CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

Chapter Three provided the conceptual framework articulating the relationships between country-of-origin effects and consumer-based brand equity. The research hypotheses were also presented in Chapter Three. This chapter describes the research methodology adopted to conduct an empirical study designed to test the proposed conceptual framework. The variables and constructs used in the study are operationalised in this chapter. The details of the research design including the sampling plan, questionnaire design, data collection and analysis procedures are also described.

4.2 RESEARCH PARADIGM

The goals of the researcher and the nature of the research topic influence the selection of a research strategy (Benbasat 1984). The present study attempted testing theory using survey methodology. The present research was carried out in the tradition of objectivism, positivism and functionalism.

The present research assumes the existence of an objective physical and social world independent of humans and whose nature can be relatively unproblematically apprehended, characterised and measured. For example, the existence of *consumer-based brand equity* was acknowledged and it was treated as a measurable concept.

The present research was conducted on the premise of the existence of prior fixed relationships within phenomena, which could typically be investigated with structured instrumentation. The empirical study involves testing theory, quantifiable measures of variables, testing of hypotheses, and drawing of inferences about the chosen phenomena from the sample to the stated population. Hence, the proposed study could be classified as a *positivist study* according to Orlikowski and Baroudi's (1991) framework.

The present research was also carried out from the functionalist perspective. The functionalist paradigm generates regulative sociology and in its overall approach seeks to provide essentially rational explanations of social affairs (Burell & Morgan 1979). The present study reflects a highly pragmatic approach to generating knowledge which can be put to use.

4.3 OVERVIEW OF RESEARCH METHODOLOGY

This section provides an overview of the research methodology employed including a brief description of the empirical study conducted in two different product categories, for testing the proposed conceptual framework. First, the relevant literature in the areas of country-of-origin effects and brand equity was reviewed to identify measures of country image and consumer-based brand equity.

Next, a pilot study was conducted to refine two country image scales from previous research, which were used in the main empirical study. A structured questionnaire (see Appendices A & B) was used for collecting the data from a student sample, in an Australian university. The pilot study results (see Appendix C) were used in determining the stimuli used. The pilot study results also helped in the identification of the brands included in the main study and in the confirmation of the choice of countries.

A cross-sectional mall intercept survey was used for the data collection for the main empirical study. The structured questionnaire used as the data collection instrument (see Appendices D & E) included the quasi-experimental design. A doubly-multivariate design was employed for examining the differences in consumer-based brand equity across three different countries of origin. The unit of analysis was the individual consumer. A total of 675 responses were collected through systematic sampling.

The associative strength of respondents' product category-brand and product category-country associations was measured using the 'naming method' suggested by Fazio (1987, 1990). Fazio suggested three classes of methods to measure associative strength. The 'naming method' involved presenting subjects with the name of the product category label (e.g., televisions/cars) and asking them to recall the names of brands or countries.

The multidimensionality of the consumer-based brand equity construct was established by confirmatory factor analysis using structural equation modelling. The AMOS 4.0 software package was used for testing the factor models.

The next step was to measure respondents' country image at both *macro* and *micro* levels. The two country image scales used in the present study were purified using exploratory factor analysis. Differences in consumers' country images of different countries were examined using repeated measures one-way ANOVA. The software package SPSS was used for the factor analysis and for the ANOVA.

The confirmatory factor analysis data were subsequently analysed, for differences in consumer-based brand equity by country-of-origin of the brand, product category and

brand name within a product category. SPSS was used for MANOVA employing a doubly-multivariate repeated measures design.

The relationships between *macro* and *micro* country images and consumer-based brand equity dimensions were then examined using canonical correlation analysis, using the software package SYSTAT. The data obtained from the factor analysis and the confirmatory factor analysis were used as the input for the canonical correlation analysis.

4.3.1 Stimuli Used

The conceptual framework was tested in two product categories: colour 'televisions' and 'cars'. Japan, Malaysia and China were the countries selected for inclusion in the present study. Sony, Hitachi and Toshiba were the brand names included in the study for the television category. Toyota, Mitsubishi and Suzuki were the brand names selected for the product category 'cars'. The rationale behind the inclusion of these stimuli in the study is provided in this section.

Selection of the product categories

There were two important reasons for selecting cars and televisions as the product categories. Previous research demonstrated country-of-origin effects for both cars (Erickson, Johansson & Chao 1984; Han 1989; Han & Terpstra 1988; Johansson, Douglas & Nonaka 1985; Lawrence, Marr & Prendergast 1992) and televisions (Ettenson 1993; Han & Terpstra 1988). It was assumed that most consumers in a developed country such as Australia would be in a position to evaluate these two product categories. The results supported the decision to select these two product categories, as all the respondents (100%) had used the products in the two categories.

Selection of the countries-of-origin

There are several reasons behind the inclusion of Japan, Malaysia and China as the countries in the present study. Previous research (e.g., Agarwal & Sikri 1996; Jaffe & Nebenzahl 2001; Nagashima 1977) has observed that consumers associate Japan with the product categories televisions and cars, compared to other countries (e.g., South Korea) in Asia. As of 2001, Japan and China are major trading partners of Australia. As of 2001, Japan (ranked 2), China (ranked 3) and Malaysia (ranked 8) were among the top 10 countries in terms of imports into Australia (Australian Bureau of Statistics [ABS] 2002a).

Japan, China and Malaysia can also be categorised as Asian countries and somewhat homogeneous in cultures compared to Western countries. Products from all three countries were available to Australian consumers. Australia provided an ideal setting for the research since many foreign products, including those from the above three countries, are available to consumers.

In order to test the proposed conceptual framework, three countries were needed, between which respondents perceived substantive differences in terms of association with the selected product categories. The pilot study results (see Appendix C) confirmed that respondents indeed perceived substantive differences among the three countries (Japan, Malaysia and China) in terms of their association with the selected product category. Respondents strongly associated Japan with both cars and televisions, compared to Malaysia and China. Respondents associated China more with both the product categories, compared to Malaysia. Thus, Japan, Malaysia and China were included as the countries in the study.

The associative strength between the product categories and the countries, in the pilot study, was calculated as follows. The order in which the pilot study respondents listed countries, when they thought of a given product category, was used as the basis for preparing a product category-country association (PCCA) rating. The PCCA rating indicates the associative strength of the product category-country associations. The PCCA rating was computed for all the countries mentioned by the respondents. The countries were then ranked based on their PCCA ratings.

Selection of the brands

Three brands from each product category were included in the study. Sony, Hitachi and Toshiba were the brand names included in the study for the television category. Toyota, Mitsubishi and Suzuki were the brand names selected for the product category cars. Products from all these brands were available to Australian consumers. The brand names were selected in such a way that (i) respondents perceived substantive differences in terms of their association with the selected product categories and (ii) they signalled the home country of the brand. Input from the pilot study (see Appendix C) was used in selecting the brand names.

Pilot study results indicated that, for televisions respondents' associations towards the brand Sony were stronger than those towards Hitachi and Toshiba. Respondents' associations towards the brand Toshiba were stronger than those towards Hitachi, but were

weaker than those towards Sony. For cars, respondents' associations towards the brand Toyota were stronger than those towards Suzuki and Mitsubishi. Respondents' associations towards the brand Mitsubishi were stronger than those towards Suzuki, but were weaker than those towards the brand Toyota.

The associative strength between the product categories and brand names was measured as follows. A product category-brand associations (PCBA) rating was computed for all the brands mentioned by the pilot study respondents, for each product category. The PCBA rating indicated the associative strength of the product category-brand associations. The brands were then ranked based on their PCBA rating. The order in which the pilot study respondents listed the brands when they thought of the selected product categories was used as the basis for preparing PCBA rating.

Brands were also selected in such a way that they would signal their country-of-origin. Thakor and Kohli (1999, pp 30-31) argued that 'country-of-origin cues are already embedded within many well known brand names'. Other researchers (e.g., Phau & Prendergast 1999, p 76) have argued similarly saying that 'origin cues are already firmly imprinted within successful brand names'.

All the selected brands signalled their country-of-origin (Japan) to consumers. The research objective was to examine differences in consumer-based equity of a brand with change in its country-of-origin. If the brands included readily signalled their country-of-origin (e.g., Japan), it would be easy for consumers to notice the change of origin when they were exposed to the same brand names made in China or Malaysia.

4.4 OPERATIONALISATION

The operational definitions of the variables and constructs included in the study are provided in this section. Country-of-origin was operationalised consistent with the definition provided by Thakor and Katsanis (1997). Brand equity was operationalised consistent with the definition provided by Aaker (1991) and Keller (1993). *Macro* country image was operationalised consistent with the definition provided by Martin and Eroglu (1993). *Micro* country image was operationalised consistent with the definition provided by Nagashima (1970, 1977).

4.4.1 Country-of-origin

As previously mentioned, country-of-origin was operationalised as 'the country in which the product is made', consistent with researchers such as Thakor and Katsanis (1997, pp. 79-80).

4.4.2 Consumer-Based Brand Equity

Several methods were suggested in the literature for the measurement of brand equity. However, a broad classification of measurement of brand equity falls into two groups, financial and consumer related ones (Keller 1993; Mackay, Romaniuk & Sharp 1997; Park & Srinivasan 1994; Simon & Sullivan 1993).

Researchers have argued in favour of a consumer-based measurement of brand equity, stating that there is value to the investor, the manufacturer and the retailer only if there is value for the consumer (e.g., Crimmins 1992; Farquhar 1989). Some of the methods suggested in the extant literature are:

- asking respondents to make trade off judgments about brand attributes (conjoint analysis) (Green & Srinivasan 1978, 1990).
- comparing actual consumer choice behaviour with those implied by utilities obtained through conjoint analysis (Srinivasan 1979).
- using real consumer choices (as against survey-based methods) and estimating segment level brand equity (Kamakura & Russel 1989, 1993).
- using consumer preference ratings for branded product versus an unbranded product (Aaker 1996a).
- asking the monetary equivalent of the total utility a consumer attaches to a brand (Swait, Erdem, Louviere & Dubelaar 1993).
- using a survey-based method to measure brand equity at individual level (Park & Srinivasan 1994).

The above approaches (except Park & Srinivasan) are of somewhat limited use for managers since brand equity is not broken into components that can be related to factors such as favourable customer perceptions (Sinha & Pappu 1998; Sinha, Leszeczyc & Pappu 2000). Park and Srinivasan divided brand equity into attributes-based and non-attributes-based components.

Measurement approach adopted by the present research

As previously mentioned, the present research conceptualises brand equity from a consumer-perspective. In the present study, a brand equity measurement method, similar to those proposed by Cobb-Walgren, Ruble and Donthu (1995), and Sinha and Pappu (1998) was adopted. The proposed method involves subdividing brand equity into four dimensions, namely brand awareness, brand associations, perceived quality and brand loyalty. An absolute measure (not a relative measure) of brand equity is obtained, and brand equity is measured at the brand level (not at the firm level). Consumer-based brand equity was measured within a given product category (e.g., televisions) for specific brands (e.g., Sony).

Operational definition

Consumer-based brand equity was operationalised in the present study as a four-dimensional construct. Likert-type items compiled from D.A. Aaker (1991, 1996c), J.L. Aaker (1997), Yoo, Donthu and Lee (2000), and Yoo and Donthu (2001) were used as the source measures for these dimensions. These indirect measures of brand equity (see Table 4.1) were empirically tested (Agarwal & Rao 1996) and used in a number of studies (e.g., Cobb-Walgren, Ruble & Donthu 1995; Sinha & Pappu 1998; Sinha, Leszeczyc & Pappu 2000; Washburn & Plank 2002; Yoo & Donthu 2001). The consumer-based measures also allowed the assessment of brand equity at the brand level in a given product category.

Each consumer-based brand equity dimension, except brand awareness, was operationalised as the average of the consumer's rating of the Likert-type items loading on it. A scale of 1 to 11 was adopted for all measures except brand awareness. The anchors 'strongly disagree' (1) and 'strongly agree' (11) were used. Brand awareness was measured using three dichotomous variables (Yes/No), and was operationalised as the sum of consumer's ratings for these three dichotomous awareness measures.

Aided and unaided recall (Aaker 1991) were used as measures of brand awareness. Organisational associations and brand personality provided measures of brand associations as suggested by Aaker (1996c). Based on Aaker (1997), five measures were also obtained for brand personality. Each of these measures was based on the five facets of brand personality developed by Aaker (1997), namely sincerity, excitement, competence, sophistication and ruggedness.

Table 4.1 Measures of brand equity used in the main empirical study.

Dimension **Measure**
Brand awareness (Aaker 1991)
Unaided recall
▪ Asked for the name of the brand (Product category is mentioned)
Aided recall
▪ Which of the brands are you aware of? (Names of the brands provided)
▪ Which of the following brands have you used before? (Brand recognition, based on aided recall, names of the brands were provided)
Brand associations
Brand personality (Aaker 1997)
▪ Sincerity
▪ Excitement
▪ Competence
▪ Sophistication
▪ Ruggedness
Organisational associations (Aaker 1991, 1996c)
▪ Like the company which makes brand X
▪ Feel proud to own products from the company which makes brand X
▪ Trust the company which makes brand X
Perceived quality (Aaker 1991; Yoo, Donthu & Lee 2000)
▪ Brand X is of very good quality
▪ Brand X is reliable
▪ Brand X has excellent features
▪ Brand X is durable
▪ Brand X offers consistent quality
Brand loyalty (Yoo, Donthu & Lee 2000; Yoo & Donthu 2001)
▪ Brand X would be my preferred choice
▪ I consider myself loyal to brand X
▪ Brand X would be my first choice

Source: Compiled from a review of the literature.

Liking, pride and trust were used to measure organisational associations as suggested by Aaker (1996c), while measures of perceived quality were obtained from Aaker (1991) and Yoo and Donthu (2001). Measures for brand loyalty were obtained from Yoo and Donthu (2001) and Yoo, Donthu and Lee (2000).

Valid and reliable scales for these measures have been provided in Aaker (1996a). A multi-item scale was developed from the 19 items compiled from D.A. Aaker (1991, 1996c), J.L. Aaker (1997), Yoo, Donthu and Lee (2000) and Yoo and Donthu (2001) and validated using exploratory and confirmatory factor analyses. Exploratory factor analysis resulted in a pool of 13 items for the subsequent confirmatory factor analysis (see Table 4.1).

4.4.3 Country Image

Respondents' overall or general images of products from a country, not those specific to a product category, were measured in the present study. For example, the present study measured the overall image of products from Japan, not the image of the product categories cars or televisions from Japan. Note that consumers are known to have product category specific country images (Kaynak & Cavusgil 1983). Consumers might have different image of 'cars' from Japan and a different image for 'wines' from Japan.

Operational definitions

Macro country image was operationalised as consumers' mean score to the Likert-type items of a modified Martin and Eroglu (1993) country image scale. *Micro* country image was operationalised as consumers' mean score to the Likert-type items of a modified Nagashima (1970, 1977) country image scale. As previously mentioned, *macro* country image refers to consumers' perceptions and beliefs at the country level, whereas *micro* country image refers to consumers' perceptions and beliefs of the country at the products level as discussed in section 3.2.3.

Macro Country Image

The present study used a modified 14-item semantic differential scale validated by Martin and Eroglu (1993) to measure the construct, *macro* country image (see section 3.2.3 for the definition). Martin and Eroglu's instrument (see Table 4.2) was modified using input from a pilot study (see Appendix C). Three items from the original Martin and Eroglu's scale were found not to be relevant and were deleted.

Table 4.2 Measures of country image - Martin & Eroglu (1993).

Dimension		Measures
Political	1	Democratic vs. Dictatorial
	2	Capitalist vs. Communist
	3	Civilian vs. Military
	4	Pro-Western vs. Pro-communist
	5	Free-market vs. Centrally planned
Economic	6	Level of standard of living
	7	Stability of economic environment
	8	Quality of products
	9	Existence of a welfare system
	10	Level of labour costs
Technological	11	Level of industrialisation
	12	Level of technological research
	13	Level of literacy
	14	Mass produced vs. Handcrafted

Source: Martin, I.M. & Eroglu, S. 1993, 'Measuring a multi-dimensional construct: Country image', *Journal of Business Research*, vol. 28, no. 3, pp. 191-210.

The *macro* country image measures obtained from the pilot study, and used in the main empirical study are shown in Table 4.3.

Table 4.3 Measures of *macro* country image used in the main empirical study.

