of GI-based quality standards will increase the income and improve the welfare of coffee farmers in the region. This will facilitate the development of local coffee agribusinesses which will, in turn, increase the economic growth of the region as per the Sustainable Development Goals (SDGs) of the United Nations.

However, the adoption of GI-based quality standards remains a challenge for coffee farmers in the Temanggung Regency (Setyowati et al., 2020). Factors such as lack of understanding, insignificant increases in cost to meet the GI-based quality standards, and less than all-out support from the government and relevant organisations results in the low adoption among coffee farmers.

Several factors; such as the behavioural characteristics of the farmers; influence the adoption of innovation as well. As such, the identification of these factors is essential to increase the adoption of GI-based quality standards among farmers. To that end, this present study aimed to identify factors that may motivate farmers to adopt the GI-based quality standards of Robusta Temanggung Coffee.

2. LITERATURE REVIEW

2.1. Coffee, Geographical Indications, and Educating Farmers

Although the biophysical characteristics of a coffee are largely determined by the plant variety and agronomic practices used during cultivation, it is also susceptible to local conditions; such as climate, soil, topography, and ecosystem. This broadens the quality range of the end product.

Geographical indications (GIs) indicate the character and uniqueness of a product based on the region of its geographic origin. GIs are an intellectual property that carry economic importance and is collectively owned. In Indonesia, GIs are officially registered by the national intellectual property office (Neilson et al., 2018).

As coffee production is geographically dispersed, in the context of GIs, good quality coffee is produced through a blend of cultures and cultivation systems that are based on local wisdom and the livelihood patterns of the local people. GIs also play an important role in efforts to promote the local potential and support economic development (Neilson et al., 2018).

GIs indicate quality products that are unique to their geographic region of origin. This is the result of a combination of socioeconomic factors, procedures, and assimilation of local and specialised resources; such as local knowledge and culture. Product development correlates with product quality development in the marketing chain, between manufacturers and consumers (Belletti et al., 2015). A GI is a tool that demonstrates the quality of a product based on its geographical authenticity and the efforts undertaken to obtain legal protections and recognition. As such, the

protection of the name and place of origin of a coffee is vital to its quality and reputation (Barjolle et al., 2017).

Protected GI (PGI) products are the result of specific GI-based production processes, interactions between social and economic factors as well as the implementation of GI-based quality standards. GIs not only serve as a territorial public policy but as part of the supply chain. The development of GI-based products plays an important role in fostering sustainable development in the region. However, this role needs to be managed with care to reduce adverse effects (Belletti et al., 2015). Various coffee regions are already building reputations among buyers in this particular segment. Many projects have been implemented to improve the quality of coffee. This includes various training programmes to educate farmers. Educating farmers is key because, as the main actors, farmers need to understand the main factors affecting the quality of a coffee during cultivation and harvesting (Teuber, 2010).

2.2. Innovation Adoption

Attitudes, readiness for change, leadership, and organisational type significantly affect innovation adoption (Aarons et al., 2011; Damanpour & Schneider, 2006; Frambach & Schillewaert, 2002; Godin et al., 2008; Greenhalgh et al., 2004; Simpson, 2002; Solomons & Spross, 2011).

Demographic factors that influence innovation adoption include age, race/ethnicity, education, training, primary discipline, professional experience, adaptability, personal values and goals, as well as personal disposition and attitudes towards an innovation. Furthermore, education, professional experience, primary discipline, and race/ethnicity affect intention to adopt (Aarons et al., 2011).

Innovation adoption is influenced by attitudes toward innovation and motivation, the need for innovation, and attitudes towards quality improvements. Educating potential adopters also increases innovation adoption. It also helps improve individual characteristics (skills and experience), society, tolerance of ambiguity, and perceived risk (Wisdom et al., 2013).

Adopter characteristics; such as innovativeness, exposure to mass media, tolerance of ambiguity, training, and personal knowledge; as well as risk have been found to affect innovation adoption (Aarons et al., 2011; Gallivan, 2001; Glanz et al., 2008; Greenhalgh et al., 2004; Rogers, 2003). Furthermore, eight theoretical framework studies posit that ease of use, partial trial, and innovative relevance also affect adoption (Aarons et al., 2011; Backer et al., 1986; Berta et al., 2005; Damanpour & Schneider, 2006; Frambach & Schillewaert, 2002; Greenhalgh et al., 2004).

