Applying Signal Quality Theory for Measuring Brand Value of the Consumer Goods

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Abstract. This study mainly focuses on development a model which generalizes relationship among signal quality, brand equity, brand-customer quality relationship and brand-customer quality relationship and brand loyalty. To achieve this goal, authors synthesis previous study about Signal theory, brand relationship quality, brand equity, brand loyalty to propose framework model. Beside that, authors use quantitative research for test relationship among variables in proposed model by SPSS and Amos software with 600 sample. To test relationship between among variable, we use confirmatory factor analysis (CFA) and structural equation model (SEM) to measure all the research measurement scales and test the theoretical model. The findings of the study shall be reasonably applied and bring brand administrators one more choice to build up and develop their brands. The measurement scales might be basically the firm foundation for the market research which need to test and evaluate the brand equity, brand relationship quality, and brand loyalty for the signaling process of a specific brand. Applying the signaling theory into building and developing the particular brands, the administrators ought to select the signals most interested by the consumers and pay much attention on the signaling process.

Keywords: brand equity, brand quality relationship, signal quality, brand loyalty.

1. Introduction

Many researchers measure brand equity in constructing and developing a brand is essential. In marketing, there are two ways to measure brand equity which are (1) cognitive psychology theory and (2) signaling theory Tho (2007). According to the cognitive psychology, the quality which is the unit measured and tested on the consumers 'perception process; The signaling theory believes in information asymmetry in the market and focus on the signals that a customer receives from a certain brand. Measuring the brand is based on the signaling theory is considered a positive method that supports for the theory of cognitive psychology Erdem and Swait (1999). Therefore, while the theory of cognitive psychology has been commonly and widely applied, measuring the brand equity upon the signals seems to be a very potential and positive to deploy it (Connelly et al., 2011).

Most researchers of signaling theory discuss mainly the nature of signals and the factors which should signal the quality of the product. There are a research pointing out the influence of signal quality in building brand equity Erdem and Swait (1999); Tho (2007); (Rea, Wang, and Stoner, 2014); (Hu et al, 2015). Typically, in their studies, Tho (2007) and Erdem and Swait (1999) confirmed the signal quality (including these three characteristics of clarity, consistency ,and credibility) plays an important and positive role in building up brand equity. The theories of the brand equity specify that it is a multi-component concept, positively affecting the brand-consumer quality relationship Chen and Myagmarsuren (2011); Tho and Trang (2011). There is still a lack of one study, which can connect all the concepts of the signal quality (from the signaling theory), brand equity (from the brand theory) and the brand relationship quality (from the relationship marketing theory) together. Looking into the role of the signal quality in creating brand equity and the brand relationship quality is still in the past days. For that reason, this research shall mainly focus on applying the signaling theory into measuring brand equity and the brand relationship quality in the consumer market in Vietnam. The results of the study shall be reasonably applied and bring brand administrators one more choice to build up and develop their brands.

2. Literature Review

2.1. Signalling Theory

It derives the signaling theory from the economics of information in which the market appears information asymmetry Spence (1973); Tirole (1988). In the markets where the information is imperfect or asymmetric, we believe it that sellers often get much more information than buyers because the sellers are the ones who understand their own product and service quality the best. In the condition of information asymmetry, it is difficult for the buyers to identify highly qualified goods from bad ones; in the meantime, the sellers have to also make themselves

recognizable and separated from the others, particularly the ones selling lower-quality products and services Akerlof (1970).

According to information economics, the sellers can send proper signals to their customers to resolve the information asymmetry. Signaling is a key that might eliminate struggles or difficulties in the market of information asymmetry Spence (1973).
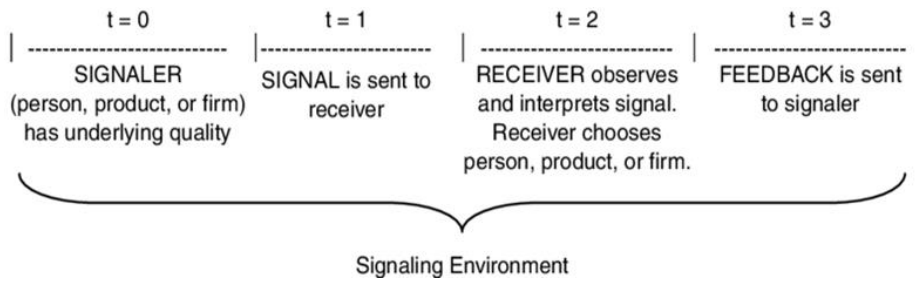