	Measure
1	Level of technological research
2	Producer of high quality products
3	High standard of living
4	High Labour costs
5	Welfare system
6	High level of industrialisation
7	Civilian non-military government
8	Highly developed economy
9	Literate
10	Free-market system
11	Democratic

Source: Adapted from Martin and Eroglu (1993).

Micro Country Image

The country image scale developed by Nagashima (1970) is shown in Table 4.4. From Nagashima's 20-item scale, 18 items were adopted. Two items (items 5 & 9 in Table 4.4, 'common-exclusive', 'mass produced – handmade'), which were considered obsolete based on expert opinion, were dropped.

Table 4.4 Measures of country image – Nagashima (1970).

	Measure	
1	Inexpensive	Expensive
2	Reasonably priced	Unreasonably priced
3	Reliable	Unreliable
4	Luxury items	Necessary items
5	Exclusive	Common
6	Heavy industry products	Light manufacturing products
7	Careful and meticulous workmanship	Not so careful meticulous workmanship
8	Technically advanced	Technically backward
9	Mass produced	Hand made
10	World wide distribution	Mostly domestic distribution
11	Inventive	Imitative
12	Pride of ownership	Not much of pride of ownership
13	Much advertising	Little advertising
14	Recognisable brand names	Unrecognisable brand names
15	Large choice of size & model	Limited choice of size and model
16	More concerned with outward appearance	More concerned with performance
17	Clever use of colour	Not clever use of colour
18	More for young people	More for old people
19	More for men	More for women
20	Upper class	Lower Class

Source: Nagashima, A. 1970, 'A comparison of Japanese and US attitudes toward foreign products', *Journal of Marketing*, vol. 34, no. 1, pp. 68-74.

Conversely, four items ('products offer good value', 'high status', 'excellent style and finish', and 'dependable'), which measure quality of products, were added to the scale. Nagashima suggested that country image was a five-dimensional construct. Price and value, service and engineering, advertising and reputation, design and style, and consumers' profile were the dimensions suggested.

However, other researchers (e.g., Agarwaal & Sikri 1996; Cattin, Jolibert & Lohnes 1982; Han & Terpstra 1988; Heslop & Papadopoulos 1993; Jaffe & Nebenzahl 1984;

Narayana 1981; Roth & Romeo 1992; White 1979) who adopted the country image of Nagashima observed a variety of dimensions for country image. Some of the country image dimensions researchers identified are shown in Table 4.5.

Table 4.5 *Micro* country image dimensions observed in the literature.

Author(s)	Country Image Dimensions
Nagashima (1977)	Price and value
	Service and Engineering
	Advertising and reputation
	Design and style
	Consumers' profile
Han and Terpstra (1988)	Technical advancedness
	Prestige
	Service
	Workmanship
	Economy
Roth and Romeo (1992) [a]	Innovativeness
	Design
	Prestige
	Workmanship
Heslop and Papadopoulos (1993)	Product integrity
	Price value
	Market presence
	Response
Agarwaal and Sikri (1996)	Technological image
	Prestige image
	Price image

Source: Compiled from a review of the literature

Note: [a] Roth and Romeo obtained these dimensions from the content analysis of the studies: Cattin, Jolibert and Lohnes (1982), Han and Terpstra (1988), Jaffe and Nebenzahl (1984), Narayana (1981) and White (1979).

Roth and Romeo (1992) observed four common country image dimensions in their review of country-of-origin literature (see Table 4.6). Because of the variety of country image dimensions observed in the literature, Nagashima's country image scale was

validated using a pilot study (see Appendix C). The *micro* country image measures obtained from the pilot study and used in the main empirical study are shown in Table 4.7.

Table 4.6 *Micro* country image dimensions - Roth and Romeo (1992).

Dimension	Measures
Innovativeness	Use of new technology
	Engineering advances
Design	Appearance
	Style
	Colours
	Variety
Prestige	Exclusivity
	Status
	Brand name reputation
Workmanship	Reliability
	Durability
	Craftsmanship
	Manufacturing quality

Source: Roth, M. & Romeo, J.B. 1992, 'Matching product category and country image perceptions: A framework for managing country-of-origin effects', *Journal of International Business Studies*, vol. 23, no. 3, pp. 477-498.

Table 4.7 Measures of *micro* country image used in the main empirical study.

	Measure
1	Excellent quality workmanship
2	Technically advanced
3	Innovative
4	Pride in ownership products from this country
5	Supported by lot of advertising
6	Recognisable brand names
7	Reliable
8	Expensive
9	High status
10	Excellent finish
11	Dependable
12	Upmarket

Source: Adapted from Nagashima, A.1970, 'A comparison of Japanese and US attitudes toward foreign products', *Journal of Marketing*, vol. 34, no. 1, pp. 68-74.

The validity and reliability of measurement scale used was a limitation of several previous country-of-origin studies (Bilkey & Nes 1982). Country image scales developed earlier suffered from poor reliability (Cattin, Jolibert & Lohnes 1982; Narayana 1981) and were not tested for internal consistency and stability (Jaffe & Nebenzahl 1984). The present study used measurement scales (Martin & Eroglu 1993; Nagashima 1970, 1977) validated in other studies (e.g., Amonini, Keogh & Sweeney 1999).

Furthermore, the country image scales were refined with the help of a pilot study (see Appendix C) using a student sample. Country image studies have used either semantic differential scales or Likert-type scales (Jaffe & Nebenzahl 1984, p 463). Likert-type scales of 1 to 11 were used in the present study with anchors 'strongly disagree' (1) and 'strongly agree' (11). Other Australian researchers (e.g., Amonini, Keogh & Sweeney 1999) have used Likert-type scales for measuring country image at both *macro* and *micro* levels.

4.5 APPROACHES TO DATA ANALYSIS

4.5.1 Confirmatory Factor Analysis

Confirmatory factor analysis was conducted to establish the multidimensionality of the consumer-based brand equity construct. Confirmatory factor analysis is a relevant technique for the validation of scales for the measurement of constructs (Steenkamp & Trijp 1991). Structural equation modelling was employed for the confirmatory factor analysis.

Confirmatory factor analysis using structural equation modelling involves the specification of a measurement model. The measurement model defines the relations between observed variables and the unobserved theoretical constructs. Brand awareness, brand associations, perceived quality, and brand loyalty, the dimensions of consumer-based brand equity, were the four latent variables or exogenous constructs in the hypothesised model. The 13 items, which served as indicator variables in the confirmatory factor analysis, are shown in Table 4.8.

These 13 items were obtained from the exploratory factor analysis of the original pool of 19 brand equity measures (see Table 4.1). Exploratory factor analysis of the original 19 items resulted in 13 items common across the three countries. Justification for the selection of the original pool of 19 measures of consumer-based brand equity is provided in section 4.4.2 in the present chapter. The hypothesised loading structure for the measurement model is shown in Table 4.8.

Table 4.8 The four–construct measurement model.

Construct Variable	Indicator Loadings on Constructs [a]
Brand awareness	
X_1 Awareness	BA_1
Brand associations [b]	
X_2 Up-market	BAS_1
X_3 Tough	BAS_2
X_4 Like the company	BAS_3
X_5 Proud to buy	BAS_4
X_6 Trust the company	BAS_5
Perceived quality [b]	
X_7 Good quality	PQ_1
X_8 Consistent quality	PQ_2
X_9 Very Durable	PQ_3
X_{10} Very Reliable	PQ_4
X_{11} Excellent features	PQ_5
Brand loyalty	
X_{12} Feel Loyal	BL_1
X_{13} First choice	BL_2

Note: [a] BA_i, BAS_i, PQ_i and BL_i are the loadings of the indicator variables on the factors brand awareness, brand associations, perceived quality and brand loyalty respectively.

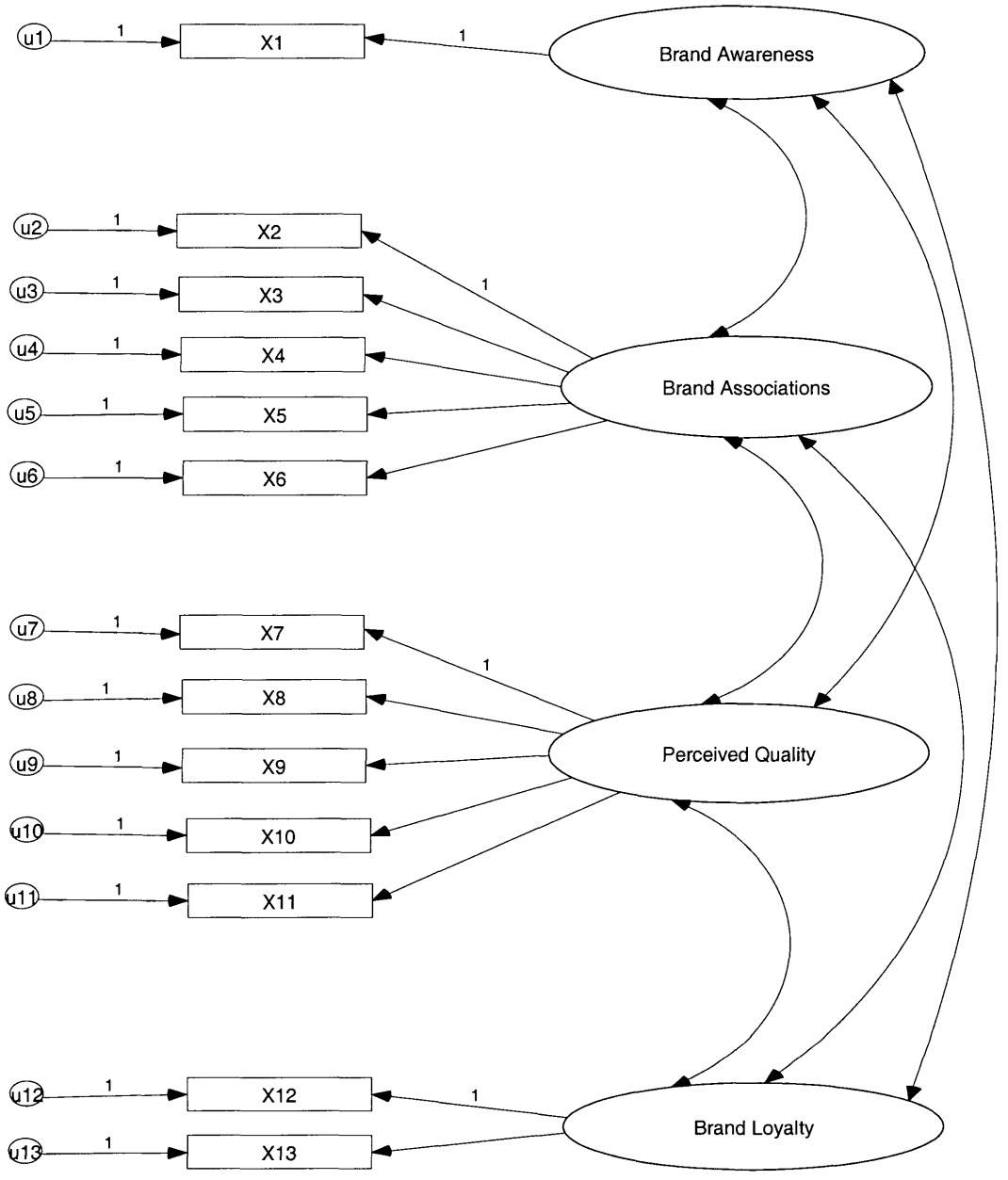
[b] The content of this Table varies slightly from that of Table 4.1. Table 4.1 listed the *facets* of brand personality whereas the measures for each brand personality *facet* are listed in this Table.

Each dimension (e.g., brand awareness) was hypothesised to be correlated with the other dimensions (e.g., perceived quality) as shown by the doubleheaded-curved arrows between each pair of exogenous constructs (see Figure 4.1). The justification for the relationships between the four dimensions was provided in Chapter Three (see section 3.3.2). Since all the constructs of the path diagram were *exogenous*, only the measurement model, the associated correlation matrices for *exogenous constructs* and *indicators* need to be considered. With no structural model, the measurement model constitutes the entire structural equation modelling effort (Hair, Anderson, Tatham & Black 1998, p 618). The terms *dimension* and *exogenous construct* were used interchangeably in this section.

As shown in the path diagram (see Figure 4.1), five indicator variables were available for each of the constructs *brand associations* (X_2, X_3, X_4, X_5 and X_6) and

perceived quality (X_7, X_8, X_9, X_{10} and X_{11}). Two indicator variables were the principal descriptors of the dimension *brand loyalty* (X_{12} and X_{13}).

Figure 4.1 The confirmatory factor model.[1]



One loading per each construct was set to the value of 1.0, to make each construct scale invariant. The variables with fixed loadings were X_1, X_2, X_7 and X_{12}. For one of the exogenous constructs, *brand awareness*, only one indicator variable (X_1) was available. All the variables, except X_1, were measured on a scale of 1 to 11.

[1] Note: u1 to u13 are unique or error variables.

Brand awareness was measured using the measures provided by Aaker (1996c). Aided recall, and unaided recall were the measures used. Aided recall was measured on a dichotomous scale (Yes/No). Two measures of aided recall were employed. Unaided recall was also measured on a dichotomous scale (Yes/No). As these three brand awareness measures were categorical in nature, these variables were re-expressed as an item parcel as suggested by West, Finch and Curran (1995, p 70), to produce a distribution that more closely approximated normality. The construction of item parcels involves summing or taking the mean of several items, which measure the same construct. In the present case, the three items were summed to come up with the item parcel.

The use of a single indicator variable for any exogenous construct requires the researcher to specify the reliability of the construct (Hair et al. 1998, p 598). Both aided and unaided recalls were accepted as reliable measures of brand awareness (Aaker 1991). Accordingly, we have fixed the reliability of the *brand awareness* measure at 0.8 consistent with the reliability estimates of brand awareness from previous studies (Sinha & Pappu 1998; Sinha, Leszeczyc & Pappu 2000). We adopted the approach recommended by Hayduk (1987) who suggested that when the covariance matrix is used as the input, the error variance of the unique variable associated with the single indicator variable should be fixed as per the formula:

$$EV_x = (1 - r_{xx}) * (V_x) \qquad (1)$$

where,

EV_x = Error variance for single indicator variable x

r_{xx} = Reliability of the single indicator variable

V_x = Variance of the single indicator variable

4.5.2 Doubly-Multivariate Repeated Measures Design

The differences in consumer-based brand equity of brands made in three different countries were examined using a doubly-multivariate repeated measures design. The four consumer-based brand equity dimensions of brand awareness, brand associations, perceived quality and brand loyalty, obtained from the confirmatory factor analysis, were used as the input for the repeated measures MANOVA. MANOVA is a useful procedure for examining group differences across a set of metric dependent measures, when the independent measures are categorical (Hair et al. 1998).

The design (see Table 4.9) consisted of two between-subjects factors (country-of-origin and product category) and one within-subjects factor (brand within product category). The factor country-of-origin (COO) varied at three levels: Japan, Malaysia and China. The factor product category (PC) was varied at two levels: cars and televisions. The within-subjects factor brand (BRAND) was varied at three levels.

Respondents were therefore randomly allocated into one of six groups. Each respondent group was exposed randomly to one product category, and was asked to rate three brands from the given product category. Toyota, Mitsubishi and Suzuki were the three brands included for the product category cars. Sony, Toshiba and Hitachi were the three brands of included for the product category televisions. Brands were nested within product category, but crossed with country-of-origin.

The four consumer-based brand equity dimensions of brand awareness (BA), brand associations (BAS), perceived quality (PQ) and brand loyalty (BL) were the interval scale dependent measures. These four dependent measures were obtained for each respondent and for each brand. As previously noted, respondents were randomly assigned to each condition. Each factor was then allocated a score by averaging the items that defined it (see Table 4.1).

Table 4.9 The doubly-multivariate repeated measures design employed.