Each dimension is a unique variation affecting innovation adoption. Although there were no differences in the direction of each antecedent effect, differences in the significance of some antecedent effects affect innovation adoption (Damanpour & Schneider, 2006).

Therefore, the primary factors affecting innovation adoption among individuals were: (1) values and goals, (2) social networks, and (3) perceived need for change (Aarons et al., 2011). Environmental characteristics may refer to the market or sector in which an innovation operates (Wisdom et al., 2014) and may be cultural, social, political, or geographical in nature (Wejnert, 2002). Social networks and links with systems outside an organisation may also positively affect

the pre-adoption (Mendel et al., 2008; Rogers, 2003; Valente, 1996) and adoption of an innovation (Berta et al., 2005; Frambach & Schillewaert, 2002; Valente, 1996).

Although innovation adoption has been studied, there is a severe lack of studies on the adoption of GI-based quality standards among farmers, coffee quality standards, good coffee farming practices, harvest standards, or coffee processing standards.

3. METHODOLOGY

This study utilised a descriptive method to shortlist factors that may motivate farmers to adopt the GI-based quality standards of Robusta coffee. This study was conducted specifically in the Temanggung Regency of Central Java, Indonesia as this region has tremendous potential to develop into a producer of good quality Robusta coffee. The population of this study were farmers living in 11 coffee-producing sub-districts, specifically, Bejen, Gemawang, Candiroto, Kandangan, Pringsurat, Wonoboyo, Tretep, Kaloran, Kranggan, Kedu, and Jumo. A total of 220 respondents participated in this study, with a variable-to-sample ratio of 1:20 (Hair et al., 2010). The total number of Robusta coffee farmers in the Temanggung Regency was 34,400 people. The primary data collected included the attitudes, subjective norms, innovation characteristics, knowledge, and intention to adopt the GI-based quality standards of Robusta coffee. The research instrument (questionnaire) was developed in Bahasa Indonesia as this made it easier for the respondents to understand. The surveys were conducted via live interview sessions with the respondents to ensure that the answers were confirmed and that every field of the questionnaire was completed.

A pilot study was conducted to measure the appropriateness and accuracy of the research instrument. Thirty statistically-compliant samples were taken from the 11 coffee-producing sub-districts and subjected to validity and reliability testing. These results were then analysed using SmartPLS 3.0 software. The purpose of these tests was to ensure that the questionnaire was valid and reliable before it was shared with the larger sample; i.e., the 220 respondents.

Validity Testing

The purpose of a validity test is to determine if a measuring instrument has performed its measuring function. In this study, validity was measured using two parameters; loading factor and the average variance extracted (AVE). An indicator was deemed valid if its loading factor > 0.7. The loading factor values of this present study are presented in Table 1.

Table 1: The Loading Factor Values of the Indicators in the Research Instrument

Indicator	Loading Factor Value	
	Before Elimination	**After Elimination**
A1	0.855	0.862
A2	**0.548**	
A3	0.891	0.991
A4	0.839	0.843
A5	0.885	0.876
SN1	**0.067**	
SN2	0.760	0.763
SN3	0.817	0.822
SN4	0.709	0.707

SN5	0.959	0.958
IC1	0.737	0.730
IC2	0.896	0.898
IC3	**0.303**	
IC4	0.872	0.881
IC5	0.914	0.916
K1	0.872	0.872
K2	0.887	0.887
K3	0.914	0.914
K4	0.913	0.913
K5	0.868	0.868
Y1	0.904	0.904
Y2	0.948	0.948
Y3	0.868	0.868
Y4	0.903	0.903
Y5	0.906	0.906

Source: Primary Data Analysis, 2019

Note:

A	:	Indicator of the statement for the Attitude latent variable
A1	:	I am happy to adopt GI-based Robusta coffee quality standards
A2	:	I am satisfied with the adoption of GI-based Robusta coffee quality standards
A3	:	It is profitable to adopt GI-based Robusta coffee quality standards
A4	:	It is important to adopt GI-based Robusta coffee quality standards
A5	:	It is good to adopt GI-based Robusta coffee quality standards
SN	:	Indicator of the statement for the Subjective Norms latent variable
SN1	:	My family encourages me to adopt GI-based Robusta coffee quality standards
SN2	:	My fellow coffee farmers motivate me to adopt GI-based Robusta coffee quality standards
SN3	:	The agricultural extension officers support the adoption of GI-based Robusta coffee quality standards
SN4	:	The chair of the coffee farmer group encourages me to adopt GI-based Robusta coffee quality standards
SN5	:	The government recommends the adoption of GI-based Robusta coffee quality standards
IC	:	Indicator of the statement for the Innovation Characteristics latent variable
IC1	:	In my opinion, GI-based Robusta coffee quality standards are consistent with my coffee agribusiness management needs.
IC2	:	In my opinion, it is possible to adopt GI-based Robusta coffee quality standards
IC3	:	In my opinion, it is easy to adopt GI-based Robusta coffee quality standards
IC4	:	In my opinion, it is easy to understand GI-based Robusta coffee quality standards
IC5	:	In my opinion, GI-based Robusta coffee quality standards are visible and observable
K	:	Indicator of the statement for the Knowledge latent variable
K1	:	I know the GI-based Robusta coffee quality standards
K2	:	I understand the GI-based Robusta coffee quality standards
K3	:	I have experience applying GI-based Robusta coffee quality standards
K4	:	I have skills in implementing GI-based Robusta coffee quality standards
K5	:	I have obtained information on GI-based Robusta coffee quality standards
Y	:	Indicator of the statement for the Intention to Adopt GI Standards
Y1	:	I plan to adopt GI-based Robusta coffee quality standards
Y2	:	I believe that I can continue implementing GI-based Robusta coffee quality standards
Y3	:	I intend to adopt GI-based Robusta coffee quality standards
Y4	:	If possible, I may adopt GI-based Robusta coffee quality standards in the future
Y5	:	I am eager to adopt GI-based Robusta coffee quality standards

Table 1 depicts the loading factor of each indicator before and after elimination. As seen, three indicators; A2, SN1, and IC3; had loading factors < 0.70 and, therefore, did not meet the validity. As such, they were deemed invalid as a variable meter and were eliminated from subsequent tests

as there was a sufficient amount of other valid indicators with which to describe those variables. A total of 21 valid indicators with loading factors > 0.7 remained.

Further validity testing was conducted by measuring the AVE of the variables. A variable was deemed valid if its AVE > 0.5. Table 2 presents the AVE of the variables in the research instrument.

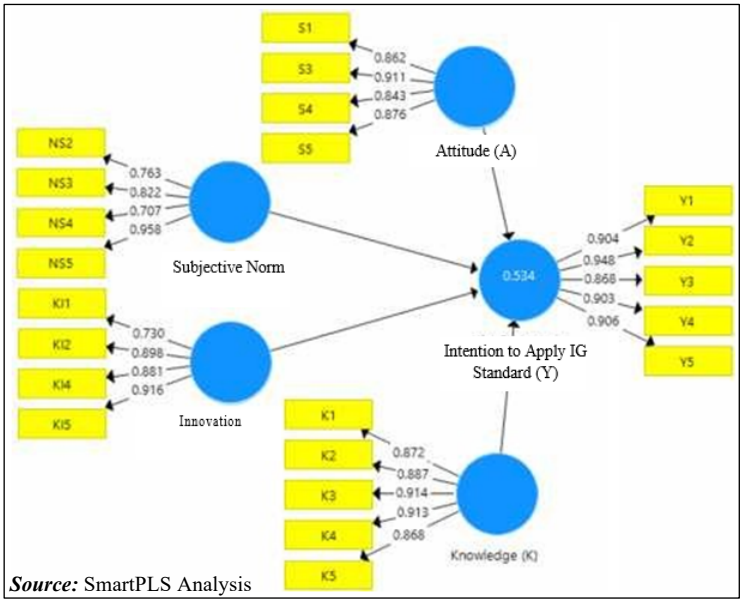
Table 2: The AVE of the Variables in the Research Instrument

No.	Variable	AVE Value	Note
1.	Attitude	0.763	**Valid**
2.	Subjective Norm	0.669	**Valid**
3.	Innovation Characteristics	0.738	**Valid**
4.	Knowledge	0.794	**Valid**
5.	Intention to Apply GIs Standard	0.821	**Valid**

Source: Primary Data Analysis, 2019

As seen in Table 2, the Intention to Adopt GI Standards variable had the highest AVE (0.821) while the Subjective Norm variable had the lowest AVE (0.669). As the AVE of each variable > 0.5, they were all deemed valid and significant. Figure 1 presents a diagram of the research instrument testing.

