A Confirmatory Factor Analysis of Customer Perceptions of Value Equity in the Internet-music Retail Environment

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ABSTRACT

The acceptance of the customer perceptions of value equity conceptual model as advocated by Zeithaml (1988), and further refined by Rust, Zeithaml & Lemon (2000), requires confirmation that it actually measures the value equity construct. This research study attempts to confirm the structure and dimensionality of Rust et. al.'s concept of value equity, using a confirmatory factor analysis, within the internet music retail environment. Several alternative models were tested. A three first-order model (price, quality and convenience) seemed to be consistent with the conceptual and empirical research of the value equity construct. Management and marketing professionals can begin to use the construct as a valid and reliable measure of customer's perceived value of a product or service. The implications for future research are also outlined.

KEYWORDS

Value Equity
Confirmatory Factor Analysis
Customer Perceived Value
Product or Service Quality
Price
Convenience
Goodness-of-fit

INTRODUCTION

Customer perceptions of value are considered the "keystone of the customer's relationship with the firm" (Lemon, Rust & Zeithaml, 2001: 22). Measuring the structure and dimensionality of customer perceptions of value are important conceptual issues that have received considerable attention in the literature (Zeithaml, 1988; Gale, 1994; Oliver, 1997; Rust, Zeithaml & Lemon, 2000; Swait & Sweeney, 2000; Sweeney & Soutar, 2001; Petrick, 2002; Rust, Lemon & Narayandas, 2005). Probably the most well known conceptual model of perceived value was advocated by Zeithaml (1988), and further refined by Rust et. al. (2000).

This refinement of the earlier work of Zeithaml introduced the concept of value equity and its key role in determining actual behaviour outcomes.[1] The three dimensions of value equity being: quality, price and convenience. This conceptual model has largely been refined through exploratory studies or replications using exploratory techniques.

PURPOSE

The acceptance of this conceptual model requires confirmation that it actually measures the value equity construct. The primary goal of this research study is to confirm the structure and dimensionality

1 According to Lemon, Rust and Zeithaml (2001) value equity is just one of three drivers of customer equity. The other two drivers of customer equity are brand equity and relationship equity. While these drivers work both independently and collectively, within each driver are specific levers that can augment customer equity. This research study only addresses the value equity driver.

of Rust et. al.'s concept of value equity. Confirmatory factor analysis will be used to test the structure and dimensionality of value equity. New sample data, from the music retail industry, is collected to test the validity and reliability of the construct. The music retail industry is currently undergoing a major transformation from distributing music through traditional retail stores to a number of different digital distribution channels (i.e. internet downloads and peer-to-peer digital file-sharing) so providing an opportunity to collect data from a completely new distribution channel.

CUSTOMERS PERCEIVED VALUE

The early research by Zeithaml (1988) on customer's perceived value of a product or service laid the foundation for numerous studies that developed multidimensional scales for the measurement of customer's perceived value. While Zeithaml's early research focused on the relationships between price, quality and value, subsequent research developed scales for price, quality and other items that determine perceived value. Some of the more recent scales have been developed by Swait & Sweeney (2000), Rust et. al. (2000), Sweeney & Soutar (2001), and Petrick (2002).

Swait & Sweeney (2000) refer to the concept of 'value orientation' which could be thought of as the innate attitude of customers towards obtaining a low price, high quality or a combination of both. Sweeney & Soutar (2001) developed a 19-item measure to assess customers' perceptions of the value of products. This 19-item measure covered four distinct value dimensions that moved beyond just price and quality to also include emotional and social dimensions. Petrick (2002) developed a 25-item measure to assess customers' perceptions of the value of services. This 25-item measure covered five distinct value dimensions including monetary price, behaviour price (search costs and convenience), quality, emotional response (joy received from purchase) and reputation.