Respondent Group	COO	Product Category	Brands											
			Sony				Toshiba				Hitachi			
			Y_1	Y_2	Y_3	Y_4	Y_1	Y_2	Y_3	Y_4	Y_1	Y_2	Y_3	Y_4
1	Japan	Televisions												
2	Malaysia	Televisions												
3	China	Televisions												
			Brands											
			Toyota				Mitsubishi				Suzuki			
			Y_1	Y_2	Y_3	Y_4	Y_1	Y_2	Y_3	Y_4	Y_1	Y_2	Y_3	Y_4
4	Japan	Cars												
5	Malaysia	Cars												
6	China	Cars												

Note: Y_1 = Brand awareness, Y_2 = Brand associations, Y_3 = Perceived quality and Y_4 = Brand loyalty

4.5.3 Exploratory Factor Analysis

The two country image scale items (*macro* and *micro*) were analysed using factor analysis. The 11 *macro* country image scale items obtained from Martin and Eroglu (1993)

and purified with the help of the pilot study (see Appendix C) were used as the input for an exploratory factor analysis. A principal component factor analysis was conducted employing a Promax rotation with these 11 variables.

The 12 *micro* country image scale items obtained from Nagashima (1970) and purified with the help of the pilot study (see Appendix C) were used as the input for a second exploratory factor analysis. A principal component factor analysis was conducted with these 12 variables employing a Promax rotation. A single *macro* country image measure was required for examining the relationship between *macro* country image and consumer-based brand equity. Hence, a second order factor analysis was conducted using the factors obtained from the factor analysis as variables.

4.5.4 Repeated Measures One-Way ANOVA

The differences in *macro* and *micro* country images of the three countries were examined using a repeated measures one-way ANOVA design. The two country image dimensions (*macro* country image and *micro* country image), obtained from the exploratory factor analysis, were used as the input for the repeated measures one-way ANOVA.

4.5.5 Canonical Correlation Analysis

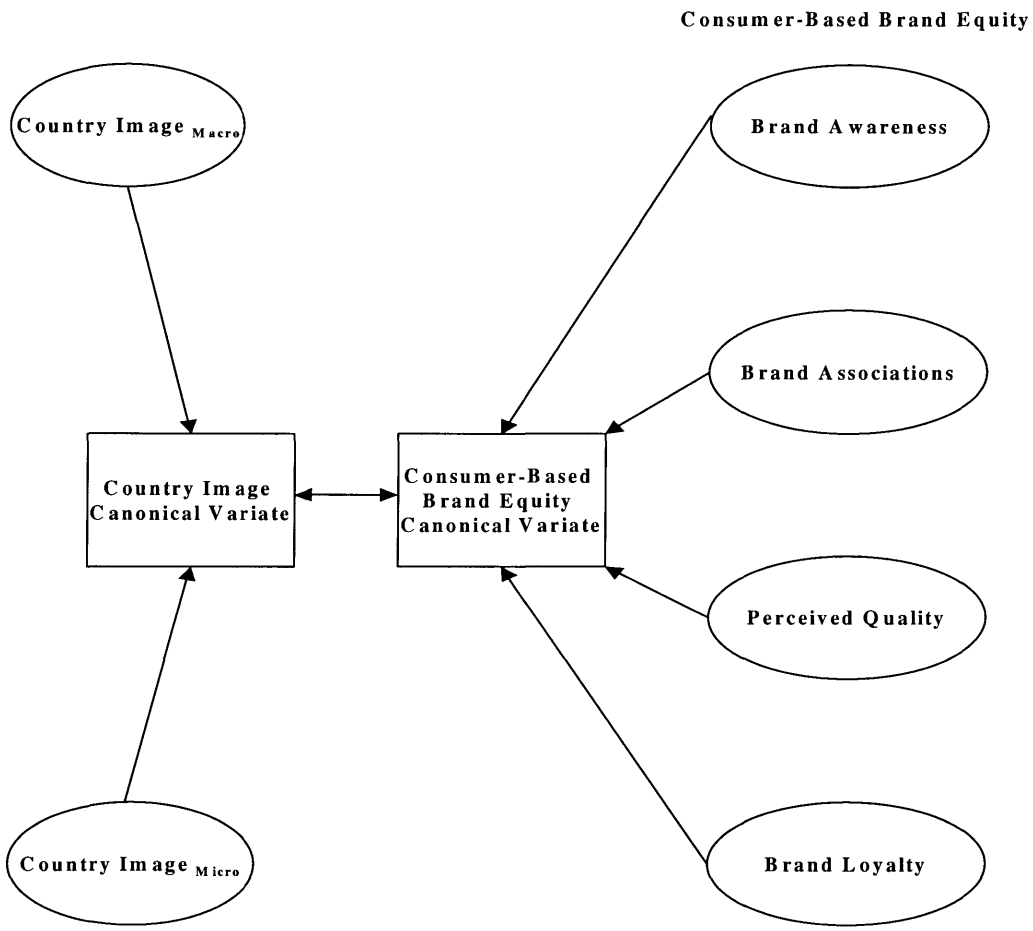
The relationships between respondents' country image perceptions and their consumer-based brand equity perceptions were examined using canonical correlation analysis. Canonical correlation analysis is a procedure for examining the relationships between a set of metric dependent measures when the independent measures are also metric (Hair et al. 1998). The four interval scale consumer-based brand equity dimensions of brand awareness, brand associations, perceived quality and brand loyalty obtained from the confirmatory factor analysis were used as the set of dependent variables. The two interval scale country image dimensions obtained from the factor analysis were used as the set of independent variables (see Figure 4.2). The relationship examined is represented by the following equation.

$$\alpha_1 Y_1+\alpha_2 Y_2+\alpha_3 Y_3+\alpha_4 Y_4 = \beta_1 X_1+\beta_2 X_2 \qquad (2)$$

where, Y_1 = Brand awareness, Y_2 = Brand associations, Y_3 = Perceived quality, Y_4 = Brand loyalty, X_1 = *Macro* country image and X_2 = *Micro* country image, and. α_i, and β_j

represent optimised canonical weights estimated during the analysis to maximise the value of the canonical correlation.

Figure 4.2 Country image in relation to consumer-based brand equity.



4.6 EMPIRICAL STUDY

This section describes the main empirical study designed to test the proposed conceptual framework. The purpose of the study was *explanation*. The research examined the relationships between country-of-origin effects and consumer-based brand equity and was aimed at building theory in the area of brand equity. Two important concepts of marketing, namely country-of-origin effects and brand equity were integrated to provide the conceptual framework tested in this empirical study. The nature of the study was *cross-sectional*. The research was *interrogational*. That is, the researcher solicited responses

from the subjects through mall intercept surveys using a structured questionnaire. The unit of analysis was the individual.

4.6.1 Mode of Data Collection

The present research involved testing a conceptual framework and included a quasi-experimental design. Primary data such as consumer-based brand equity, country image perceptions and demographics were required from respondents. Since consumers' perceptions were being solicited, a survey was used to uncover the opinions of consumers who were actual buyers of products. Survey research has a number of advantages. It is flexible, quick and inexpensive (Urban & Hauser 1988).

The structured questionnaire, used as the data collection instrument, was 10 pages long and contained five sections. Lengthy questionnaires are known to generate low response rates in mail surveys (McDaniel & Gates 1999). Hence, mail surveys were ruled out. The complex nature of the questionnaire and the inclusion of lengthy attitudinal scales and a series of measurement scales also precluded the administration of the questionnaire via telephone. Telephone administration and door-to-door administration were also eliminated because they were not cost effective.

Hence, the mall intercept survey was the adopted mode of data collection, which was less expensive than door-to-door or mail surveys. Mall intercept surveys provide better sampling control compared to mail surveys. In addition, mall intercept surveys are known to produce better response rates than mail surveys. The mall intercept survey method was also advantageous because mall intercept surveys enabled interviewers to explain/clarify, if needed, the difficult tasks associated with rating the three scales included in the study.

A disadvantage associated with mall intercept surveys was the lack of representativeness of the sample (McDaniel & Gates 1999). Another potential problem associated with mall intercept surveys is the high refusal rates. Measures were put in place to address these two issues (lack of representativeness and high refusal rates) as discussed in section 4.6.4.

4.6.2 Questionnaire Design

All respondents were provided with an information sheet (see Appendix D) in which respondents' rights were clearly explained. The self-completion questionnaire contained five sections (see Appendix E). The study was conducted for two product categories, cars and televisions. Hence, a total of six versions of the questionnaire were designed. Three

different versions of the questionnaire, one for each country, were designed for each of the product categories included in the study. Except for section two, all other sections were identical in each of the three versions of the questionnaire, for a given product category. Each respondent completed only one version of the questionnaire.

Section one of the questionnaire comprised two questions, aimed at capturing respondents' product category-country and product category-brand associations. Respondents were asked to mention the names of (a maximum of six) countries and brands that come to their mind when they thought of a given product category. Respondents were given the option of saying that no countries or brands come to their mind when they think of a product category.

Section two of the questionnaire included items measuring various dimensions of consumer-based brand equity namely, brand awareness, brand associations, perceived quality and brand loyalty. It was assumed that brand name would capture the effect of brand equity on consumers' product evaluations. Section two of the questionnaire was different for each of the three versions of questionnaires, in each given product category, in a corresponding between-subjects design. Each respondent was asked to evaluate the brand equity measures from one of the three countries, Japan, Malaysia or China. Questions from section two served as the input for the confirmatory factor analysis and the MANOVA.

Section three of the questionnaire included questions about country image at *macro* level. Measures that had already been used in previous studies (e.g., Martin & Eroglu 1993) and found to be valid and reliable (e.g., Amonini, Keogh & Sweeney 1999) were included in the present study. Respondents were asked to rate how far they agree or disagree with a series of statements given about a given country. The items used for the *macro* country image are shown in Table 4.3. Each item had different verbal anchors for the 1 and 11 scale points as shown in Appendix E.

Section four of the questionnaire included questions about country image at the *micro* level. Measures that had already been used in previous studies (e.g., Nagashima 1970, 1977) and found to be valid and reliable (e.g., Amonini, Keogh & Sweeney 1999) were included in the present study. Respondents were asked to rate how far they agree or disagree with a series of statements given about products/services from a given country. The items used for the *micro* country image are shown in Table 4.7. Each item had different verbal anchors for the 1 and 11 scale points as shown in Appendix E.

Section five of the questionnaire included questions about respondents' prior knowledge, previous usage and ownership of products in the product category. In addition,

questions on respondent gender, age, length of stay in Australia and country of birth were included as demographic variables. The questionnaire was pretested using a judgment sample of 20 actual consumers and was revised to improve readability and understanding.

4.6.3 Sampling Design

The population was defined as 'males or females between the ages of 18 and 70 who have been living in Australia for more than 1 year, and who have used products in the relevant category (televisions or cars)'. Since consumers' country images were known to differ by consumer's home country, it was necessary to have respondents originating from a given country. Hence, only observations from respondents, who lived in Australia for more than 1year, were included in the final analysis. A large percentage of the respondents (65.5%) had lived in Australia for 20 years or more, with 16.6% of the respondents living between 15 and 19 years, and 6.7% of the respondents living between 10 and 14 years. A small percentage of the respondents (3.7%) had lived in Australia between 5 and 9 years. All the respondents had used products in the category they were exposed to (televisions or cars).

Sampling frame

The present study used a sample of actual consumers who have used and owned the product categories included in the study. This was to avoid the use of student samples, a limitation in previous country-of-origin research. Customers at a busy business and shopping precinct in South Australia were identified as the sampling frame. Adelaide is often used as a test market, because of its representative nature (McCarthy, Perreault & Quester 2001). Shopping mall customers comprised an adequate sampling universe (Tull & Hawkins 1990). Previous country-of-origin researchers had used shopping malls as their sampling frame (e.g., Cameron & Elliott 1999; Liefeld, Heslop, Papadopoulos & Wall 1996; Okechuku 1994; Strutton & Pelton 1993).

Sample selection

Systematic sampling was employed in the present study. Systematic samples are efficient and are easy to use (Churchill & Iacobucci 2002; McDaniel & Gates 1999). Systematic sampling involves selecting a random starting point first and then selecting every kth element thereafter. Trained research assistants were employed to collect the data

from the shopping mall consumers. The research assistants were instructed to approach every tenth person for administering the survey questionnaire.

Sample size

The sample size was determined largely by data analysis considerations including usage of techniques such as structural equation modelling, factor analysis and MANOVA. For structural equation modelling, a ratio of minimum 10 respondents per estimated parameter is considered appropriate (Hair et al. 1998, p 604). Nine parameters were estimated in the confirmatory factor analysis. Hence, the minimum group size required, to ensure a case-to-parameter ratio of at least 10, was 90. For the maximum likelihood estimation procedure adopted, a sample size of 200 is recommended (Hair et al. 1998, p 605). This required a total of minimum 400 observations (200 for each product category).

For the analysis of data using the doubly-multivariate MANOVA (with two between-subjects factors [COO-3 levels; PC – 2 levels] and one within-subjects factor [BRAND - 3 levels]) with four dependent measures, a large enough sample was needed to ensure minimum effective cell sizes. MANOVA requires a minimum cell size of 20 observations (Hair et al 1998, p 342). The minimum overall sample size required to ensure a minimum cell size of 20 observations in the six cells, was therefore 120.

For factor analysis, a ratio of a minimum of 10 observations for each variable included, is recommended (Hair et al. 1998, p 99). Hence, for the *macro* country image, a sample of 110 was required with the 11 variables included. For the *micro* country image, a sample of 120 was required with the 12 variables included.

4.6.4 Data Collection Procedures

In the first phase, data were collected towards the end of February 2002, on three different days of the week. In the second phase, data were collected in the middle of March 2002 on three different days of the week. The respondents were contacted in accordance with the systematic sampling plan. Interviewers were instructed to approach consumers and contact every tenth consumer who passed them by.

Information was provided to respondents concerning the nature of the study and its purpose. Respondents were told that the results of the research would be included in a PhD thesis and that the study involved investigating consumer decision-making. The respondents completed the questionnaires themselves and the interviewers provided any

clarifications sought. Respondents were clearly informed that they were free not to participate in the study and to withdraw from the study at any stage.

Non-coverage is a possible problem with mall intercept surveys, as it is with mail or email surveys (Churchill & Iacobucci 2002). For example, only people who shopped at this particular mall have the chance of being included in the study. However, the venue for data collection was not a small shopping mall but a major business and shopping precinct in the Adelaide CBD. The data were also collected during different times of the day and on different days of the week to minimise periodicity and noncoverage problems.

To reduce the problem of refusals, several measures were put in place. First, a minor incentive was included to improve the response rate. All respondents who returned a completed questionnaire nominated their preferred charity and entered a draw for their charity to win an amount of $ 200. The amount was donated to the charity nominated by the winning entry. Furthermore, respondents were guaranteed anonymity. The demographic profile of the sample is provided in Table 4.10. The demographics indicated that the sample was comparable to that of the Australian national population.

Table 4.10 Comparison of the final obtained sample and Australian population.

Demographic Characteristic	Sample		Australian Population (2001 Census)
	n	Percent	Percent
Gender (n = 530)			
Male	286	54.0	49.4
Female	244	46.0	50.6
Missing	9		
Total	539	100.0	100.0
Age (n = 530)			
18-29 years	257	48.5	16.4
30-39 years	81	15.3	15.1
40-49 years	82	15.5	14.7
50-59 years	64	12.1	11.8
60+ years	46	8.7	19.5
Missing	9		
Total	539	100.0	
No of years of stay in Australia (n = 519)			
1-4 years	39	7.5	
5-9 years	19	3.7	
10-14 years	35	6.7	
15-19 years	86	16.6	
20 or more	340	65.5	
Missing	20		
Total	539	100.0	

Source: Australian Bureau of Statistics (2002b).

Of the 755 people approached, 83 people refused to fill in the surveys yielding an acceptable response rate of 89%. Out of the 672 completed questionnaires obtained, 75 were found to be incomplete and were discarded as unusable. Out of the remaining 597 questionnaires, 58 were from respondents who were not born in Australia or who had not lived in Australia for at least one year. Since the population was defined as people between the ages of 18 and 70, who lived in Australia for 1 year or more, these 58 respondents were considered ineligible and eliminated from the analysis. This gave a final usable response rate of 90% or 539 respondents.

CHAPTER 5: DIMENSIONAL ANALYSIS OF KEY CONSTRUCTS

5.1 INTRODUCTION

Chapter Four detailed the research methodology employed in the present study, and presented the details of an empirical study designed for testing the relationships between country-of-origin effects and consumer-based brand equity. The approach adopted for the measurement of the main constructs was also delineated in Chapter Four. This chapter summarises the product category associations and dimensional analysis of the data collected through the mall intercept survey and presents some results. Results of respondents' product category-country and product category-brand associations are presented first. Results from the confirmatory factor analysis conducted to establish the multidimensionality of consumer-based brand equity follow this. The subsequent section includes results of the factor analyses conducted to establish the dimensionality of the two country image scales included in the present research. Results of repeated measures one-way ANOVA conducted to compare respondents' country image perceptions are also presented in this chapter.