Figure 1: Research Instrument Testing After Indicator Elimination



Reliability Testing

Reliability tests aim to determine the consistency of a measurement instrument when it is used repeatedly. This is accomplished by measuring the composite reliability (CR) and Cronbach's alpha (α) of an instrument. The minimum value is 0.7, while the ideal is 0.8 or 0.9. Table 3 presents the reliability testing results of this research instrument.

Table 3: The Composite Reliability and Cronbach's Alpha of Instrument Variables After Indicator Elimination

No.	Variable	Composite Reliability	Cronbach's Alpha	Notes
1.	Attitude	0.928	0.897	**Reliable**
2.	Subjective Norm	0.889	0.834	**Reliable**
3.	Innovation Characteristics	0.918	0.884	**Reliable**
4.	Knowledge	0.951	0.936	**Reliable**
5.	Intention to Apply GIs Standard	0.958	0.946	**Reliable**

Source: Primary Data Analysis, 2019

As seen in Table 3, both the CR and α of each variable was > 0.7, therefore, all the variables were deemed reliable and capable of performing consistently. The Intention to Adopt GI Standards endogenous variable had the highest CR and α with 0.958 and 0.946, respectively, while the Subjective Norm variable had the lowest scores with 0.889 and 0.834, respectively.

Attitude denotes an individual's feelings, be they positive or negative, towards a intention to perform or adopt a particular behaviour. Multiple studies have found that the better the attitude towards a behaviour, the higher the intention to adopt it (Bock et al., 2005; Chennamaneni, 2006; Hou & Hou, 2019; Pavlou & Fygenson, 2006; Taylor & Todd, 1995). Based on these studies, the following hypothesis was formulated:

H1: Attitude affects the intention of farmers to adopt GI-based Robusta coffee quality standards

Subjective norms are built on normative beliefs. This is an individual's assessment of the perception that other individuals have of a particular behaviour. An individual is more likely to adopt a particular behaviour if other individuals hold this behaviour in high regard. Multiple studies suggest that the assessment or information provided by fellow farmers, agricultural extension officers, and chairs of farmers groups will increase the intention of farmers to adopt GI standards (Bock et al., 2005; Chennamaneni, 2006; Hou & Hou, 2019; Joao et al., 2015; Shah Alam et al., 2012). Based on these studies, the following hypothesis was formulated:

H2: Subjective norms affect the intention of farmers to adopt GI-based Robusta coffee quality standards

The characteristics of an innovation is one of the determinants of its successful adoption. According to (Rogers, 2003), some of the innovation characteristic that influence innovation adoption include its relative advantage, compatibility, complexity, observability, and trialability. The adoption of an innovation by farmers is based on rational decisions that depend on whether the farmer perceives it to be feasible or unfeasible. Multiple studies have shown that assessments of GI-based standards may influence the intention of farmers to adopt GI standards (Adesina & Zinnah, 1993; Chou et al., 2012; Joao et al., 2015). As such, the following hypothesis was formulated:

H3: The characteristics of an innovation affect the intention of farmers to adopt GI-based Robusta coffee quality standards

The decision to adopt an innovation begins with knowledge, which involves studying the innovation and looking for information on it (Rogers, 2003). An individual's knowledge of a behaviour influences their intention to adopt it. It has been suggested that the knowledge that farmers have about GI standards will affect their intention to adopt it (Hair et al., 2010; Martono et al., 2019). As such, the following hypothesis was formulated:

H4: Knowledge affects the intention of farmers to adopt GI-based Robusta coffee quality standards

4. RESULTS AND DISCUSSION

4.1. Evaluation of Measurement Model (Outer Model)

A measurement model was used to determine the correlation between each indicator block and its latent variable. An SEM PLS outer model, that was constructed using the CR and α test results, provided the following results.

Convergent Validity

Convergent validity highlights the correlations between reflexive indicator scores and their latent variables by determining the loading factor of each construct. A loading factor of ≥ 0.7 indicates that the validity of the measurement model is high. Table 4 presents the loading factors of this study.

Table 4: Loading Factor of Each Indicator

Code	S	NS	KI	K	Y
A1	0.834				
A3	0.836				
A4	0.836				
A5	0.805				
SN2		0.760			
SN3		0.831			
SN4		0.819			
SN5		0.787			
IC1			0.792		
IC2			0.743		
IC4			0.793		
IC5			0.796		
K1				0.829	
K2				0.902	
K3				0.867	
K4				0.867	
K5				0.781	
Y1					0.902
Y2					0.888
Y3					0.935
Y4					0.860
Y5					0.899

Source: Primary Data Analysis, 2019

As seen in Table 4, the loading factor of each indicator was > 0.7 and, therefore, met the convergent validity criteria. The "I intend to adopt GI-based Robusta coffee quality standards" (Y3) indicator, under the Intention to Adopt GI Standards variable, had the highest loading factor (0.935). As the loading factors obtained indicate high validity between individual variable indicators, data analysis could be conducted in the next stage.