Fig. 1: Signaling Timeline

Source: Connelly et al. (2011)

In a marketing context, the phenomenon of asymmetric information occurs whenever the sellers understand their own products and services more than their consumers. The consumers have little knowledge of products and services which makes it hard to realize the sellers with high-quality products and make purchases. Therefore, by delivering marketing signals, the sellersshall send the information about their goods' quality to their consumers Kirmani and Rao (2000). The marketing signals are the marketing activities which provide the information that helps customer infer about the quality of the product Herbig and Milewicz, (1996).

2.2. Brand and brand equity theories
In the late twentieth century, the global economy had increasingly become more competitive; and along with this trend, it has also recognized brand names under the general points of marketing Trang and Tho (2011). A brand is not just a name or symbol, but more complicated Davis (2002). It is actually a group of characteristics that provides target customers with the values they desire Amber and Styles (1996). Brand equity is defined as the response of customers, distributors, and the cooperation of other businesses which allows the brand to make customers buy more and gain more profits than non-branded products, and it creates the power, ability and competitive advantages for the brand; the brand equity is the customers' knowledge of brands Keller (1993).

2.3. Relationship marketing and Relationship quality
It introduced relationship marketing for the first time by Berry (1983) in service marketing; he believes that the relationship is a strategy in attracting, maintaining and enhancing the relationship with customers Berry (1983). Gummesson (1997)

found that relationship marketing was a key strategy for interaction, relationship, and social network.

The relationship quality concept was basically developed from the theory of relationship marketing by Crosby et al. (1990) and gets more and more attention from researchers and administrators. The relationship quality is particularly the perception of customers to the relationship, which is related to the customers' expectations, plans and objectives Jarvelin and Lehtinen (1996).

2.4. Brand relationship quality

The brand relationship quality is the strength and depth of the relationship of a customer with a particular brand (Smith et al, 2007). Following Tho and Trang (2011) research, this study considers the conceptualization of brand relationship quality which comprises six components: passion, self- connection, commitment, interdependence, intimacy, and trust.

2.5. Brand loyalty

A loyal consumer is the one who buys many products of a specific brand and repeat it gradually Chaudhuri (1999), or the brand loyalty represents the consumers' behavior that if they trust and have a good impression on a brand, they will prior to buy that brand's products (Yoo et al, 2000).

2.6. Signal quality and brand equity

It creates a positive brand image through marketing activities and events Keller (1998). And, the information provided by the brand in those marketing activities and events is a marketing signal Herbig andMilewicz (1996). As a result, holding a marketing event is the first step to provide a clear, consistent and trustworthy signal to create a wonderful impression in consumers' memories, and make the consumers feel and identify the difference among a variety of brands. This makes the brand more attractive than the others. Therefore, the following hypotheses are proposed.

H1: The signal quality positively affects on the brand image.

H2: The signal quality positively affects on the brand attractiveness.

2.7. Signal quality and brand relationship quality

The consumers believe that only highly qualified providers can deliver clear, consistent and credibility signals Tho (2007). Therefore, the quality of information is initially perceived by the consumers so they might decide if they keep using and maintaining the relationship with that brand.

Heil (1988) emphasized that sending signals consistently and properly shown the senders' good faith and effort, and that they looked forward to a quick response from the consumers for a long-term relationship. Therefore, we propose a hypothesis as below.

H3: The signal quality positively affects on the brand relationship quality.

2.8. Brand equity and brand relationship quality

For a specific brand, a powerful brand image shall create an amazing message much better than other ones in a competition Hsieh and Li (2008). In consequence, the brand image (Burmann et al, 2008) which is a competitive factor to increase the credibility and trustworthiness of the brand Latif et al. (2014 shall influence and determine the consumers' behavior). We may consider the image of products as an antecedent variable in the brand relationship quality Kressmann et al. (2006). Chen and Myagmarsuren (2011) and Raza and Rehman (2012) claimed that the brand image made a positive impact on the brand relationship quality. For those reasons, the brand image may influence on the brand relationship quality in the consumer goods market in Vietnam. Thus, the following hypothesis is hereby proposed.