As mentioned in the introduction, the concept of value equity as put forward by Zeithaml (1988) and refined by Rust et. al. (2000) is probably the most well known concept in determining customer's perceived value. Rust et. al. (2005) urge that value equity is likely to have some level of importance to customers when innovative products and services are introduced. There is no doubt that the music industry is currently facing a number of innovative distribution channels, requiring customers to learn and understand new ways of acquiring music. These new distribution channels will contain an element of risk for the customers, so requiring the customer to spend more time comparing the different channels. In so doing the customer spends more time evaluating perceived value. This makes the new distribution channels in the music retail industry an ideal source of data to confirm the value equity construct.

Rust et. al. (2005: 268) contend that customers could generally define value in four ways:

1. Low price
2. Whatever a customer wants in product
3. The quality the customer gets for the price the customer pays
4. What the customer gets for what the customer gives up, including time and effort.

The first definition equates low price with value. While price is important in defining value, more recent studies have shown that it is not the only factor in determining value (Swait & Sweeney, 2000; Sweeney & Soutar, 2001; and Petrick, 2002).

According to Zeithaml (1988) the second definition is essentially the same as the economics definition of utility (i.e. individual welfare), that is, a subjective measure of satisfaction. This would imply that customer value is a uni-dimensional construct that is measured by summating customer's individual items to obtain a total score for value (or utility).

The third definition conceptualises

customer value as a transaction trade-off between a 'give' component, price, and a 'get' component, quality. This would imply that customer value is a two dimensional construct. The trade-off or relationship, however, between price and quality is a contentious issue as there seems to be no clear evidence in the literature that a positive trade-off exists (Zeithaml, 1988).

The fourth definition conceptualises customer value as a transaction trade-off between all relevant 'give' and 'get' components. Zeithaml's definition of value equity builds on this fourth definition to imply that value can also include a dimension for convenience (i.e. time and effort). This would imply that customer value is a three dimensional construct. Value equity is therefore defined as "the customer's objective assessment of the utility of a product, based on perceptions of what is received and what is given" (Zeithaml, 1988: 14). In this case the 'product' would refer to the distribution channel.

In Figure 1, the three dimensions of value equity (quality, price and convenience) are shown with their related items (10 items in total). Each dimension will be discussed in turn.