Discriminant Validity

Discriminant validity confirms a strongly correlation between the reflexive indicators of a block but a weakly correlation or no correlation with the reflexive indicators of other blocks. The AVE of each variable was used to ascertain its validity. The criteria required that the AVE of each indicator > 0.50 to prove its validity (Table 5):

Table 5: AVE of Each Variable

No.	Variable	AVE Value	Notes
1.	Attitude	0.685	Valid
2.	Subjective Norm	0.640	Valid
3.	Innovation Characteristics	0.611	Valid
4.	Knowledge	0.723	Valid
5.	Intention to Apply GIs Standard	0.805	Valid

Source: Primary Data Analysis, 2019

As seen in Table 5, the AVE of each variable was > 0.50. Therefore, as every variable was valid, data analysis could be conducted in the next stage. The Intention to Adopt GI Standards variable had the highest AVE (0.805) while the Innovation Characteristics variable had the lowest (0.611). Discriminant validity was also evident in the cross-loading of each indicator (Table 6).

Table 6: Cross-Loadings of the Indicators

Code	S	NS	KI	K	Y
A1	**0.834**	0.597	0.718	0.571	0.606
A3	**0.836**	0.517	0.548	0.494	0.603
A4	**0.836**	0.474	0.522	0.383	0.561
A5	**0.805**	0.436	0.471	0.389	0.496
SN2	0.511	**0.760**	0.552	0.521	0.555
SN3	0.492	**0.831**	0.440	0.456	0.473
SN4	0.499	**0.819**	0.409	0.449	0.488
SN5	0.455	**0.787**	0.385	0.372	0.436
IC1	0.517	0.411	**0.792**	0.440	0.577
IC2	0.520	0.443	**0.743**	0.431	0.568
IC4	0.561	0.436	**0.793**	0.491	0.469
IC5	0.556	0.483	**0.796**	0.480	0.468
K1	0.413	0.385	0.409	**0.829**	0.350
K2	0.500	0.565	0.588	**0.902**	0.445
K3	0.490	0.462	0.519	**0.867**	0.373
K4	0.510	0.542	0.553	**0.867**	0.446
K5	0.458	0.440	0.402	**0.781**	0.377
Y1	0.627	0.572	0.634	0.450	**0.902**
Y2	0.623	0.580	0.596	0.419	**0.888**
Y3	0.652	0.564	0.631	0.431	**0.935**
Y4	0.530	0.476	0.556	0.358	**0.860**
Y5	0.644	0.565	0.602	0.452	**0.899**

Source: Primary Data Analysis, 2019

In cross-loading assessment, the correlational value of the indicator and its construct should be higher than the correlational value of the indicator and another construct. As seen in Table 6, the cross-loading of each indicator and its latent variable was higher than the correlational value of the latent variable and another indicator.

Composite Reliability and Cronbach's Alpha

In order to measure internal consistency, the CR and α of each indicator block were used to determine the reliability of the reflective indicator. The CR and α should > 0.7. Table 7 depicts the CR and α of the variables.

Table 7: The Composite Reliability and Cronbach's Alpha of the Variables After Indicator Elimination

No.	Variable	Composite Reliability	Cronbach's Alpha	Notes
1.	Attitude	0.897	0.847	**Reliable**
2.	Subjective Norm	0.876	0.813	**Reliable**
3.	Innovation Characteristics	0.862	0.789	**Reliable**
4.	Knowledge	0.929	0.904	**Reliable**
5.	Intention to Apply GIs Standard	0.954	0.939	**Reliable**

Source: Primary Data Analysis, 2019

Table 7 shows that the CR of each variable was > 0.7 The Intention to Adopt GI Standards variable had the highest CR (0.954) while the Innovation Characteristics variable had the lowest (0.862). The α of each variable was also > 0.7. The Intention to Adopt GI Standards variable had the highest α (0.939) while the Subjective Norm variable had the lowest (0.813). As the CR and α of each variable fulfilled the criteria of the assessment model, all variables were deemed reliable.