H4: The brand image positively affects on the brand relationship quality.

Besides, the brand attractiveness is one of the most important factors influencing on brand success Sophonsiri and Polyorat (2009). Kowner (1995) research results shown that the attractiveness was the key factor that determined what consumer's decisions was. Also, according to the theory of personal interaction relationship, the perceived brand attractiveness might affect to the brand relationship quality Hayes et al (2006); and, the brand relationship quality is somehow determined by the perceived brand attractiveness. Thus, here is the hypothesis proposed.

H5: The brand attractiveness positively affects on the brand relationship quality.

2.9. Brand relationship quality and brand loyalty

A loyal consumer is the one who buys many products of a specific brand and repeat it gradually Chaudhuri (1999). The brand loyalty is determined as the result of the relationship quality Odekerken-Schroder et al. (2001); Hennig-Thurau and Thurau, (2003); Bojei and Alwie (2010). Liu et al(2014) ; Raza and Rehman, (2012). Then, the last hypothesis in the research is proposed as below.

H6: The brand relationship quality positively affects on the brand loyalty.

Based on the theories of signaling, brand equity and relationship quality, this study proposes a theoretical model including of six hypotheses as illustrated below.
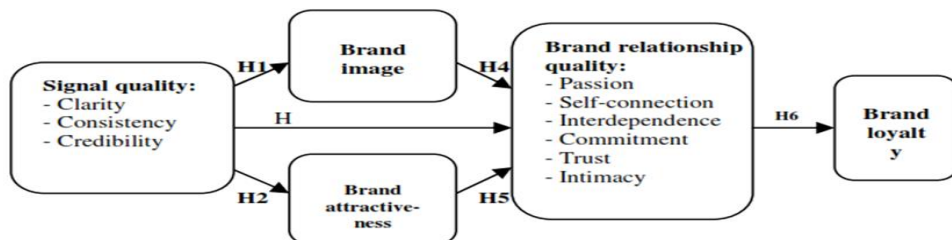

Fig. 2: Research Model

Authors' own compilation

3. Research method

3.1. Research Design

We conducted this research through two steps which were (1) qualitative study and (2) quantitative study. The qualitative research aims at exploring concepts and their relations and then adjusts the measurement scale suitable with the research circumstances in Vietnam. Also, the quantitative research is mainly to measure the scales and test all the hypotheses and research model.

a. Research method

The Cronbach alpha reliability and the Exploring Factor Analysis (EFA) measured the collected data from the quantitative research. After that, we continued these scales to be evaluated by using the Confirmatory Factor Analysis (CFA) to measure all the research measurement scales. The factor loading of the observed variables lower than 0.5 (<0.5) would be eliminated. After measuring the scales, the remained variables would test the theoretical model through the Structural Equation Model (SEM).

b. Samples

When applying the Structural Equation Model, the research was necessary to have many samples in compliance with the theory of distributing large samples Raykov and Widaman (1995). However, this is still in a discussion we consider which amount as the large number Tho and Trang (2011). According to Bollen (1989), research size had to be minimum five (05) samples (much better with 10 samples) for a parameter to be estimated. In this research, there are 31 observed variables, so we predict it that there might be 310 approved samples. We use the more samples, the more reliable the research is. Therefore, this research sample size is n = 600.

3.2. Measurement

a. Measure of Signal quality

Signal quality was one second-order construct was measured on seven observed variables, a seven-point Likert scale developed by Erdem and Swait (1999), Tho (2007).

Table 1: Scale Of Signal Quality

Clarity	Code
I know about this brand	RR1
I know what this brand wants to express.	RR2
Consistency	Code
Everythings is consistent with its fit, quality,	NQ1
A provided information of this brand is consistent from all sources.	NQ2

Reliability	Code
This brand does what its commitment	TC1
This brand delivers what its own	TC2
I highly appreciate the trust of this brand	TC3

b. Measure of Brand image

Brand image is the first-order construct was measured by a seven-point Likert on three items scales, developed by Raza and Rehman (2012) and Erfan and Ling (2013).