Figure 1: The Three Dimensions of Value Equity
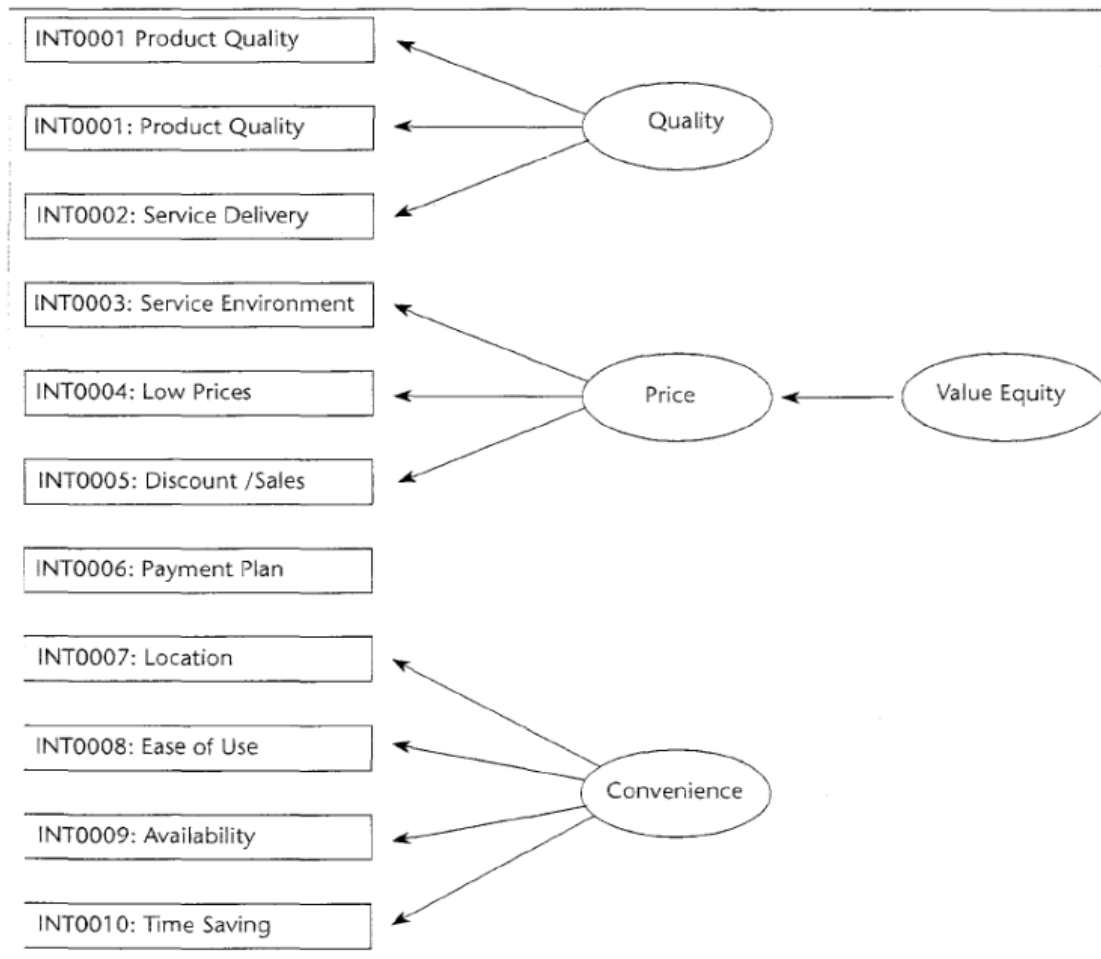
Source: Adapted from Rust et. al. (2000: 72-73).

Quality

Quality encompasses the objective physical and non-physical aspect of the distribution channel which is under the control of the distributor. Quality consists of three items: the product, service delivery and service environment (Rust et. al., 2005). The quality of the product could be defined in terms of either tangible or intangible aspects. The tangible aspect could be the quality of the music recording on the CD, while the intangible aspect could be the quality of the music recording downloaded onto a PC or digital device. The quality of the service delivery could be defined as to the extent that the distributor delivers what it promises through the actual performance of the service. Finally, the quality of the service environment is defined in terms of the surrounding in which the music is acquired. For example, the quality of the service environment in a music-retail store as opposed to downloading music at home or work

Price

Price encompasses the aspects of "what is given up by the customer" which can to some extent be influenced by the distributor. In this case, price is more than just the 'market price' of the music that is acquired. Price consists of three items: low prices, discounts/sales and payment plans. Low prices refer to consistent low 'prices' to the customers. In this specific case low price is more than just a low 'monetary price' for the music that is acquired, it is also the 'price' paid for the internet connection, being caught infringing intellectual copyrights, catching computer viruses, or receiving spyware. Price discounts refer to temporary reductions in 'price' offered to customers. This could take the form of price promotions, buy-one-get-one-free, coupons or in the case of music acquired over the internet, the 'price' of not receiving advertising, spam and other promotional material. Payment plans refers to the flexibility in the price paid, timing of

the payment, and the methods of payment available (Rust et/ al., 2005).

The International Federation of the Phonographic Industry (2005) assert that the reason why young customers (under 25) are more reluctant to use licensed download websites is that the payment method requires a credit card. 'Payment' on unlicensed P2P is often in the form of allowing 'peers' access to music files stored in other 'peers' computers. This is commonly referred to as 'uploading'.