4.2. Evaluation of Structural Model (Inner Model)

The coefficient of determination (R^2), ranging between 0 and 1, was used to ascertain the extent to which the structural model could explain the variances of the endogenous variables. If $R^2 \leq 0.500$, the ability of the independent variable to explain the variance of the dependent variable was minimal. If the $R^2 > 0.500$, the independent variable was able to provide nearly all the information necessary to predict the variance of the endogenous variable (Alfidella et al., 2015).

Table 8: The Coefficient of Determination of the Variables

Dependent Variable	R-Square	Adjusted R-Square
Intention to Apply GIs Standard	0.584	0.575

Source: Primary Data Analysis, 2019

As seen in Table 8, the R^2 of the Intention to Adopt GI Standards variable was (0.584). This indicated that the other variables; i.e., Attitude, Subjective Norm, Innovation Characteristics, and Knowledge; were able to explain 58.4% of the Intention to Adopt GI Standards variable. Therefore, 41.6% of the variable was explained by other variables; such as experience, social norm, and personal characteristics; that were not included in this model. This research model fell into the 'strong' category as its R^2 was > 0.67.

4.3. Hypothesis Testing

Hypothesis testing was conducted using a statistic test on each track while the significance of the parameter coefficient was estimated using the bootstrapping method. The bootstrapping method helps reduce non-reliability when normal distribution is misused. The hypothesis testing was performed with t-statistic = 1.96 and p-value ≤ 0.05 (α 5%). If p-value < α, the proposed hypothesis was supported. However, if p-value ≥ α, the proposed hypothesis was not supported. Table 9 provides a summary of the bootstrapping analysis results.

Table 9: Results of the Bootstrapping Analysis

No.	Variable			T Statistics	P-Value	Notes
1.	Attitude	→	Intention to Apply GI Standard	4.810	0.000	Significant
2.	Subjective Norm	→	Intention to Apply GI Standard	4.373	0.000	Significant
3.	Innovation Characteristics	→	Intention to Apply GI Standard	4.236	0.000	Significant
4.	Knowledge	→	Intention to Apply GI Standard	**0.853**	**0.394**	**Insignificant**

Source: Primary Data Analysis, 2019

As seen in Table 9, there was an insignificant correlation between the Knowledge variable and the Intention to Adopt GI Standards variable as p-value > α (0.05) and t-statistic < T-table (1.96), with p-value = 0.394. Therefore, this hypothesis was not supported. Meanwhile, the correlation between the other variables was significant as p-value ≤ α (0.05) and t-statistic > T-table (1.96). Therefore, this hypothesis was supported. The results of the hypothesis testing using the bootstrapping method are as follows:

4.3.1. The Effect of Attitude on the Intention to Adopt GI Standards

Attitude, in the content of this study, denoted the positive or negative feelings that the coffee farmers in Temanggung Regency had towards the adoption of GI-based Robusta coffee quality standards. The attitude of the farmers was found to influence their adoption of the GI-based standards. Hypothesis 1 stated that attitude directly and positively affects the intention of farmers to adopt the GI-based quality standards. For the Attitude variable, the results of the bootstrapping method confirmed that *p*-value = 0.000 or < α (0.05) while t-statistic = 4,810 or > T-table (1.96). This indicated that attitude had a significant effect on the intention to adopt the GI-based quality standards. As, such hypothesis 1 was accepted.

However, various underlying factors affect the attitude of farmers towards the adoption of the GI-based quality standards. Firstly, the farmers indicated that they were happy to adopt these standards. This alluded that they felt comfortable and were willing to adopt it. The next factor was the presumptions that these farmers held. As adopting GI-based Robusta coffee quality standards was favourable or profitable, helped produce better quality products, and generated more income, it encouraged farmers to continue implementing cultivating, harvesting, and post-harvest processing methods as per the GI-based Robusta coffee quality standards. Moreover, the farmers viewed the adoption of GI-based quality standards as important because these standards have been extensively

tested by the authority in the hopes of improving the income of the farmers and the image of Temanggung coffee.

Furthermore, these farmers also viewed the adoption of the GI-based quality standards as a good call. Local governments recommend that farmers adopt these GI standards to increase the value of the coffee, which will, in turn, impact local tourism programmes positively. Therefore, the adoption of GI-based quality standards is very important for regional development.

