

Developing and Examining a Model of Perceived Quality, Perceived Value and Perceived Risk Affecting Customer Loyalty of Environmentally-Friendly Electronic Products

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ABSTRACT

Customer perception is a very important factor concerning green marketing management and is viewed as a motivational construct influencing subsequent consumer behaviour. This research uses four constructs i.e. perceived quality, perceived value, perceived risk and customer loyalty in the context of environmentally-friendly electronic products in Thailand. It employs an empirical study using the questionnaire survey method to verify the hypotheses. Data were obtained from 420 consumers who bought and used environmentally-friendly electronic products, particularly mobile phones, computers and laptops, in Thailand. The data were analysed using confirmatory factor analysis (CFA) and structural equation modelling (SEM). The results showed that perceived value and perceived risk had direct effect on customer loyalty while perceived quality had no direct effect on customer loyalty. Furthermore, perceived quality had direct effects on perceived value and perceived risk. The results from the final SEM model are used to confirm the proposed relationships among the variables.

Keywords: Customer perception, perceived quality, perceived value, perceived risk, customer loyalty, environmentally-friendly electronic products

INTRODUCTION

The idea of natural reserves is an important matter, and globalisation has put pressure on and motivated various industries to improve their environmental operations (Zhu & Sarkis, 2004; Lee, 2008). In the past, investments in environmental activities were considered unnecessary investments.

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However, the regulations concerning strict environmental problems and popular problems about the environment caused a change in the rules of business competition (Bacallan, 2000; Chiou, 2011).

When 'green industry' began to be a byword in industry and businesses became increasingly interested in environmentally-friendly production, consumers began to have options, and this gave businesses the opportunity for competitive advantage. Therefore, to enter the environmental industry, one must study the marketing of products and the consumers of products. By studying consumer behaviour prior to deciding on products, consumers determine what external and internal factors would influence their own behaviour. When environmental factors are taken into account in the system of human thinking, consumers behave with these factors in mind. Businesses should have an interest in the environmentally-friendly market or participate in so-called 'green marketing' to add value to products as a customer's perceived value and reduced perceived risk have an influence on a consumer's decision (Roselius, 1971; Jacoby & Kaplan, 1972; Havlena & DeSarbo, 1991; Greenleaf & Lehmann, 1995).

To meet the green market principles, studying consumer behaviour is very important. Consumer behaviour includes perceiving quality or product benefits, which most consumers require, to check whether the products are worth using, considering information from advertising and comparing products from competitors.

Loyalty keeps old consumers, and building new interactions is the challenge that a business must face. Businesses need to adjust the loyalty trend to set up a consumer tie strategy that would help their marketing.

Consumer perception is a very important factor in green marketing management and for becoming conscious of being responsible and encouraging participation in environmental activities for the benefit of social effects. A review of prior studies indicates that researchers have studied the relationship between perceived quality, perceived value and perceived risk on customer loyalty. Li and Green (2011) presented an analysis of the empirical literature on mediating influences on customer loyalty, including the role of perceived value. The study sought to answer the question, "Is the perceived value a mediating influence resulting from a marketing strategy of customer loyalty?" Customer perceived value is critical to driving market share and increasing customer loyalty. However, this study focussed on customer loyalty and the antecedents in consumer markets and may not, or does not represent industrial markets. Yang and Peterson (2004) examined the moderating effects of switching costs on customer loyalty through satisfaction and perceived value. They found that the moderating effects of switching costs on the association of customer loyalty and customer satisfaction and on the perceived value were significant only when the level of customer satisfaction or perceived value was above average. Hu (2012) explored

the relationship among perceived risk and customer involvement with brand equity and customer loyalty as mediators. The findings indicated that brand equity, perceived risk and customer loyalty have significant and positive relationships with customer involvement. The findings also supported the hypotheses that brand equity and customer loyalty partially mediate the relationship between perceived risk and customer involvement, while customer loyalty had a slightly stronger mediating effect on customer involvement than brand equity.

Although the literature about the relationships among perceived quality, perceived value, perceived risk and customer loyalty is rich, no work has focussed on the relationship of the mentioned variables on customer loyalty of environmentally-friendly electronic products in Thailand. The forces of going green are now extending to the Asian region, where environmental threats are alarming local governments and citizens. Consequently, consumers pay more attention to rising environmental protection activities, and green consumption has gained more momentum for environmental protection. It is necessary to investigate the relationship of these variables in the Thai context.

Thus, for this research, the researcher was interested in studying the influence of the above variables of perceived quality, perceived value, perceived risk and customer loyalty on the consumers who bought and used environmentally-friendly electronic products, especially

mobile phones, computers and laptops. The paper is organised as follows. First, a literature review is presented, followed by the conceptual framework of the study, the research hypotheses and the methodology and results. Finally, the conclusions of the research are presented.

