Operationalising assortment in the theory of marketing systems: an example from the Australian tourism marketing system for international visitors 1999-2001

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Operationalising Assortment in the Theory of Marketing Systems:

An Example from the Australian Tourism Marketing System for International Visitors 1999 – 2001

Submitted in fulfillment of the requirements for
the degree of Doctor of Philosophy

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Although the term "assortment" is generally known in the retail and marketing literature as the overall collection of products and services provided by a retailer, its interpretations and definitions are diverse and narrow at the same time.

The aim of this thesis is to conceptualize and measure assortments in the marketing system. This particular perspective provides a generalizable context for the application of the assortment concept, and at the same time opens a door for understanding the marketing systems through the lens of assortments.

The second aim of the thesis, which is instrumental in achieving the first, is to identify and measure properties of acquired assortments. Acquired assortments are the main type of assortments that represent the demand side at the interface of exchange in the marketing system.

Two groups, altogether five properties of acquired assortments have been identified in the thesis. The first group involves the concept of diversity and comprises of three components: variety, balance and disparity. The second group deals with two relational properties, association and sequence.

To substantiate the proposed measures, using the International Visitor Survey data, the thesis examines destination assortments acquired by short-term international visitors in the tourism marketing system of Australia in a two-year period between 1999 and 2001. Besides the theoretical implications as described by the two aims, this study also provides some useful insights for members of the Australian tourism industry in understanding how international visitors respond to the destinations offered in the system according to their own characteristics and trip characteristics together with the influence of a big event, the 2000 Sydney Olympics.

Finally, nature and inter-relationships of the measures are discussed. The results show that the proposed measures reflect inter-related but different aspects of the acquired assortment. In particular, empirical inter-relationships exist between measures at the same level of categorization as well as that between different levels of aggregation. The evidence supports the idea of internal consistency in the assortment and has implications for understanding and evaluating the functioning of the marketing system.

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Abstract

Although the term “assortment” is generally known in the retail and marketing literature as the overall collection of products and services provided by a retailer, its interpretations and definitions are diverse and narrow at the same time, which is the reason of the scattered knowledge on assortment in terms of both theoretical frameworks and empirical applications. Despite the lack of holistic models, the concept has gained attention in many different contexts, both within and outside of the marketing discipline.

In marketing, there is a particular research gap that can be filled by the concept of assortment, that is, the linkage between micro-marketing knowledge such as consumer behaviors and the macro level outcomes such as market evolution and stability. To address the gap in literature, the aim of this thesis is to conceptualize and measure assortments in the marketing system. This particular perspective provides a generalizable context for the application of the assortment concept, and at the same time opens a door for understanding the marketing systems through the lens of assortments. Although researchers have always been trying to put marketing decisions and marketing intelligence in context, which means taking into consideration competition as well as other forces of market dynamics, most research have a single product/brand/company focus. This singular focus is inherited from the micro-marketing tradition, which normally takes the standpoint of “a” company (brand/product). The assortment perspective is not suggesting that single product perspective is not important, it is rather the opposite—by proposing the concept of assortment, the gaps between single-product perspective and multi-product perspective as well as that between micro level knowledge and macro level outcomes are bridged.

The second aim of the thesis, which is instrumental in achieving the first, is to identify and measure properties of acquired assortments. Representing collections of goods, services, experiences and ideas, assortments can be used to describe both what offered and acquired in the marketing system as well as that accessible and accumulated by the customers. Acquired assortments are the main type of assortments that represent the demand side at the interface of exchange in the marketing system. However, relatively few studies have

specifically explored the various aspects of acquired assortments, in particular the properties. As suggested in the ecology and economics literature, the importance of assortments lies in the relationships between their properties and the performance or critical features of the system embedded.

Two groups, altogether five properties of acquired assortments have been identified in the thesis. The first group involves the concept of diversity and comprises of three components: variety, balance and disparity. The second group deals with relational properties, in particular the association and sequence of categories illustrated in the constructive process of acquired assortments.

To substantiate the proposed measures and the related analytical framework, in an empirical setting, the thesis examines destination assortments acquired by short-term international visitors in the tourism marketing system of Australia in a two-year period between 1999 and 2001. The empirical examination is facilitated by secondary data analysis of an existing database, the International Visitors Survey (IVS) data, collected by an international research firm for the Australian Tourist Commission. Besides evaluating the implications of assortment measures in empirical studies, this study also provides some useful insights for members of the Australian tourism industry in understanding how international visitors respond to the destinations offered in the system according to their own characteristics and trip characteristics, and furthermore how the responses change in the presence of a big event, the 2000 Sydney Olympics.

The applicability of assortment measures in an empirical setting is evaluated through cross-sectional comparisons among segments as well as a tentative longitudinal exploration using the proposed measures. In the comparison of measures, besides the traditional descriptive statistics, network analysis is adopted for several considerations. First of all, it is the most manageable approach, if not the only one, to organize relational data. Second, it makes it possible to describe structures in a comparable sense. And last but not least, it has theories that embrace some of the ideas that have been ignored in other methods, for example, to look at the network from both ego-centric (i.e., the micro level analysis that focus on the constituent categories in the assortment space) and socio-centric (the macro level) perspectives.

Finally, as a summary of the applicability and implications of the proposed measures for acquired assortments, nature and inter-relationships of the measures are discussed. The results show that the proposed measures reflect inter-related but different aspects of the acquired assortment. In particular, empirical inter-relationships exist between measures at the same level of categorization as well as that between different levels of aggregation. The evidence supports the idea of internal consistency in the assortment and has implications for understanding and evaluating the functioning of the marketing system.

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CHAPTER 1: INTRODUCTION

Although the term "assortment" is generally known in the retail and marketing literature as the overall collection of products and services provided by a retailer, its interpretations and definitions are diverse and narrow at the same time, which is the reason for the scattered knowledge of assortment in terms of both theoretical frameworks and empirical applications. Despite the lack of holistic models, the concept has gained attention in many different contexts, both within and outside of the marketing discipline.

In marketing, there are at least two research gaps that can be filled by the concept of assortment. The first gap is the linkage between micro-marketing knowledge such as consumer behaviors and the macro level outcomes such as market evolution and stability. In the thesis, a marketing system perspective is taken to conceptualize and analyze assortments. This particular perspective provides a generalizable context for the application of the assortment concept, and at the same time opens a door for understanding the marketing system through the lens of assortments.

At the same time, although researchers have been trying to put marketing decisions and marketing intelligence in context, which means taking into consideration competition as well as other forces of market dynamics, most research has a single product/brand/company focus. This singular focus is inherited from the micro-marketing tradition, which normally takes the standpoint of "a" company (brand/product). Under the general conceptual framework of assortments, a single product choice is just a special case of assortment. Hence, the assortment perspective is not suggesting that single product perspective is not important, it is rather the opposite—by proposing the concept of assortment, the gaps between single-product perspective and multi-product perspective as well as that between micro level knowledge and macro level outcomes are bridged.

1.1 Research Background

1.1.1 Does Marketing Need Reform?

In recent years, marketing researchers have become more and more concerned with the future direction of the discipline despite of the important contributions it had to the wisdom in business world and to the knowledge in general. Does marketing need reform? In 2006, a number of scholars joined with Jagdish N. Sheth and Rajendra S. Sisodia in their edited book and approached the issue from different aspects, including the image of marketing, causes of problem, models used, and mission of marketing.

It seems that the resistance of consumers to common perceptions of marketing practice has rung a bell for both the researchers and practitioners. “Consumers are demanding more from marketers than great products. Consumers also want a better experience with the marketing for a product. Otherwise, they see marketing as an unnecessary, unwanted, and disagreeable imposition on their scarce time and resources” (Smith 2006: 18). To this point, there is a danger related to the single product focus most marketing studies take. The danger of focusing on single products is that marketers assume the product has a demand with certain consumers, and then push to get the information through to these consumers, only to find overlapping messages make the saturation and intrusiveness of marketing communication appear even worse. In other words, a single product promotion standpoint may provide only limited insights for a dense marketplace.

The main purpose of marketing is to deliver goods and services effectively and efficiently, hence it is important to understand what is going on in the whole system in terms of the actual patterns of consumption. The direction in which the whole system heads, together with some general understanding of the consumption behavior, including growth and expansion of choices, will shape the direction of marketing research in the future.

1.1.2 Assortments

This research is concerned with assortments in the operation of a marketing system. Although the concept has been embraced by retailing industry for a long time, to a large extent its application had been limited to the supplier's side (i.e., assortments offered) until the "shopping basket" problem (i.e., assortments acquired) attracted researchers' attention. While both forms of assortment are important, it is the customer response to an offered assortment that is of primary interest in this study.

Assortments can arise in many different ways, all of interest in the study of marketing systems. Examples include:

- The mix of products or product categories chosen when visiting a supermarket – this is where the "shopping basket" problem gained its name
- The mix of shops chosen within a shopping mall in the course of a visit to the mall
- The choice of rides made when visiting a Disney World theme park
- The mix of destinations chosen to visit in the course of a trip to another country

Each of these examples leads to an acquired assortment of goods, services, experiences or ideas, selected from an assortment on offer. In studying these acquired assortments our interest centers on both the composition of the assortment and the sequence of choices leading to an assortment. The first leads to questions about issues such as the mix of choices made (e.g., shops visited or categories bought), while the second leads to questions about movements through a mall or a supermarket, or the sequential choice of rides or destinations. In both cases measures of size and structural composition are of interest. The relative incidence of pairs of product categories, shops, rides or destinations ("this goes with that" combinations), and the possibility of more complex clusters forming, are also of interest.

A distinguishing feature of this study is that it is concerned with assortments of products, services, experiences and ideas, rather than the choices of single brands or product categories. It focuses on the assortments acquired by customer groups responding to an offered assortment rather than the individual choice processes involved, looking for recurring patterns or combinations in acquired assortments at the macro level rather than at the micro or individual level. Since the relevant literature in both macro and micro marketing is relatively sparse the study is primarily exploratory in nature, seeking to identify effective ways of capturing properties or patterns in assortments.

Despite the importance of assortment, our knowledge is scant, especially in the discipline of marketing. The lack of empirical studies in most sub-disciplines of marketing further prevents it from being explored and applied. But what type of empirical study may fulfill the needs of theoretical explorations? As Layton (2007) has pointed out, marketing systems have one primary social function and that is to provide assortments that will serve the needs and interests of customers active in the system. In this context an assortment is a set of products, services, experiences and/or ideas, often differentiated by brands, location in space and time and by factors such as cost, price or quality.

1.2 Research Aims and Objectives

1.2.1 A Generalizable Conceptualization of Assortments in the Marketing System

To address the gap in literature, where the importance and wide applicability of assortment related concepts have been recognized, while the definitions of the concepts are diverse and narrow at the same time, the primary aim of this thesis is to conceptualize and measure assortments in a generalizable context—the marketing system.

1.2.2 Measuring Properties of Assortment

The second aim of the thesis, which is instrumental in achieving the first, is to identify and measure properties of acquired assortments. Representing collections of goods, services, experiences and ideas, assortments can be used to describe both what offered and acquired in the marketing system as well as that accessible and accumulated by the customers. Acquired assortments are the main type of assortments that represent the demand side at the interface of exchange in the marketing system. However, relatively few studies have specifically explored the various aspects of acquired assortments, in particular the properties. As suggested in the ecology and economics literature, the importance of assortments lies in the relationships between their properties and the performance or critical features of the system embedded. For example, ecologists are mostly concerned with stability (e.g., Tilman 1996), and productivity (e.g., Wilsey and Potvin 2000) of a community, an ecosystem, or even the whole population in relation to biodiversity. Economists, on the other hand, are interested in the relationship between product variety and welfare in the economy (e.g., Lancaster 1990).

The importance of proper measures for assortment has been emphasized by Gans and Hill (1997) and many others (e.g., Alexander 1996; Cadeaux 1997; Lancaster 1980; Peterson and Berger 1996). Well-measured properties of assortments could contribute to our understanding of how marketing systems evolve and survive, what will be offered by certain marketing systems, and how players in marketing systems, be it suppliers or buyers or intermediaries, can better adapt to or co-create a more efficient system.

1.2.3 In Search of Patterns

Measures of assortment properties will be based on patterns of "events" (i.e., products purchased or places visited). Formalizing the verification of such a pattern-oriented theory, Abbott (1990) argues that three questions should be asked: existence of patterns, which is the central issue; why the patterns are the way they are; and the effects of given patterns on outcomes. Borrowing from Abbott's (1990) thoughts, we will start from the question of whether patterns of assortments (or measures of assortment properties) exist (from both structural and non-structural views); then try to justify why such patterns might exist (through discussion of local interactions and mechanisms); and finally, get to questions about the consequences of such patterns. Therefore, patterns/measures constitute a major thread of this study, which can be illustrated in all the following major research objectives:

- To understand assortments acquired as responses of consumers to assortments offered in the market. This in a sense covers the theoretical and empirical foundations of the existence of assortment patterns.
- To propose measures that can usefully describe properties and patterns of assortments, and at both macro and micro levels be used in comparisons over time and space.
- To understand how segmentation and external factors (age, gender, big events in the contextual environment, etc.) are reflected in assortment pattern differences and to develop managerial implications.
- To explore the nature of and inter-relationships between proposed assortment measures for further conceptual development.