Table 2: Scale Of Brand Image

Brand image	Code
This brand delivered a delightful image to its customers	H1
I link to the characteristics of this brand when someone talks about it.	H2
This brand has a distinct image from others.	H3

Table 3: Scale Of Brand Attractiveness

Brand attractiveness	Code
This brand is attractive me.	HD1
This brand always attracts my attention	HD2
If this brand was a person, I would enjoy being seen with her in public.	HD3

Table 4: Scale Of Brand Relationship Quality

Passion	Code
I feel the lovely when talking about this brand	ĐM1
I feel to be proud of when talking about this brand	ĐM2
I feel very pleased when mentioning this brand	ĐM3
Self-Connection	**Code**
This brand helps me to express myself	GK1
This brand is a part of mine	GK2
Commitment	**Code**
I always stick with this brand	CK1
To me, this brand is an irreplaceable brand	CK2
Interdependence	**Code**
This brand help me to express my success	PT1
I feel sad when someone criticizes this brand	PT2
Intimacy	**Code**
I have become very knowledge about this brand	TM1
I always sympathize with this brand	TM2

I have a deep understanding of this brand	TM3
Trust	**Code**
This brand give me a sense of confidence	TN1
This brand is adequate to be trust	TN2
I always believe in this brand	TN3

c. Measure of Brand attractiveness

Brand attractiveness was measured by seven-point Likert on three item scales, developed by Kim *et al* (2001) and Hayes (2006).

d. Measure of Brand relationship quality

Tho and Trang developed measurement scales for brand relationship quality concept (2011), and Chen and Myagmarsuren (2011). Brand relationship quality was measured by 15 observed variables, used a seven-point Likert as below.

e. Measure of Brand loyalty

We measured brand loyalty by three observed variables, developed by Kim et al. (2001); Tho and Trang (2011) was continuously used in this study

Table 5: Scale Of Brand Loyalty

Brand loyalty	**Code**
I only find to buy this brand.	TT1
I will continue to use this brand because I am satisfied and acquainted with it.	
I will use this brand in spite of competitors' deal	TT3

4. Results

4.1. Measurement Validation

Table 6: Results From Analyzing Cronbach Alpha

	Cronbach's alpha reliability
Clarity	0.7949
Consistency	0.6645
Reliability	0.8679
Brand image	0.8225
Brand attractiveness	0.8091
Passion	0.8913
Self-connection	0.7335
Commitment	0.6990
Interdependence	0.6708
Intimacy	0.8681

Trust	0.8293
Brand loyalty	0.8343

Cronbach's alpha reliability analysis

The Cronbach alpha results reflect that the measurement scales in this research are completely reliable ($\sigma \geq 0.6$; and the item - total correlation coeffiency ≥ 0.3) (Table 6).

b. Exploring Factor Analysis (EFA)

EFA for Single direction concepts

KMO (Kaiser-Meyer Olkin) and Significance Bartlett's Test is 0.815 and 0.000, therefore EFA is suitable for research. The results of EFA analysis showed that three factors were extracted with a total variance extracted of 74,326%, factor loading factors were greater than 0.5 (from 0.656 to 0.874). This means the scale of concepts of image, attractiveness and loyalty to achieve convergent and differentiated values. Table 7 records the results of this analysis as follows

Table 7: Single Direction Concepts Factor Weight

Variable	Factor		
	1	**2**	**3**
H2	0.874		
H1	0.845		
H3	0.754		
TT3		0.868	
TT1		0.853	
TT2		0.826	
HD2			0.848
HD3			0.832
HD1			0.656
Variance	43.235	63.165	74.326
Eigenvalue	3.982	1.794	1.004

EFA for multiple concepts

KMO and Bartlett testing for the concept of multiple directional quality signal shows KMO coefficient = 0.886 (> 0.5) and the significance of Bartlett testing is Sig = 0,000 (<0.005). Thus, the condition of analyzing EFA for the concept of quality signal is appropriate. The analytical results of Table 8 show that the total variance index is 63,083% (> 50%), the eigenvalue coefficient = 4,346 (> 1) and the factor loading factor of variables varies from 0.659 to 0.856 (> 0.5) is satisfactory.