LITERATURE REVIEW

This study presents a review of the empirical literature and the theoretical framework that is supported by this literature, summarises the literature on green marketing and provides a new managerial framework on customer loyalty. Specifically, perceived quality, perceived value, perceived risk and customer loyalty were selected after an extensive review of the marketing literature.

Perceived Quality

Zeithaml (1988) defined perceived quality as the customer's judgement about a brand's (or product's) overall environmental excellence or superiority. Chen and Chang (2013) proposed a novel construct, "green perceived quality," although environmental consciousness is more popular and was referred to by Zeithaml (1988). Sweeney et al. (1999) defined product quality as products that would be reliable, dependable and durable and for which the workmanship would be good. Perceived quality was defined as the consumers' judgement about an entity's services containing overall excellence or superiority (Zeithaml, 1988 in Snoj et al., 2004). Perceived quality can deliver value to customers by offering them a reason to purchase and by differentiating the

product or brand from those of competitors (Zeithaml, 1988; Aaker, 1991). This research suggested a six-dimensional construct of perceived quality using performance, durability, attention, worthiness, reliability and product safety.

Perceived Value

Perceived value was defined as a consumer's overall evaluation of the net benefit of a product or service based on a consumer's appraisal (Bolton & Drew, 1991; Patterson & Spreng, 1997). Chen and Chang (2012) proposed a novel construct, "green perceived value," because environmental consciousness is currently more prevalent, and they defined green perceived value as a consumer's overall appraisal of the net benefit of a product or service among what is received compared to what is given based on the consumer's environmental desires, sustainable expectations and green needs. In addition, customer perceived value was also defined as the consumer's overall assessment of the utility of a product based on his or her perception both of what is received and what is given (Zeithaml, 1988; Sinha & DeSarbo, 1998; Sweeney et al., 1999; in Ulaga & Chacour, 2001). Slater and Narver (2000) stated that product value for a consumer is created when the benefits a consumer receives with a product are greater than the long-term costs a consumer is expected to pay for a product. In conclusion, this study defined the perceived value as the worth that a product has in the mind or opinion of the consumer. It is the value that a customer perceives as obtainable by buying a product.

This research suggested a five-dimensional construct of perceived value using function, performance, environmental concern, environmentally-friendly production and environmental benefit.

Perceived Risk

Perceived risk was defined as an uncertain phenomenon encountered by the consumers while purchasing a product regarding the outcome of the product usage. This uncertainty regarding the product outcome is generally for highly priced products and highly complex items. The literature argues that reduction in perceived risk leads to an increase in purchase probability, so a decrease in perceived risk is useful for increasing customer trust (Wood & Scheer, 1996; Corritore et al., 2003; Chang & Chen, 2008). Perceived risk has been measured by (1) functional risk (Jacoby & Kaplan, 1972; Murphy & Enis, 1986; Sweeney et al., 1999; Chen et al., 2012; Chen & Chang, 2012; Hu, 2012; Chen & Chang, 2013); (2) performance risk (Roselius, 1971; Jacoby & Kaplan, 1972; Brooker, 1984; McCorkle, 1990; Crisp et al., 1997; Sweeney et al., 1999; Chen et al., 2012; Chen & Chang, 2012; Chen & Chang, 2013); (3) psychological risk (Jacoby & Kaplan, 1972; Brooker, 1984; McCorkle, 1990); (4) social risk (Roselius, 1971; Brooker, 1984; Chen et al., 2012; Hu, 2012; Chen & Chang, 2013); (5) financial risk (Roselius, 1971; Jacoby & Kaplan, 1972; Brooker, 1984; McCorkle, 1990; Crisp et al., 1997; Chang & Chen, 2008; Hu, 2012); and (6) physical risk (Chen & Chang, 2013). Jacoby and Kaplan (1972)

defined the dimension of perceived risk to include functional risk, performance risk, psychological risk, social risk, financial risk, safety and time. This research suggested a six-dimensional construct of perceived risk using functional risk, performance risk, physical risk, psychological risk, social risk and financial risk.