1.3 Methodological Approach

1.3.1 Context of Empirical Research

The concept of assortment has been most widely used in retailing but not in other industry settings. Since the primary aim of the research is to build a generalizable framework for the conceptualization and measurement of assortments on the basis of the marketing system, an empirical study in a contextual setting other than retailing would be beneficial to the theory development. Therefore in this thesis, a tourism marketing system, which is different to the retailing system, is used.

1.3.2 The Methodological Framework

1.3.2.1 Foundations of Measures of Assortment

A. Category Definition

In the mathematical language, the assortment problem is a set problem. The simplest measure of set is arithmetic counts, which are based on a defined unit or units. Since assortment is a concept that may appear at different levels, we should define the categories (i.e., the defined unit or units at different levels) before we can make the counts. The multi-level definition of units/categories allows us to measure assortments without ignoring the effect of aggregation.

Retailing researchers have shown concern as to the difficulty of defining categories in practice and in research. According to Russell et al. (1999), categorization is also an important component of the information-processing behavior of consumers. Although the cognitive psychology literature has devoted a lot of effort to it, little work has dealt with operationalization issue of category definition in empirical studies. For example, should we use the supplier-defined categories? Will the consumers use the category definition given by the suppliers, or do they create their own definition of categories when they apply their heuristics in decision-making?

For these reasons, definition of categories is often arbitrary. However, the underlying logic is not arbitrary. When a category is defined, it is implied that (1) the category belongs to a certain level in the hierarchical system, (2) there are some other categories at the same level of this category unless it is located at the top level, and (3) the category is also a set (in our case, an assortment) itself, which is composed of units (subcategories) from a lower level.

B. <u>Dyadic Relations</u>

Besides the simple counts, items in a set also interact with each other to a greater or lesser extent. In this research, we consider two basic types of interaction, association and sequence. In other words, to explore the interaction between items, the unit of analysis is now the dyadic relationship between pairs of items in a set. At this level the focus shifts to the frequencies with which these dyads occur in the items found within the set – to the dyads of product categories, brands, shops or rides that arise jointly or sequentially.

This kind of analysis points to work in data mining where association and sequencing are two major aspects (Brand and Gerristen 1998). Data mining is the practice that explores patterns in a large database through iterative applications of certain algorithms, always with assistance of computer.

Choosing “pairs of purchases” as the unit of analysis simplifies the model estimation process. Non-structural patterns such as counts can be seen as a local characteristic embedded in a higher level structure. The structural patterns within assortments are the major patterns we want to understand and interpret.

1.3.2.2 A Network Perspective on Relational Patterns

A network includes two basic types of information: the nodes and ties between any pairs of nodes. If we think of items in an assortment as nodes, and pair relationships between items as ties, then the emergence of network from assortment data is not at all surprising. The convenience of addressing relational properties such as association and sequence through the framework of graph theory makes network analysis highly relevant to the current study. Established measures in network analysis like centrality and connectivity at different levels (i.e., in the whole network or in a partition of the network), as well as the more complex topological patterns, allow us to abstract some influential structural properties of assortment.

1.3.2.3 Summary of Methodology

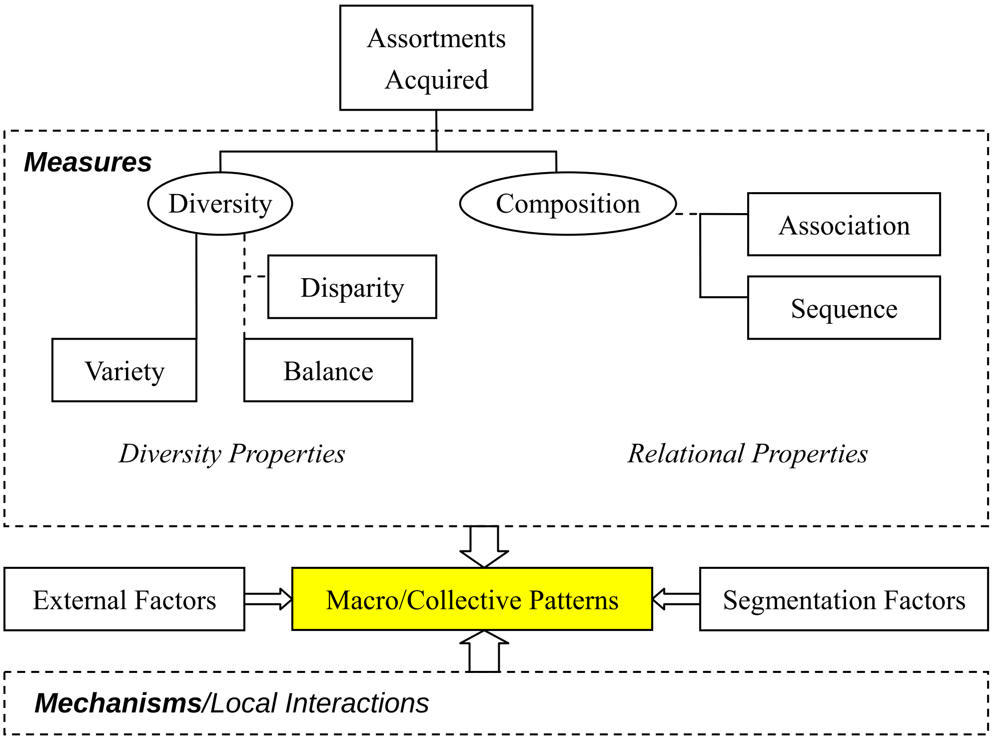
Figure 1-1 summarizes the major aspects of our methodological consideration towards an exploratory empirical study on acquired assortments.

Specifically, this study focuses on two key inter-related aspects of assortment research: measures/patterns of assortment properties and mechanisms that lead to these patterns. Given the lack of research on assortment, and even less on its properties, the properties we include in our research are not exhaustive. Measurable properties are classified into structural and non-structural, with the former adopting a network framework.

A system perspective is involved in that we consider mechanisms as local interactions that underly the emergence of macro (or global) patterns, the relationship of which is examined at different levels of aggregation. Since global patterns are the result of local interactions, it can be used to define and investigate the relations that drive the local interactions, or the so-called “mechanisms”.

Possible implications/consequences of assortment measures are explored through segmentation factors and external factors. Segmentation factors include demographic variables (such as age, gender and nationality), behavioral indicators (such as Internet users vs. non-users), and other factors (e.g., purpose of visit under the tourism setting) that can differentiate customer groups in terms of their aggregate assortment patterns. External factors, in this thesis, refer to those forces external to the characteristics of the customers or any other segmentation factors. External factors may drive the change of assortment patterns as well.

Figure 1-1: Methodological Framework for Empirical Study



1.3.3 The Tourism Data

The tourism marketing system for international visitors to Australia is used as the context of the empirical study. Data comes from approximately 32,320 interviews carried out with exiting visitors over a two-year period by the Australian Tourist Commission. Data collected includes destinations visited, reasons of visit, expenditure, etc. Trips then become acquired assortments of the available destinations (in effect, shopping baskets) and serve as the fundamental variables in the analysis.

Though the identified properties of assortment are generally applicable in different contexts, the specific interpretation of the proposed measures would differ from one context to the other. Those detailed guidelines for interpretation normally would be unfolded along the analytical process, which is how the empirical study of this thesis is organized.

1.4 Key Contributions

To address the gap in literature, this thesis proposes a conceptualization and measurement framework for assortments in the marketing system. This particular perspective provides a generalizable context for the application of the assortment concept, and at the same time opens a door for understanding the marketing systems through the lens of assortments.

Two groups, altogether five properties of acquired assortments have been identified in the thesis. The first group involves the concept of diversity and comprises of three components: variety, balance and disparity. The second group deals with relational properties, in particular the association and sequence of categories illustrated in the constructive process of acquired assortments.

An analytical framework is developed for empirical exploration of the proposed measures. Specifically, the applicability of assortment measures in an empirical setting is evaluated through cross-sectional comparisons among segments as well as a tentative longitudinal exploration using the proposed measures. In the comparison of measures, besides the traditional descriptive statistics, network analysis is adopted for several considerations. First of all, it is the most manageable approach, if not the only one, to organize relational data. Second, it makes it possible to describe structures in a comparable sense. And last but not least, it has theories that embrace some of the ideas that have been ignored in other methods, for example, to look at the network from both ego-centric (i.e., the micro level analysis that focus on the constituent categories in the assortment space) and socio-centric (the macro level) perspectives (Scott, 1991).

Finally, through analysis of empirical inter-relationships between measures at the same level of categorization as well as that between different levels of aggregation, the research provides empirical evidences on the internal consistency in the assortment and has implications for understanding and evaluating the functioning of the marketing system.

In summary, through operationalizing assortments in the marketing system, this study has both substantial and methodological contributions to the literature in that it:

- Theoretically defines the concept of assortment
- Identifies properties of assortment and proposes possible measures for the properties
- Develops an analytical framework with the measures of assortment that can (1) examine differences in assortment patterns across segments and over time; (2) explore the implications of assortment measures to the marketing system; and (3) bridge the gap between micro knowledge and macro considerations, and that between single-product and assortment perspectives
- Provides empirical evidences for the generalizability of the assortment concept and the nature of proposed assortment measures

This study also provides some useful insights for members of the Australian tourism industry in understanding how international visitors respond to the destinations offered in the system and to a big event took place in the system, that is, the 2000 Sydney Olympics.

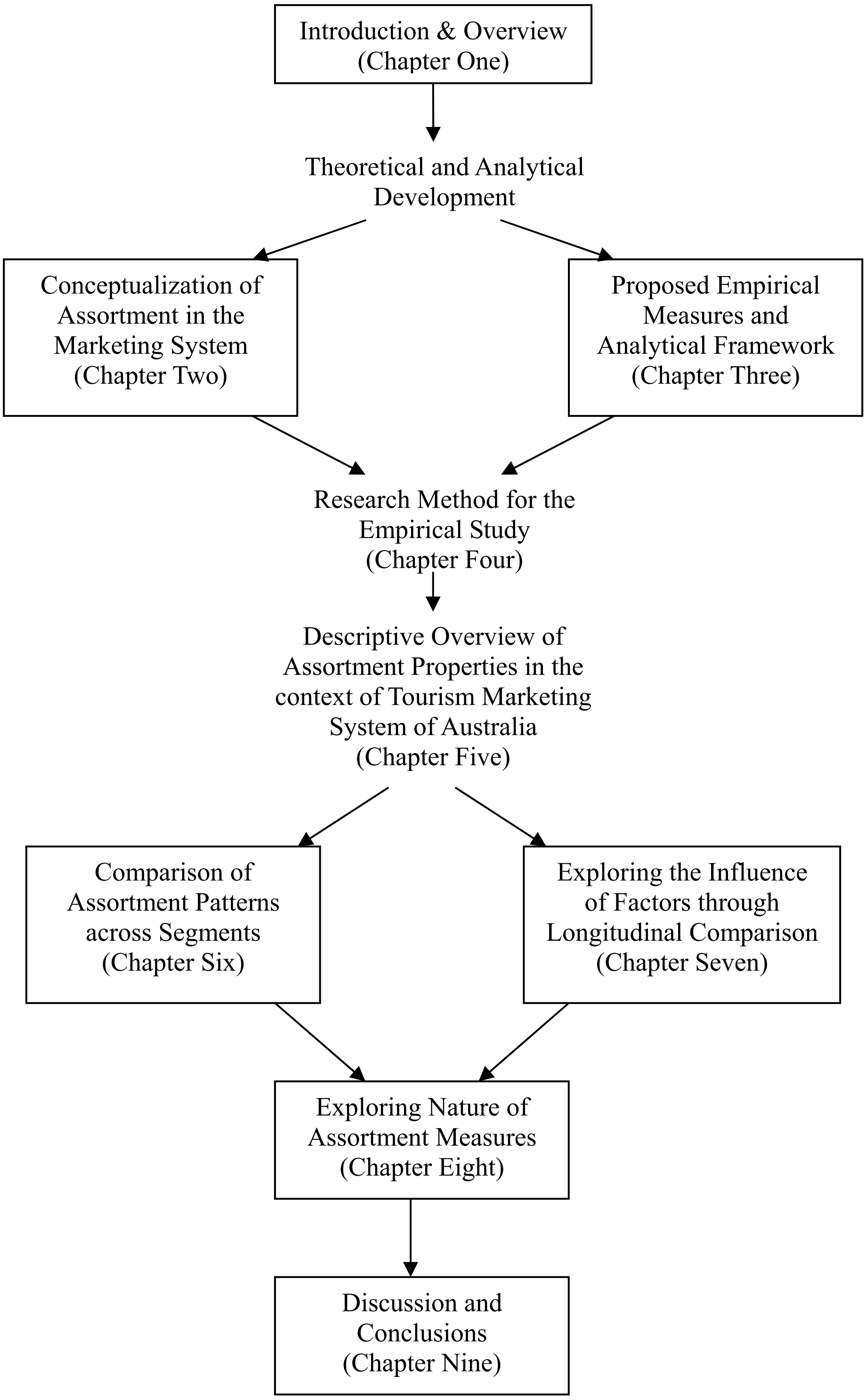
1.5 Limitations

As the first study that aims to build a holistic model of assortment in the marketing system context, this study is limited by its early stage theoretical foundation and exploratory nature. Part of the findings is highly interpretive rather than conclusive. Moreover, few confirmative models are used. As a result, confounding effects caused by unrecognized factors may exist. The limitations together with future research directions are discussed in more detail in Chapter Nine.