This figure shows the conceptual scales of signal quality reaching convergent values. However, one outstanding feature is that the EFA analysis results only extract a single factor while in theory the signal quality is a multiple directional concept consisting of three components: clarity, consistency and reliability. Therefore, implementing the next CFA test will give more accurate results.

Table 8: Signal Quality Factor Weight

Variables	Factor
	1
NQ2	0.807
TC1	0.856
TC2	0.823
TC3	0.806
RR1	0.766
RR2	0.712
NQ1	0.659
Variance	62.083
Eigenvalue	4.346

Table 9: Brand Relationship Quality-Customer Factor Weight

Variable	Factor					
DM1	0.824	0.208	0.187	0.186	0.103	0.148
DM2	0.788	0.232	0.245	0.106	0.226	0.235
DM3	0.764	0.311	0.123	0.117	0.227	0.183
TM2	0.213	0.824	0.165	0.134	0.198	0.146
TM3	0.232	0.773	0.252	0.193	0.136	0.084
TM1	0.253	0.773	0.185	0.134	0.148	0.203
TN2	0.167	0.173	0.837	0.196	0.068	0.063
TN1	0.253	0.211	0.784	0.177	-0.025	0.081
TN3	0.078	0.165	0.774	0.023	0.315	0.223
CK2	0.094	0.164	0.163	0.837	0.113	0.213
CK1	0.239	0.213	0.178	0.684	0.322	0.028
GK2	0.189	0.318	0.118	0.317	0.753	0.083
GK1	0.439	0.175	0.186	0.165	0.652	0.182
PT2	0.291	0.275	0.142	0.028	0.143	0.778
PT1	0.212	0.104	0.195	0.446	0.074	0.701
Variance	46.873	56.425	63.504	70.139	75.381	79.188
Eigenvalue	7.181	1.283	1.062	0.995	0.786	0.571

EFA for Brand relationship quality- customer

Analyzing EFA for Brand relationship quality- customer concept with KMO

coefficient = 0.920 (> 0.5) and significance level of Bartlett Sig = 0,000 (<0.05). This means performing EFA analysis for the brand relationship quality concept - the customer is appropriate. EFA results show that the six factors extracted from the research data with the total variance extracted are 79,188% (> 50%), the load factor of the variables from 0.652 to 0.837 (> 0.5) shows the Part of the brand relationship quality concept - customers achieve convergence value and discriminant value. EFA analysis results for the concept of Brand relationship quality- customer is reflected in Table 9.

c. Confirmatory Factor Analysis (CFA)

The final measurement model had an accepted fit to the data, X^2 (26) = 583.487, p = .000; GFI = .897; CFI = .925; RMSEA = .079. All factor loadings were substantial ($\geq$ .56) and significant (p < .001). All factor correlations were significantly below unity (p < .001) (Table 10).

Table 10: Confirmatory Factor Analysis

| Observed variables	Means	Standard errors	Loading
Clarity: ρc = 0.803; ρvc = 0.672; Cronbach alpha = 0.7949			
I know about this brand	4.655	1.634	.873
I know what this brand wants to express.	4.590	1.397	.764
Consistency: ρc = 0.703; ρvc = 0.551; Cronbach alpha = 0.6645			
Everything is consistent about its fit, quality,	4.918	1.263	.587
A provided information of this brand is consistent from all sources.	4.493	1.595	.870
Reliability: ρc = 0.868; ρvc = 0.684; Cronbach alpha = 0.8689			
This brand does what it commitment	4.616	1.385	.863
This brand delivers what it own	4.773	1.288	.831
I highly appreciate the trust of this brand	4.833	1.319	.788
Brand image: ρc = 0.842 ; ρvc = 0.630; Cronbach alpha = 0.8224			
This brand delivered a good image to its' customers	4.953	1.305	.846