Customer Loyalty

Customer loyalty is defined as a deeply held commitment to rebuy or repatronise a preferred product or service consistently in the future, despite situational influences and marketing efforts that have the potential to cause switching behaviour (Oliver, 1999). With loyal customers, companies can maximise their profit because these customers are willing to purchase more frequently, spend money on trying new products or services, recommend products and services to others and give companies sincere suggestions (Reichheld & Sasser, 1990). Oliver (1999) defined loyalty as a deeply held commitment to repurchase a preferred product or service in the future. A combination of past frequent behaviour and of intent to repurchase (Pritchard et al., 1999 in Tuu et al., 2011; Nijssen et al., 2003) is also used to assess a global and cumulative loyalty measure. Tuu et al. (2011) defined customer loyalty as a cumulative construct including both the act of consuming (action loyalty) and expected consumption (future repurchasing). Most studies measure customer loyalty outcomes using behavioural loyalty dimensions such

as word-of-mouth communication, purchase intention, price insensitivity and complaint behaviour (Bloemer et al., 1999; Bloemer & Odekerken-Schröder, 2002; Ibrahim & Najjar, 2008). Another way customer loyalty can be measured is by repurchase intention (Li & Green, 2011; Li, 2011; Cengiz & Yayla, 2007; Haelsig et al., 2007; Reichheld & Sasser, 1990; Marakanon & Panjakajornsak, 2013). This research suggested a four-dimensional construct of customer loyalty using repurchase intention, complaint behaviour, price insensitivity and word-of-mouth.

Previous research indicated that there is a relationship between perceived quality and customer loyalty (Martensen et al., 2000; Bei & Chiao, 2001; Zins, 2001; Aydin & Özer, 2005) because perceived quality helps the customer rebuy a preferred product or service consistently in the future. The subsequent hypothesis explains the relationship between perceived quality and customer loyalty:

H₁: There is a significant association between perceived quality and customer loyalty.

Previous research indicated that there is a relationship between perceived quality and perceived value (Sweeney et al., 1999; Martensen et al., 2000; Teas & Agarwal, 2000; Zins, 2001; Hellier et al., 2003; Snoj et al., 2004; Ball et al., 2006; Vantamay, 2007; Tam, 2012). The subsequent hypothesis explains the relationship between perceived quality and perceived value:

H₂: There is a significant association between perceived quality and perceived value.

Previous research indicated that there is a relationship between perceived quality and perceived risk (Sweeney et al., 1999; Snoj et al., 2004; Chang & Chen, 2008) because consumer behaviour involves risk in a sense that any action of a consumer will produce consequences that the consumer cannot anticipate with any approximating certainty, and some of those consequences are likely to be unpleasant (Snoj et al., 2004). The subsequent hypothesis explains the relationship between perceived quality and perceived risk:

H₃: There is a significant association between perceived quality and perceived risk.

There was evidence to support a relationship between perceived value and customer loyalty (Parasuraman & Grewal, 2000; Yang & Peterson, 2004; Li & Green, 2011; Li, 2011; Tam, 2012; Chuah et al., 2014; Marakanon & Panjakajornsak, 2014b). Perceived value has an important influence on customer behaviour because it influences the decisions on product choice, purchase intention, repeat purchasing and customer loyalty. Hence, the preceding discussion leads to the following hypothesis:

H₄: There is a significant association between perceived value and customer loyalty.

The literature presented evidence to support a relationship between perceived risk and customer loyalty (Tuu & Olsen, 2009; Yen, 2010; Tuu et al., 2011; Hu, 2012; Tam, 2012; Marakanon & Panjakajornsak, 2014a). Hence, this study proposed the following hypothesis:

H₅: There is a significant association between perceived risk and customer loyalty.

The variables used in Figure 1 and the corresponding hypotheses are further elaborated on in the following sections.

METHODOLOGY

Research Framework

The purpose of this study was to examine the association between customer perception and customer loyalty of environmentally-friendly electronic products in Thailand. Based on the hypothesis, the causal relationship between the potential variables was analysed using structural equation modelling (SEM). The research framework is as follows.

Research Design

The study reviewed literature that generated items to measure the credibility ascribed to perceived quality, perceived value and perceived risk in determining customer loyalty in order to find appropriate items for the area. This research was quantitative with a questionnaire created as a tool for measuring variables. The questionnaire was developed from studying research papers

related to customer perception and customer loyalty. The tested and validated items were then administered on selected samples through a survey. Then, structural equation modelling was used to find the relationships between the items and was administered to measure the proposed model and hypotheses for analysng causal models. Finally, data analysis and result discussion sessions were represented. Thus, this section presents the measurement design, data collection and data analysis as follows.

Measurement Design

The questionnaire consisted of five sections as follows.

- (1) Background: These questions covered research variables including gender, age, occupation, income and buying experience. The purpose was to have further understanding of the investigated subjects.
- (2) Perceived quality: There were 23 items covering six dimensions including performance, durability, attention,

worthiness, reliability and product safety. Reference was made to Sweeney et al. (1999), Yoo and Donthu (2001) and Snoj et al. (2004).