1.6 Structure of the Thesis

Figure 1-2 provides a graphical overview of the structure of this thesis.

Figure 1-2: Thesis Structure



CHAPTER 2: UNDERSTANDING ASSORTMENTS: THE SUPPLIER, CUSTOMER, AND MARKETING SYSTEM PERSPECTIVE

2.1 Introduction

More than 30 years after Wind's (1977) call for change of focus from single brands to assortments, research on assortments has been limited except for work in the retail sector. The concept of assortment, however, should have much broader implications for the marketing discipline in general. As suggested by Wilkie and Moore (2007), the singular focus on an individual organization shown in the official definition of marketing issued by the American Marketing Association (AMA) in 2004 "leaves us without strong concepts to assess simultaneous marketing activity" (p.270). Wilkie and Moore suggest that simultaneous marketing activity is a norm in product markets, corresponding to the nature of marketing system, where competition is a major dimension.

As shown in the literature reviewed in this chapter, although traditionally in retail and marketing literature, assortment is used mainly as a concept for retail management and therefore defined from the supplier's point of view, the underlying idea of assortment can also be found in describing consumer choices. The marketing system perspective, on the other hand, takes both supplier's and customer's assortments into consideration and forms a different set of research questions to that of supplier's and customer's perspectives. From a marketing system perspective, the assortment can be considered as the interface of the market and reflects the interactions between suppliers and buyers as well as the influences of external forces and the social matrix in which it embedded. In this chapter, following a brief introduction of the early history of assortment concept in marketing, research streams related to the supplier and customer perspectives are reviewed. The final part of this chapter is devoted to the conceptualization of assortment in the marketing system context.

2.2 Assortments: A Brief History in Marketing Theory

2.2.1 Early Research and Conceptual Developments

An interest in assortment is not new to marketing. An emphasis on the role of assortment in marketing can be traced back to Alderson (1965; 1957). According to Alderson, an assortment is a heterogeneous collection (as opposed to homogeneous accumulation), and it is the “potency of assortment” that drives the market behaviors. The underlying meaning of potency is similar to that of utility but it is advocated by Alderson as being a more precise description of the value of the assortment compared to utility, since the purchase behavior of each consumer unit, such as a household, is also related to future contingencies, which “vary both as to their likelihood of occurring and as to the degree of urgency in case they should occur” (Alderson 1957: 196).

The owner of an assortment can increase the potency of assortment through exchange. Hence, Alderson interprets exchange, a basic and probably the most frequently observed behavior in a market, as “the act of improving the assortment held by the two parties to the exchange” (1957: 195). In the sense that assortment constitutes a product collection with diverse characteristics, what is offered by suppliers, demanded by consumers, and other product collections at different aggregation levels can all be referred to as assortments, though they are different types of assortment.

Alderson’s assortment concept not only includes the utility generated at the time of exchange behavior, but also future expectations. It puts an emphasis on the consumers’ side and takes a system point of view (i.e., the organized behavior system), which was quite ahead of its time. Alderson describes consumers as a sink for the marketable goods he acquires in replenishing or extending his assortment. Motivated by the expectation of greater satisfactions inside the household than outside, the consumer accumulates and adjusts a collection of goods as time goes on.

The potency of assortments can apply to suppliers as well. Alderson distinguishes items in an assortment into two groups, which he thinks are similar for retailers as they are for consumers. For the retailer, the first group contains items with a large conditional value in terms of gross profit; the other group is composed of items with a smaller conditional value but a greater expectation of frequency of sale or turnover. These two sets of values, economic utilities and risk-shield utilities, have been implemented in retail management as well as used for explaining customers' variety-seeking behavior.

Another very important assortment-related concept that has been raised by Alderson is the "discrepancy of assortments", given that "the assortment of goods which is optimal for any particular manufacturer to produce is seldom the same as the assortment of goods which is optimal for an intermediary to carry" (Alderson 1965: 78), and thus there exists difference between these two optimal assortments. Discrepancy of assortment does not just exist between manufacturers and intermediaries. In an earlier book (Alderson 1957), Alderson also shows great interest in the gap between producer and consumer, saying that while both groups are heterogeneous, their heterogeneity is different. Intuitively, selecting randomly from the market, a specific producer's assortment is rarely the same as that of a certain customer, and the larger the difference in these assortments, the larger will be the possibility of a discrepancy gap that is likely to drive change for either party.

2.2.2 Assortment Properties: Some Early Discussions

As early as in the 1950s, assortment has been an influential concept in the marketing literature, although the real start point should be dated back a few more years in the inventory control researches. Among the writers who use the term "assortment" directly, Wroe Alderson put assortment as one of the central concepts. While Alderson (1957, 1964, and 1965) emphasizes how important assortments are to the ultimate users, with a clear direction of how assortments move through the marketing system (hence he comments on the "irreversibility of assortments"), another researcher during the same period of time began to emphasise assortment of the retailer as a subject and tool for retail management (Balderston 1956). These two trends then move on over the years, one focusing on the consumer's choice (e.g., Hoch et al. 1999; Kahn and Wansink 2004; Morales et al. 2005; van Herpen and Pieters 2002), the other on retail strategy (e.g., Hart and Rafiq 2006); each with major developments and refinements, but only a few studies delved into the intertwining nature of these two types of assortments.

The most widely read discussion of assortment can be found in the retailing literature, where most evidence supporting empirical generalizations has been developed. The word "assortment" is used at different aggregation levels, from the whole store to a specific category or subcategory. Retailers have developed sophisticated skills and technologies on assortment management. However, assortment analysis has not gained much attention outside of the retail industry, where the focus is primarily on the assortment offered.

Conceptual and practical development of discrepancy of assortments have been found in some studies in marketing, such as in the vertical co-operative strategies between manufacturers and retailers (Cadeaux 1992), but rarely have gained enough attention in sub-disciplines of marketing other than retailing, and relevant empirical studies are even rarer. Although a group of researchers are trying to bring back Aldersonian thought to marketing, arguing Alderson's theory is actually more parsimonious and universal compared to similar theories developed in other disciplines (Wooliscroft et al. 2006), to the wider marketing audience the impact of Aldersonian thoughts seems to be largely ignored. A lack of empirical studies may be one of the reasons contributing to an underestimation of Alderson's theory. Before any empirical study of assortment that might help can be carried out, we need to further understand the concept itself, its observable forms, and the properties underlying its role in a marketing system.

Potency and discrepancy of assortment are interrelated. Because of discrepancy of assortments, to achieve potency of assortment, customers rely heavily on product information. Thus a matching process between supply and demand is involved, where information search on both sides plays an important role. Although there might be several stages in a matching process, the assortments offered by retailers are the assortments presenting choice for consumers, the final stage before items are acquired to form the assortments owned by consumers. To this extent, using the retailer's definition of categories as the unit constituting assortment offered and acquired is reasonable, so that it has been adopted by most of the later studies.

2.3 Assortment Management: The Suppliers' Perspective

2.3.1 Merchandise Planning

In retailing management, assortment has been widely used in merchandise planning. Retail textbooks (e.g., Beisel 1987) suggest the following levels of assortments in a store: merchandise assortment (often called the product mix, is the total assemblage of products that a retailer carries in the store), merchandise group (or product line, is any broadly related assortment of products), merchandise class (or classification, is a subdivision of a merchandise group), and merchandise categories (within merchandise classifications, specific assortments of goods that are directly comparable and can be readily substituted for each other; generic in nature). Beisel (1987) goes on to suggest appropriate measures: assortment breadth is the number of generic classifications or categories that a store carries; and assortment depth is the number of different brands and styles that are offered within each of a store's generic classifications or categories.

Assortment consistency is also a measure relevant to retail strategy. Consistency refers to the degree of relationship between the products carried (Beisel 1987). For example, if an automotive supply store also carries women's lingerie, consumers may sense some inconsistency with the assortment. However, as Beisel notes, assortment inconsistency (or scrambled merchandising) was quite common in 1980s, and it contributed to the growth of "one-stop shopping" strategy. Assortment consistency can be best described as a continuous spectrum: at one end of the spectrum, consumers' desire for one-stop shopping makes it rational to carry unrelated products; at the other end, assortment inconsistency makes it difficult for retailers to position their stores in the mind of consumers.

Another concern of retailers related to assortment is stock balance, which means "including in the assortment a wide enough variety of goods that will attract customers, yet at the same time investing in adequate inventory of the most wanted goods to support demand and not over-investing in slower moving and marginal stock" (Beisel 1987, p.318).

2.3.2 Competitive Strategies

Due to the complexity of competition within retail industry, implementing a workable strategy that can solve stock balance problems is not easy. Take low turnover items as an example. Whether to carry these items would depend on consumer preferences on these items (i.e., the items may act as appeals that attract the customer flow to the retail facility) and other factors. However, research suggests consumers may follow a hierarchical structure of choice processing, which may mean that store choice is included before choice of items (Bell et al. 1998). To some extent, it also implies a need to compare shopping centers instead of individual stores in order to gain a thorough understanding about consumers' assortment choices with shopping needs. Thus, a different set of considerations than product preferences is involved, in particular extending to multi-level choice making.

In a comparison of shopping centers with supermarkets, as summarized by O'Kelly (1983), there are three possible relationships between different retail sectors (i.e., different classes of retail outlet). The first type is that there may be absolutely no interdependence between those outlets; the second relationship is called "active interdependence", which means "the location patterns of facilities of one type may alter the cost and scale characteristics of other facilities" (p. 231); the third and final type of relationship is "passive interdependence", which exemplifies the fact that some customers may visit more than one store on a trip. Although there has been a research tradition to focus on the first two types of relationships between different classes of retail outlets and/or between retail outlets and facilities of other land uses (such as tourism), the multi-stop multi-purpose trips nevertheless constitute a large portion of all trips according to the review done by O'Kelly (1983). Both multi-level and multi-purpose choices are important aspects of choice from offered assortments.

Product assortment can also be used to gain sustainable differentiation in retail (Simonson 1999). The differentiation strategy requires an in-depth understanding of consumer preferences and decision processes. Based on some assumptions about consumers' preferences and behaviors, technologies in operations research offer retail stores an opportunity to optimize their assortments to achieve higher sales or profits (Black and Highby 2005; Brijs et al. 2000; Chen and Lin 2007). One of the preference related behaviors is substitution, by which consumers may satisfy their demand for an un-stocked or out-of-stock item with a substitute item (e.g., Campo et al. 2004). It is also relevant to retailers if consumers' preferences include the desire to purchase sets of complementary items (e.g., Chernev 2005).

A natural extension to the strategic consideration of retail assortments is the relation between manufacturers, retailers, and other players in the distribution channel. Cadeaux (1997; 1992) shows that industry volatility measured by the diversity of assortment has a significant association with co-operative strategies between suppliers and retailers. This illustrates the broader implications of assortment, reinforcing the important role of assortment properties in the matching process to solve discrepancy of assortments.

At the manufacturer's end, assortment management is usually referred to as product line management. Bordley (2003) presents a model that balances the benefits of increased revenue from a broad product line against production and engineering costs, incorporating product life cycle and investment life cycle effects. He suggests manufacturers should pay attention to effective number of product entries when making decisions. Based on observations of ice cream producers, Shugan (1989) finds that producers of premium and non-premium products may benefit from different types of assortment size strategies, in particular, premium producers may be profitable with a smaller assortment than that carried by non-premium producers. In addition, a larger market potential, greater competitive costs and sharper competition encourage larger assortment by the super-premium producer.

2.3.3 Width and Depth

From a decision making point of view, Hart and Rafiq (2006) suggest a hierarchical framework of assortment properties. Based on an extensive review of marketing literature, most of which falls in the retailing field, they trace the conceptual development of assortment, its role and definition, and most important, the ambiguity and inconsistency in use and interpretation of the term. As a solution, they advocate the system view of Cadeaux (1992) and propose a multi-tiered system of product assortments embedded in the marketing/consumption system.

In describing assortments in such a multi-layer system, Hart and Rafiq (2006) first divide the concept of assortment into macro and micro levels, then deliberately select terms to fit the functioning properties at each level. At a macro level, which is also called strategic level, they use *width* to refer to the mix of departments, merchandise classes and categories carried (or to be carried) by the store. They then distinguish *breadth* from *width* by using the former to describe the number of product lines carried within a category. In addition, *depth* is defined as "the number of variants within each product line; each variant having individual sizes/colors" (p.342). These measures are quite straightforward compared to Betancourt and Gautschi (1990), where the depth of assortment is defined as the extent to which items in a retail assortment are net substitutes, and breadth is the extent to which items are net independents.

Measuring the above three assortment properties defined by Hart and Rafiq (2006) is feasible, since over years of practice, the retail industry has already built related bases of counting into their terminology and management: for example, assortment breadth is defined as the number of generic classifications or categories that a store carries, where a category contains "goods that are directly comparable and can be readily substituted for each other" (Beisel 1987); and assortment depth is the number of different brands and styles that are offered within each of a store's generic classifications or categories (Beisel 1987), which is consistent with Hart and Rafiq's definition of depth that variants at the lowest level of the hierarchy are stock keeping units (SKUs).