5.2 RESPONDENTS' ASSOCIATIONS

One of the objectives of the present research was to understand whether respondents' associations influence the impact of country-of-origin on consumer-based equity of brands. Hence, it was essential to understand the extent to which respondents associated the selected countries with the product categories included in the study. The present research also aimed to investigate how consumer-based brand equity varied between brands. Hence, it was also necessary to understand the extent to which respondents associated the selected brands with the product categories included in the study. The results from this section provided an understanding of respondents' product category-country and product category-brand associations.

5.2.1 Respondents' Product Category-Country Associations

The results of respondents' product category-country associations are presented in this section. Input for the analysis of product category-country associations was obtained from section one of the questionnaire (see Appendix E), where respondents were asked to list the names of (a maximum of six) countries that came to their mind when they thought of a given product category (televisions or cars). Respondents had the option to say that no

countries came to their mind when thinking of the given product category. The order in which the respondents listed the countries was used as the basis for preparing a product category-country association (PCCA) rating for each of the countries. A PCCA rating was then computed for all the countries mentioned by the respondents. The countries were then ranked, based on their PCCA rating. That is, if Japan was the first country, in the list of the six countries mentioned by the respondent, Japan was given a score of six. If Japan was the second country mentioned, Japan was given a score of five. If Japan was the sixth country mentioned, Japan was given a score of one, and so on. The PCCA rating was computed for each country, by summing the scores of all the respondents for that country.

Product category-country associations for televisions

Japan, USA, Australia, UK and Germany were the top five countries associated by respondents with the product category televisions. Compared to China (ranked 6) and Malaysia (ranked 9), respondents associated Japan (ranked 1) more strongly with televisions. The details of the countries respondents associated with televisions are provided in Table 5.1.

Table 5.1 Respondents' product category-country associations for televisions.

Country	1	2	3	4	5	6	PCCA Rating	Rank
Japan	113[a]	29[b]	15	22	6	7[c]	**968[d]**	**1**
USA	79	47	34	19	8	0	918	2
Australia	37	34	25	13	9	3	552	3
UK	4	31	25	16	8	4	347	4
Germany	3	19	18	25	12	5	289	5
China	5	20	12	14	9	6	**244**	**6**
Korea	1	24	20	9	1	1	236	7
Taiwan	2	7	6	10	3	3	110	8
Malaysia	1	7	9	4	1	4	**95**	**9**
France	0	0	9	7	7	10	81	10

Note: The PCCA rating for Japan in this Table 5.1 was calculated as shown below.

[a] 113 respondents in the product category televisions mentioned Japan as the first country that came to their mind when they thought of televisions.

[b] 29 respondents in the product category televisions mentioned Japan as the second country that came to their mind when they thought of televisions.

[c] 7 respondents in the product category televisions mentioned Japan as the sixth country that came to their mind when they thought of televisions.

[d] PCCA rating = (113*6) + (29*5) + (15*4) + (22*3) + (6*2) + (7*1) = 968.

Product category-country associations for cars

Japan, Germany, USA, Australia and Italy were the top five countries respondents associated with the product category cars. Respondents strongly associated Japan (ranked 1) with cars, compared to the other two countries, China (ranked 10) and Malaysia (ranked 12). The details of the countries respondents associated with cars are given in Table 5.2.

Table 5.2 Respondents' product category-country associations for cars.

Country	1	2	3	4	5	6	PCCA Rating	Rank
Japan	88	53	49	11	18	9	**1067**	**1**
Germany	54	51	38	25	18	9	851	2
USA	43	48	42	26	19	7	789	3
Australia	52	31	26	41	14	11	733	4
Italy	21	29	17	22	18	13	454	5
UK	9	20	21	24	8	13	339	6
Korea	2	15	21	14	11	11	246	7
France	6	9	13	12	14	8	205	8
Sweden	2	4	7	2	6	4	82	9
China	0[a]	4[b]	6	0	1	2	**48[c]**	**10**
Poland	0	1	5	3	2	2	40	11
Malaysia	1	0	0	1	2	3	**16**	**12**

Note: The PCCA rating for China in Table 5.2 was calculated as shown below.

[a] No respondent in the product category cars mentioned China as the first country that came to their mind when they thought of cars.

[b] 4 respondents in the product category cars mentioned China as the second country that came to their mind when they thought of cars.

[c] PCCA rating = [(0*6) + (4*5) + (6*4) + (0*3) + (1*2) + (2*1)] = 48.

Respondents seemed to associate Japan, Malaysia and China with the product categories to a different extent. The differences in the PCCA ratings provide an indication of the extent to which these three countries differ in terms of respondents' product category-country associations. For televisions, the PCCA rating differences between Japan and China (724), and between Japan and Malaysia (873) were larger than the PCCA rating difference between Malaysia and China (149). For cars, the differences in PCCA rating between Japan and China (1019) and between Japan and Malaysia (1051) were larger than the difference in PCCA rating between Malaysia and China (32).

5.2.2 Respondents' Product Category-Brand Associations

Input for the analysis of respondents' product category-brand associations was also obtained from section one of the questionnaire, where respondents were asked to list the names of (a maximum of six) brands that came to their mind, when they thought of a given product category (televisions or cars). Respondents had the option to say that no brands came to their mind when thinking of the given product category. A PCBA (product category-brand associations) rating was computed, similar to the PCCA rating, for each brand. The order in which the respondents listed the brands was used as the basis for preparing the PCBA rating. The PCBA rating was computed for all the brands mentioned by the respondents. The brands were then ranked based on their PCBA rating.

Product category-brand associations for televisions

The details of the brands respondents associated with the product category televisions are included in Table 5.3. Sony, Panasonic, Phillips, LG and Sanyo were the top five brands respondents associated with televisions. Sony (ranked 1) received a higher ranking than Toshiba (ranked 9) and Hitachi (ranked 13). Respondents strongly associated Sony with televisions. Toshiba and Hitachi were way down in the list, and few respondents associated these two brands with the product category.

Table 5.3 Respondents' product category-brand associations for televisions.

Brand	1	2	3	4	5	6	PCBA Rating	Rank
Sony	112	33	27	15	10	6	**1016**	**1**
Panasonic	47	62	33	19	8	2	799	2
Phillips	10	27	23	8	9	4	333	3
LG	8	14	24	16	8	7	285	4
Sanyo	13	17	11	9	8	1	251	5
Sharp	10	10	11	7	3	2	183	6
Teac	6	10	12	13	2	1	178	7
NEC	11	9	5	8	3	3	164	8
Toshiba	5	9	15	1	5	5	**153**	**9**
Akai	2	13	10	7	4	0	146	10
Samsung	3	13	8	5	5	3	143	11
JVC	3	4	6	2	4	2	78	12
Hitachi	0	4	5	4	4	5	**65**	**13**

In comparison to Hitachi, respondents associated Toshiba more strongly with televisions. Respondents seemed to associate each brand with the respective product

category to a different extent. For televisions, the PCBA rating differences between Sony and Toshiba (863) and between Sony and Hitachi (951) were larger than the difference in the PCBA rating for Toshiba and Hitachi (88).

Product category-brand associations for cars

The details of the brands associated by respondents with the product category cars are provided in Table 5.4. Ford, Holden, Toyota, BMW and Mercedes were the top five brands associated by the respondents with cars. Toyota (ranked 3) received a higher ranking than the brands Mitsubishi (ranked 6) and Suzuki (ranked 12). Respondents strongly associated Toyota with cars. In comparison to the brand Suzuki, respondents associated Mitsubishi more strongly with cars. For cars, the PCBA rating differences between Toyota and Suzuki (596) and between Toyota and Mitsubishi (351) were larger than the PCBA rating difference for Mitsubishi and Suzuki (245).

Table 5.4 Respondents' product category-brand associations for cars.

Brand	1	2	3	4	5	6	PCBA Rating	Rank
Ford	26	41	46	26	19	10	671	1
Holden	48	38	26	16	8	0	646	2
Toyota	47	26	28	21	17	5	**626**	**3**
BMW	23	27	14	14	13	8	405	4
Mercedes	11	20	13	9	16	12	289	5
Mitsubishi	10	11	21	17	6	13	**275**	**6**
Nissan	13	14	9	6	5	5	217	7
Honda	10	13	9	8	7	12	211	8
Porsche	6	8	8	3	6	3	132	9
Ferrari	11	2	6	7	3	1	128	10
Suzuki	0	1	1	3	5	2	**30**	**12**

5.2.3 Conclusion

A hierarchy was observed among the three countries included in the study, in terms of respondents' product category-country associations. The order of the countries in the hierarchy was Japan, China and Malaysia, for both the product categories. A hierarchy was also observed among the brands included in each product category, in terms of respondents' product category-brand associations. The order of the brands in the hierarchy was Sony, Toshiba and Hitachi, for televisions, and Toyota, Mitsubishi and Suzuki, for cars. The results were similar to those from the pilot study.

The respondents associated Japan most strongly with both the selected product categories (cars and televisions) and associated China and Malaysia to a far lesser degree, with either cars or televisions. Compared to Malaysia, however, respondents associated China more strongly with both the selected product categories. The respondents strongly associated the brand Sony, and the brands Toshiba and Hitachi to a far lesser extent, with televisions. Compared to Hitachi, respondents associated Toshiba more strongly with televisions.

Respondents associated the brand Toyota strongly, and the brands Mitsubishi and Suzuki to a far lesser extent, with cars. Compared to Suzuki, respondents associated Mitsubishi more strongly with cars. Respondent seemed to associate each of the three countries to a different degree with cars and televisions.

5.3 RESULTS OF CONFIRMATORY FACTOR ANALYSIS OF BRAND EQUITY MEASURES

The principal objective of the research was to examine how the consumer-based equity of a brand varies by (i) country-of-origin of the brand, (ii) product category and (iii) brand name. Hence, it was important to measure consumer-based brand equity, in order to conduct the proposed examination. Consumer-based brand equity was hypothesised as a four-dimensional construct. This section provides the results of the confirmatory factor analyses conducted to establish the multidimensionality of the construct consumer-based brand equity.

A total of six confirmatory factor analyses were carried out: three were conducted within each product category, one for each brand. The overall sample for the study was relatively homogenous, comprising Australian consumers. There was no a priori reason to expect factorial differences between countries of origin. Hence, it was considered appropriate to pool consumer responses across countries of origin. This had the additional benefit of providing adequate sample sizes for all confirmatory factor analyses.

The input for the confirmatory factor analysis was obtained from section two of the questionnaire (see Appendix E), where respondents were asked to rate brands from a given product category. Each respondent was asked to rate three brands from a given product category, arising from the same country-of-origin, on all the brand equity measures. Confirmatory factor analysis with structural equation modelling involved the specification and estimation of the measurement model. The measurement model was specified in section 4.5.1 on research design, in Chapter Four. The next section provides details of the

data. This is followed by the details of estimation and identification of the models. The overall model fits are assessed next and the evaluation of various goodness-of-fit measures is then discussed. The parameter estimates for the measurement model are discussed subsequently, followed by a discussion of the reliability and variance estimates. The discriminant validity of the factors is established next. The factor structure for the six brands is then compared.

5.3.1 Details about the Data

The correlation matrices and standard deviations for the 13 variables for each brand are presented in Appendix F. An analysis of the missing values indicated that the brand equity scale data were randomly missing (Little's MCAR test: χ^2 (624.72), p = 0.053), and that all variables contained a low level of missing data (there were no variables with 5 percent or more missing values). Three cases had around 50 percent missing values and were eliminated from the analysis. Out of the possible remedies, the 'complete case approach' could not be used because this would reduce the resulting sample to an inappropriate size. Missing data were therefore replaced by mean imputation. The sample size employed fell within the acceptable limits for both cars (n = 254) and televisions (n = 285). The ratio of respondents to observed variables was 19 for cars and 22 for televisions. The ratio of respondents to estimated parameters was 28 for cars and 31 for televisions [A ratio of minimum 10 respondents per parameter was considered most appropriate (Hair et al. 1998, p 604) for structural equation modelling.]. All the basic assumptions of structural equation modelling were examined. The variables met all the assumptions. For example, the 13 variables were assessed for normality and kurtosis. No variable was found to significantly depart from normality or have excessive kurtosis.

5.3.2 Model Estimation

The measurement model was estimated based on a covariance matrix based on advice from Cudeck (1989). The models were estimated using the maximum likelihood estimation method. Maximum likelihood estimation has been the most commonly used approach in structural equation modelling (Chou & Bentler 1995) and performs reasonably well under a variety of less-than-optimal conditions such as small sample sizes or excessive kurtosis (Hoyle & Panter 1995). The final parameter standard errors were estimated through bootstrapping based on 2000 re-samples. The measurement model was estimated using the AMOS 4.0 (Arbuckle 2002). The constructs were made scale-invariant

by fixing one factor loading for each construct to a value of 1.0, and estimable by fixing all uniqueness paths to 1.0.

5.3.3 Identification of the Model

The results were first examined for offending estimates. No offending estimates (e.g., negative variances, non-significant error variances, correlations larger than one in magnitude and covariance or correlation matrices which were not positive definite) were present. The goodness-of-fit of the confirmatory factor analysis was then assessed.

5.3.4 Evaluating the Goodness-of-Fit Criteria

In confirmatory factor analysis, the overall model fit indicates the degree to which the specified indicators represent the hypothesised constructs.

Overall model fit

This section provides details of the various goodness-of-fit measures selected and the evaluation of the model proposed.

Measures of Fit Selected

Three types of goodness-of-fit measures, namely, (1) absolute fit measures (2) incremental fit measures and (3) parsimonious fit measures are suggested for assessing the fit of the model. Researchers are encouraged to employ one or more measures from each type (Hair et al. 1998, p 621). Hoyle and Panter (1995) recommended several fit indexes for evaluating structural equation models. The measures of absolute fit and incremental fit were selected as per their recommendations.

The Chi-square value (χ^2; Joreskog & Sorbom 1993), and the goodness-of-fit index (GFI; Joreskog & Sorbom 1988; Joreskog& Sorbom 1993) were the absolute fit measures used. Tucker-Lewis Index (TLI) (Bentler & Bonnet 1980; Tucker & Lewis 1973), Incremental Fit Index (IFI) (Bollen 1989) and Comparative Fit Index (CFI) (Bentler 1989, 1990), were the incremental fit measures used. In addition, the Root Mean Square Error of Approximation (RMSEA) (Browne & Cudeck 1993; Steiger 1990), a measure for absolute fit, and Normed Chi-square (Joreskog 1970), a measure of parsimonious fit, were also used.

Absolute Fit Measures

The absolute fit measures directly assess how well an *a priori* model reproduces the data (Hu & Bentler 1995). The χ^2, GFI and RMSEA were the absolute measures of fit used. The Chi-square statistic is a statistically based measure of fit available in structural equation modelling, with large values of χ^2 relative to the degrees of freedom signifying that the observed and estimated matrices differ considerably. A Chi-square value of zero indicates perfect fit. The researcher is looking for nonsignificant differences. That is, a lower Chi-square value with significance levels of greater than 0.05 or 0.1 indicates that the actual and predicted matrices are not statistically different (Hair et al. 1998, 654). The GFI is an index of the relative amount of variance and covariance jointly explained by the model (Byrne 1989). The GFI represents the overall degree of fit by comparing the squared residuals from prediction with the actual data. Its values range from 0 to 1, with values closer to 1 indicating better fit. The RMSEA essentially is a measure of lack of fit per degree of freedom (MacCallum 1995). Values ranging from 0.05 to 0.08 are acceptable, with values equal to or above 0.1 indicating unacceptable levels of fit (Browne & Cudeck 1993).

The Chi-square values for both cars (Toyota 200.836, Mitsubishi 167.934, Suzuki 187.913) and televisions (Sony 201.827, Toshiba 200.318 and Hitachi 174.070) were statistically significant at $p<0.001$ level (see Table 5.5). However, the Chi-square test becomes more sensitive as the sample size exceeds 200. The Chi-square test becomes less reliable and has a great tendency to indicate significant differences when sample sizes are outside of the range from 100 to 200. (Hair et al. 1998). Hence, other measures were also examined.