- (3) Perceived value: There were 21 items covering five dimensions including function, performance, environmental concern, environmentally-friendly production and environmental benefit. Reference was made to the work of Chen and Chang (2012) and Roig et al. (2006).
- (4) Perceived risk: There were 20 items covering six dimensions including function risk, performance risk, physical risk, psychological risk, social risk and financial risk. Reference was made to the work of Chen and Chang (2012), Chen and Chang (2013), Jacoby and Kaplan (1972) and Sweeney et al. (1999).
- (5) Customer loyalty: There were 19 items covering four dimensions including repurchase intention, complaint behaviour, price insensitivity and word-

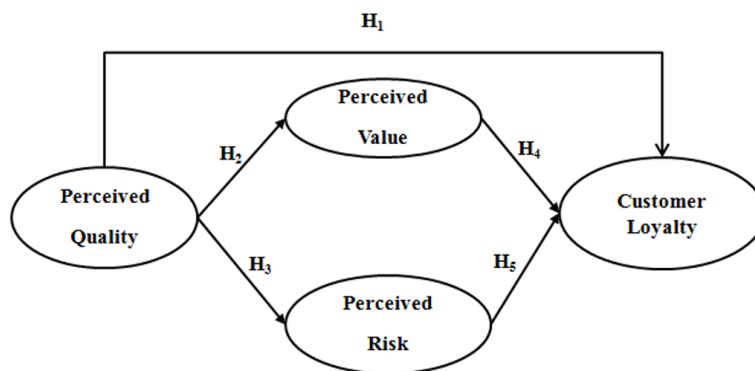


Figure 1. Conceptual framework.

of-mouth. Reference was made to the work of Li (2011) and Li and Green (2011).

A questionnaire using a 7-point Likert scale with the anchors of (1) 'strongly disagree' to (7) 'strongly agree' reduced variability in the results where there may have been differences and enhanced the reliability of the responses. The questionnaire was developed in several stages before it was deployed. First, a draft questionnaire was tested for validity using the Internal Objective Congruence (IOC) technique. The questionnaire achieved an IOC value of 0.984. Second, the draft questionnaire was pre-tested and analysed reliability with Cronbach's Alpha Coefficient. Nunnally (1978) suggested that the Cronbach's Alpha should be at least equal to 0.5 and preferably larger than 0.7. The Cronbach's Alpha for four latent constructs were calculated, and the results of each item was more than 0.8, meaning that the questionnaire had high reliability.

Data Collection

Data was collected from consumers who bought and used environmentally-friendly electronic products, especially mobile phones, computers and laptops, in Thailand. Roscoe (1979) proposed that the rule of thumb for determining a sample size of more than 30 and less than 500 is appropriate for most research.

The researcher used the purposive sampling method due to the infinite population of people who bought and used

environmentally-friendly products. The researcher separated the sample by answered questionnaires related to environmentally-friendly products and collected data from those questionnaires to obtain the targeted samples. The sample size was a proportional allocation separated by region according to which sampling data were representative of relevant data in the data collection.

Sample size was one of the key issues in the structural equation model because it affected the degrees of freedom of the model and the model fitting process. Hence, considering the 21 variables used in confirmatory factor analysis and structural equation modelling, this study required a minimum sample size of 420 respondents.

Data Analysis

The data was analysed using descriptive statistical analysis, confirmatory factor analysis (CFA) and structural equation modelling (SEM). The results from the final SEM model were used to confirm the proposed relationships among the variables.

RESULTS

Descriptive Analysis

The main purpose of using descriptive analysis was to describe the basic features of the data in this study. Results shown in Table 1 revealed that the sample group of this research was the consumers who bought and used environmentally-friendly electronic products in Thailand sectors and most of them (60.0%) were female. The highest range of their age (50.7%) was between 31 and 40

years. Most of them (43.8%) were employees of private companies and their income was between 20,000 and 30,000 THB/month. About 35.5% had buying experience of over 5 times. A fuller description of the participants is shown in Table 1.

Reliability and Validity Test

In Table 2, testing normality is presented. The obtained data had normal distribution because the values of skewedness (SK) and kurtosis (KU) were in the range of -3.0 to 3.0 (Glass & Stanley, 1970). There were several measures to confirm the reliability and validity of the constructs. With respect to the quality of the measurement model, the

Table 1
Background of the Respondents (N=420)

Characteristics		Frequency	Percent
Gender	Male	168	40.0
	Female	252	60.0
	Total	420	100.0
Age (Years)	Under 20	14	3.3
	21-30	120	28.6
	31-40	213	50.7
	41-50	52	12.4
	51-60	16	3.8
	Over 61	5	1.2
	Total	420	100.0
Occupation	Student	19	4.5
	Government officer	122	29.0
	State enterprise employee	41	9.8
	Private company	184	43.8
	Own business	45	10.7
	Other	9	2.1
	Total	420	100.0
Income (THB/Month)	Under 10,000	15	3.6
	10,001-20,000	133	31.7
	20,001-30,000	175	41.7
	30,001-40,000	63	15.0
	40,0001-50,000	21	5.0
	Over 50,000	13	3.1
Total	420	100.0	
Buying Experience (Times)	1-3	138	32.9
	4-5	133	31.7
	Over 5	149	35.5
	Total	420	100.0