Convenience

Convenience encompasses the aspects that helps reduce the customer's time costs, search costs, and effort to acquire recorded music from the distributor. Convenience consists of four items: location, ease of use, availability, and time saving (Rust et. al., 2005). Location is defined as the physical (retail store) or virtual space (internet) where the customer interacts with the distributor. Ease of use is defined as the enhancements to the distribution channel that enables the customer to acquire music more efficiently and effectively. This could involve the ease of navigating an internet website. Availability is defined in terms of both when the customer can interact with the distributor and extent of the available recorded music catalogue. Time saving is defined as the time saved to acquire recorded music.

RESEARCH METHODS

The three dimensions of value equity have largely been refined through exploratory studies or replications using exploratory techniques. The acceptance of this conceptual model requires confirmation that it actually measures the value equity construct. In order to test and confirm the dimensionality of value equity the researcher will use confirmatory factor analysis. Confirmatory factor analysis is appropriate to this study as the construct (value equity) is well grounded in theory and empirical research. In CFA, the

structural relationships between the items (observed measures) and dimensions (latent measures or factors) are postulated a priori and then statistically tested. The hypothesised model is statistically tested to determine the adequacy of goodness of fit to the sample data (Byrne, 2001: 6). From the results of the test, the researcher either rejects or fails to reject the model.

Sample data was collected through a survey. The research instrument was based on the conceptual model of perceived value as put forward by Rust et. al. (2000). The 10-item scale consisted of three items for quality, three items for price and four items for convenience. The data collection instrument that was used to collect the primary data was the structured questionnaire. The survey was conducted through an anonymous self-completed questionnaire. The questionnaire consisted of two parts. The first part contained questions pertaining to basic demographic details and current music distribution channel usage. The second part contained 10 statements representing the three dimensions. Respondents were asked, on a five-item Likert scale, to indicate their opinion on each statement.

The defined population chosen for the study was university students. The reason for choosing university students is that they have potential access to all the various music distribution channels, are early adopters of new technology and are the single biggest music customer group (International Federation of the Phonographic Industry, 2005). The questionnaire was administered to a convenience sample of 200 students attending a business course. A total of 200 questionnaires were collected, of which 187 were usable. Once the data had been collected, it was captured and collated using SPSS Version 12.

According to Bickman, Rog & Hendrik (1998) the collected data is useless unless it is accurate, valid, and reliable. In order to establish both internal and external validity it was necessary to address the issues of content validity and construct validity.

Content validity arises from the understanding that the definition of value equity is captured by the statements representing the three dimensions. Content validity was sought through pilot testing the questionnaire and reviewing the questionnaire by marketing professionals and academics. Several changes were made to the questionnaire during this stage.

According to Paul Peter (1981: 134) construct validity is "inferred if the measures scores (variance) perform as substantive theory postulates they should perform". Supportive evidence of construct validity in this case is if the confirmatory factor analysis is supported by the theory that the value equity construct produces three meaningful factors.

A popular diagnostic measure of reliability – Cronbach's alpha coefficient - was used to test the consistency of both the three factor scores, as well as the overall summated scores (Paul Peter, 1979). For the value equity construct to be reliable, Hair et. al. (2006) affirm that the Cronbach's alpha coefficient should be greater than .70. For the value equity construct at a whole the Cronbach's alpha was .84, exhibiting high reliability.

This study uses Amos Version 5 (Arbuckle, 2003) to test the goodness of fit of a number of alternative hypothesised perceived customer value models against the collected sample data. Based on logic, theory and empirical research (specifically Rust et. al., 2000 definitions of value) four alternative models are proposed and assess.

ALTERNATIVE MODELS

This section presents the four alternative models. Model 1 hypothesises a priori that value equity could be explained by one first-order factor (uni-dimensional) with errors of measurement associated with each observed variable (item) being uncorrelated. The model is shown in Figure 2. The description for each observed variable was given in Figure 1.