However, all three measures actually refer to the same conceptual property though at different levels. Hart and Rafiq (2006) add *consistency* as a fourth dimension to assortment. They argue that this fourth dimension can be applied to both macro and micro levels, and relate it to consumers' perceptions at macro level and retailers' management tools at micro level. Hart and Rafiq (2006) admit that consistency of assortments is very hard to measure due to its intangibility, even using Gist's (1968: 254) early definition of "the degree to which the different types of products that comprise the merchandise assortment are related" or more recently with the terms 'cohesion' or 'compatibility'. The concept is confusing because it involves not only subjective evaluations such as those of the consumer but also temporal comparison or even dynamic adjustments in response to the evaluations.

2.4 Choice Theory: The Customers' Perspective

Assortment is normally labeled as a supplier side concept that is provided and managed by retailers. However, the consumer side of assortment does attract attention. Consumer behavior is a major branch of marketing research. Knowledge of consumer behavior, especially that of consumers' choice behavior towards the assortment offered, is important as the theoretical foundation of mechanisms leading to patterns in assortments acquired.

Widely observed multi-category choices bring up several challenges to the assumptions in traditional choice models. The first assumption that has been challenged is that consumers only consider a narrowly defined set of products/brands (most frequently items within a supplier-defined category) and will eventually pick up one from these choices. Another assumption challenged is the independence of choices, which has long been adopted in traditional consumer choice models. In response to the call for investigation of assortment rather than single product or brand, McAlister (1979) suggests that some selections are neither independent nor exclusive of each other even in the same class of items. These challenges call for further investigation of consumers' choice processes, but since a thorough examination of the consumer's decision process facing assortments and their contexts is beyond the scope of the current study, the focus here will be on selective aspects of consumers' choice.

Although much of the theoretical discussions of choice process are concerned with consumer products, they can be extended to other sectors such as services, experiences and ideas, and to a consideration of multi-level multi-purpose decisions.

The following parts of this section review some of the main concepts or research streams in consumer choices that are related to a multi-item perspective.

2.4.1 Multi-Category Choice Modeling

Extending consumer choice modeling from single-item to multi-item especially multi-category choices has been suggested in the literature. Harlam and Lodish (1995) point out that there is a major potential problem of contemporary choice models, that by focusing on purchase of a quantity of a single item in a product category while failing to recognize the possibility of assortments of multiple-item purchases, they can lead to incorrect conclusions about the impact of past purchase behavior on current choices.

A stream of research in retailing that addresses the assortment issue from the consumers' point of view is the investigation and modeling of multi-category choice of consumers (e.g. Manchanda et al. 1999; Singh et al. 2005). It is a commonly presented phenomenon in many sectors. However, as suggested by Manchanda et al. (1999), not all such purchases are deliberately planned; there are at least four types of reasons that could lead to multi-category purchase: (a) the categories are complementary to each other, (b) they have similar purchase cycles, (c) they demonstrate the heterogeneity of needs in a household, and (d) sometimes it is pure co-incidence.

Consumer choice studies that take a multi-item perspective however have proliferated over the years including early studies on item collection (Green and Devita 1974; Green, Wind and Jain 1972), which leads to conjoint analysis, and component-based approach as suggested by Chung and Rao (2003). The component-based approach has been applied to product bundle choice analysis, while a similar approach is taken by researchers who try to understand the consumer's choices through either product-based or attribute-based perspectives (e.g., van Herpen and Pieters 2002).

Seetharaman et al. (2005) give an extensive review of the literature on multi-category choice models. The implication of relations within- or cross-category for strategic management is that the stock carried and shelf display in a retail store can be manipulated so that maximum profit would be achieved, which is made explicit in terms of profiles of product assortments at multiple levels (core merchandise groups, their brand structure and their width, depth, availability etc.), together with marketing decisions such as pricing, merchandise seasons, and managerial targets.

2.4.2 Consideration Sets

Previous literature has been concerned with the theory of how consumers respond to offered assortments. Much of this has focused on a decision stage between offered assortments and acquired assortments labeled a 'consideration set', that has been observed in the purchase of both packaged goods and durable goods (Roberts and Lattin 1991). While common, it may not be a necessary stage in all circumstances. From another point of view, instead of the choice process being a two-step process where consumers form a consideration set before their choice, it could be that the consideration set is only a reflection of consumers' preference (Horowitz and Louviere 1995).

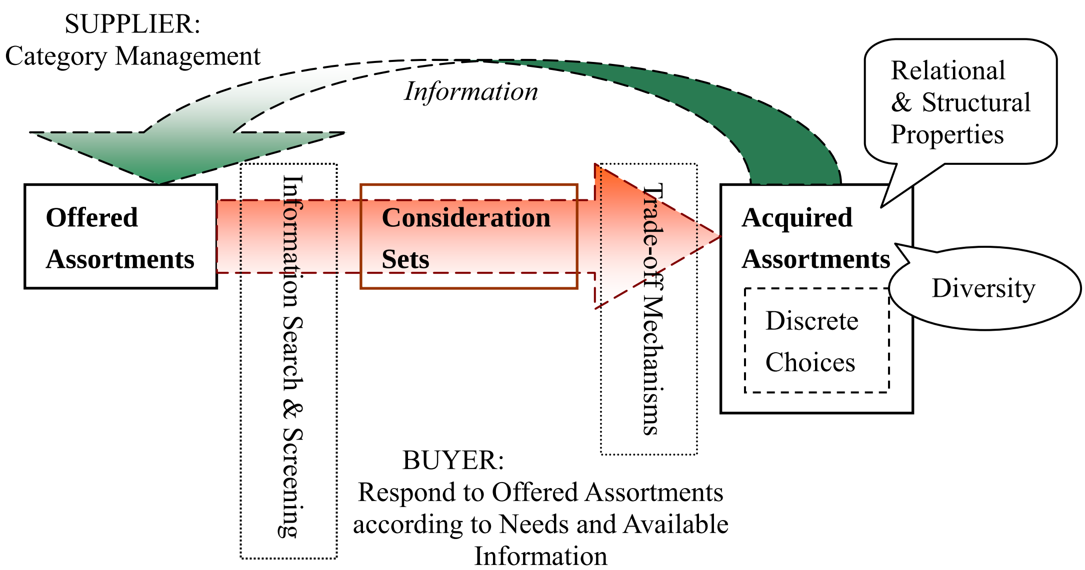
A consumer's consideration set is restrained by the offered assortment and is formed with the information provided by the offered assortment. Additionally, the satisfaction experienced by the consumer with the consideration set and whether s/he will continue searching, is also a function of the offered assortments.

The following diagram (Figure 2-1) illustrates the related types of assortments in the consumer's decision process, from offered assortments to acquired assortments. It can also be considered as a model of formation of acquired assortments. In other words, the concept of consideration set is "also a logical outcome of information search in economics" (Roberts and Lattin 1991, p 430).

No matter whether the choice process is modeled as one-step or two-step, there are two types of behaviors involved: Information search and screening, and trade-off. In the two-step consideration set model, these behaviors distinguish the stages, namely (1) consideration set formation and (2) evaluation of alternatives in the consideration set.

Both attribute-based and product-based approaches deal with the trade-off mechanism.

Figure 2-1: Consumer Behaviors Surrounding Consideration Sets



Other aspects of consumer behavior could also influence the consideration sets. One example of an important influential factor is the shopping environment, that is, the general physical setting of the marketing system. Cues in the environment directly affect the size and composition of consideration sets, and consequently the final purchase (Alba and Chattopadhyay 1985).

Mathematical tools have been proposed in the modeling of consideration sets. Because of the name and conceptualization of consideration sets, logically, researchers turn to set theory such as fuzzy set for assistance (Viswanathan and Childers 1999; Wu and

Rangaswamy 2003; Zadeh 1997). In previous researches, fuzzy set theory contributes to assortment investigation in at least two aspects: first, it is arguably an eligible theory for product categorization, which is the foundation of assortments (Viswanathan and Childers 1999); second, it can be directly used for choice modeling, in particular choice modeling with consideration sets (Wu and Rangaswamy 2003).

2.4.3 Variety-seeking Behavior

In some categories, it is frequently observed that a consumer purchases multiple items from a product category on a specific shopping trip. For example, Walsh (1990) reports that 74% of all yogurt shopping trips and 78% of all soup shopping trips contain multiple purchases. This type of behavior is labeled as variety-seeking.

Built on behavior theory, some early literature on variety-seeking behavior treats it as something to overcome boredom (Faison 1977). Further researches reveal that it is a multidimensional concept that is subject to the context of usage. Harlam and Lodish (1995) further introduce the variety seeking concepts developed in the choice for consumption literature into the choice for purchase context. In the assortment context, where variety takes an important role, an extension of variety seeking concepts into the marketing system framework is needed.

Empirically, researchers found that the number of items purchased and the number of different items selected on a purchase occasion could be positively correlated (Simonson 1990). Besides purchase quantity, display format could also influence variety in consumer's choices (Simonson and Winer 1992). At the same time, variety-seeking shows different patterns at SKU and brand levels. In particular, consumers were more likely to select their regular brands when purchasing more quantity in a product category on a given occasion.

Read and Loewenstein (1995) tell an interesting story in their paper about a party one of them attended. Although the host of the party provided a good quantity of several varieties of premium beer, the guests seemed to favor only one brand, so quite quickly that brand were consumed out, leaving behind a large quantity of several marginally less desirable beers. The authors suggest it is a kind of bias, that while people actually don't prefer variety in their own preferences, in some situations, such as making decisions for other people, they would be variety-seeking. Consumers show much more variety-seeking when making simultaneous choices (that is, for immediate and future consumptions) than when making sequential choices (Simonson 1990; Read and Loewenstein 1995).

2.4.4 Hierarchical Choices

Previous studies suggest that many choice decisions are multi-level. International travel, for example, may involve three levels of decisions, namely whether to go on holiday, whether to go abroad, and whether to go to multiple destinations (Nicolau and Más 2005). This resembles the hierarchical decision in other marketing systems such as shopping at retail stores. Similarly, in the retail shopping context, customers may first determine whether to do the retail shopping, then choose a store, and finally decide on what assortment to acquire.

Information Integration Theory (IIT) (Louviere and Gaeth 1987; Oppewal et al. 1994; Timmermans 1982) implies that there is a hidden hierarchical structure in consumers' purchase decision, some higher-order constructs may represent the attributes of products and are used as the decision criteria by consumers. The store choice literature, on the other hand, suggests that the decisions are hierarchical and store choice is at the higher-order of decisions (Baltas et al. 2010).

Supplier side hierarchical considerations also exist, providing another reason for consumers' hierarchical choices. One example is the central place hierarchy (Craig et al. 1984). Within each level of defined area, there are some places more central than the others. It is derived from the central place theory, which is the best known and most widely accepted theory of the location and spacing of retail centers in the early 1980s.

2.4.5 Shopping Environment

It is suggested in the literature that shopping environments, in particular in-store shelf arrangements, may have an impact on what and how many items customers purchase (e.g., Harlam and Lodish 1995). The shopping environment is especially influential when there is a shopping momentum effect (Ramanathan and Dhar 2010). As suggested by Dhar et al. (2007), the shopping momentum occurs when an initial purchase provides a psychological impulse that enhances the purchase of a second, unrelated product.

Using retail stores as the setting, previous studies have looked at the impact of specific shopping environments on exchange behaviors in the marketing system. Focusing on the location of products in terms of shelf arrangements, Simonson (1999) suggests that product assortment can play a key role in influencing buyer wants and preferences. He reviews and synthesizes empirical evidence and summarizing them into the following points: (a) retailers can use the assortment subset that buyers consider to enhance the likelihood that a purchase will be made and to affect the specific option selected, (b) the manner in which the set of considered options are presented also affects buyer preferences and purchase decisions, and, (c) the effects of the considered options and presentation formally interact with other elements of the marketing mix such as sales promotions.

Under the influence of the shopping environment and other factors, seemingly unrelated items may be acquired in a shopping trip, indicating a phenomenon of "buying association" (Borges 2003). Similarly, Manchanda et al. (1999) suggest co-incidence and co-occurrence are also reasons for observed multiple-category purchases.

2.4.6 Constructive Consumer Choices, Information-Processing Strategies, and Internet

To some extent, consumer choices are constructed rather than predetermined by fixed preferences. Bettman et al. (1998) give two reasons why under some circumstances preferences are constructed: one is that consumers lack the cognitive resources to generate well-defined preferences for many situations; and the second reason is that consumers often bring multiple goals to a given decision problem. The authors summarize four primary aspects that characterize consumer choice strategies: the total amount of information processed, selectivity in information processing, the pattern of processing (whether by alternative [brand] or by attribute), and whether the strategy is compensatory or non-compensatory. They give a thorough assessment of how information environments interact with the processing strategies of consumers. These information-processing strategies include classic decision strategies such as weighted adding strategy, as well as other “less rational” (i.e., more heuristic) strategies, such as a lexicographic strategy, satisficing, and elimination-by-aspects (EBA). Goals and the accuracy of a decision are suggested to justify the contingency of information-processing strategies.

Similarly, as noted above, Simonson (1999) propose that the assortment of the store may have an impact on consumers’ preferences. Consumers’ preferences are not stable but are constructed for specific consumption goals and are influenced by the specific assortment faced during decision-making. The relevant assortment could be that offered, presented, or perceived.