The GFI values for both cars (Toyota 0.90; Mitsubishi 0.92; Suzuki 0.91) and televisions (Sony 0.89; Toshiba 0.89; Hitachi 0.90) were higher than or very near to the cut-off value of 0.9. The GFI values indicated an acceptable level of fit for each model.

The RMSEA values were just within the acceptable range of 0.080 or less, for both cars (Toyota 0.078; Mitsubishi 0.068; Suzuki 0.072) and televisions (Sony 0.077; Toshiba 0.076; Hitachi 0.071). Thus, the RMSEA values also indicated an acceptable level of fit for each model. All the absolute fit measures indicated an acceptable level fit for the proposed model, in each of the six analyses.

Incremental Fit Measures

The incremental fit indexes compared the proposed model to some baseline model. The baseline model was hypothesised as a single factor model with no measurement error. Both type 2 and type 3 incremental fit indices recommended by Hoyle and Panter (1995) were used in this data analysis. The TLI and the IFI were the two type 2 incremental fit indices selected. The CFI was the type 3 incremental fit index selected. The TLI compares the lack of fit of a target model to the lack of fit of a base model, the null model. The IFI is interpreted similarly to the TLI, but is less variable than TLI in small samples and more consistent across estimators (Hoyle & Panter 1995). The CFI indexes the relative reduction in lack of fit as estimated by the noncentral χ^2 of a target model versus a baseline model. Values above 0.9 are recommended for all three measures (Bentler & Bonett 1980).

Table 5.5 CFA results – Goodness-of-fit measures (cars and televisions).

	Car Brands (n = 285)			**Television Brands (n = 254)**		
	Toyota	**Mitsubishi**	**Suzuki**	**Sony**	**Toshiba**	**Hitachi**
Measures of absolute fit						
Chi-square	200.84	167.93	187.91	201.83	200.32	174.07
Degrees of Freedom	60	60	60	60	60	60
Significance level	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Goodness-of-fit Index	0.897	0.915	0.909	0.892	0.892	0.906
Root Mean Square Error of Approximation	0.078	0.068	0.072	0.077	0.076	0.071
Incremental fit measures						
Tucker Lewis Index	0.948	0.958	0.941	0.939	0.926	0.938
Incremental Fit Index	0.960	0.968	0.955	0.954	0.943	0.953
Comparative Fit Index	0.960	0.968	0.955	0.953	0.943	0.952
Parsimonious fit measures						
Normed Chi-square	3.347	2.799	3.132	3.364	3.339	2.901

The TLI values for both cars (Toyota 0.95; Mitsubishi 0.96; Suzuki 0.94) and televisions (Sony 0.94; Toshiba 0.93; Hitachi 0.94) indicated excellent fit and were well above the cut-off value of 0.9 (see Table 5.5). Similarly, the IFI values were also much higher than the cut-off value of 0.9 for both cars (Toyota 0.96; Mitsubishi 0.97; Suzuki 0.96) and televisions (Sony 0.95; Toshiba 0.94; Hitachi 0.95). The CFI values for both cars (Toyota 0.96; Mitsubishi 0.97; Suzuki 0.96) and televisions (Sony 0.95; Toshiba 0.94;

Hitachi 0.95) were well above the cut-off value of 0.9. Thus, all the incremental fit measures exceeded the heuristic critical value of 0.9 and further supported the acceptance of the proposed model.

Parsimonious Fit Measures

The parsimonious measures assess the parsimony of the model by evaluating the fit of the model versus the number of estimated coefficients needed to achieve that level of fit (Hair et al. 1998). The Normed Chi-square was selected as the parsimonious fit measure. The Normed Chi-square is the ratio of the Chi-square divided by the degrees of freedom. It can indicate over-fitted models (Chi-square values less than 1) as well as models that are not truly representative (Chi-square values above the cut-off value of 2 or 3 or 5) of the observed data.

The recommended upper threshold of the Normed Chi-square values ranged from 2 or 3 (Byrne 1989; Carmines & McIver 1981) to a value of 5 (Joreskog 1970; Marsh & Hocevar 1985). The Normed Chi-square values for both cars (3.347 for Toyota, 2.799 for Mitsubishi, 3.132 for Suzuki) and televisions (3.364 for Sony, 3.339 for Toshiba and 2.901 for Hitachi) were around 3.0 and were well below the upper cut-off value of 5.0 (see Table 5.5). The parsimonious fit measure selected indicated an acceptable level of model parsimony. The normalised residuals were examined. None of the normalised residuals exceeded the value of $\pm$ 2.58.

Measurement model parameter estimates

After establishing that the hypothesised model fitted the data reasonably well, for all brands, the parameter estimates of the measurement model were assessed next. Correlated factors were hypothesised in the model. The results are summarised in Tables 5.6, and 5.8, which show that all indicator variables loaded their hypothesised factors in a statistically significant ($p<0.05$) manner.

The respective matrix construct correlations appear in Tables 5.7 and 5.9. The bootstrap standard errors of the parameter estimates shown in Tables 5.7 and 5.9. In all cases, parameter estimates fell well outside the range of $\pm$ 2 bootstrap standard errors, indicating a significant non-zero estimate. The *reliability* and *variance extracted* measures for each construct were estimated next.

Table 5.6 CFA results – Standardised parameter estimates (televisions).

Dimension	Sony		Toshiba		Hitachi	
Measure	SRW [b]	S.E	SRW	S.E	SRW	S.E
F1: Brand awareness						
X_1 Awareness [a]	0.89*	0.01	0.89*	0.01	0.89*	0.01
F2: Brand associations						
X_2 Up-market [a]	0.75*	0.05	0.76*	0.04	0.73*	0.04
X_3 Tough	0.70*	0.05	0.71*	0.05	0.67*	0.05
X_4 Like the company	0.84*	0.03	0.74*	0.05	0.77*	0.05
X_5 Proud to buy	0.80*	0.04	0.77*	0.04	0.79*	0.03
X_6 Trust the company	0.88*	0.02	0.82*	0.04	0.81*	0.04
F3: Perceived quality						
X_7 Good quality [a]	0.88*	0.03	0.87*	0.03	0.85*	0.03
X_8 Consistent quality	0.89*	0.03	0.84*	0.03	0.88*	0.02
X_9 Very durable	0.93*	0.01	0.89*	0.03	0.90*	0.02
X_{10} Very reliable	0.95*	0.01	0.91*	0.02	0.92*	0.01
X_{11} Excellent features	0.85*	0.03	0.80*	0.03	0.76*	0.04
F4: Brand loyalty						
X_{12} Feel loyal [a]	0.71*	0.04	0.84*	0.03	0.83*	0.03
X_{13} First choice	0.88*	0.03	0.88*	0.03	0.88*	0.03

Note: [a] These loadings were fixed to the value of 1.0 during the estimation process.

[b] SRW: Standardised regression weights; SE: Bootstrap standard errors.

*Deemed significant at $p<0.05$ due to estimate falling outside the interval 0 to $\pm$ 2 Bootstrap standard errors.

Table 5.7 CFA results – Correlation matrix of latent constructs (televisions).

	Sony				Toshiba				Hitachi			
	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
F1	1.00				1.00				1.00			
F2	0.26	1.00			0.28	1.00			0.19	1.00		
F3	0.25	0.74	1.00		0.28	0.72	1.00		0.18	0.70	1.00	
F4	0.38	0.74	0.79	1.00	0.31	0.79	0.70	1.00	0.13	0.80	0.70	1.00

Note: F1 Brand Awareness, F2 Brand Associations, F3 Perceived Quality and F4 Brand Loyalty.

Table 5.8 CFA results – Standardised parameter estimates (cars).

Dimension	Toyota		Mitsubishi		Suzuki	
Measure	SRW[b]	S.E	SRW	S.E	SRW	S.E
F1: Brand awareness						
X_1 Awareness [a]	0.89*	0.01	0.89*	0.01	0.89*	0.01
F2: Brand associations						
X_2 Up-market [a]	0.69*	0.04	0.73*	0.04	0.69*	0.04
X_3 Tough	0.75*	0.03	0.75*	0.03	0.73*	0.04
X_4 Like the company	0.83*	0.03	0.85*	0.03	0.83*	0.03
X_5 Proud to buy	0.85*	0.03	0.82*	0.03	0.85*	0.03
X_6 Trust the company	0.87*	0.03	0.87*	0.02	0.84*	0.03
F3: Perceived quality						
X_7 Good quality [a]	0.91*	0.02	0.92*	0.01	0.89*	0.02
X_8 Consistent quality	0.92*	0.01	0.92*	0.01	0.89*	0.02
X_9 Very durable	0.91*	0.02	0.89*	0.02	0.88*	0.02
X_{10} Very reliable	0.93*	0.01	0.90*	0.02	0.86*	0.02
X_{11} Excellent features	0.85*	0.02	0.84*	0.03	0.79*	0.03
F4: Brand loyalty						
X_{12} Feel loyal [a]	0.89*	0.03	0.88*	0.02	0.81*	0.04
X_{13} First choice	0.89*	0.02	0.89*	0.02	0.84*	0.03

Note: [a] These loadings were fixed to the value of 1.0 during the estimation process.

[b] SRW: Standardised regression weights; SE: Bootstrap standard errors

*Deemed significant at $p<0.05$ due to estimate falling outside the interval 0 ± 2 Bootstrap standard errors.

Table 5.9 CFA results – Correlation matrix of latent constructs (cars).

	Toyota				Mitsubishi				Suzuki			
	F1	F2	F3	F4	F1	F2	F3	F4	F1	F2	F3	F4
F1	1.00				1.00				1.00			
F2	0.35	1.00			0.20	1.00			0.14	1.00		
F3	0.36	0.74	1.00		0.20	0.75	1.00		0.11	0.72	1.00	
F4	0.35	0.76	0.80	1.00	0.16	0.74	0.76	1.00	0.20	0.73	0.78	1.00

Note: F1 Brand awareness, F2 Brand associations, F3 Perceived quality and F4 Brand loyalty.

Reliability and Variance Extracted

The reliability and variance extracted values for all of the dimensions except for brand awareness, are shown in Table 5.10. As discussed earlier in section 4.5.1, the reliability for the exogenous construct brand awareness was fixed at 0.80 since the brand awareness construct had a single indicator. The reliability and the variance extracted were calculated as per the following formulae (Hair et al. 1998, p 624).

$$\text{Construct Reliability} = \frac{(\text{Sum of standardised loadings})^2}{(\text{Sum of standardised loadings})^2 + \text{Sum of indicator measurement error}}$$

$$\text{Variance Extracted} = \frac{\text{Sum of squared standardised loadings}}{\text{Sum of squared standardised loadings} + \text{Sum of indicator measurement error}}$$

Each of the three exogenous constructs (brand associations, perceived quality and brand loyalty) exceeded the suggested level of 0.70 for reliability, for both cars (Toyota 0.90, 0.96, and 0.87; Mitsubishi 0.90, 0.95, and 0.88; Suzuki 0.89, 0.94 and 0.81) and televisions (Sony 0.90, 0.96 and 0.78; Toshiba 0.87, 0.94 and 0.85; and Hitachi 0.87, 0.94 and 0.84).

All three exogenous constructs exceeded the suggested level of 0.50 for variance extracted in the selected product categories of cars (Toyota 0.64, 0.82, and 0.77; Mitsubishi 0.65, 0.80, and 0.79; Suzuki 0.63, 0.75 and 0.68) and televisions (Sony 0.64, 0.81 and 0.64; Toshiba 0.58, 0.75 and 0.74; and Hitachi 0.57, 0.75 and 0.73). Thus, reliability and variance extracted estimates indicated that all the specified indicators were sufficient in their specification of the constructs.

Table 5.10 CFA results – Reliability estimates (cars and televisions).

	Car Brands			**Television Brands**		
	Toyota	**Mitsubishi**	**Suzuki**	**Sony**	**Toshiba**	**Hitachi**
Reliability						
Brand awareness	0.80	0.80	0.80	0.80	0.80	0.80
Brand associations	0.90	0.90	0.89	0.90	0.87	0.87
Perceived quality	0.96	0.95	0.94	0.96	0.94	0.94
Brand loyalty	0.87	0.88	0.81	0.78	0.85	0.84
Variance extracted						
Brand awareness	0.80	0.80	0.80	0.80	0.80	0.80
Brand associations	0.64	0.65	0.63	0.64	0.58	0.57
Perceived quality	0.82	0.80	0.75	0.81	0.75	0.75
Brand loyalty	0.77	0.79	0.68	0.64	0.74	0.73

Discriminant Validity

To test for discriminant validity, each pair of constructs were first analysed by standard confirmatory factor analytic procedures. For each pair of constructs, a second confirmatory factor model (Non-discriminance model) was compared to the standard model. In the second model, the correlation between the two factors was fixed at 1.0 and

their relationship with other variables was constrained to be equal. For example, to test for discriminant validity of the constructs 'brand awareness' and 'brand associations, two factor models were compared. In the standard model, the correlation between the constructs 'brand awareness' and 'brand associations' was not fixed. In the non-discriminance model, the correlation between the constructs brand awareness and brand associations was fixed at 1.0. The difference in Chi-square values of the two models ($\Delta\chi^2$ = 231.12 – 201.83 = 29.29), at the difference degrees of freedom (ΔDF = 61- 60 =1), if significant, indicates discriminant validity of the two constructs (Shemwell & Yavas 1999). The discriminant validity of each pair of constructs for all the six brands was tested. The results are summarised in Tables 5.11 and 5.12, which indicated that the four constructs exhibited discriminant validity.

Table 5.11 CFA results – Test of discriminant validity (televisions).

Brand Equity Dimensions	**Non-discriminance**		**Difference**		**Prob**
	χ^2	**DF**	$\Delta\chi^2$	**ΔDF**	
Sony (Standard model: χ^2 = 201.83; DF = 60)					
Brand awareness & Brand associations	231.12	61	29.29	1	<0.01
Brand awareness & Perceived quality	229.25	61	27.42	1	<0.01
Brand awareness & Brand loyalty	209.39	61	7.56	1	<0.01
Brand associations & Perceived quality	303.37	61	101.54	1	<0.01
Brand associations & Brand loyalty	288.64	61	86.81	1	<0.01
Perceived Quality & Brand loyalty	294.36	61	92.53	1	<0.01
Toshiba (Standard model: χ^2 = 200.32; DF = 60)					
Brand awareness & Brand associations	218.54	61	18.22	1	<0.01
Brand awareness & Perceived quality	213.85	61	13.53	1	<0.01
Brand awareness & Brand loyalty	208.68	61	8.36	1	<0.01
Brand associations & Perceived quality	301.69	61	101.37	1	<0.01
Brand associations & Brand loyalty	261.59	61	61.27	1	<0.01
Perceived Quality & Brand loyalty	260.89	61	60.57	1	<0.01
Hitachi (Standard model: χ^2 = 174.07; DF = 60)					
Brand awareness & Brand associations	207.75	61	33.68	1	<0.01
Brand awareness & Perceived quality	207.17	61	33.10	1	<0.01
Brand awareness & Brand loyalty	205.90	61	31.83	1	<0.01
Brand associations & Perceived quality	205.56	61	31.49	1	<0.01
Brand associations & Brand loyalty	223.55	61	49.48	1	<0.01
Perceived Quality & Brand loyalty	222.21	61	48.14	1	<0.01

Table 5.12 CFA results – Test of discriminant validity (cars).