**Figure 2:** Model 1. One First-order Factor
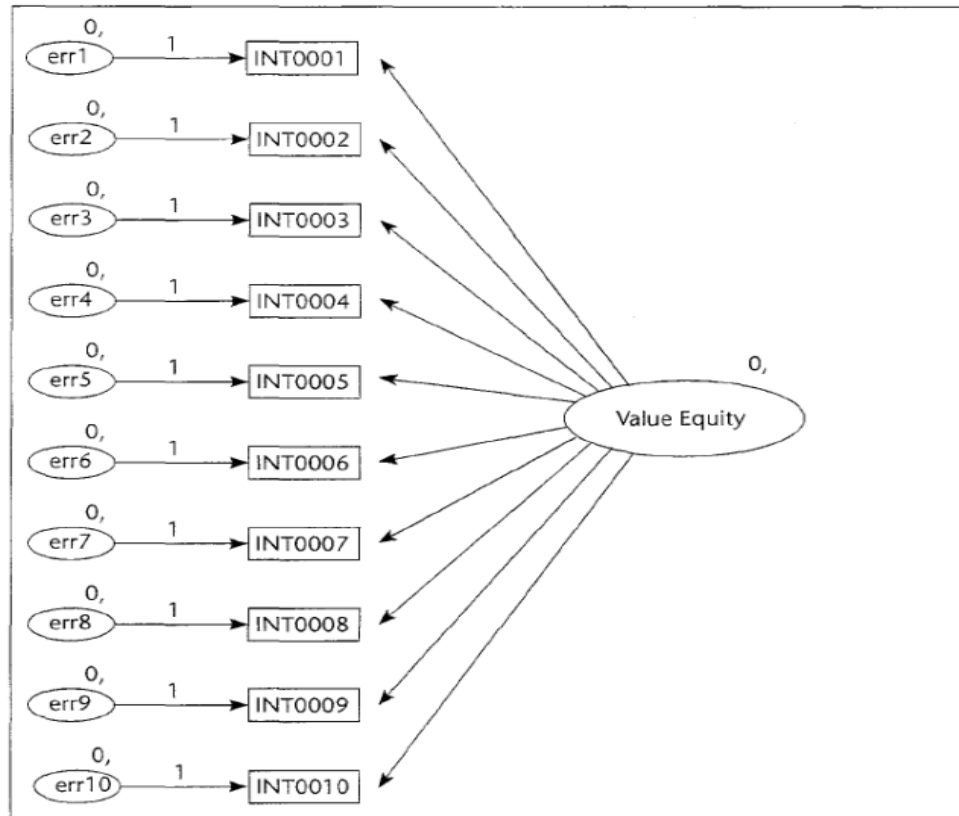
Model 2 hypothesises a priori that value equity could be explained by two first-order factors with errors of measurement associated with each observed variable and factors being uncorrelated. The model is shown in Figure 3. Price and quality as modelled as if there is no relationship between the two factors (ignoring the two-headed arrows between price and quality). The observed variables loading onto the factors in the following pattern: INT0001-INT0003 and INT0007-INT0010 loading on the quality factor and INT0004-INT0006 loading on the price factor. Each observed variable was restricted to load on only one variable.

Model 3 hypothesises a priori that value equity could be explained by two first-order factor with errors of measurement associated with each observed variable being uncorrelated. The model is shown in Figure 3. The two factors, quality and price are correlated (as indicated by the two-headed arrows between price and quality). The observed variables loading onto the factors in the following pattern: INT0001-INT0003 and INT0007-INT0010 loading on the quality factor and INT0004-INT0006 loading on the price factor. Each observed variable was restricted to load on only one variable.