loading of all items of the four constructs were significant. Because the Cronbach's Alpha Coefficients of all the constructs were more than 0.7 (Nunnally, 1978), the measurement of this study was acceptable in reliability. In addition, the validity of the measurement can be examined by composite reliability (CR), factor loadings (λ) and average variance extracted (AVE). This study applied CR greater than 0.8, factor loading greater than 0.7 and AVE at least 0.5 as good criteria (Fornell & Larcker, 1981). As shown in Table 2, the CR of the four constructs were 0.838, 0.861, 0.874 and 0.826, which were all higher than 0.7. The AVEs of the four constructs were 0.564, 0.674, 0.701 and 0.615, which were all higher than 0.5. According to the above results, this study possessed adequate reliability and validity.

The Results of the Confirmatory Factor Analysis (CFA)

This study utilised structural equation modelling (SEM) to verify the research framework and hypotheses and applied AMOS 21 to obtain the empirical results. This study started with a confirmatory factor analysis (CFA) for each latent and observed variable.

Measurement models of factors promoting customer loyalty in the dimension of the consumers who bought and used environmental-friendly electronic products in Thailand consisted of five latent variables including perceived quality, perceived value, perceived risk and customer loyalty. CFA was conducted to indicate whether

the observed variables were elements in model and for the factor loading of observed variables.

The results of the CFA showed that the variables of perceived quality could be measured from four observed variables: performance, worthiness, reliability and product safety with standardised loadings: $\lambda=0.675, 0.772, 0.805$ and 0.747 , respectively. The variables of perceived value could be measured from three observed variables: function, environmental concern and environmentally-friendly production with standardised loadings: $\lambda=0.868, 0.817$ and 0.776 , respectively. Perceived risk could be measured from three observed variables: function risk, performance risk and financial risk with standardised loadings: $\lambda=0.871, 0.934$ and 0.686 , respectively. Customer loyalty could be measured from three observed variables: repurchase intention, price insensitivity and word-of-mouth with standardised loadings: $\lambda=0.862, 0.678$ and 0.801 , respectively. All observed variables were significant when considering a p value that was <0.001 .

The Results of the Structural Equation Model

For SEM, this research had to identify the latent variables that were exogenous and those that were endogenous. Exogenous latent variables were independent variables that were not influenced by other latent variables (Chiou et al., 2011). Endogenous latent variables were dependent variables that were affected by exogenous variables in the model. In this study, perceived quality

was an exogenous variable. Perceived value, perceived risk and customer loyalty were endogenous variables. The proposed model (see Figure 1) was validated by four latent constructs, each being measured by the indicators given in Table 3.

Table 2
Model of Research Constructs

	Mean	SD	Standardised loadings (λ)	SK	KU	CR	AVE	Cronbach's Alpha (α)
PQ						0.838	0.564	0.840
Perfo	4.55	0.96	0.675	-0.128	0.240			
Worth	4.92	0.96	0.772	-0.271	0.066			
Relia	4.95	0.96	0.805	-0.054	-0.279			
Safet	5.03	0.98	0.747	-0.232	-0.169			
PV						0.861	0.674	0.817
Funct	4.89	0.91	0.868	0.033	-0.327			
Conce	4.98	0.95	0.817	-0.291	0.158			
Frien	5.00	1.00	0.776	-0.025	-0.080			
PR						0.874	0.701	0.887
Funri	4.54	1.04	0.871	-0.144	-0.095			
Perri	4.52	1.11	0.934	-0.191	0.028			
Finri	4.41	1.19	0.686	-0.333	176			
CL						0.826	0.615	0.868
Repur	5.01	0.97	0.862	-0.202	-0.034			
Price	4.97	0.98	0.678	-0.259	0.745			
Word	5.12	1.02	0.801	-0.225	-0.077			

Table 3
Observed Variable

Latent Variables	Observed Variables	Code
Perceived Quality	Performance	Perfo
	Worthiness	Worth
	Reliability	Relia
	Product Safety	Safet
Perceived Value	Function	Funct
	Environmental concern	Conce
	Environmentally-friendly	Frien
Perceived Risk	Function risk	Funri
	Performance risk	Perri
	Financial risk	Finri
Customer Loyalty	Repurchase intention	Repur
	Price insensitivity	Price
	Word-of-mouth	Wordo

The results from the final measurement model were used to evaluate the structural model that tested the significance of the theorised relationships. The final model with path coefficients is shown in Figure 2. Of the five path coefficients, four were significant. The path coefficients were measured to support the hypotheses, as shown in Table 4.