Brand Equity Dimensions	Non-discriminance		Difference		Prob
	χ^2	DF	$\Delta\chi^2$	ΔDF	
Toyota (Standard model: χ^2 = 200.84; DF = 60)					
Brand awareness & Brand associations	212.35	61	11.52	1	<0.01
Brand awareness & Perceived quality	204.82	61	3.98	1	<0.01
Brand awareness & Brand loyalty	212.75	61	11.91	1	<0.01
Brand associations & Perceived quality	316.62	61	115.78	1	<0.01
Brand associations & Brand loyalty	315.63	61	114.79	1	<0.01
Perceived Quality & Brand loyalty	358.56	61	157.72	1	<0.01
Mitsubishi (Standard model: χ^2 = 167.93; DF = 60)					
Brand awareness & Brand associations	200.67	61	32.74	1	<0.01
Brand awareness & Perceived quality	191.16	61	23.23	1	<0.01
Brand awareness & Brand loyalty	190.63	61	22.70	1	<0.01
Brand associations & Perceived quality	301.41	61	133.48	1	<0.01
Brand associations & Brand loyalty	296.07	61	128.14	1	<0.01
Perceived Quality & Brand loyalty	294.93	61	127.00	1	<0.01
Suzuki (Standard model: χ^2 = 187.91; DF = 60)					
Brand awareness & Brand associations	245.79	61	57.88	1	<0.01
Brand awareness & Perceived quality	237.84	61	49.93	1	<0.01
Brand awareness & Brand loyalty	226.42	61	38.51	1	<0.01
Brand associations & Perceived quality	274.08	61	86.17	1	<0.01
Brand associations & Brand loyalty	247.66	61	59.75	1	<0.01
Perceived Quality & Brand loyalty	268.35	61	80.44	1	<0.01

5.3.5 Factor Comparison

The factors that emerged from each of the six brands were then compared. The comparison involved the comparison of the *number of factors*, *complexity* and *configuration* (Rummel 1970). The factor comparison clearly indicated that the same set of factors have been revealed across the six brands. *Complexity* refers to the degree to which different variables loaded on to factors. Tables 5.7 and 5.9 showed that the variables are loading onto respective factors to a similar degree for the six brands. *Configuration* refers to the pattern and magnitude of the loadings of the variables. Tables 5.7 and 5.9 also showed that, similar variables were loading onto similar factors for all the six brands.

The factor pattern-magnitude similarity of factor loadings can be measured by the Root Mean Square Coefficient (RMSC), which is a measure of the similarity of magnitude

and direction of the factors involved. If the magnitude of RMSC is zero, the two factors being compared are similar in magnitude and direction. As RMSC departs from zero, the two factors being compared are less alike (Rummel 1970, p 461). The values of all the RMSCs were nearer to zero as shown in Table 5.13, indicating that the factors revealed by the six brands were similar in both magnitude and direction.

Table 5.13 Measures of factor comparison – Root mean square coefficient (μ).

Brands	Factor			
	Brand Awareness	**Brand Associations**	**Perceived Quality**	**Brand Loyalty**
Sony and Toshiba	0.00	0.05	0.15	0.09
Sony and Hitachi	0.00	0.05	0.05	0.08
Toshiba and Hitachi	0.00	0.03	0.13	0.01
Sony and Toyota	0.00	0.04	0.02	0.12
Sony and Mitsubishi	0.00	0.03	0.03	0.12
Sony and Suzuki	0.00	0.04	0.05	0.07
Toshiba and Toyota	0.00	0.07	0.16	0.04
Toshiba and Mitsubishi	0.00	0.06	0.15	0.03
Toshiba and Suzuki	0.00	0.06	0.13	0.03
Hitachi and Toyota	0.00	0.06	0.05	0.05
Hitachi and Mitsubishi	0.00	0.06	0.05	0.04
Hitachi and Suzuki	0.00	0.05	0.04	0.03
Toyota and Mitsubishi	0.00	0.02	0.02	0.01
Toyota and Suzuki	0.00	0.02	0.05	0.07
Mitsubishi and Suzuki	0.00	0.03	0.03	0.06

The Coefficient of Congruence (CC) measures not only the pattern similarity but also the magnitude similarity of the factors from the six brands. The CCs were calculated for all four factors for the six brands as shown in Table 5.14. The value of CC varies between –1 and +1. A value of –1 indicates perfect negative similarity of the two factors being compared. A value of +1 indicates perfect similarity of the two factors being compared. A value of zero indicates dissimilarity of the two factors being compared (Rummel 1970, p 461). The values of all the CCs were nearer to +1 as shown in Table 5.14, indicating that the factors revealed by the six brands had nearly perfect similarity. Thus, pattern similarity as well as magnitude similarity of the factors from the six brands was established.

Table 5.14 Measures of factor comparison – Coefficient of congruence (δ).

Brands	Factor			
	Brand Awareness	Brand Associations	Perceived Quality	Brand Loyalty
Sony and Toshiba	1.00	0.99	0.99	0.99
Sony and Hitachi	1.00	0.99	0.99	0.99
Toshiba and Hitachi	1.00	0.99	0.99	0.99
Sony and Toyota	1.00	0.99	1.00	0.99
Sony and Mitsubishi	1.00	1.00	0.99	0.99
Sony and Suzuki	1.00	0.99	0.99	0.99
Toshiba and Toyota	1.00	0.99	0.99	1.00
Toshiba and Mitsubishi	1.00	0.99	0.99	1.00
Toshiba and Suzuki	1.00	0.99	0.99	1.00
Hitachi and Toyota	1.00	0.99	0.99	1.00
Hitachi and Mitsubishi	1.00	0.99	0.99	1.00
Hitachi and Suzuki	1.00	0.99	0.99	1.00
Toyota and Mitsubishi	1.00	0.99	0.99	0.99
Toyota and Suzuki	1.00	0.99	0.99	0.99
Mitsubishi and Suzuki	1.00	0.99	0.99	0.99

5.3.6 Conclusion

The hypothesised model fitted the data well for all brands. All factor loadings were large and statistically significant. Anderson and Gerbing (1988) suggested that such statistically significant factor loadings indicate convergent validity. The overall model goodness-of-fit results and the measurement model supported the proposed four-factor model. The measures of absolute and incremental fit indicated that the model in each case, was acceptable. The overall results of the confirmatory factor analysis confirmed that consumer-based brand equity was a four-dimensional construct. The six confirmatory factor analyses conducted across the brands provided consistent and comparable results.

5.4 RESULTS OF FACTOR ANALYSIS OF COUNTRY IMAGE MEASURES

One of the objectives of the present research was to investigate the relationship between country image and consumer-based equity of brands. Hence, it was important to measure respondents' country image. This section presents the results of factor analyses conducted with the *macro* country image and *micro* country image scale items separately. Input for the analyses was obtained from sections three and four of the survey questionnaire (see Appendix E), where respondents were asked to rate (i) the countries

Japan, Malaysia and China, and (ii) products in general from these three countries. As discussed in Chapter Four, Likert-type scales of 1 to 11 were used to measure country image, where 1 meant 'strongly disagree' and 11 meant 'strongly agree.'

A missing values analysis indicated that the country image data were randomly missing (Little's MCAR test: χ^2 (2971), p>0.001), and that all variables had a low level of missing data. There were no variables with 5 percent or more missing values. Cases (14) with high number of missing values were dropped from the analysis. Out of the possible remedies, the 'complete case approach' could not be used because this would reduce the resulting sample to an inappropriate size. Missing data were therefore replaced with the mean of the relevant variable. The sample size (n = 539) used was above the minimum required as explained in section 4.6.3. The correlations matrices accompanied by the standard deviations for all these variables, for each brand are presented in Appendix G.

5.4.1 *Macro* Country Image

The items used for measuring the *macro* country image were derived from Martin and Eroglu (1993), also purified with the help of the pilot study (see Appendix C). A principal component factor analysis was conducted with these 11 items employing a Promax rotation, for each of the three countries, Japan, Malaysia and China. One item with low communality (item 9 – refer back to Table 4.3) was dropped. This resulted in a three-factor solution.

The results are summarised in Tables 5.15 and 5.16. Items 1, 2, 6 and 8, all of which related to the strength of the country as a producer of goods, loaded onto the first factor. This factor was named *production*. Items 3, 4 and 5, all of which refer to the standard of living of the people of a country, loaded onto the second factor. This factor was named *people*. Items 7, 10 and 11, all of which refer to the political nature of a country, loaded onto the third factor. The third factor was named *political*. These results are consistent with the results of the pilot study. Items loading onto each factor were averaged to obtain a unit weighted score for the factor. These three factors also exhibited high values of Cronbach's alpha coefficient demonstrating reliability (see Table 5.15).

Table 5.15 Factor analysis results – *Macro* country image.

	Japan			Malaysia			China		
	F1	**F2**	**F3**	**F1**	**F2**	**F3**	**F1**	**F2**	**F3**
F1 - Production									
1.Technological research	0.98			0.99			0.86		
2. High quality products	0.92			0.83			0.64		
6. Industrialisation	0.66			0.77			0.87		
8. Developed economy	0.65			0.52			0.61		
Cronbach's alpha coefficient	**0.87**			**0.83**			**0.81**		
F2 – People									
3. High standard of living		0.63			0.50			0.61	
4. High labour costs		0.64			0.91			0.84	
5. Welfare system		0.94			0.82			0.72	
Cronbach's alpha coefficient		**0.72**			**0.76**			**0.74**	
F3 – Political									
7. Civilian government			0.92			0.77			0.74
10. Free-market system			0.71			0.80			0.77
11. Democratic			0.83			0.82			0.58
Cronbach's alpha coefficient			**0.79**			**0.73**			**0.70**
Eigenvalues	5.1	1.0	1.1	4.78	1.0	1.2	4.5	1.24	0.87
Variance extracted %	51.1	9.2	11.1	47.7	9.2	11.8	45.4	12.3	8.6
Total Variance extracted %		71.4			68.7			70.3	

Note: Extraction method: Principal component analysis. Rotation method: Promax.

The values shown in the table are factor-loading correlations.

Table 5.16 Factor analysis results – Correlation matrix of *macro* country image.

	Japan			Malaysia			China		
Factor	**F1**	**F2**	**F3**	**F1**	**F2**	**F3**	**F1**	**F2**	**F3**
F1	1.00			1.00			1.00		
F2	0.63	1.00		0.64	1.00		0.61	1.00	
F3	0.60	0.54	1.00	0.52	0.52	1.00	0.46	0.57	1.00
Mean	9.11	7.35	7.75	6.21	4.70	5.54	5.94	3.90	3.91
Standard Deviation	1.80	2.18	2.39	2.00	2.04	2.18	2.11	1.99	2.03

Note: F1 = Production, F2 = People and F3 = Political

A single *macro* country image measure was required for examining the relationship between *macro* country image and consumer-based brand equity. Hence, a second order factor analysis was performed, using the three factor scores as variables. This resulted in a

single-factor solution for all three countries (see Table 5.17). These three factors also exhibited high values of Cronbach's alpha coefficient (see Table 5.17). This indicates that the three factors are all sub-dimensions of a higher-order *macro* country image. This result is consistent with the results from the pilot study, and similar to other studies (e.g., Amonini, Keogh & Sweeney 1999). This in turn allowed the calculation of an overall *macro* country image score. The *macro* country image score was later used in the repeated measures one-way ANOVA and the canonical correlation analysis.

Table 5.17 Factor analysis results – Second order *macro* country image.

Variable	Japan	Malaysia	China
	Factor-Loading Correlations		
Production	0.88	0.86	0.88
People	0.85	0.86	0.83
Political	0.83	0.80	0.80
Cronbach's alpha coefficient	**0.80**	**0.79**	**0.78**
Variance extracted %	72.48	70.16	70.03

Note: Extraction method: Principal component analysis.

The values of all the coefficients of congruence were calculated and were nearer to +1 (see Table 5.18), indicating that the factors revealed by the three countries had nearly perfect similarity.

Table 5.18 Measures of factor comparison – Coefficient of congruence (δ).

Countries	Factors		
	Production	People	Political
Japan & Malaysia	0.993	0.969	0.993
Japan & China	0.975	0.973	0.985
Malaysia & China	0.986	0.993	0.990

5.4.2 *Micro* Country Image

The items used for measuring the *micro* country image were derived from Nagashima's (1970, 1977) scale, purified with the help of the pilot study. A principal component factor analysis with Promax rotation was conducted with the 12 items. Items 5, 6 and 8 (refer back to Table 4.7), which had unacceptably low communalities, were dropped from the analysis. This resulted in a single factor solution with nine variables, for all three countries (see Table 5.19). This result is consistent with the results of the pilot study, and similar to other studies (e.g., Amonini, Keogh & Sweeney 1999; Roth & Romeo

1992). The obtained single factor explained a substantial amount of variance (Japan 67%; Malaysia 61%; and China 67%) and exhibited high values of Cronbach's alpha coefficient (see Table 5.19). The nine variables were averaged to obtain an overall score for the *micro* country image, which was used in the repeated measures one-way ANOVA and the canonical correlation analysis.

The coefficients of congruence values were calculated for each pair of countries and were nearer to +1 (Japan & Malaysia 0.998; Japan & China 0.999; Malaysia & China 0.998), indicating that the factor revealed by the three countries had nearly perfect similarity.

Table 5.19 Factor analysis results – *Micro* country image.

Variable	Japan	Malaysia	China
	Factor Loading Correlations		
1. Excellent quality workmanship	0.85	0.82	0.85
2. Technically advanced	0.80	0.82	0.82
3. Innovative	0.74	0.76	0.75
4. Proud to own	0.67	0.77	0.65
7. Reliable	0.89	0.85	0.89
9. High status	0.82	0.81	0.81
10. Excellent finish	0.87	0.85	0.87
11. Dependable	0.88	0.87	0.87
12. Upmarket	0.84	0.83	0.84
Cronbach's alpha coefficient	**0.93**	**0.94**	**0.94**
Variance extracted %	67.0	67.0	61.0

Note: Extraction method: Principal component analysis.

5.5 RESULTS OF REPEATED MEASURES ONE-WAY ANOVA

Respondents' scores on country image for each country were averaged and tabulated. Results (see Table 5.20) indicated that respondents held a favourable country image for Japan for both selected product categories, followed by Malaysia and China, at both *macro* and *micro* levels. Japan received the rank of 1, followed by Malaysia (ranked 2) and China (ranked 3). The results of a repeated measures one way ANOVA indicated that respondents' country image perceptions of the three countries were significantly different at the 0.05 level, both for *macro* country image [$F(2, 1076) = 841.022$; $p<0.001$; partial $\eta^2 = 0.610$] and *micro* country image [$F(2, 1076) = 803.710$; $p<0.001$; partial $\eta^2 = 0.599$].

Table 5.20 Repeated measures one-way ANOVA – Mean ratings for country image.

Country	*Macro* Country Image (n = 539)			*Micro* Country Image (n = 539)		
	Mean	**Std. Deviation**	**Rank**	**Mean**	**Std. Deviation**	**Rank**
Japan	8.22	1.78	1	8.46	1.89	1
Malaysia	5.59	1.75	2	5.44	1.90	2
China	4.75	1.73	3	5.06	2.05	3

Post hoc Tukey's (1953) HSD multiple comparisons were conducted to investigate group differences (see Table 5.21). Respondents' *macro* country image for Japan was significantly higher than that for Malaysia and China. Respondents' *macro* country image for Malaysia was significantly higher than that for China. Respondents' *micro* country image for Japan was significantly higher than that for Malaysia and China. Respondents' *micro* country image for Malaysia was significantly higher than that for China.

Table 5.21 Repeated measures one-way ANOVA – Post hoc tests for country image.

Dimension	Country1	Country2	Mean Difference	Tukey's HSD
***Macro* country image**	Japan	Malaysia	2.63*	0.21
	Japan	China	3.47*	
	Malaysia	China	0.84*	
***Micro* country image**	Japan	Malaysia	3.02*	0.21
	Japan	China	3.40*	
	Malaysia	China	0.38*	

* Deemed significant at 0.05 level.

5.5.1 Conclusion

The results of the repeated measures one-way ANOVA indicated that respondents' country image perceptions of the three countries included in the present study were significantly different. Respondents' held a significantly more favourable country image for Japan compared to Malaysia and China, at both *macro* and *micro* levels. Respondents also held significantly more favourable country image of Malaysia than of China, at both *macro* and *micro* levels.

5.6 SUMMARY

This chapter provided the first part of the analysis of the data and the results. Results of consumers' product category-country and product category-brand associations were presented first. Results indicated that respondents strongly associated Japan with the product categories cars and televisions, compared to Malaysia and China. Compared to Malaysia, respondents associated China more strongly with both product categories. Respondents perceived larger differences between Japan and the other two countries (China and Malaysia), but perceived smaller differences between China and Malaysia. Respondents thus perceived a hierarchy among the brands in both the product categories. The hierarchy of the brands for televisions was: Sony, Toshiba and Hitachi. The hierarchy of the brands for cars was: Toyota, Mitsubishi and Suzuki.

The multi-dimensionality of consumer-based brand equity was then established. The results indicated that consumer-based brand equity was indeed a four-dimensional construct as hypothesised. Factor analyses and repeated measures one-way ANOVA of the country image data indicated that respondents' country image perceptions of Japan, Malaysia and China were significantly different at both *macro* and *micro* levels. Respondents held a more favourable country image for Japan compared to Malaysia and China, at both *macro* and *micro* levels. Respondents held a more favourable country image of Malaysia compared to China at both *macro* and *micro* levels.