When the attitude toward the adoption of GI-based quality standards increased, the intention to adopt GI-based quality standards also increased. Furthermore, when the attitude towards sharing knowledge and understanding was good, the intention to share knowledge and comprehend the innovation increased (Bock et al., 2005; Chennamaneni, 2006; Ibragimova, 2006).

4.3.2. The Effect of Subjective Norms on the Intention to Adopt GI Standards

Subjective norms, in the content of this study, represented an individual's perception of social pressures to adopt or not to adopt GI-based Robusta coffee quality standards in Temanggung Regency. In relation to the adoption of GI standards, these subjective norms consisted of four indicators: motivation from fellow farmers (SN2), support from agricultural extension officers (SN3), encouragement from the chair of the coffee farming group (SN4), and recommendations from the government (SN4).

Hypothesis 2 posited that subjective norms significantly affect intention to adopt GI standards. For the Subjective Norms variable, the results of the bootstrapping method showed that *p*-value = 0.000 or $< \alpha$ (0.05) while t-statistic = 4.373 or > T-table (1.96). This indicated that subjective norms significantly affect intention to adopt GI standards. As, such hypothesis 2 was accepted.

Several factors trigger the effects that subjective norms have on the intention of farmers to adopt GI standards. The first factor was motivation and encouragement from fellow coffee farmers to adopt GI standards. This was because coffee farmers could see the direct benefits that their fellow farmers reaped from implementing the cultivating, harvesting, and post-harvesting techniques outlined in the GI-based Robusta coffee quality standards. This, in turn, affected their willing to adopt the same GI standards. Secondly, the opinions of agricultural extension officers are held in high regard and trusted as the officers often guide farmers and help them overcome problems as and when they arise. As such, the information that these officers provide the farmers is highly trusted and this extends to recommendations to adopt GI standards. Thirdly, most coffee farmers in Temanggung Regency are affiliated with an organisation/group that is led by a head. The chairperson of these organisations usually acts as a role model to the member farmers. Therefore, support from these chairs to adopt GI standards deems it appropriate for adoption. Lastly, as the government recommends the adoption of GI-based Robusta coffee quality standards as well as provides programmes that ease its adoption, recommendation from this quarter also increases the intention of farmers to adopt GI standards.

Therefore, higher subjective norms significantly increase the intention of farmers to adopt GI standards. These results were corroborated by the finding of other studies that concluded that attitude, subjective norms, and perceived control simultaneously affect the behaviour positively or negatively (Joao et al., 2015; Wauters et al., 2010).

4.3.3. The Effect of Innovation Characteristics on the Intention to Adopt GI Standards

In the context of this study, innovation characteristics imply the perceptions that farmers have of the innovation characteristics of the GI-based Robusta coffee quality standards. The results showed that the innovation characteristics of the GI standards affect intention to adopt GI standards. Hypothesis 3 surmised that innovation characteristics positively and directly affect intention to adopt GI standards. For the Innovation Characteristics variable, the results of the bootstrapping method showed that p-value = 0.000 or < α (0.05) while t-statistic = 4.236 or > T-table (1.96). This indicated that innovation characteristics significantly affect intention to adopt GI standards. As, such hypothesis 3 was accepted.

When the value of innovation characteristics was higher, the intention to adopt GI standards increased. The findings of Adesina and Zinnah (1993) corroborated the findings of this present study in that the adoption of innovation by the farmers reflected rational decision making based on their perception of the feasibility or unfeasibility of the characteristics of an innovation.

4.3.4. The Effect of Knowledge on the Intention to Adopt GI Standards

Knowledge, in the context of this study, alluded to the understanding that the farmers had of the GI-based Robusta coffee quality standards. This knowledge was found to highly accommodate and support technology adoption and business perpetuity among these farmers. The results showed that knowledge did not affect the intention of these farmers to adopt GI standards. Hypothesis 4 theorised that knowledge would influences the intention to positively and directly adopt GI standards. However, for the Knowledge variable, the results showed that p-value = 0.394 or > α (0.05) while t-statistic = 0.853 or < T-table (1.96). This indicated that knowledge did not significantly affect intention to adopt GI standards. As, such hypothesis 4 was rejected.