In addition, a goodness-of-fit test was carried out. Table 5 shows the results of the structural model in this study. The overall fit measured for the full model in

the SEM indicated that the fit of the model was acceptable. The set of goodness-of-fit indices that were employed in this study were the chi-square (χ^2)/degrees of freedom (df), goodness-of-fit index (GFI), comparative fit index (CFI), normed fit index (NFI), incremental fit index (IFI), Tucker-Leis fit index (TLI) and root mean square error of approximation (RMSEA).

According to Bagozzi and Yi (1988), a value of 0.9 is acceptable for the model fit of GFI, CFI, NFI and IFI. According to Hu and

Table 4
Support Hypotheses: Path Coefficient

Hypotheses	Support (Yes/No)	Proposed effect	Path coefficient
H ₁ : There is significant association between perceived quality and customer loyalty.	No		0.209
H ₂ : There is significant association between perceived quality and perceived value.	Yes	+	0.962***
H ₃ : There is significant association between perceived quality and perceived risk.	Yes	+	0.752***
H ₄ : There is significant association between perceived value and customer loyalty.	Yes	+	0.588*
H ₅ : There is significant association between perceived risk and customer loyalty.	Yes	+	0.613*

(* and ***represent p levels of 0.05 and 0.001, respectively)

Table 5
Measurement of Goodness-of-Fit

	Heuristic	Final structural model
Chi-Square	$p > 0.05$ ^{ab}	29.8 ($p = 0.276$)
χ^2/df	< 3.0 ^{ab}	1.146
Goodness-of-fit index (GFI)	> 0.9 ^{ab}	0.990
Comparative fit index (CFI)	> 0.9 ^{ab}	0.999
Normed fit of index (NFI)	> 0.9 ^{ab}	0.991
Incremental fit index (IFI)	> 0.9 ^a	0.999
Tucker-Leis fit index (TLI)	> 0.95 ^c	0.997
Root Mean Square Error of Approximation (RMSEA)	≤ 0.08 ^b	0.019

^aBagozzi and Yi (1988); ^bHair et al. (2010); ^cHu and Bentler (1995)

Bentler (1995), a value of 0.9 is acceptable for the model fit for TLI. According to Hair et al. (2010), a value of 0.08 is acceptable for the model fit for RMSEA.

The values of the goodness of fit statistics (illustrated in Table 4) were as follows: GFI=0.990, $\chi^2/df=1.146$ ($\chi^2=29.8$, $df=26$), CFI=0.999, NFI=0.991, IFI=0.999, TLI=0.997 and RMSEA=0.019.

In this study, the value of χ^2/df is 1.146 and is, therefore, acceptable. In addition, the value of the GFI was 0.990, which represents the overall degrees of freedom in the specified model. One value that should be considered in baseline comparisons is CFI, which is recognised as an index to reflect all sample sizes and measure the comparative reduction in non-centrality (Bentler, 1990). The value of the CFI was 0.999 in this model and was highly acceptable.

Next, the values of the NFI and IFI were 0.991 and 0.999, respectively, which fell into the acceptable ranges. The value of the TLI was 0.997 in this study, which is larger than 0.95 and considered a good indicator of good fit (Hu & Bentler, 1995). Moreover, the value of RMSEA was 0.019, which was acceptable.

The results of the full model in this study are shown in Figure 2. Four estimated paths are significant. Therefore, H₂, H₃, H₄ and H₅ are supported in this study.

According to the results shown in Figure 2, the variables of perceived quality had no direct effect on customer loyalty with a statistical significance. The variable of perceived quality had direct and positive effects on perceived value and perceived risk with standardised regression coefficients $\beta=0.952$ and 0.752 , respectively, and a p value <0.001 . In addition, the

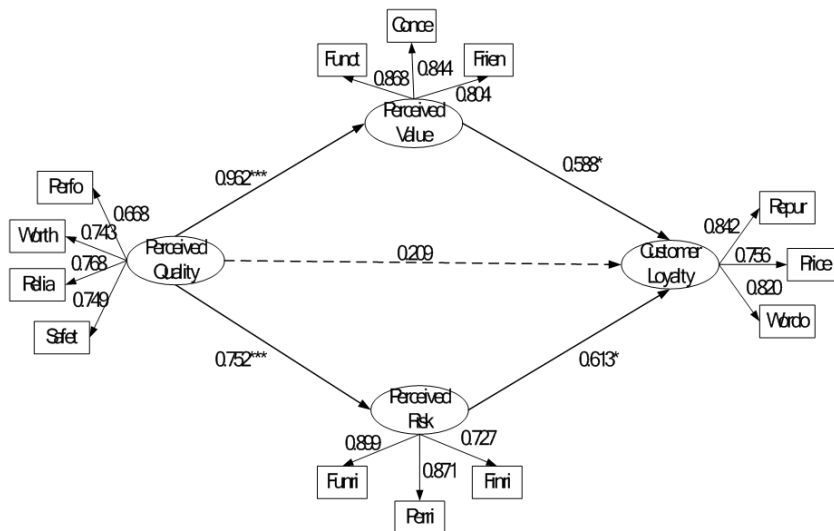


Figure 2. Results of structural equation modelling of perceived quality, perceived value, perceived risk, customer trust and customer loyalty. * $p<0.05$, *** $p<0.001$.