I link to the characteristics of this brand when someone talks about it.	4.895	1.477	.794
This brand has a different image from others.	4.731	1.328	.758
Brand attractiveness: $\rho c = 0.818$; $\rho vc = 0.598$; Cronbach alpha = 0.8092			
This brand is really atractive me.	4.591	1.432	.786
This brand always attract my attention	4.130	1.481	.828
If this brand was a person, I would like being seen with her in public.	3.816	1.578	.704
Passion: $\rho c = 0.894$; $\rho vc = 0.735$; Cronbach alpha = 0.8912			
I feel very lovely when talking about this brand	4.051	1.634	.825
I feel to be proud of when talking about this brand	4.166	1.624	.910
I feel very pleased when mentioning this brand	4.130	1.634	.838
Self-connection: $\rho c = 0.735$; $\rho vc = 0.578$; Cronbach alpha = 0.7334			
This brand helps me to express myself	3.996	1.485	.776
This brand is a part of mine	4.003	1.423	.748
Commitment: $\rho c = 0.69983$; $\rho vc = 0.539$; Cronbach alpha reliability = 0.6990			
I always stick with this brand	4.430	1.439	.774
To me, this brand is an irreplaceable brand	4.093	1.415	.694
Interdependence: $\rho c = 0.673442$; $\rho vc = 0.508$; Cronbach alpha = 0.6707			
This brand help me to express my success	4.155	1.397	.710
I feel sad when someone criticizes this brand	4.258	1.555	.714
Intimacy: $\rho c = 0.867$; $\rho vc = 0.687$; Cronbach alpha = 0.8682			
I have become very knowledge about this brand	4.186	1.332	.818

I always sympathize with this brand	4.265	1.401	.857
I have a deep understanding of this brand	4.370	1.367	.813
***Trust:** ρc = 0.821; ρvc = 0.632; Cronbach alpha = 0.8283*			
This brand give me a sense of confidence	4.793	1.294	.776
This brand is adequate to be trust	4.741	1.343	.834
I always believe in this brand	4.803	1.282	.754
***Brand Loyalty:** ρc = 0.846 ; ρvc=0.639 ;Cronbach alpha = 0.8243*			
I only find to buy this brand.	4.193	1.453	.767
I will continue to use this brand because I am satisfied and acquainted with it.	4.521	1.447	.789
I will use this brand in spite of competitors' deal	4.205	1.650	.824

d. Research Model Testing

Theoretical Model Testing

The SEM results showed that the theoretical model is reasonably acceptable with these following statistics: chi-square = 563.730 (p = 0.000), GFI = 0.912, TLI = 0.923, CFI = 0.938 and RMSEA = 0.75.
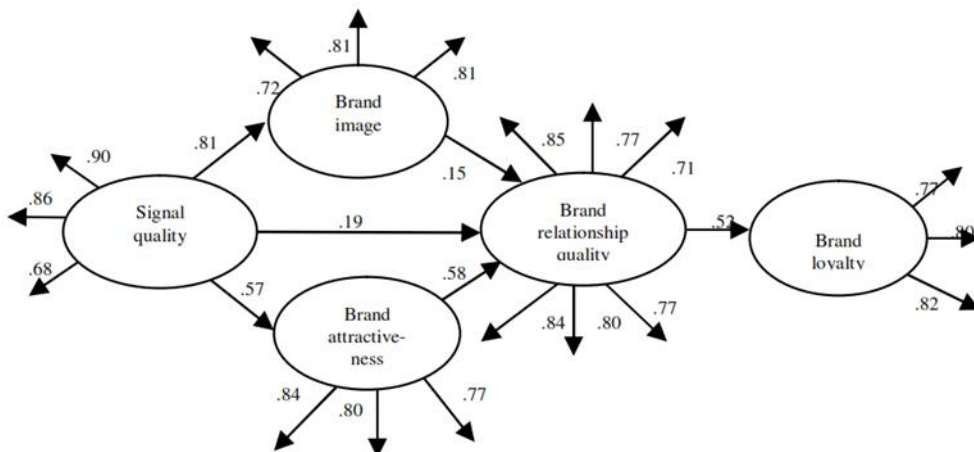
Chi-square = 563.730; df=126; P=0.000; Chi-square/df=4.466;
GFI=.912; TLI=.923; CFI=.938; RMSEA=.075

Fig. 3: SEM results

e. Hypothesis Testing

The results of the SEM confirmed that all the proposed hypotheses are meaningful and valuable for $p < 0.05$ (view Table 11). With the collected statistics, the hypotheses and concepts in this research is concluded to be strongly connected with the theories.