Information-processing strategies are part of the aforementioned information search behavior. Recent information technology developments have transformed largely how consumers conduct information search. This is probably a reason for emergence of the "Long Tail" market—products previously demanded by but not available to some consumers due to the physical limitations of display and access can now be identified and then accessed through website search engines. Anderson (2006) describes the Long Tail market from the market's point of view. Will information technology like the Internet make a difference to the patterns of assortments acquired? Assortments offered? The answer seems to be affirmative according to the sales figures (from Amazon and e-Bay for example) shown by Anderson, which illustrate the acquired assortments at a highly aggregate level, and the strategies adapted by retailers thereafter.

2.4.6.1 Why Internet Matters to the Choice of Assortment

Two broad reasons are related to the argument that Internet may bring change to consumers', and especially travellers', information search strategy and thereafter decision making and consumption patterns. The first reason is that the obstacles to access certain information have been reduced as the need to visit travel agent or other information centres physically is substituted by browsing websites. As an interactive tool that works in a computer mediated environment, the Internet is able to provide greater detail as to features of products sold using comparison charts, virtual tours, and graphics in video and still image formats. Comparison between different service providers is not only possible but also more convenient and less costly. Secondly, the online community has become prosperous in many countries. These communities are influential in high involvement products like tourism product (Ching and Ellisib 2004; Godes and Mayzlin 2004; Jun et al. 2007; Pan and Fesenmaier 2006). Featuring experience sharing and interaction between information providers and information seekers, the online community gives naive travellers an opportunity to "try" the experience. Thus both good and bad experiences of previous tourists might be reinforced and some extremely successful strategies might become popular examples and copied later by more tourists to the same country. The result is likely to be a reinforcement of some patterns in certain countries and cultures.

Besides the two direct effects, the changed environment for information search brought by Internet may also have an indirect impact on consumer behaviors. For example, Diehl (2005) finds the optimal strategy for search intensity is different in an ordered environment (i.e., expert recommendations are given by either filters or other systems) than in an unordered environment. He finds the quality of choice is driven by the following factors: lower search costs, more options, greater accuracy motivation.

2.5 The Marketing System Perspective

The concept of assortment provides an opportunity to develop a framework that can be used to holistically examine supplier offerings, consumer choices, and the marketing system in which they embedded. While both supplier offerings and consumer choices have been studied extensively, the interface of their interactions (i.e., assortments) has often been ignored as few studies have explored the direct impact of assortment on the interaction of supplier and consumer choice. As has been seen the studies that do take assortment properties into account normally look at one aspect such as perceived variety of the retailer's assortment or buying association. Here we propose a conceptualization of assortment in relation to a marketing system in which it embedded and suggest a multi-aspect though integrated approach to assortment research.

2.5.1 Definition of Marketing System

As suggested by Layton (2007), a marketing system is "a network of individuals, groups and entities, linked directly or indirectly through sequential or shared participation in economic exchange of value, which jointly creates, assembles, transforms and makes available assortments of products, services, experiences and ideas, provided in response to or anticipation of customer demand," As such it comprises within a defined boundary a set of exchange contexts, flows, roles, actors or nodes, governance processes, assortments, customer groups and outcomes (see Table 2-1 below for a detailed list). The emergence of marketing systems and the assortments of goods, services, experiences and ideas is a direct consequence of the evolutionary effects of specialization and the division of labor in exchange.

Since assortments of goods, services, experiences and ideas are important outputs of a marketing system (Layton 2007), it is unavoidable that the specification of assortments is intertwined with that of the marketing systems they are embedded in.

Table 2-1: Components of Marketing System (Layton 2007)

Components	*Examples*
Transaction and related costs	
Nodes:	Subsystems, roles (e.g., traders or intermediaries, suppliers, customers)
Decision processes:	Options, choice, information, risk, value/ethics, business models
Resource allocation across nodes:	Tangible, intangible; access options
Exchange elements:	Physical products, services, experiences, ideas
Linkages:	Exchange, transactions, transvections; fixed, random; precise, fuzzy; capacity constrains; physical, electronic
Relationships:	Arm's length, related; trust, guanxi, contractual
Flows:	Information, goods, possession, risk, finance
Activities:	Sorting, shifting (time, space), dispersing, transforming
Stakeholders:	Public, private; employee, consumer
Markets:	Bazaars, auctions; traditional, modern; bargaining, negotiated, fixed price; physical, electronic; real, virtual
Sub-systems:	Marketing systems as subsystems; dual, parallel; grey, black; distribution of power; interactions

The factors to be considered in studying the interactions between customers and assortments within marketing systems are also worth noting. A detailed depiction of these interactions is provided by Layton (2008) as shown in the following Figure 2-2.

Figure 2-2: Marketing Systems – Customers and Assortments (Layton, 2008)

Customers/Buyers

- Specifications, description
  - Aggregation levels – individuals, households, segments, regions/clusters, society at large …
  - Membership – individual, group, network …
  - End-user or intermediate
  - Exchange role – passive, active – co-producer, co-creator of value
  - Single, multiple purchase; 'shopping basket' construction, linked purchase patterns
  - Participation – self sufficient, market dependent
  - Heterogeneity – resource endowments, capabilities, and preferences
- Classification/demographics (social, industrial)
  - Type, number, size distributions, location (space, time) …
- System coverage, by segment or group; access barriers, limitations
  - Assortment access
  - Communication systems reach
- Decision processes
- Contexts, settings

Assortments

- Location in system, contexts, hierarchies, physical characteristics…
- Presentation/display – place, shop, mall …
- Type
  - Offered
  - Sought
  - Accessible
  - Acquired
  - Accumulated
- Attributes, diversity/variety measures
  - Membership – type, counts, dimensions
  - Single, multi-level assortments
  - Size distribution, entropy, information
  - Pareto, power law characteristics
  - Cross elasticities, complexity measures
  - Dynamics – additions, deletions, rates and drivers of change: merged, and de-merged assortments
- Discrepancy levels, discrepancy drivers, gaps
  - Offered/sought
  - Sought/accessible
  - Accessible/acquired
  - Acquired/accumulated

The research stream of macro marketing has taken marketing system as one of its main conceptual foundations from the very beginning. For this reason, previous researches in macro-marketing have contributed to the understanding of assortment more than any other sub-discipline of marketing, especially for the theoretical thinking. Cadeaux (2000), for example, explores the implication of external benefits as an additional dimension of consumption of goods and services (i.e., assortment acquired), which is shaped in the marketing system.

The importance of the concept of assortment lies in its relationship with the marketing system. However, the marketing system itself is very complex. Taking what Wilkie and Moore (1999) describe as the aggregate marketing system of breakfast as an example, the whole supply chain is involved.

Although a simple model cannot catch all the complexity those activities illustrate, the purpose is not to be lost in the complexity. Hence, it is important to focus on the end point of a marketing system, where buyers take purchase actions. From there, the potential discrepancy of assortments offered and acquired can be placed in context and inferences drawn as to how to trace and perhaps reduce it, so that the efficiency and effectiveness of the marketing system can be improved. The contribution of this study lies in the approach taken, as a first step, to establish suitable metrics of assortment.

2.5.2 The Complex System Perspective

Because assortments are embedded in a marketing system, it is important to have some basic understandings of what marketing systems are about. As Layton (2009) has pointed out, marketing systems are in many cases, examples of complex adaptive systems.

Theoretically, a complex system can be defined according to its behaviors, which involve non-predictability, emergence, driven by the non-linear interactions between some or all of its parts. As a result of these behaviors, a complex system is a system for which it is difficult, if not impossible to reduce the number of parameters or characterizing variables without losing its essential global functional properties (Pavard and Dugdale 2007). This makes the measurement tasks related to a complex system difficult. However, in reality different levels of complexity obviously exist. Thus, the essential question is to what extent the properties that characterize the complexity appear in the context of assortments in marketing systems.

Pavard and Dugdale (2007) list four properties of complex systems that are related to socio-technical systems: non-determinism, limited functional decomposability, distributed nature of information and representation, and emergence and self-organization. In other words, these systems tend to have a dynamic structure and are difficult to anticipate through examining only its parts, since the parts are not functionally stable and some of their functions cannot be precisely localized.

Emergence is an important (although somewhat controversial) property of complex systems. These are properties which are not directly accessible (identifiable or anticipated) from an understanding of its components (Pavard and Dugdale 2007). Thus, in measuring the trading elements in the marketing system, the attributes of individual products alone are potentially less important in understanding a marketing system; instead the focus is more on the context-free, scale-free properties that are related to the complex nature of them.

2.5.3 Assortment in a Marketing System

An assortment is the public face of a marketing system. An assortment has not only a substantial or physical expression within a marketing system, but also a socio-cognitive aspect, through which different parties manage to come to some type of agreement or consensus that allows them to exchange efficiently in the market (Rosa et al., 1999).

Assortment is the result of exchange in a focal marketing system that involves goods, services, experiences, and ideas. An individual assortment in this circumstance is defined as the assortment of one entity at either buyer or supplier side. Collective assortments are attained by aggregating individual assortments according to certain considerations, which could be different marketing channels used by the customers (i.e. the sub-systems in the focal marketing system), or attitudes and preferences of customers. Many of these considerations are related to the segmentation of customers, a key concept that helps to facilitate the function of marketing, and in turn, improves the efficiency and effectiveness of the marketing system.

2.5.4 Assortments Acquired and Offered

Early in the history of assortment research, Alderson (1957) defines the assortment as "a heterogeneous collection of products designed to serve the needs of some behavior system" (p. 195). According to Alderson, a consumer is a typical behavior system. Though the examples given of the consumer's assortment are based on purchase choices, similar ideas can be extended to other stages of its appearance in a marketing system.

A theoretical development parallel to that of Wroe Alderson is made by Balderston (1956), who makes explicit how assortment can be applied to wholesale and retail marketing. In particular, Balderston (1956) defines and explores the role of "selling assortment", implying there might be other types of assortments.

Types of assortments can be defined according to different stages as the products pass from manufacturer to the end user or even beyond the final purchase. For example, Wind (1977) suggests that measurement of assortment should cover not only purchase stage, which is the stage that most studies have been based on, but usage and disposal stages as well. The discrepancies between assortments of these stages are the driving force of evolution of marketing systems.

Types of assortments may appear in the form of other concepts. Although the word assortment is rarely mentioned outside of retailing, its fundamental meaning has been widely used in different contexts in marketing. One linked concept is "evoked set", first defined by Howard and Sheth (1969). Besides the commonly found "consideration set", other types of evoked sets may also have a role in the various stages of a consumer's decision, for example, awareness set, choice set, infeasible set, and their counterparts. In a review of consumer behavior in tourism, Moutinho (1987, p.28) states that "the total set is comprised of all possible tourist alternatives in a particular tourist product category that are available in the market", which is similar to a definition of offered assortment. However, very little of the literature talks about the properties of those "sets", nor suggests how to measure them. Calls for theoretical development of assortment have continued over the years (e.g., Dixon and Wilkinson 1989; Reekie and Savitt 1982; Wind 1977).

Besides those appeared in academic research, marketing practice has also seen change and evolution in assortments and in the discrepancy of assortments. In the era of mass production, when the number of choices was small, discrepancy of assortment could be solved partly with relatively simple distribution systems, and one could trace the discrepancy with Alderson's sortability scale, which basically used category (or class) definitions given by suppliers. When more and more choices became available, the focus of marketing shifted from the supplier's side to the consumer's side, and mass customization was proposed. Mass customization, in essence, is a combination of philosophy and technique to solve the discrepancy of assortment.

From the standpoint of manufacturers (or suppliers in a broader sense), mass customization is not cost-effective according to the traditional rationale of scale economics. This difficulty is relieved conceptually by economists working in the strategic economics area, proposing adding economies of scope to complement economies of scale. The most common rationales for adopting a strategy leveraging scope economies were probably flexibility and responsiveness to consumers' needs, although conflicts with firms' current management structure may emerge and difficulties may apply (Berger et al. 2006; Bordley 2003; Holweg 2005; Jiang et al. 2006; Lancaster 1980; Sorenson 2000; Worren et al. 2002). The extent of discrepancy in assortments – or mismatching of assortments offered and assortments desired – is one of the driving forces for these practices, whose effects will eventually be shown in the structure and dynamics of marketing systems.

From consumers' side, even with the mass customization approaches implemented by firms aiming to address more precisely consumers' needs, the abundance of choices may be confusing (Huffman and Kahn 1998). Without a thorough understanding of consumers' response to assortments offered and of how assortments acquired are constructed, marketing strategies, in particular those related to mass customization may not be successful, and the discrepancy of assortment problem would remain unsolved.

In recent years, researchers have begun to show interest in assortment types other than the assortment offered. Among them, one of the most popular streams is research on consumers' shopping baskets or in our terms, acquired assortments. In a consumer's shopping basket, one would expect to see products from multiple categories. How the consumer constructed her/his shopping basket and whether the relationships among items in a shopping basket are consistent are some of the major assortment acquisition questions that have been asked. Other assortment concepts include accessible, sought and accumulated assortments, each arising at the interfaces between buyers and sellers at each point in a marketing system.

Acquired assortments by consumers reflect information on their behavior at the point of exchange. Since exchange is considered as *the central phenomenon* of the market, it is possible to explore a focal marketing system with the measures on the assortments embedded in it, and expand and generalize the knowledge to a larger system and those came before and appear after the current system under research.

Among all the types of assortments, assortments acquired and offered are probably the most important as they reflect the decisions of the two main parties involved in the exchanges in the marketing system. In this study, we focus on measuring the acquired assortments. However, the framework is generally applicable that we can also use it on assortments offered by suppliers.