CHAPTER 6: SUBSTANTIAL RESULTS AND TESTS OF HYPOTHESES

6.1 INTRODUCTION

Chapter Five provided the results of respondents' product category-country and product category-brand associations. The results from the confirmatory factor analysis conducted to establish the multidimensionality of consumer-based brand equity and results of the factor analyses conducted to establish the dimensionality of the two country image scales were also included in Chapter Five. This chapter summarises the results of the full design doubly-multivariate repeated measures MANOVA conducted to examine consumer-based brand equity differences between brands from different countries of origin. This is then followed by the results of the canonical correlation analysis conducted to examine the relationships between country image and consumer-based brand equity.

6.2 RESULTS OF MANOVA

One of the objectives of the present research was to examine consumer-based equity differences of brands made in different countries. This section provides the results of the doubly multivariate repeated measures MANOVA undertaken to examine consumer-based equity differences of brands across different countries of origin. Data for the MANOVA were obtained from the computed scores on the four confirmed dimensions of brand equity identified in Chapter Five.

Country-of-origin (3 levels) and product category (two levels) were the two between-subjects factors. Brand name (3 levels) was the within-subjects factor: 3 levels were nested within each product category (i.e., Toyota, Mitsubishi and Suzuki were nested within cars; Sony, Toshiba and Hitachi were nested within televisions). Brand awareness, brand associations, perceived quality and brand loyalty were the four interval scale dependent measures. The four variables (brand awareness, brand associations, perceived quality and brand loyalty) were computed by averaging the scores of the variables loading onto them (see Table 4.1). All of the assumptions for MANOVA were met for the analysis, and in all cases, the cell sizes (see Table 6.1) were well above the minimum recommended (Hair et al. 1998) size of 20. The results of all multivariate hypothesis tests associated with the experimental design are summarised in Table 6.2. Several statistically significant results were obtained.

Table 6.1 MANOVA results – Between-subjects factors cell sizes.

Product Category	Country-of-Origin			Total
	Japan	Malaysia	China	
Television	77	86	91	254
Car	96	104	85	285
Total	173	190	176	539

Table 6.2 MANOVA results – Significance of multivariate tests.

Effect	Wilk's Λ	Exact F	Hypoth df	Error df	p	MVη^{2a}
Between-subjects						
Country-of-origin x Product category	0.975	1.720	8	1060	0.090	0.013
Country-of-origin (COO)	0.940	4.166	8	1060	<0.001*	0.030
Product category (PC)	0.956	6.111	4	530	<0.001*	0.044
Within-subjects						
Brand within PC	0.425	8.019	16	526	<0.001*	0.574
Brand within PC by COO	0.979	0.172	32	1052	0.989	0.020

Note: [a] MV indicates multivariate. * Deemed significant at 0.05 level.

6.2.1 Between-Subjects Effects

Country-of-origin x product category multivariate interaction

The two-way multivariate interaction between *country-of-origin* (COO) and *product category* (PC) was not significant at $p<0.05$ indicating that differences in consumer-based brand equity of brands based on their country-of-origin did not differentially vary across the two product categories (see Table 6.2). Though this two-way multivariate interaction was technically not significant, since the p value was 0.09, this could be seen as suggesting a possible interaction. This issue is explored further in Chapter Seven (see section 7.2.1).

Country-of-origin

Country-of-Origin Multivariate Main Effect

The multivariate main effect for *country-of-origin* indicated that there were significant differences in the set of consumer-based brand equity dimensions among the three different countries (see Table 6.2). The mean vectors for the brand equity dimensions

for each of the three countries of origin, are shown in Table 6.3. The significant multivariate test signals that these 3 vectors were significantly different. Hypothesis H_1 was therefore supported. However, the multivariate main effect for the *country-of-origin* accounted for a small (3%) percentage of the variance in the dependent variables.

Table 6.3 MANOVA results – Mean vectors of consumer-based brand equity by COO.

Consumer-Based Brand Equity Dimension	Japan	China	Malaysia
Brand awareness	1.64	1.55	1.50
Brand associations	6.54	5.89	5.77
Perceived quality	7.19	6.33	6.32
Brand loyalty	5.87	5.02	4.98

Recall that the repeated measures one-way ANOVA, reported in Chapter Five, indicated there were significant differences amongst the three countries in their country images (refer to Table 5.21). Also, recall that there were differences amongst the three countries in the extent of their product category-country associations (see Tables 5.1 & 5.2). If one connects the outcomes of this MANOVA effect with the country image and associations outcomes, a logical inference would be that the consumer-based equity of a brand varied significantly according to the country-of-origin of the brand where respondents perceived substantive differences between the countries in terms of their country images and their association with the product category.

Country-of-Origin – Follow-up Univariate F-Tests

Univariate F-tests (see Table 6.4), conducted as a consequence of the significant multivariate country-of-origin main effect, showed that each of the consumer-based brand equity dimensions, of *brand associations*, *perceived quality* and *brand loyalty* varied significantly with the *country-of-origin* of the brand. Hypotheses H_{1a}, H_{1b} and H_{1c} were therefore supported.

As previously mentioned (see section 3.3.2), no hypotheses were made regarding the differences amongst the groups in terms of their *brand awareness*. The brand awareness measures were not systematically varied among the three groups of respondents. That is, respondents were only asked if they were aware of the brand Sony. They were not asked if they knew of the brand Sony made in Malaysia/China/Japan. However, significant country-of-origin differences were observed. The possible reasons for this significant effect for brand awareness are explored in Chapter Seven (see section 7.2.1).

Table 6.4 MANOVA results – Univariate tests – between-subjects effects.

Source Measure	Type III Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Country-of-origin x Product category						
Brand awareness	1.49	2	0.75	0.94	0.391	0.004
Brand associations	58.61	2	29.31	2.64	0.072	0.010
Perceived quality	85.59	2	42.79	3.93	0.020**	0.015
Brand loyalty	44.08	2	22.04	1.34	0.262	0.005
Country-of-origin						
Brand awareness	6.28	2	3.140	3.96	0.020*	0.015
Brand associations	192.53	2	96.26	8.66	0.000*	0.031
Perceived quality	261.69	2	130.84	12.02	<0.001*	0.043
Brand loyalty	150.99	2	75.49	4.60	<0.010*	0.017
Product category						
Brand awareness	6.11	1	6.11	7.70	0.006*	0.014
Brand associations	120.30	1	120.30	10.83	0.001*	0.020
Perceived quality	106.63	1	106.63	9.79	0.002*	0.018
Brand loyalty	167.25	1	167.25	10.19	0.001*	0.019
Error						
Brand awareness	422.839	533	0.79			
Brand associations	5921.234	533	11.11			
Perceived quality	5800.945	533	10.88			
Brand loyalty	8742.547	533	16.40			

Note: * Deemed significant at 0.05 level.

**p<0.05 but this finding will not be interpreted because the multivariate test of the country-of-origin by product category interaction was not significant.

Country-of-Origin – Post Hoc Multiple Comparisons

Post hoc multiple comparison tests were conducted to investigate significant univariate group differences among means (see Table 6.5). Tukey's (1953) honestly significant differences (HSD) method was used in all cases.

Brand awareness. Respondents' awareness of brands made in Japan was significantly higher than that of brands made in Malaysia, but was not significantly different from that of brands made in China (see Table 6.5). Respondents' awareness of brands made in Malaysia was not significantly different from that of brands made in China.

Table 6.5 MANOVA results – Post hoc tests for country-of-origin.

Consumer-Based Brand Equity Dimension	Country1	Country2	Mean Difference	p
Brand awareness	Japan	Malaysia	0.14*	0.02
	Japan	China	0.09	0.24
	Malaysia	China	–0.05	0.52
Brand associations	Japan	Malaysia	0.77**	<0.01
	Japan	China	0.65**	<0.01
	Malaysia	China	–0.12	0.80
Perceived quality	Japan	Malaysia	0.87**	<0.01
	Japan	China	0.86**	<0.01
	Malaysia	China	–0.01	0.99
Brand loyalty	Japan	Malaysia	0.89**	<0.01
	Japan	China	0.85**	<0.01
	Malaysia	China	–0.04	0.23

Note: * Deemed significant at 0.05 level. ** Deemed significant at 0.01 level

Brand associations. Respondents' brand associations for brands made in Japan were significantly higher than those for brands made in China, and Malaysia (see Table 6.5). However, respondents' brand associations for brands made in Malaysia were not significantly different from those for brands made in China.

Perceived quality. Respondents' perceived quality of brands made in Japan was significantly higher than that of brands made in China and Malaysia (see Table 6.5). However, respondents' perceived quality of brands made in Malaysia was not significantly different from that of brands made in China.

Brand loyalty. Respondents' brand loyalty for brands made in Japan was significantly higher than that for brands made in Malaysia or China (see Table 6.5). On the other hand, respondents' brand loyalty for brands made in Malaysia was not significantly different from that for the brands made in China.

Conclusions Regarding Country-of-Origin

Overall, the consumer-based equity of a brand significantly varied according to its country-of-origin supporting H_1. Each of the individual consumer-based equity dimensions (e.g., brand awareness, brand associations, perceived quality and brand loyalty) of a brand

varied significantly according to the country-of-origin of the brand supporting H_{1a}, H_{1b} and H_{1c}.

Linking the outcomes of this MANOVA effects with the results of repeated measures one-way ANOVA of country image (section 5.5) and respondents' association outcomes (section 5.2.1), provides additional insights. It can be inferred that consumer-based equity of brands made in a country (e.g., Japan) with a highly favourable country image and strong associations with the product category was significantly higher than that for the same brands made in the countries (e.g., Malaysia and China) with less favourable country images and weaker association with the product category, where respondents perceived substantive differences between the countries in terms of their country images and their association with the product category.

Recall that Post hoc multiple comparison tests indicated that the consumer-based brand equity dimensions of brands were significantly different when the country-of-origin was changed from Japan to Malaysia or from Japan to China, but not when it was changed from Malaysia to China. Also recall that respondents perceived larger rank differences between Japan and the other two countries (Malaysia and China) (see section 5.2.1) in terms of their association with the selected product categories.

Respondents associated Japan ($PCCA_{Televisions}$ 968; $PCCA_{Cars}$ 1067) more strongly with both product categories, compared to Malaysia ($PCCA_{Televisions}$ 95; $PCCA_{Cars}$ 16) and China ($PCCA_{Televisions}$ 244; $PCCA_{Cars}$ 48). Also recall that the repeated measures one-way ANOVA results indicated that respondents perceived larger rank differences between Japan and the other two countries (Malaysia and China), in terms of their country images (see section 5.5).

Japan had a favourable country image (CI_{Macro} 8.22; CI_{Micro} 8.46) compared to the other two countries, Malaysia (CI_{Macro} 5.59; CI_{Micro} 5.44) and China (CI_{Macro} 4.75; CI_{Micro} 5.06). Accordingly, the consumer-based brand equity dimensions for brands made in Japan were significantly higher than those for the brands made in the countries Malaysia and China.

It may also be recalled that respondents perceived smaller rank differences between the countries China and Malaysia, in terms of their association with the selected product categories, and in terms of their country images. Accordingly, the consumer-based brand equity dimensions of brand made in China were not significantly different from those for the brands made in Malaysia.

Product category

Product Category – Multivariate Main Effect

Table 6.2 shows that the multivariate main effect for the *product category* was significant at $p<0.05$, indicating that the mean vectors for consumer-based equity measures varied significantly between the two product categories, cars and televisions (see Table 6.6). Hypothesis H_2 was therefore supported. However, the multivariate main effect for the *product category* accounted for a small (4.4%) percentage of the variance in the dependent variables.

Product Category – Follow-up Univariate F-Tests

The follow-up univariate F-tests of each of the four consumer-based brand equity dimensions of *brand awareness*, *brand associations*, *perceived quality* and *brand loyalty* indicated significant differences by *product category* (see Table 6.4). Hypotheses H_{2a}, H_{2b}, H_{2c} and H_{2d} were therefore supported. The consumer-based brand equity dimensions were product category specific. The individual means for brand equity dimensions for televisions and for cars are shown in Table 6.6. Televisions showed significantly higher ratings for brand associations, perceived quality and brand loyalty, but significantly lower brand awareness ratings, compared to cars.

Table 6.6 MANOVA – Mean vectors of consumer-based brand equity ratings of by product category.

Consumer-Based Brand Equity Dimension	Televisions	Cars
Brand awareness	1.50	1.62
Brand associations	6.33	5.81
Perceived quality	6.86	6.38
Brand loyalty	5.53	5.05

6.2.2 Within-Subjects Effects

Brand within product category

Brand within Product Category – Multivariate Main Effect

The multivariate main effect for brand within the product category was significant at $p<0.05$, indicating that the mean vectors of consumer-based brand equity measures varied

significantly by brand within a given product category (see Table 6.2). Hypothesis H_3 was therefore supported. The multivariate main effect for brand name within the product category accounted for 57.4 percent of the variance in the dependent variables.

Brand within Product Category – Follow-up Univariate F-Tests

The univariate F-tests for the four consumer-based brand equity dimensions *brand awareness*, *brand associations*, *perceived quality* and *brand loyalty* all varied significantly by brands within product category (see Table 6.7). Hypotheses H_{3a}, H_{3b}, H_{3c} and H_{3d} were therefore supported. The brand means for all dependent variables are shown in Table 6.8.

Table 6.7 MANOVA results – Univariate tests - within-subjects effects.

Source Measure	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared [a]
Brand within product category						
Brand awareness	506.12	4	253.06	260.02	<0.001*	0.494
Brand associations	1219.57	4	609.79	161.05	<0.001*	0.377
Perceived quality	1204.26	4	602.13	156.26	<0.001*	0.370
Brand loyalty	1809.95	4	904.98	144.55	<0.001*	0.352
Brand within product category by country-of-origin [b]						
Brand awareness	1.74	8	0.44	0.45	0.890	0.003
Brand associations	23.99	8	6.00	1.58	0.873	0.012
Perceived quality	18.93	8	4.73	1.23	0.722	0.009
Brand loyalty	36.88	8	9.22	1.47	0.836	0.011
Error						
Brand awareness	518.74	1066	0.49			
Brand associations	2018.14	1066	1.89			
Perceived quality	2053.83	1066	1.93			
Brand loyalty	3336.87	1066	3.13			

Note: [a] The η^2 values reported in this section are the partial η^2 values, instead of the more global eta square (η^2), measure of strength of association the as suggested by Tabachnick and Fidell (1996, p 53). Tabachnick and Fidell argued in favour of using partial η^2, saying the use of eta square (η^2) is flawed, particularly for within-subjects effects.

$$\text{Partial } \eta^2 = \frac{SS_{effect}}{(SS_{effect} + SS_{error})}$$

[b] These findings will not be interpreted because the overall brand within product category by country-of-origin interaction was not significant.

* Deemed significant at 0.05 level.

Table 6.8 MANOVA results – Mean ratings of consumer-based equity by brand.

Consumer-Based Brand Equity Dimension	Cars			Televisions		
	Toyota	Mitsubishi	Suzuki	Sony	Toshiba	Hitachi
Brand awareness	2.04	1.72	1.11	2.46	1.16	0.87
Brand associations	6.56	5.95	4.92	7.78	5.75	5.47
Perceived quality	7.26	6.41	5.46	8.23	6.32	6.03
Brand loyalty	5.98	5.15	4.01	7.46	4.93	4.65

Brand within Product Category - Post Hoc Multiple Comparisons

Post hoc Tukey's HSD multiple comparisons were conducted to investigate group differences (See Table 6.9). The results are summarised in the following sections.

Brand awareness. For televisions, respondents' brand awareness of Sony was significantly higher than that of Toshiba and Hitachi. Respondents' brand awareness of Toshiba was significantly higher than that of Hitachi. For cars, respondents' brand awareness of Toyota was significantly higher than that of both Mitsubishi and Suzuki. Respondents' brand awareness of Mitsubishi was also significantly higher than that of Suzuki.

Brand associations. Respondents' brand associations for Sony were significantly higher than those for Toshiba and Hitachi for televisions. But respondents' brand associations for Toshiba were not significantly higher than those for Hitachi. Respondents' brand associations for Toyota were significantly higher than those for Mitsubishi and Suzuki, for cars. Respondents' brand associations for Mitsubishi were also significantly higher than those for Suzuki.