Although the adoption of cultivating, harvesting, and post-harvest processing methods as per the requirements of the GI-based Robusta coffee quality standards increases production times, the quality of the coffee produced also increases. However, some of the obstacles to the adoption of these GI Standards among agribusiness owners include limited marketing capabilities, limited ownership of information on GI-based Robusta coffee quality standards, longer processing and production times, and a lack of encouragement from the families of these coffee farmers. Together, these conditions present obstacles for coffee farmers who rely only on the coffee agribusiness for income. As such, possessing additional knowledge of these GI standards does not affect intention to adopt GI standards because coffee farmers are already aware of the market opportunities, the prices offered, the time it takes to manage a Robusta coffee agribusiness, and their urgent household needs.

These results contradict the findings of Rogers (2003) who concluded that decision-making to adopt an innovation begins with acquiring knowledge and researching the innovation.

However, the findings of this study also showed that several factors would increase the intention of farmers to GI standards. This included more positive attitudes, more motivation, and more intensive knowledge-sharing between farmers and other parties; such as agricultural extension officers and chairs of farmers groups. Therefore, it is believed that if government and other related institutions intensively mentored these farmers, it may build their confidence, increase optimism

and enthusiasm towards GI standards, and make them feel that it was easy and economically beneficial.

At present, the Indonesian government has liaised with relevant agencies to provide coffee farmers with networking opportunities, training, and agricultural tools; such as pulpers and hullers. However, the number and frequency of these initiatives are insufficient to cater to all Robusta coffee farmers in the region. This may be due to a lack of sharing information and knowledge among farmers, a lack of dialogue between the government and the farmers, and coffee farmer institutions; such as the Temanggung Robusta Coffee's Geographical Indication Protection Society (MPIG-KRT), coffee farmer cooperatives, and farmer groups; not functioning optimally.

The government plays a role in drafting legislation, reviewing applications, procuring free trade agreements (Barjolle et al., 2017; Chabrol et al., 2017), regulating international exchanges using public control over export quality (Belletti et al., 2015), developing legal systems, protecting certain GI in addition to registering, inspecting, and protecting their interests abroad as well as undertaking diplomatic efforts to influence GI law in other countries (Marie-Vivien & Biénabe, 2017).

The adoption of GI-based Robusta coffee quality standards is still appealing. Although strict legal sanctions are not imposed on farmers who do not adopt these standards, an informal sanction exists as non-GI-quality coffee products are valued lower by buyers. This is because coffee buyers buy GI-quality coffee products at higher prices than non-GI-quality coffee products. Although there is an ever-present demand for GI-quality coffee, the supply of GI-standard products is insufficient. This deficit presents farmers with an opportunity to increase the value and competitiveness of their coffee products as well as improve their income and well-being. Therefore, it is necessary to organize and rally farmers together to produce coffee products that meet the GI-based Robusta coffee quality standards.

Coffee is the flagship product of the Temanggung Regency as the coffee that is produced in this region has a distinctive taste due to a combination of geographical factors and human resource intervention. However, opportunities to develop the Robusta coffee agribusiness in this area remains wide open. In this regard, the farmers are largely to blame as their practices affect the quality of the final coffee product. As such, the adoption of GI-based Robusta coffee quality standards is essential as it will increase the competitiveness of the coffee products at the national and international level. This will, in turn, improve the income and welfare of the farmers. Producing coffee products that meet certain quality standards will also benefit other economic actors so that the economy of the region will also grow. This is similar to the ideals proposed in the United Nations' SDGs. Therefore, the successful adoption of GI-based Robusta coffee quality standards should be supported by all stakeholders; such as farmers, local governments, escorts, farmer groups, the MPIG-KRT, coffee farmers institutions, coffee farmers associations, related agencies, universities, financial institutions, farmer cooperatives businesses etc.

5. CONCLUSION

The factors that motivate a intention to adopt GI standards among farmers were attitude, subjective norms, and innovation characteristics. Knowledge did not motivate the intention to adopt GI

standards as it caused farmers to consider marketing flow, capital, and the processing time that GI standards require. The intention of coffee farmers in Temanggung Regency to adopt GI-based quality standards of Robusta coffee requires the support of various parties, especially the government of the Temanggung Regency. By identifying the obstacles that farmers encounter when adopting these GI standards, innovation adoption can progress smoothly for the benefit of the region's economy. The results of this study can be used to motivate Robusta coffee farmers and further strengthen positive attitudes regarding the benefits of adopting the GI-based quality standards in Robusta coffee production. Farmers can also learn from the chairs of farmer groups, agricultural extension officers, and chairs of the farmers groups as well as encourage fellow farmers to adopt the GI-based quality standards of Robusta coffee.

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