2.5.5 Contemporaneous and Serial Choices in a Marketing System

Patterns of choice that can be either observed or theoretically assumed are important to an understanding of assortment properties. In this study, two general patterns, contemporaneous and serial choice, are chosen for a more detailed evaluation of assortments at both macro and micro/individual levels. Consumers' contemporaneous and serial choices are the basis of the two types of relations between items in acquired assortments: association and sequence.

Both contemporaneous and serial choices can be found in the real world, at different levels. One of the most typical examples of contemporaneous choice at individual level is the shopping baskets which "comprise the set of categories (or items) that individual consumers purchase on one and the same purchase occasion" (Mild and Reutterer 2003: 123). The availability of shopping basket data facilitates the proliferation of research in multi-categories choice modeling with a motivation for designing micro-marketing and/or targeted cross-selling programs (an extensive review of such models is provided by Seetharaman et al. 2005). These programs normally are based on the estimation of future purchases according to association rules among categories generated from past data.

As noted earlier Manchanda et al. (1999) suggest that there are three main reasons why items from different categories are purchased together in one shopping occasion (i.e., a shopping trip or a shopping basket): besides the widely accepted "complementarity in purchase" (as distinguished to complementarity in use, cf. Balderston 1959, p. 178) between categories, consumer heterogeneity (within a household) and co-incidence can also cause cross-category purchases. This framework of interpretation suits well contemporaneous choice data, but its application to predicting future purchases would be limited since there might be a number of totally different reasons underlying the complementary relations, so that during each purchase occasion, some would be classified as complementary while others would fall into the co-incidence type, which includes all the "residual" reasons. What makes things even more complex is that during different purchase occasions, different sets of reasons might be defined as complementary and thus co-incident. This may explain partly why results based on one dataset are very hard to generalize to other settings.

Shifting away from the purely contemporaneous data focus, Russell et al. (1999), however, interpret the cross category choices using a taxonomy that not only takes into account the influence of use and multiple choices in sequence over time, but also emphasizes consumers' cognitive decision process. In the taxonomy, they identify three key types of cross category dependence, namely cross-category consideration, cross-category learning and product bundling. This taxonomy gives an important insight into how the assortments possessed by consumers are constructed, but empirical evidence is not so balanced among the three types of dependence, partly because the information-processing details of consumers are not directly observable. Thus, contrary to sparseness in evidence of the influence of choice heuristics, goal ambiguity or conflict, and the nature of choice environment on cross-category consideration, a number of different models with empirical tests that capture cross-category learning can be found in the marketing literature, in particular those on multiple choices in sequence over time.

Sequence of acquisition as a focal dimension of consumers' purchase patterns can be dated back to Hebden and Pickering (1974), and Paroush (1965). To model the sequence of acquisition, Paroush (1965) proposes that it is possible to select a group of commodities that almost all consumers will purchase in the same order. This is less strict an assumption than the constant utility for a given product. It is also more consistent with observation of everyday life, where for example, people normally start with a simple consumer durable and upgrade to more sophisticated ones when their incomes rise over time.

With an emphasis on managerial implications, studies on serial choices are most frequently found to be discussed together with product bundling and cross-selling strategies (e.g., Ansell et al. 2007; Kamakura et al. 1991), although whether a formal bundling (such as packaging together) is plausible or not is sometimes in doubt (Gourville and Soman 2001). Kamakura et al. (1991) suggest consumer's acquisition order of products/services has important implications for market segmentation and cross-selling strategies. To explain the existence of sequential acquisition patterns, they propose two reasons: logical orderings and resource constraints. They also conclude that hierarchical structuring of objectives implies a sequential acquisition pattern and a contingent asymmetric relationship between financial products—ownership of higher-order products may lead to high probability of ownership of lower-order products.

Ansell et al. (2007), on the other hand, explore the relationship with customer loyalty and lifestage segmentation. They find there are clear differences between the lifestage segments, which are identified with respect to customer characteristics affecting the likelihood of a second purchase from the company and the timeframes within which the second purchase is likely to take place.

Fishbach and Dhar (2005) notice that goal conflict is also relevant to serial choices, as multiple goals may lead to inconsistency of sequence of actions. Ratneshwar et al. (1996) also report that attributes in the finally selected assortment may be negatively correlated when there is a goal conflict.

More needs to be done on serial choice. To some extent, choice at one point of time is never isolated – it is not only influenced by previous experience, but may also take consideration of future choices, that is, the influence could take both directions – which makes the situation even more complex. However, with data on what actually have been chosen serially, it may be possible to explore the contexts in which these theories and their alternatives work.

2.5.6 Choice and Definition of the Focal System(s)

Dealing with relationship between species diversity and stability of the ecosystem, McNaughton (1977) suggests that models are true only insofar as they are verified as accurate descriptions of the systems they purportedly characterize. This principle also applies to the assortments in the marketing system.

Generally, a focal marketing system can be identified for any type of assortment (and vice versa); for example, a retail store for a shopping basket, a catalog seller for the mail-order purchasing, a shopping center for items got on a shopping trip, a bank for financial portfolio choices, or, a tourism marketing system for the places visited in a tourism trip.

At the same time, marketing is a process embedded in a social matrix. Considering marketing's social role and many other aspects that seemed to be scattered in previous researches, it is suggested that a marketing system can be used as the unit of analysis (Layton 2007). More and more researchers have now taken a more holistic and system perspective on marketing (Wilkie and Moore 1999; Lusch 2007)

Given that assortments can be aggregated (and disaggregated) at different levels, the boundaries of the marketing system used to measure assortments may be arbitrary. The ultimate aggregated assortment is the whole socio-economic system; and the smallest assortment is any individual product.

Hence, from both assortment and marketing system perspectives, a focal marketing system needs to be defined. Once the focal system is decided, the boundaries of the assortments embedded in the system are also determined. Though the definition of boundaries for a focal marketing system could be arbitrary, it does put the research in context and as a result facilitates further investigations. In addition, the focal system approach is also critical to the generalization of results in assortment research.

In some circumstances, the boundary can be defined by the behavior observed, for example, the shopping basket is defined as those purchased in one shopping trip. But in most circumstances, arbitrary judgment is unavoidable in defining assortments, while at the same time certain criteria for boundary defining should be employed. Alderson gives some direction for this matter as he describes assortment as “the most convenient or constructive association of goods” (1957, p.216), implying that the composition of assortment could be quite purposeful. In this sense, measurement approaches for different purposes or to follow different research directions can be quite different.

Burt (1988) suggests that market boundaries and transaction patterns are inseparable. More specifically, “the boundary of a market is defined by the pattern of buying and selling transactions typical of producing the market’s commodity. To the extent that the producers of one commodity and the producers of another have identical suppliers and identical consumers, they are competitors in the same market.” (p. 358). Burt (1988) distinguishes production differentiation from market differentiation as that product differentiation is a strategy that takes place within a given market.

It is also possible to define a focal marketing system around a specific local community. For example, Ingene (1984) investigates the potential of the aggregate retail market covering eight lines of retail trade, namely apparel, department, drug, general merchandise, grocery, hardware, furniture, and variety. It is shown that (1) the effect of specific household characteristics on retail expenditures differs significantly by line of trade, and (2) household characteristics do not account for a large proportion of the cross-sectional variation in average expenditures per household.

2.6 Elements of Assortment

2.6.1 Categories/Product markets

Categorization can be driven by either suppliers or buyers or both. A socio-cognitive process may be involved (Rosa et al. 1999), and the boundary can be fuzzy (Visvanathan and Childers 1999). It can be totally deductive from theories, or it can be derived from data of observations. With SKUs as an observational unit, a commonly used method is cluster analysis. However, with all the merits cluster analysis has, it is more of an exploratory approach than definitive. At the same time, the fuzzy definition of categories makes it difficult for traditional network measures, such as average degree and clustering coefficients, to capture the essence of product networks and to be properly interpreted. This is just one type of difficulty in subsequent analysis caused by the nature of product categorization. To this extent, the methods available as yet still cannot meet the needs of assortment analysis.

Any marketing system should have some kind of categorization scheme, under which the products and services are organized. With such a scheme and a defined boundary, a set can be created that exemplifies an assortment from the marketing system. Hence the definition of assortment is sensitive to both the categorization scheme and the boundary.

There are many ways to define categories. The simplest way is probably to make use of some standard convention for the characterization of the available options, such as that of biological species, which is discrete and mostly well-defined (Stirling, 1998: 66). However, in most other situations, including the case of products and services in the market, options are rarely as distinctive or as discrete as biological species.

A further look at the taxonomies involved in different fields yields that the ideal situation would be an "ultrametric model" that involves only lineal relationships in the taxonomy system. The model is best conceptualized by Weitzman (1992), who suggests that there are several underlying assumptions about the structure in such a system, including 'monotonicity in options', 'twinning property' and 'continuity'. The key measure here is the disparity between options. Solow et al. (1993) give these assumptions a brief summary as follows: the 'monotonicity in options' will exist in the condition that if one portfolio is a subset of another, then the disparity of the subset should always be less than that of the encompassing portfolio; 'twinning property' holds that the disparity of a portfolio plus an additional option should be identical to the disparity of that portfolio taken alone, if (and only if) the distance between that option and the portfolio as a whole is zero; finally, 'continuity' describes the effect that the disparity of a portfolio plus an additional option should be a continuous increasing function of the distance between that portfolio and that option.

Stirling (1998) criticizes the ultrametric model as holding less than realistic assumptions, in particular that the ultrametric model excludes collateral and contingent relationships between categories. While Stirling is right on the existence of other types of relationships than the pure lineal relationship, he doesn't point out when and how collateral and contingent relationships may take place.

Categorization scheme or the taxonomy of markets is itself a research topic. The distinctiveness of categories (elements that make into a count in variety) as concerned by the managerial decision or research goal is the criterion for choosing categorization schemes.

In the conceptualization model of many economists and marketing researchers, market and competition are closely related concepts. The meeting grounds for buyers and sellers of goods, product markets are "the bounded arenas in which prices and quantities for substitutable goods and services are negotiated by consumers and producers and are separated from other bounded arenas by gaps in demand between the product groupings" (Rosa et al. 1999). However, as Buzzell (1999) suggests, the traditional definition of competition which assumes products only directly compete with one another within the scope of a "product market" is oversimplified.

The knowledge structure theory of product markets advocated by many scholars (DeSarbo et al. 2006; Lounsbury and Rao 2004; Rosa and Porac 2002; Rosa et al. 1999) has depicted the socio-cognitive process underlying the representation of product categories and how shared knowledge facilitates decisions of both buyers and sellers. Among other things, this view is especially insightful for questions such as how markets evolve and how new product diffuse into new markets.

The inherent ambiguity of product market boundaries, together with the high frequent switching behavior of consumers in more and more industries, and factors other than product attributes that influence consumers' purchase behavior such as shopping environment, all indicate the limitations of product market approach.

2.6.2 Unit of Variety and SKUs

In the choice modeling literature, studies have explored different units of choice, such as brands, SKUs, or even assortments (choice sets). Brands have been frequently used in measuring variety in the variety-seeking literature, which has built its main theoretical base around brand loyalty and switching behaviors. However, as the retailer's decision always needs to go down to the SKU level, assortment planning and category management studies generally use stock keeping units (SKUs) as the counting basis for assortment variety (e.g., Boatwright et al. 2001). In an industrial application research done by Sinha et al. (2005), a choice model on SKUs is combined with market share data. Moreover, part of the category management decision is to decide on how many SKUs are to be stored in the category, that is, the "depth" question of variety. Examples of research include Cadeaux (1999) and Srinivasan et al. (2006). In addition, SKUs are also used in measuring consumers' perception of variety (e.g., Broniarczyk et al. 1998).

Although SKU is most widely used in retailing, it has been shared by manufacturers for a long time. With the proliferation of products through online outlets, the SKU has been an even more suitable unit of measurement for analysis Brynjolfsson et al. (2003). The potential generalizability of the concept of SKU in industries other than retailing is high. Basically, SKUs are countable items that are different more or less to each other. They are the smallest possible categories in a given marketing system.

2.7 Summary

Although previous studies that involve the concept of assortment locate mostly in the retailing literature, the generalizability of the concept is undeniable. This chapter reviews the literature of assortments from both supplier and buyer perspectives and concludes with a proposed conceptualization of assortment embedded in the marketing system.

CHAPTER 3: PROPERTIES OF ASSORTMENTS: EMPIRICAL EXPLORATIONS

3.1 Introduction

A review of the marketing literature reveals that assortment is an important but under-researched construct. Assortment is a complex phenomenon that contains critical information for marketing analysis and consideration. Hence, tools are needed to describe, compare, and evaluate assortments. Also needed is an interpretive framework to guide the applications and implications of assortment in the marketing system.

Although very little literature can be found on the measurement of assortment directly, a number of research sub-streams are relevant to this issue, including cross-elasticity assessments on the relations between the categories constituting assortments and diversity measures. Hence, instead of proposing new measures, we start from existing empirical studies on assortment-related variables or constructs, and then propose a framework to consider properties of assortment and their measures.

3.2 Size of Assortment

3.2.1 Assortment Size

A trend to the widening of choice makes the size of assortment an important factor. Interestingly enough, opposite opinions towards whether more choice or a larger assortment is good also exist, and both sides have gained some empirical support. In a review of the retailing literature, researchers often use “size of assortment” and “variety in assortment” interchangeably, understandable perhaps since these two constructs should be similar in a retail context. However, this may not always be true.