Model 4 hypothesises a priori that value equity could be explained by three first-order factor with errors of measurement associated with each observed variable being uncorrelated. The model is shown in Figure 4. The three factors, quality, price and

Figure 3: Model 2 & 3. Two First-order Factors (uncorrelated and correlated)
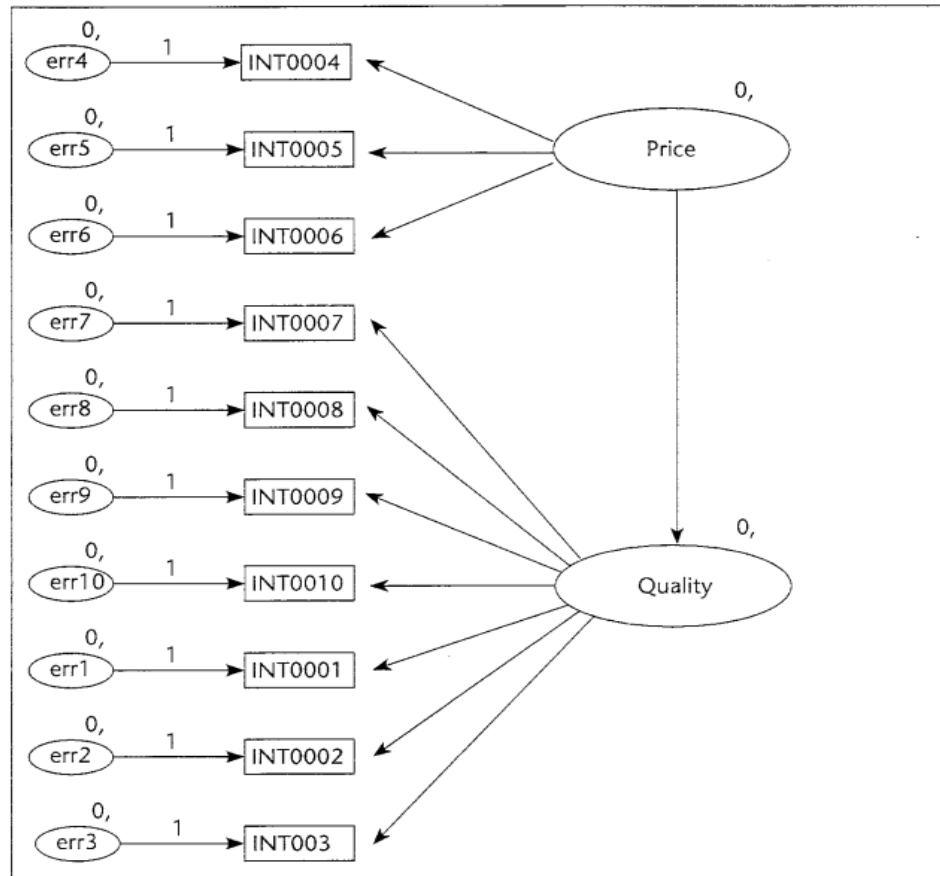
convenience are correlated. The observed variables loading onto the factors in the following pattern: INT0001-INT0003 loading on the quality factor, INT0004-INT0006 loading on the price factor and INT0007-INT0010 loading on the convenience factor. Each observed variable was restricted to load on only one variable.

CRITERIA FOR COMPARING GOODNESS OF FIT

In order to test the goodness-of-fit of the four alternative hypothesised models, against the collected sample data, it is necessary to fit the sample variance-covariance data to each model. If the fit of the model is not entirely adequate, then the hypothesised model will not be supported by the sample data, so leading to the rejection of the model. If the fit of the model is adequate, then the hypothesised model will be supported by the sample data, so leading to the non-rejection of the model (Byrne, 2001). To determine the adequacy of the model, a number of possible indices could be reported. These include chi-square (x^2) statistic, relative fit index (RFI), comparative fit index (CFI), root-mean-square error of approximation (RMSEA) and goodness-of-fit index (GFI).