variable of perceived value had a direct and positive effect on customer loyalty with a standardised regression coefficient $\beta=0.588$ and a p value <0.05 . The variable of perceived risk had a direct and positive effect on the customer loyalty with a standardised regression coefficient $\beta=0.613$ and a p value <0.05 .

DISCUSSION

This research used four constructs – perceived quality, perceived value, perceived risk and customer loyalty – in the context of environmentally-friendly electronic products in Thailand. Of five path coefficients four were significant. The analysis results revealed that perceived quality did not directly affect customer loyalty, which did not follow the set hypothesis in the research. Although it was not significant, the situation can be explained by the general characteristics of the Thai electronics market. The explanation for the relationship between perceived quality and customer loyalty could be that the consumers' perceived quality of products was a personal perception and consumers' perceptions were different for products or services without definite standards. Consumer perceptions depended on the decision of personal sense and experience. The results showed that the customers' comprehension of quality varied with any purchasing reasons, marketing position or differences from other brands, price, attractive channel or expansion. The perceived quality became an asset of the brand caused by the marketing investment, advertising and long-time publication.

Furthermore, to build customer loyalty for a product, the results demonstrated that firms should seek to build satisfactory information in any matters of the products, including branding new products with a strong effort to increase continuous product demand.

The perceived quality directly affected the perceived value, with a statistical significance at 0.001, corresponding to the level in Snoj et al.'s research (2004). Snoj et al. (2004) studied the relationship among perceived quality, perceived risk and perceived product value on mobile phone owners who were students. The research found that the perceived quality positively affected perceived value. These results corresponded with the results of Sweeney et al. (1999) and Teas and Agarwal (2000). Therefore, the perceived value was the customers' sense that concerned the value compared with the expected benefit and the total paid margin to buy products and services. These results corresponded with Beneke et al.'s research (2013), which studied latent variables, perceived quality, perceived risk and perceived product value. Beneke et al. (2013) found that perceived quality positively affected perceived value, and their results also corresponded with those of Patterson and Spreng (1997) and Chen and Chang (2012). They mentioned that the perceived value of green products could be measured from function, ability, efficiency of green products in environmental concern, environmentally-friendly products and benefits.

Perceived quality directly affected perceived risk, with the statistical

significance of 0.001, which corresponded to the research results of Snoj et al. (2004) and Beneke et al. (2013). Snoj et al. (2004) and Beneke et al. (2013) studied the latent variables of perceived product quality, perceived risk and perceived product value and found that perceived quality affected perceived risk and, additionally, that perceived risk was perceived by consumers to be an unexpected and bad result, which happened simultaneously in product or service purchasing (Dowling & Staelin, 1994). That was the fundamental concept of consumer behaviour, which meant that the consumers must face unexpected events prior to buying products in each category and lose the expected level of such results as a result of product buying and having an unexpected level.

Perceived value directly affected customer loyalty, with a statistical significance of 0.05, which corresponded with Li and Green's research (2011). Li and Green (2011) studied the influence of many variables to customer loyalty by studying the role of perceived value and found that customer loyalty was a successful marketing strategy, which was competitive for value building for consumers and corresponded with Yang and Peterson's research (2004). Yang and Peterson (2004) studied customer perceived value, satisfaction and loyalty in the margin change to answer the question, "What is the role of satisfaction and perceived value in building loyalty?" A company should obtain customer loyalty and stated that satisfaction and perceived value are the first

priorities. These results corresponded with Marakanon and Panjakajornsak's research (2014b). Marakanon and Panjakajornsak (2014b) found that perceived value had direct association with customer loyalty. This means that if customers' perceived value is higher, loyalty will be higher and customers will show high loyalty to purchase products.

Perceived risk directly affected customer loyalty, with a statistical significance of 0.05, which agreed with Hu's research (2012). Hu (2012) did research on the relationship among brand value, perceived risk, customer loyalty and customer participation. The population of the research was the consumers who bought digital cameras in Taiwan by measuring the loyalty from repeat buying, the cost increase, suggestion and cross purchase and perceived risk measurement from financial risk, duty or qualification and society. These results corresponded with Marakanon and Panjakajornsak's research (2014a), which studied observed variables, functional risk, performance risk and financial risk. Marakanon and Panjakajornsak (2014a) found that risk, performance risk and financial risk influenced customer loyalty. These results corresponded with the work of Tuu et al. (2011), whose research was the effect of the mediation variables of perceived risk, knowledge and uncertainty on satisfaction and loyalty. The purpose of Hu's research was to discuss and test the overall role of the above-mentioned variables. The research result found that perceived risk had an impact on loyalty.