Perceived quality. For televisions, respondents' perceived quality of Sony was significantly higher than that of Toshiba and Hitachi. Respondents' perceived quality of Toshiba was also significantly higher than that of Hitachi. For cars, respondents' perceived quality of Toyota was significantly higher than that of Mitsubishi and Suzuki. Respondents' perceived quality of Mitsubishi was also significantly higher than that of Suzuki.

Table 6.9 MANOVA results – Post hoc tests for brand within product category.

Consumer-Based Brand Equity Dimension	Product Category	Brand1	Brand2	Mean Difference	Tukey's HSD
Brand awareness	Cars	Toyota	Mitsubishi	0.33*	0.17
	Cars	Toyota	Suzuki	0.61*	
	Cars	Mitsubishi	Suzuki	0.93*	
	Televisions	Sony	Toshiba	1.30*	
	Televisions	Sony	Hitachi	1.59*	
	Televisions	Toshiba	Hitachi	0.29*	
Brand associations	Cars	Toyota	Mitsubishi	0.61*	0.34
	Cars	Toyota	Suzuki	1.65*	
	Cars	Mitsubishi	Suzuki	1.04*	
	Televisions	Sony	Toshiba	2.03*	
	Televisions	Sony	Hitachi	2.30*	
	Televisions	Toshiba	Hitachi	0.28	
Perceived quality	Cars	Toyota	Mitsubishi	0.85*	0.34
	Cars	Toyota	Suzuki	1.80*	
	Cars	Mitsubishi	Suzuki	0.95*	
	Televisions	Sony	Toshiba	1.91*	
	Televisions	Sony	Hitachi	2.21*	
	Televisions	Toshiba	Hitachi	0.29	
Brand loyalty	Cars	Toyota	Mitsubishi	0.83*	0.43
	Cars	Toyota	Suzuki	1.97*	
	Cars	Mitsubishi	Suzuki	1.14*	
	Televisions	Sony	Toshiba	2.53*	
	Televisions	Sony	Hitachi	2.81*	
	Televisions	Toshiba	Hitachi	0.28	

Note: *Deemed significant at 0.05 level.

Brand loyalty. For televisions, respondents' brand loyalty for Sony was significantly higher than that for Toshiba and Hitachi. However, respondents' brand loyalty for Toshiba was not significantly higher than that for Hitachi. For cars, respondents' brand loyalty for

Toyota was significantly higher than that for Mitsubishi and Suzuki. Respondents' brand loyalty for Mitsubishi was also significantly higher than that for Suzuki.

Conclusions Regarding Brand within Product Category

Overall, the consumer-based brand equity of brands significantly varied by brand within a product category. Each of the consumer-based equity dimensions (brand awareness, brand associations, perception of quality and brand loyalty) of brands significantly varied according to the product category.

Here again, linking the outcomes of this MANOVA effects with the results of repeated measures one-way ANOVA of country image (see section 5.5) and respondents' association outcomes (see section 5.2), provides additional insights. It can be inferred that, everything else being equal, consumer-based equity of brands with strong associations with the product category was significantly higher than that for the same brands with weaker association with the product category, where respondents perceived substantive differences between the brands in terms of their association with the product category in question.

For cars, all the four consumer-based brand equity dimensions were significantly higher in relation to Toyota than those same dimensions in relation to Mitsubishi and Suzuki. The four consumer-based brand equity dimensions in relation to Mitsubishi were also significantly higher than those same dimensions in relation to Suzuki. Recall that respondents perceived larger rank differences between each of the pair of brands (see section 5.2.1), Toyota and Suzuki (PCBA Rating difference 596), and Mitsubishi and Suzuki (PCBA Rating difference 245) and Toyota and Mitsubishi (PCBA Rating difference 351). Respondents associated the brands Toyota (PCBA Rating 626) and Mitsubishi (PCBA Rating 275) strongly with the product category cars compared to the brand Suzuki (PCBA Rating 30).

For televisions also, all the four consumer-based brand equity dimensions were significantly higher in relation to Sony than those in relation to Toshiba and Hitachi. Also recall that, respondents perceived larger rank differences between Sony (PCBA Rating 1016) and the brands Toshiba (PCBA Rating 153) and Hitachi (PCBA Rating 65) (see section 5.2.1) (refer to Table 5.4). Respondents associated Sony more strongly with televisions compared to Toshiba and Hitachi. However, the four consumer-based brand equity dimensions in relation to Toshiba were not significantly higher than those in relation to Hitachi. Recall that, respondents perceived only small differences between the brands Toshiba (PCBA Rating 153) and Hitachi (PCBA Rating 65).

Brand within product category by country-of-origin

As Table 6.2 showed, the multivariate main effect for brand name within product category by country-of-origin was not significant at the 0.05 level, indicating that differences in consumer-based brand equity perceptions according to brand names within a given product category, did not differentially vary across country-of-origin.

6.2.3 Conclusion

In conclusion, the results of the MANOVA indicated that consumer-based brand equity varied significantly by (i) the country-of-origin of the brand (ii) the product category and (ii) the brand name within a given product category. Univariate tests established that each of the four dimensions of consumer-based brand equity also varied significantly between the countries of origin of the brand, by the product category and by the brand name within a product category.

Combining the results of the MANOVA with the results of (i) the repeated measures one-way ANOVA, and (ii) consumers' product category-country associations (section 5.2.1) and (iii) consumers' product category-brand associations (section 5.2.2) provided additional insights. It was inferred that consumer-based equity of a brand made in a country with favourable country image and strong association with the product category was significantly higher than that of the same brand made in a country with a less favourable country image and weaker association with the product category, provided that respondents perceived substantive differences between the countries in terms of their country image and association with the product category. It was also inferred that the consumer-based equity of a brand with strong association with the product category was significantly higher than that of a brand with weaker association with the product category, where respondents perceived substantive differences between the brands in terms of their association with the product category.

6.3 RESULTS OF CANONICAL CORRELATION ANALYSIS

One of the objectives of the present research was to investigate the relationship between consumer-based equity of brands and image of the country-of-origin of the brand. This section includes the results of the canonical correlation analysis conducted to examine the relationships between respondents' country image and consumer-based brand equity. Canonical correlation analysis 'seeks to identify and quantify the associations between *two sets* of variables' (Johnson & Wichern 1998, p 587). Data for the canonical correlation

analysis were obtained from the unit-weighted scores on the four confirmed dimensions of consumer-based brand equity, and the unit-weighted scores for the two country image scales.

Canonical correlation analysis was performed between the set of consumer-based brand equity variables and the set of country image variables using the Set Correlation procedure in SYSTAT (Cohen & Wilkinson 1999). The consumer-based brand equity variables served as the dependent variable set and included the four interval variables of brand awareness, brand associations, perceived quality and brand loyalty. The country image variables served as independent variable set and included the interval scale variables *macro* country image and *micro* country image.

As discussed in section 3.3.5 in Chapter Three, it was hypothesised that consumer-based equity of a brand should be positively related to the consumers' image of the country-of-origin of the brand. The sample sizes (n = 285 for cars; n = 254 for televisions) were more than the minimum required 10 observations per variable. The data were checked, and all the assumptions (e.g., normality and linearity) of canonical correlation analysis were met. A total of six canonical correlation analyses were conducted: three brands by two products.

6.3.1 Televisions

Sony

The canonical correlation between the consumer-based brand equity variables and the country image variables for Sony was significant (**R** = 0.39; Bartlett's $\chi^2(8) = 45.39$, $p<0.001$). The first column in Table 6.10 shows that the major contributors to this relationship, in decreasing order of strength, were *brand associations, brand loyalty* and *perceived quality* respectively. The variable *brand awareness* did not contribute substantially to the relationship. The *macro* country image made a stronger contribution to the relationship than the *micro* country image.

Toshiba

The canonical correlation between the consumer-based brand equity variables and the country image variables for Toshiba also was significant (**R** = 0.34; Bartlett's $\chi^2(8) = 36.67$, $p<0.001$). *Brand associations, perceived quality* and *brand loyalty* respectively were the major contributors to this relationship, as shown in the second column in Table 6.10.

The variable *brand awareness* did not contribute substantially to the relationship. The *macro* country image made a stronger contribution to the relationship than the *micro* country image.

Table 6.10 Canonical correlation analyses: Canonical variate structure correlation (loading) patterns.

	Televisions			Cars		
	Sony	**Toshiba**	**Hitachi**	**Toyota**	**Mitsubishi**	**Suzuki**
Brand equity						
Brand awareness	0.27	0.12	0.04	0.22	0.02	0.14
Brand associations	0.98	0.97	0.97	0.91	0.91	0.82
Perceived quality	0.84	0.83	0.77	0.98	0.98	1.00
Brand loyalty	0.89	0.80	0.81	0.63	0.65	0.63
Percent of variance	0.63	0.57	0.55	0.56	0.55	0.52
Redundancy	0.10	0.07	0.05	0.16	0.18	0.13
Country image						
Macro country image	1.00	1.00	1.00	0.97	0.97	0.97
Micro country image	0.77	0.86	0.87	0.97	0.96	0.96
Percent of variance	0.79	0.86	0.87	0.93	0.93	0.93
Redundancy	0.12	0.10	0.08	0.27	0.31	0.23

Hitachi

The canonical correlation between the consumer-based brand equity variables and the country image variables for Hitachi was significant (**R** = 0.31; Bartlett's $\chi^2(8) = 30.13$, $p<0.001$). The third column in Table 6.10 shows the major contributors to this relationship, in decreasing order of strength, were *brand associations, brand loyalty* and *perceived quality* respectively. The variable *brand awareness* did not contribute substantially to the relationship. The *macro* country image made a stronger contribution to the relationship than *micro* country image.

The results indicated significant positive relationships between consumer-based brand equity variables and country image, for televisions. The contribution of brand associations was stronger than that of perceived quality, and brand loyalty for all three brands surveyed. The relative contribution of the variables brand loyalty and perceived

quality varied by brand. The brand awareness variable did not make a substantive contribution to the relationship between the two sets of variables for televisions. The variable *macro* country image made a stronger contribution to the relationship, compared to the *micro* country image, for all the three brands.

6.3.2 Cars

Toyota

The canonical correlation between the consumer-based brand equity variables and the country image variables for Toyota was significant (**R** = 0.54; Bartlett's $\chi^2(8) = 96.64$, $p<0.001$). The fourth column in Table 6.10 shows the major contributors of the different variables to this relationship, in decreasing order of strength, were *perceived quality*, *brand associations* and *brand loyalty* respectively. The variable *brand awareness* did not contribute substantively to the relationship. Both variables in the country image set contributed equally strongly to this relationship.

Mitsubishi

The canonical correlation between the consumer-based brand equity variables and the country image variables for Mitsubishi was significant (**R** = 0.57; Bartlett's $\chi^2(8) = 114.24$, $p<0.001$). The fifth column in Table 6.10 shows the major contributors to this relationship, in order of strength, were *perceived quality*, *brand associations* and *brand loyalty* respectively. The variable *brand awareness* did not contribute to the relationship. Both variables in the country image set contributed equally strongly to this relationship.

Suzuki

The canonical correlation between the consumer-based brand equity variables set and the country image variables set for the brand Suzuki was significant (**R** = 0.49; Bartlett's $\chi^2(8) = 80.11$, $p<0.001$). The sixth column in Table 6.10 shows the major contributors to this relationship, in decreasing order of strength, were *perceived quality*, *brand associations* and *brand loyalty* respectively, for the consumer-based brand equity variables set. The variable *brand awareness* did not contribute substantively to the relationship. Both variables in the country image set contributed equally strongly to this relationship.

The results uncovered significant positive relationships between consumer-based brand equity and the country image for cars. The contribution of perceived quality was

stronger than that of brand associations and brand loyalty respectively for all three brands surveyed. Brand awareness, on the other hand, did not make a meaningful contribution to the relationship between the two sets of variables for cars. Both *macro* country image and the *micro* country image variables made equally strong contributions to the relationship, for the product category cars.

6.3.3 Conclusion

Overall, a significant positive relationship was observed between consumer-based brand equity and country image, for both selected product categories. However, the contributions of different variables varied by product category. Brand associations made a stronger contribution, compared to perceived quality and brand loyalty, in the case of televisions. Perceived quality made higher contributions to the relationship, compared to brand associations and brand loyalty, in the case of cars. The variable brand awareness did not make a substantive contribution to the relationships between the two sets of variables for both the selected product categories. Brand loyalty made a stronger contribution to the relationship for televisions, than it did for cars.

The variable *macro* country image made a stronger contribution, compared to the *micro* country image, in the case of televisions. In the product category cars, both *macro* country image and the *micro* country image variables made equally strong contributions. The results indicated that the relationship between consumer-based brand equity and country image was positive as well as product category specific. It is also interesting to note that the canonical correlation relationship was stronger for all brands of cars than for all brands of televisions.

6.4 SUMMARY

Consumer-based equity of brands varied according to the country-of-origin of the brand, provided that consumers perceived significant differences between the countries where the brands were made. Consumer-based brand equity also varied by product category. Moreover, consumer-based equity of brands, within a given product category, varied by brand if consumers had varying degrees of product category-brand associations. Finally, the consumer-based equity of a brand was positively related to the image of the country-of-origin of the brand. All the proposed hypotheses were supported (see Table 6.11).

Table 6.11 Hypotheses testing outcomes.

Hypothesis	Result
H_1: In a given product category, the consumer-based equity of a brand varies significantly depending on the country-of-origin of the brand.	Supported
H_{1a}: In a given product category, brand associations, a dimension of consumer-based equity of a brand, varies significantly according to the country-of-origin of the brand.	Supported
H_{1b}: In a given product category, perceived quality, a dimension of consumer-based brand equity, varies significantly according to the country-of-origin of the brand.	Supported
H_{1c}: In a given product category, brand loyalty, a dimension of consumer-based brand equity, varies significantly according to the country-of-origin of the brand.	Supported
H_2: The consumer-based equity of a brand varies significantly according to product category.	Supported
H_{2a}: Brand awareness varies significantly according to product category.	Supported
H_{2b}: Brand associations vary significantly according to product category.	Supported
H_{2c}: Perceived quality varies significantly according to product category.	Supported
H_{2d}: Brand loyalty varies significantly according to product category.	Supported
H_3: In a given product category, the consumer-based equity of a brand varies significantly according to the brand name.	Supported
H_{3a}: In a given product category, brand awareness varies significantly according to brand name.	Supported
H_{3b}: In a given product category, brand associations vary significantly according to brand name.	Supported
H_{3c}: In a given product category, perceived quality varies significantly according to brand name.	Supported
H_{3d}: In a given product category, brand loyalty varies significantly according to brand name.	Supported
H_4: *Macro* country image is substantively linked to consumer-based brand equity.	Supported
H_5: *Micro* country image is substantively linked to consumer-based brand equity.	Supported

MANOVA of the data derived from the confirmatory factor analysis of brand equity measures indicated that consumer-based brand equity in a given product category significantly varied according to the country-of-origin of the brand, product category and brand name within a product category. Linking the results of MANOVA with the results of

repeated measures one-way ANOVA and respondents' associations, it was inferred that consumer-based brand equity of a brand made in a country with a favourable image and strong association with the product category was significantly higher than that of the same brand made in a country with a less favourable image and weaker association with the product category, where respondents perceived substantive differences among the countries in terms of their country images and association with the product category. It was also inferred that in a given product category, consumer-based equity of a brand with strong associations with the product category was significantly higher than that of a brand with weaker associations with the product category, where respondents perceived substantive differences between the brands in terms of their association with the product category.

Canonical correlation analysis of the data obtained from factor analysis and confirmatory factor analysis indicated a significant relationship between consumer-based brand equity and the image of the country-of-origin of the brand. The relationship between the two sets of constructs was positive as well as product category specific. The impact of *macro* country image was relatively stronger than that of *micro* country image for televisions. Both *macro* and *micro* country images made equally strong impact on consumer-based brand equity for cars. Brand awareness did not make a substantive contribution to the relationship between the two sets of variables for both the selected product categories.

Cars as a product category appear to be much more sensitive to country image impacts than televisions both at *macro* and *micro* levels, as reflected in higher canonical correlations for cars compared to televisions. Overall, the results provided support for the proposed theoretical framework and the hypotheses developed.