The x^2 statistic is a statistical test of the model's ability to reproduce the sample variance-covariance data. A non-significant x^2 value indicates that the model and the sample variance-covariance data are similar. Conversely, researchers have highlighted

Figure 4: Model 4. Three First-order Factors (correlated)
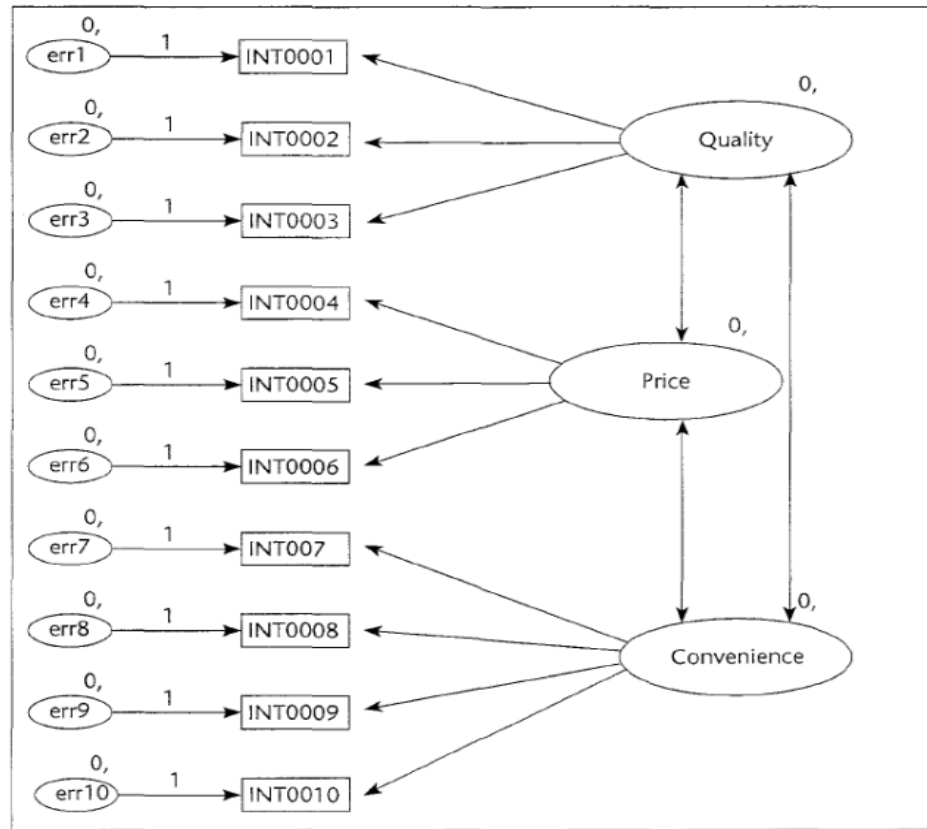
a number of limitations with using the x^2 statistic, preferring to use newer goodness-of-fit tests (Schumacker & Lomax, 2004).

The RFI and CFI both compare the specified model and a null model. Values lie between 0 (poor fit) and 1 (perfect fit). Any value greater than .80 is deemed acceptable. The RMSEA compares the specified model in terms of the population, not just the sample used for estimation. Any value ranging from 0 to .08 is deemed acceptable. Any value greater than .10 is deemed unacceptable (Hair, Black, Babin, Anderson & Tatham, 2006).

RESULTS

The goodness-of-fit indices for the four alternative models are summarised in Table

1. Models 1-3 indicate a significant x^2 value leading to the rejection of the models. This is supported by the other goodness of fit test that also indicate that the models do not fit the sample data. In general then, a one or two first-order hypothesised model does not fit the sample data well.

Model 4 yielded a x^2 value of 57.30, with 32 degrees of freedom and a probability greater that .0001, thereby suggesting a reasonably adequate fit. However because of the concerns raised about the use of the x^2 statistic, it was necessary to report the newer goodness of fit tests. The RFI value of .875 is representative of a reasonable fit whereas the CFI value of .965 is considered evidence of a good fit. This is supported by the RMSEA value of .065, thus indicating

the model fits the sample data. Model 4 is therefore not rejected.