Table 11: Hypothesis Test

Hypothesis	The relationship between the research concept			Estimate	S.E.	C.R.	P
H1	Signal quality	→	Brand image	0.414	0.030	13.866	***
H2	Signal quality	→	Brand attractiveness	0.362	0.031	11.582	***
H3	Signal quality	→	Brand relationship quality	0.217	0.074	2.937	.003
H4	Brand image	→	Brand relationship quality	0.332	0.163	2.032	.042
H5	Brand attractiveness	→	Brand relationship quality	1.022	0.103	9.968	***
H6	Brand relationship quality	→	Brand loyalty	0.271	0.027	9.878	***

f. Using Bootstrap to Estimate the Model

The research applied Bootstrap with the number of repeated samples (N = 1000). After estimating the average of 1000 items and its difference rate, the statistics indicate that the difference rates are mostly meaningless in the theoretical research, and the rate of accuracy is up to 95%. In conclusion, the estimation in the model is completely reliable.

Table 12: Using Bootstrap to Estimate Model

The relationship between the research concept			Estimate	S.E.	S.E.-S.E.	Mean	Bias	S.E.-Bias	CR
Signal quality	→	Brand image	0.568	0.039	0.001	0.568	0	0.001	0

Signal quality	Brand attractiveness	0.815	0.024	0.001	0.813	-0.001	0.001	1
Signal quality	Brand relationship quality	0.192	0.067	0.002	0.193	0.001	0.002	0.5
Brand image	Brand relationship quality	0.149	0.074	0.002	0.151	0.002	0.002	1
Brand attractiveness	Brand relationship quality	0.577	0.048	0.001	0.575	-0.002	0.002	1
Brand relationship quality	Brand loyalty	0.519	0.043	0.001	0.522	0.002	0.001	2

5. Conclusion and Limitations

The results of the SEM state that the theoretical model is completely matching with the market statistics, and the hypotheses are acceptable with the reliability rate of 95%. Consequently, the scales measuring the research concepts are valuable in the aspect of theory.

Components of the measured concepts: The combination of all the components of measured concepts and their relationship in a same research has never been carried out before, and this is the first time ever.

Scales: By referring to the measurement scales from the previous researches and applying the qualitative study in adjusting the scales, the research model states the true value of the scales in the early researches, and simultaneously makes the measured scales fit with the research conditions of Vietnam market.

Hypotheses: The study showed that signal quality has impacted on the brand relationship quality directly and indirectly through the brand image and brand attractiveness. In addition, this research confirmed the positive influence of the brand relationship quality on the brand loyalty.

The research findings state that the signal quality positively impacts on the brand equity and the brand relationship quality, i.e. the methodology of measuring the the brand equity based on the signaling theory is valuable and meaningful. This means the administrators can practically apply the signaling theory into measuring their brand equity and brand relationship quality.

The other practical meaning of the research is that the measurement scales might be basically the firm foundation for the market researches which need to test and evaluate the brand equity, brand relationship quality, and brand loyalty for the

signaling process of a specific brand.

Kindly note that when applying the signaling theory into building and developing the particular brands, the administrators ought to select the signals most interested by the consumers and pay much attention on the signaling process.

There are some limitations in our study. First, the data used to measure, evaluate and test the theoretical model was mainly collected in Danang City, Vietnam; therefore, the generalization of the research findings needs to be re-evaluated when expanding the research area to other regions across the whole country.

Second, this research mainly discusses on two types of consumer goods which are the mobile network and personal cars. Due to not looking into the other services and products, this is also a point of limitation in the research. However, this is positively a theme for the next research.

Third, the methodology of collecting the samples was the convenience-based one, so the representation is generally limited. If the samples had been randomly selected, the generalization of the research results would have been more reliable.

Finally, the research solely considers the indirect influence of the signal quality on the relationship quality through two components of the brand equity, which is the brand image and attractiveness. There is no discussion on the other components such as brand awareness, perception quality, or the other factors like investment into signal and relationship quality, general marketing components (products, price, place, promotion, etc.), customer's attitude and subjective standard, and many more. This is the research's limitation, but on the bright side it is also the direction of research in the future.

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