In an international comparison of determinant attributes for retail patronage, Arnold et al. (1983) find significant differences between markets and across cultures. However, critical determinants including assortment/variety in a store are similar across all markets. Craig et al. (1984) and Louviere and Gaeth (1987) also report that perception of variety is an important determinant of attitudes and store choice, just next to location and price.

Intuitively, the larger the variety, the better it is for the customer since more options are provided. This intuition has been supported by many studies. For example, Oppewal and Koelemeijer (2005) find that adding any item improves assortment evaluation, regardless of their attributes or the original size of the assortment.

On the other hand, the abundance of choice has worried psychologists. Schwartz published his influential book *The Paradox of Choice: Why More is Less* in 2004, warning about the negative impacts of choice on the "overloaded" consumers. Schwartz (2004) is not alone, his opinion finds echoes in the marketing literature (Boatwright and Nunes 2001; Chernev 2006a; Chernev 2003). On researching the relationship between sales and variety of categories, Boatwright and Nunes (2001) find that the sales of a retail store increase with a reduction in the number of low-selling SKUs. In *c*ontrast to the effect of assortment size identified by Boatwright and Nunes (2001), a follow-up study using literally the same data (data derived from a natural experiment conducted around 1997 by an online grocery/delivery service), Borle et al. (2005) found that a reduction in assortment reduces overall store sales. The inconsistency may be explained partly for the reasons given by Boatwright and Nunes for the negative relationship between sales and choice, indicating that brand and flavor are important attributes to consumers in the choice from an assortment.

Chernev (2006a) gives different reasons as to why consumers prefer a smaller assortment size. He considers choice as a hierarchical decision process, and suggests that choice among assortments is a function of consumer's decision focus and, in particular, the degree to which the subsequent task of making a choice from the selected assortment is salient to consumers. In other words, a larger assortment provides consumers with flexibility, but consumers' need for flexibility can be overestimated by themselves, which may subsequently cause the observed lesser confidence in choices made from larger assortments.

Slightly different to its effects on store choice, assortment size at a brand level has a more consistent effect. Based on six experiments, Berger et al. (2006) report that brands offering a greater variety of compatible options are expected to be perceived as having greater commitment and expertise in the category, which, in turn, enhances their perceived quality and purchase likelihood.

However, it might be oversimplified to generalize any isolated effects of assortment size. Roberts and Lattin (1991) report from their model that the marginal utility of assortment decreases with assortment size and, at some point, is offset by the additional cost of consideration. Kahneman and Tversky (1979) suggest that people's perceptions are attuned to noticing changes rather than absolute magnitudes of stimuli and that outcomes will naturally be coded as gains and losses relative to some reference point. This may partly explain the inconsistency of results from studies on assortment size. According to Marks (1974), changes of assortment size within a certain range may go unnoticed because they are under the just noticeable differences threshold and changes in sensations are linear with log-size changes in the physical dimensions of objects.

In an attempt to investigate how the way information is framed may impact the effects of assortment size, Hoch et al. (1999) proposed a mathematical model of variety and tested it empirically. The model is based on the information structure of an assortment, defined both by the *multiattribute structure* of the objects and their *spatial locations*. The findings suggest (1) people are more influenced by local information structure (adjacent objects) than non-local information structure, and (2) both variety perceptions and organization drive stated satisfaction and store choice.

Many studies found that reducing the assortment size of the retailers actually increases the profits of the retailer (e.g., Boatwright and Nunes 2001). However, studies have also shown perceived variety is one of the top three reasons for consumers' store choice (Arnold et al. 1983; Craig et al. 1984; Louviere and Gaeth 1987). In this case, reducing the assortment size can lead to losing consumers to competing stores, and eventually reduce the profit.

Using numerical examples, the assortment optimizing model developed by Agrawal and Smith (2003) suggests that optimal assortment size depends on consumers' preference structure, and in particular, if consumers are willing to substitute, a smaller assortment would be desirable for retailer in terms of profits. On the other hand, if consumers are quite complementary oriented, a larger assortment should benefit the retailer. It is interesting to note that their results also show a tendency to decreasing profits by offering larger number of substitution possibilities since there is no small subset of products that can satisfy most of the customers. In this case, more is less.

In a similar sense, Kök and Fisher (2007) model the demand of customers for substitution behavior to optimize retailer assortment. They find the model effective when applied to a supermarket chain in the Netherlands – the recommended assortment suggests a more than 50% increase in profits compared to the existing system.

3.2.2 Other Measure of Assortment Size

As discussed in Chapter Two, width and depth are probably two of the most important features identified of assortment in retailing literature. Hart and Rafiq (2006) incorporate these two features into their multidimensional model of assortment. Although the dimensions of assortments raised by Hart and Rafiq need to be further refined, it is generally agreed that to apply the concept of assortment in marketing it is important to consider more than one dimension. For example, Oppewal and Koelemeijer (2005) suggest that assortment variety should have at least two properties: one is the number of items (or SKUs) in an assortment, the other is the composition of the assortment when the former remains the same.

Width and depth distinguishes whether the decision is within a product category or between product categories. It is arguable that the two dimensions can be aligned aside the common concept of variety, though at different levels of the categorization scheme.

Measures other than width and depth have also been used to refer to assortment size in empirical studies. For examples, Bell and Lattin (1998) explain how large basket shoppers respond to the pricing strategy of retailers differently than the small basket shoppers do. They find price expectations for the basket influence store choice. While large basket shoppers generally prefer Every-Day-Low-Price (EDLP) stores, small basket shoppers tend to choose HILO stores. The measure they use to operationalize basket size is derived from household-level grocery expenditures of the shoppers.

3.2.3 Contents of Assortment: Beyond Size

Although assortment size is the most frequently researched feature of assortment, other attributes attached to assortments also have caught the attention of marketing scholars. For example, Bradlow and Rao (2000) show that consumers are heterogeneous in terms of price sensitivity and responsiveness to product attributes, and many of them focus on purchasing products with high levels of attributes that they want (i.e., do not prefer varied assortments). This result of content being more - or at least no less important than size - is supported by Oppewal and Koelemeijer (2005).

When considered together with other dimensions of the same assortment, choice may become even more complex (Gourville and Soman 2005). Take price as an example, where Chernev (2006b) comments that “When options [in an assortment] are priced at parity, the choice becomes more complicated because of the uncertainty associated with identifying an option that best matches the consumer’s preferences” (p. 200). Chernev concludes that uncertainty associated with consumers’ preferences and consistency of these preferences with options’ prices (the additional dimension) are important determinants of consumers’ assortment choices. The study of Agrawal and Smith (2003) provides insights into this issue by exploring the composite structure of the assortment, which finds the many possibilities of substitution in the assortment may cause a consumer to withdraw from purchasing. Confused consumers may feel not confident to buy, or even depressed, as Schwartz (2004) suggests.

Kalyanam, Borle and Boatwright (2005) suggest that some key items could be the ones that determine whether the multi-item assortments will be purchased, although there are other items in the assortments. Key-item effect may moderate customers’ response to assortment change in the retailing store. It is found that is in the category of apparel that more frequently purchased categories are less adversely affected by the reduction of assortment.

3.3 Relationship between Categories

3.3.1 Cross-Elasticity and Relations between Categories

As stated in Chapter 2, a research stream that has been facilitated by panel and shopping basket data in recent years is the modeling of consumers’ multi-category purchase decisions. Research on contemporaneous multi-category buying as observed in supermarkets has resulted in distinguishing complementary, substitutable and independent relationships between items from different categories. These pair-wise patterns/relationships can be captured with cross elasticity of demand under the influence of marketing variables. For example, Betancourt and Gautschi (1990) use cross-price effects and Manchanda et al. (1999) model both cross-price and cross-promotion variables. However, to estimate the model and thus parameters/measures of these patterns, data with marketing variables is required and the data should include longitudinal information.

The work of Betancourt and Gautschi (1990) presents an interesting conceptual framework addressing how relations among categories at different layers of marketing systems might intertwine with each other. They use the same typology of relationships and cross-elasticity measures as mentioned above while extending it to include distribution services. In addition, the cross-elasticity measures are decomposed into two parts aiming to separate direct production (i.e., household production) effect and consumption effect, based on which they distinguish net complements, independent, or substitutes from gross complements, independent, or substitutes. The "net" relationships are the relationships between two categories that have been formally addressed in most previous multi-category researches; they are "net" because only pairwise interactions between categories are included. Though Betancourt and Gautschi (1990) do not explicitly aim to build a multi-layer model, they suggest their model is applicable to issues such as the nature of competition and retail agglomerations, which involve a multi-layer marketing system perspective. It is arguable that if the common operation costs (e.g., costs invoked by distribution services) imposed by the marketing systems they are embedded in (in this case the retail service providers) and above (e.g., the shopping center that the retail store located in) are not accounted for, interpretations of contemporaneous choice patterns could be misleading.

Cross-elasticity of demand is also an important analytical method for customer-oriented product-market definitions (Day et al. 1979). The underlying logic of product-market definition is similar to that of Betancourt and Gautschi's model. Basically, both are concerned with how categories of products/markets can be better defined from consumers' point of view, while at the same time attaining it as a managerial tool (for category management) of suppliers. To this extent, market segments can be considered as a special case of product-market.

The concept of cross-elasticity is useful in describing the relations between categories constituting assortments. To apply it to the measurement of assortments, especially with empirical data, however, cautions should be paid in defining the relationship and assessing the cross-elasticity. For example, it is very difficult, if not impossible, to identify substitutions through information within an assortment. Also, there is a need to distinguish between use association (UA) and buying association (BA) if the aim is to test some theoretically assumed relationship, since "two products are complementary is not a guarantee that those products will be present in the same market basket" (Borges 2003: 3).

3.3.2 Shopping Basket Analysis

Market basket analysis probably provides the most comprehensive set of techniques in analyzing the inter-dependence among product categories. Though the main goal of market basket analysis is to draw inferences about cross-category purchase effects among the supplier's assortments, depending on the managerial or research interest, the analysis could be based on either the composition of market baskets or variations of marketing mix variables, or both.

According to its purpose, market basket analysis can be divided into two types: exploratory and explanatory. The primary task of exploratory approaches on market basket analysis is to uncover and represent hidden category relationships, while explanatory models focus on the identification and quantification of complementary cross-category choice effects of some marketing variables under managerial control, such as price, promotions, or in-store marketing features (Mild and Reutterer 2003).

Traditional association coefficient based approaches, including cluster analysis and multidimensional scaling, correlation/regression analysis, and econometric models such as multivariate logit, have found their applications in market basket analysis. On the other hand, exploratory methods such as those related to data mining techniques have also gained attention (Decker 2005).

The purpose of data mining with market basket data is to find rules that can be applied to situations such as couponing and discounting, product placement, and cross-marketing. To distinguish a useful pattern from random co-occurrence, the probability of the pattern happening can be compared to a baseline likelihood, the probability of the event occurring independently. For example, if a pattern states that “when people buy diapers they also buy beer 50 percent of the time”, while normally people buy beer 5 percent of the time, then people are 10 times more likely to buy beer when they buy diapers. The ratio in this kind of comparison is called lift, and a key goal of an association data mining exercise is to find rules that have the desired lift.

There are many ways to interpret the rules found. Some measures have been developed to facilitate the interpretation with two widely used ones being confidence and support. Support (or prevalence) measures how often items occur together, as a percentage of the total transactions. Confidence (or predictability), on the other hand, measures how much a particular item is dependent on another. Note that a rule can be stated using either of the items involved. While confidence of a rule is normally different from that of the inverse rule, support is not dependent on the direction of the rule.

Rules found in data mining market baskets are used for recommender systems, which literally turn the rules into recommendations for the consideration of customers through specifically designed algorithms. With exploding product variety and information, proper recommendations could save the search time for customers while help certain information to reach potential customers, therefore improving the efficiency and effectiveness of a marketing system.

Researchers and practitioners have investigated and experimented with a variety of recommendation approaches, taking three types of data as input: product attributes, consumer attributes, and previous interactions between consumers and products (including purchase, rating, and other types of interaction). Collaborative filtering algorithms use the third type of data, that is, they base the recommendation on other customers' purchases. Again, this approach may shorten the information search process, but it is not a trigger of purchase.

The recommender system approach can be easily transformed into research problems based on graphs. According to Huang, Zeng and Chen (2007), the collaborative filtering problem can be described as the one that predicts the future state(s) of the consumer-product graph conditional on the current graph (and possibly past ones). In graph terms, the algorithm tries to recommend candidate product vertices for individual consumers to form future edges.

As with many other exploratory approaches on cross-category relationships, the results of market basket analysis need to be interpreted with care. In particular, the relationships detected may not be due solely to the suggested mechanism, but to a yet unknown organizing principle. However, with an increasing number of market basket researches, more and more previously unknown mechanisms are discovered. For example, Chib, Seetharaman and Strijnev (2002) find that ignoring unobserved heterogeneity across households overestimates cross-category correlations and underestimates the effectiveness of the marketing mix. Hence the demand for conceptualization and generally applicable empirical measures of market baskets (i.e., the acquired assortments) is high.

3.3.3 Sequence Analysis in Purchases

Multi-category purchase over time has been the subject of sequence analysis in consumer behavior. Sequence analysis makes explicit the assumption that, at least in some circumstances, consumers' choices are not temporally independent. To this extent, mechanisms may exist that drive the sequential relationship among categories.