In general then, a three first-order hypothesised model fits the sample data well. Since this seems to confirm the conceptual and empirical research of Zeithaml (1988) and Rust et. al. (2000) it is necessary to further determine the viability of the estimated parameter values of Model 4. In particular, parameter estimates should show the correct sign and size, and be consistent with the value equity theory. Any estimates that do not adhere to these limits would signal a clear indication that the model is wrong.

In Table 2 the unstandardised estimated value (column 1), standard error (column 2), and critical ratio (column 3) are listed for each parameter estimate. The results are presented separately for the regression weights (factor loadings), the covariances, and variances (in this case, for both factors and measurement errors). All the parameter estimates seem to show the correct sign and size, with standards errors (SE) that are not too 'small' or too 'large'. The critical ratio (CR) which represent the parameter estimate divided by its standard error are all statistically significant at a .05 level of significance (p <.05), suggesting that the parameters are correctly specified and valid. Construct validity is inferred as the confirmatory factor analysis supported the theory that the value equity construct produces three meaningful factors.

CONCLUSIONS

Doll, Xia & Torkzadeh (1994) express concern that CFA results should always be interpreted with caution. The reason for this is that the criteria for judging goodness-of-fit are always relative rather than absolute, and do not have universally accepted standard cut-off values. Consequently, the three first-order model presented in this study does not imply that it is the optimal solution because models can always be re-specified to improve the fit. Future research may in fact attempt to revise and improve the value equity construct by re-specifying the model or analysing the relationship between the errors of measurement terms. Future research may also attempt to test some of the four and five dimensional value models as put forward by Swait & Sweeney (2000), Sweeney & Soutar (2001), and Petrick (2002).

Nevertheless, this study confirms the dimensionality and structure of the value equity construct advocated by Zeithaml (1988), and further refined by Rust et. al. (2000). It provides evidence that value equity is a multidimensional construct that consists of three dimensions, namely price, quality and convenience. Management and marketing professionals can begin to use the construct as a valid and reliable measure of customer's perceived value of a product or service.

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Table 1: Goodness of Fit Indexes for Alternative Models

Model	x^2 (df)	Probability	RFI	CFI	RMSEA
Model 1	225.23 (35)	.000	.549	.739	.171
Model 2	299.55 (35)	.000	.400	.637	.202
Model 3	222.02 (34)	.000	.542	.742	.172
Model 4	57.30 (32)	.004	.875	.965	.065

Table 2: Model 4 Three First-order Factor Parameter Estimates

Regression Weights			Estimate	S.E.	C.R.	p
INT0003	<---	Quality	1.000			
INT0002	<---	Quality	1.122	.114	9.821	<.000
INT0001	<---	Quality	.648	.091	7.145	<.000
INT0004	<---	Price	1.583	.401	3.945	<.000
INT0005	<---	Price	1.238	.323	3.833	<.000
INT0006	<---	Price	1.000			
INT0007	<---	Convenience	1.060	.097	10.950	<.000
INT0008	<---	Convenience	1.115	.098	11.374	<.000
INT0009	<---	Convenience	.862	.083	10.428	<.000
INT0010	<---	Convenience	1.000			
Covariances			Estimate	S.E.	C.R.	p
Quality	<-->	Price	.152	.073	2.098	.036
Convenience	<-->	Quality	.310	.086	3.596	<.000
Convenience	<-->	Price	.388	.102	3.810	<.000
Variances			Estimate	S.E.	C.R.	p
Quality			.935	.159	5.881	<.000
Price			.243	.106	2.287	.022
Convenience			.826	.153	5.394	<.000
err10			.693	.086	8.046	<.000
err9			.339	.045	7.452	<.000
err8			.257	.046	5.548	<.000
err7			.344	.051	6.759	<.000
err6			1.238	.148	8.388	<.000
err5			1.184	.151	7.818	<.000
err4			.692	.119	5.796	<.000
err3			.389	.088	4.400	<.000
err2			.285	.103	2.766	.006
err1			.887	.103	8.604	<.000

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