CONCLUSION AND IMPLICATIONS

This research studied the structural equation model that influenced customer loyalty in buying electronic products and examined green products in Thailand. The model tested found that the statistical value for testing matched the proposed model and empirical data. The perceived quality factor directly influenced perceived value and perceived risk. Additionally, the factors of perceived value and perceived risk were latent variables that were influenced directly by customer loyalty. However, the factor of perceived quality did not directly influence customer loyalty. Beyond studying the relationship, this study also suggested applications for businesses, especially for electronic products.

Theoretical Implication

In terms of theoretical implication, the findings do provide some feedback and insights for electronics manufacturer in drafting various managerial strategies on how to increase customer loyalty. This study combines the concepts of green marketing and consumer behaviour to develop a research framework of customer loyalty.

There are four academic contributions in this study. First, it summarised the literature into a new managerial framework of customer loyalty. Second, this study demonstrated that perceived quality is found significantly related to perceived value and perceived risk. Perceived quality plays an important role in enhancing value and risk perceptions of customers. Third, the study demonstrated that perceived

value and perceived risk are found significantly related to customer loyalty, which empirically support the finding that customer perceptions play an important role in influencing customer loyalty. The findings also suggested that customer loyalty can be generated through improving communications with customer. Thus, it is believed that the relationships between customer perception and customer loyalty will be more thoroughly comprehended with perceived quality, perceived value and perceived risk. Fourth, this paper extended the research on customer perception and customer loyalty into the field of green marketing. This suggests that companies must enhance their customer perception in order to raise customer loyalty in this era, which sees the environment as a crucial area of human life.

In addition, based on the confirmatory factor analysis, eight items that measured the constructs (two items for perceived quality, two items for perceived value, three items for perceived risk, one item for customer loyalty) were taken out due to the weak representation of the data. The remaining items for the constructs were tested and proved to fulfil reliability and validity. The construct of loyalty was found to be positively influenced by perceived value and perceived risk. This suggests that the higher customer perception is, the stronger will loyalty be. In conclusion, this research finding has added some theoretical and methodological contributions to the literature.

Managerial Implication

In terms of managerial implication, the practitioners must create different strategies on how to enhance perceived quality (in term of performance, worthiness, reliability and product safety), perceived value (in term of function, environmental concern, environmental friendly) and perceived risk (in terms of function risk, performance risk, financial risk) for the purpose of increasing the likelihood of customer loyalty (enhancing repurchase intention, price insensitivity, word-of-mouth).

This study provided an understanding of what factors affect customer loyalty. Realisation of these factors will help companies anticipate what activities should be undertaken for a successful launch of these practices. According to the empirical results of this study, companies should emphasise their perceived quality, perceived value and perceived risk in order to elevate customer loyalty. As previously mentioned, acquiring new customers is both costly and difficult in terms of marketing for the company when the number of customers has peaked. Hence, it can be said that factors such as perceived quality, perceived value and perceived risk are very important for an electronics manufacturing company to establish loyal customers. A useful starting point for practitioners or marketers is to develop marketing strategies to increase customer perception in order to build longer-term loyalty in the context of environmentally-friendly products nowadays. In order to effectively influence loyalty, it is important that practitioners understand which aspects

of marketing contribute most to customer perception.

Consequently, it is highly recommended to electronics manufacturing companies that they should dedicate sufficient budgets and resources to improving customer perception. They need to emphasise on educating customers about the details of performance, environmental functions, worthiness, reliability and product safety of their electronic products. Moreover, companies should use advertising to convince their customers that the risks for purchasing their products are much lower than others. Therefore, this study suggests that companies should invest more resources for the purpose of increasing of perceived value and perceived risk since both are associated with customer loyalty. Finally, it is hoped that the research results are helpful to managers, practitioners, marketers and policy makers, and will contribute to future research as reference.

LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

Although this research collected cross-sectional data, additional research should include developmental research to study the relationship or change that occurred during the period. The periodic knowledge would apply the comparative data or apply longitudinal studies. Furthermore, this research studied the relation between variables concerning consumer perception, specifically green electronic products. In general, the discussion about the effects of

various variables in developed countries still has little evidence in Thailand. Future research should emphasise the profoundness of consumer perception, awareness or other factors that affect customer loyalty to realise different objectives. However, the present research was undertaken in the case of environmentally-friendly products from Thailand only. Future research should expand the scope to a more representative sample of population and to other products or services. In addition, similar research should be done in other countries or markets for comparison with these results.

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