An early and probably the most popular application of sequence analysis in consumer behavior is in the acquisition patterns of consumer durable goods (Hebden and Pickering 1974; Kasulis et al. 1979; Paas 1998; Paroush 1965; Pauly 1977), which has later on been extended to financial products (Kamakura et al. 2004; Kamakura et al. 1991; Kamakura et al. 2003; Paas 2001; Paas and Kuijlen 2001; Paas et al. 2007). This analysis is found quite useful to marketers for life-cycle segmentation as well as strategies like product bundling and cross-selling. The former can be achieved through relating acquisition patterns to family types and life-cycles; the latter is conducted by identifying the next logical product/service acquisition for the customer based on patterns of his/her previous acquisitions and of other customers.

The Hidden Markov model (HMM), which is also known as latent Markov model or latent transition model, has been widely applied in sequence analysis on a diverse range of phenomena. For example, acquisition of products/services by customers, acquisition of intellectual skills by children, speech recognition and weather forecasting are all possible application areas for hidden Markov model. As defined by Rabiner and Juang (1986, p.5), "an HMM is a doubly stochastic process with an underlying stochastic process that is not observable (it is hidden), but can only be observed through another set of stochastic processes that produce the sequence of observed symbols." Hence Hidden Markov Model provides a viable way of analyzing the relationships among categories through the observation of their sequence in the purchase. As shown in the analysis of consumer durables and financial products, the results as well as the original observations are important with managerial implications.

3.4 Measuring Acquired Assortments

Assortments should be measurable since an assortment of goods has structure and internal consistency (Alderson 1957). The question is: what aspects should be measured so that they best reflect the structure and internal consistency of the assortment?

One of the greatest thinkers in the history of economics, Schumpeter indicates that variety in consumer goods is “one of the fundamental impulses that set and keep the capitalist engine in motion” (1912, p. 83). The link between variety-seeking consumers and innovation is not hard to build. At the society level, despite addressing the heterogeneity issue in consumers’ tastes, the increase of variety in goods available is also considered as a heuristic indicator of the growth of wealth in a society (Beinhocker, 2007). For a long time, variety has been the sole measurable property of assortment. However, a single measure is definitely limited in both theoretical and empirical explorations. A deeper understanding of the assortment and its properties is needed, as well as proper measures.

Earlier sections in this chapter reviewed some of the most important aspects of assortment that have been investigated in previous research. Taking a marketing system point of view, it is possible to identify some gaps in assortment research, while highlighting the two most important dimensions in assortment: diversity and relational features. For a long time, variety and diversity have been used interchangeably in marketing literature. As diversity being the most important feature of assortment, relational properties gain their importance on account of an inconsistency between observation and the assumption of independent choice.

Five basic characteristics of assortment may be important. These characteristics are:

variety, balance, disparity, association, and sequence. These five are chosen for two reasons - it is easy to find an operational interpretation of each in relevant contexts, and they can be represented quantitatively and potentially compared across assortments.

In the context of assortment, variety is represented by the number of categories included in the assortment, while balance captures the pattern of how much or often each category is represented, and disparity refers to how different the categories are. While perhaps rooted in the same taxonomy of categories for a certain assortment under scrutiny, these three properties reflect different aspects of diversity, which have different importance depending on the context, the decision to be made, or the purpose of the research.

Association and sequence, on the other hand, are relational characteristics and reflect the way consumers construct their assortments. These two characteristics of assortment tell us that, among the many choices available in an offered assortment, which items are included in an assortment acquired by some consumer and in what sequence.

Comparing to the diversity measures, in particular variety and balance, which have established measures and can be represented in some simple ways such as a single number, properties of association and sequence are (normally) presented in the form of data matrix. Therefore, information extraction techniques are required for analysis and interpretation of the two relational properties.

Data mining is a way to extract information. It reduces the whole dataset into rules, which according to some thresholds used are more important than other information. Network measures are another way of extracting information where the nodes of a network correspond to the items in an assortment with nodal links corresponding to association or sequence. It is arguable that a network can be partly reproduced based on some features, such as size (number of nodes), average path length, clustering coefficient and degree distribution (Albert & Barabási, 2001; Huang, Zeng, & Chen, 2007).

Related to the network measures are random network models, where nodes or items are linked randomly with each other following a specific stochastic process. These provide benchmarks for comparing observed networks to the theoretical models. Since the 1950's, a random network model (Erdős-Rényi model) has been used as the basic model for large-scale networks which have no apparent design principles. Ever since then, deviations from random network have been frequently observed in many real systems. Many empirically useful network measures such as the clustering coefficient were developed in the process of modeling random networks.

No matter what analytical approach is taken, to incorporate that amount of complexity presented in the assortment, there are some basic criteria the methods should meet: (1) they should be able to extract important information from the complexity; (2) they should be able to support some type of replication of the original assortment; (3) they should be meaningful in interpretation. Some times, given the lack of established theory, a combination of various methods may be taken so that triangulation of results is possible.

The following two sections explore these five assortment measures identifying the substantial and methodological characteristics of each measure.

3.5 Measures of Diversity

3.5.1 Role of Diversity Measures in Different Systems

Diversity is probably the most important property of assortment. A consumer's overall impression of an assortment largely comes from the diversity of items in the assortment, with the result that sometimes assortment and diversity are used interchangeably. Although measures of width, breadth and depth are all related to diversity of the assortment at the designated level, few if any studies in the marketing literature can be found to have made the theoretical connection between them. The ecology literature, on the other hand, contains the most extensive and mature discussion of diversity measures.

A measure of diversity/variety also finds its position in economics. Gans and Hill (1997) comment that besides its long existing importance in industrial organizations, product diversity has also received renewed attention in models of international trade and economic growth. Lancaster (1980; 1990) connects product variety with competition and social welfare, where product variety in the market increases with a decrease in the degree of economies of scale or an increase in the width of the spectrum (difference between the most preferred specifications of the extreme consumers). Lancaster (1990) proposes that the basis for market equilibrium under imperfect competition is interaction between the gain of variety and scale economies, where he assumes that consumers' desire for variety is infinite.

Commenting on Lancaster's review of product variety, Ratchford (1990) emphasizes the limitations and applications of economics of product variety, stressing that the economics of product variety is actually industry dependent, i.e., parameters of optimal variety to a society may vary across industries.

Although economists, ecologists and marketers are all interested in diversity, the concept does have different implications in these disciplines. Economists connect product diversity with social welfare outcomes and propose there might be an optimal diversity, while ecologists are concerned with preservation of species so that a high ecological diversity (more specifically, species richness) could be attained. Retailers take a different perspective, considering assortment diversity as something that need to be balanced to both attract customers and gain a high turnover. In other words, economists and marketers normally consider diversity as an overall measure of the assortment and use it mostly as the input of their model, while for ecologists, diversity of species assortment is the goal or output of the ecological system. While both roles are considered here, the output role of assortment diversity, however, will be stressed in the following section reviewing briefly some aspects of the ecology literature.

It should be noted that no matter how sophisticated a measure might be, the starting point to measure assortment is always the simplest counts. Thus, as noted earlier it is critical to define the fundamental unit in the counts. Economists take "variant" as the unit of variety (Lancaster 1990); ecologists, being more experienced and practical in measuring diversity in nature, however, use the word "individuals" to connote "distinct, indivisible organisms that can be counted, regardless of whether they differ from one another genetically," distinguishing them from colonies that have indefinite boundaries (Pielou 1974, p. 132). The retailers' approach is similar to that of ecologists in that SKUs are taken as the basic units of counts.

3.5.2 Finding Dimensions in Diversity: The Ecology Literature

The most extensive literature of diversity measurement is found in ecology. In this section a brief introduction is provided to how diversity is defined and measured in ecology.

Parallel to the idea that assortment properties such as diversity have to be defined according to the marketing system in which it embedded, ecologists normally measure diversity within "communities". According to Pielou (1974), the definition of community is given as follows: "when several or many species-populations occur together and interact with one another in a small region of space, they jointly constitute an ecological community" (p. 288). Note that in drawing the boundaries of the community to be studied a certain degree of arbitrariness is sometimes unavoidable. Once the boundary of the community is determined, a qualitative definition of diversity can be given using the following statement: In a pair of contrasting communities the one with the greater number of species could be said to be more diverse than the other, or to have greater diversity.

Level of aggregation also applies to the definition of community and therefore measurement of diversity. Pielou (1974) suggests splitting a community's overall diversity into hierarchical components corresponding to the hierarchical levels of taxonomic classification (p. 294).

Though the concept of diversity in assortment seems straightforward and easy to understand in a retrospective view, it has been used to refer to quite different things (Stirling 1998). To measure it quantitatively, in ecology "diversity" is most often used as a synonym for "number of species" without regard to their relative abundance, which Pielou (1974) believes to be the reason why no satisfyingly convincing theory has been put forward to explain the relationships between environment and the resulting diversity. Huston (1994), on the other hand, criticizes the many "complex components and scales of spatial and temporal variability" used to represent biological diversity and argues for a concept/measurement that "can be divided into components within which repeatable patterns and consistent behavior occur." (p. 2)

In an attempt to define in a precise, but still generalized manner, what is or should be meant by the many terms surrounding the concept-cluster diversity, Peet (1974) points out that even within the ecology literature, diversity covers terms as broad as species, varietal, generic, and structural diversity. Peet grouped the measures of ecological diversity into species richness indices, heterogeneity indices and equitability indices. Heterogeneity has been proposed to address the confounded concept 'diversity', especially when "diversity is a statistical function that implies no particular regularity in distribution, and whose computation the numbers of individuals in all the species are taken into account" (Margalef [1969], as quoted by Pielou [1974]).

Finding the original single dimension concept of diversity confounding and misleading, many ecologists embraced the idea that diversity consists of two components, namely variety (richness) and the relative abundance of species (Magurran 1988). Further, as suggested by Huston (1994) and others, diversity statistics differ primarily in the degree to which they emphasize species richness versus species evenness, thus the two dimensions should be distinguished and measured separately despite of their overlapping in measurement practice.

In summary, the ecology literature, where some of the most intense intellectual activity on diversity has taken place, suggests that the measurement of diversity should not be set alone without considering the context (i.e., the system embedded) and that there are more than one dimensions in the concept of diversity.

3.5.3 Measures of Diversity Used in Marketing Literature

Besides diversity itself, there are many diversity-related concepts in marketing literature, among which heterogeneity and variety are probably the most important. The two concepts have different roles in comparison with diversity. While variety is often used interchangeably with diversity, heterogeneity seems to be emphasizing a certain aspect of diversity. The reason of such usage can be traced back to the initial meaning of diversity. Diversity, according to one of the Oxford Dictionaries (Hornby and Cowie 1989), is "the state of being varied" or "variety", which represents the quality of "not being the same" and "more than one". Since diversity means 'many different things', it is arguable that "many" and "different" could comprise the two major aspects of diversity. Variety deals with the property of "many" and can be measured through the count (or quantity) of categories; heterogeneity, in this case, highlights the property of difference. Quantity measures are easy to implement but some alternative approaches also have their own merits.

Noticing that count of categories doesn't capture enough information, Reinartz et al. (Reinartz, Thomas, & Bascoul, 2008) use another measure called "balance" in addition to "width". In their research, balance is measured as "minus" the standard deviation of the share of purchase across the categories. Reinartz et al. (2008) also find that behavioral loyalty leads to wider and more balanced assortments acquired by the customer.

Taking the breadth of product assortment as a major output of a retail sector (i.e., a marketing system), Betancourt and Gautschi (1993) develop two alternative measures for it, one quantity based and one value based: the first indicates for each sector the number of establishments carrying a product line relative to the total number of establishments; the second measures the breadth of assortment as the entropy in the distribution of sales across product lines in a sector.

The use of entropy as a measure for outputs of marketing systems is not limited to retail sector. For example, Alexander (1996) proposed entropy as a measure of product diversity in the music recording industry. Measuring the degree of uniformity (through degree of randomness), a simple form of entropy measure is given by

$$-\sum\sum p_{ij} \ln p_{ij} ,$$

where *i* represents the *i*th dimension of which diversity matters,

j represents the *j*th combination.

3.5.4 The Three-Component Diversity Concept

It is clear now diversity is not a unidimensional concept and emphasis on its different subordinate properties should vary under different research questions. In an effort to clarify the concept of diversity that has been central in research across a wide range of disciplines, Stirling (1998, 2007) suggests that diversity concepts employed in previous research display some combination of three fundamental properties: variety, balance and disparity. These three components are consistent with the knowledge on assortment and are therefore adapted here as a main part of the measurement of assortment.

Stirling, as well as many other researchers, tends to favor the dual concept diversity, which integrates variety and balance. However, as always, a combination approach may lead to loss of information on the one hand, and offset of conflicts between the constituent characteristics where false conclusions might be derived on the other hand. Given that the knowledge of assortment and its properties is still limited, for the current study, it is more plausible to clearly define and evaluate those characteristics separately.

The rest of the section depicts the assortment properties and measurements related to the three subordinate characteristics of diversity: variety, disparity, and balance.

3.5.4.1 Variety

Variety is measured by the count of different "variants" in an assortment. It is probably the most commonly used measure of diversity. When the categories of the assortment space are determined, this is simply the count T of the number of distinct items/categories in an assortment. It includes the number of shops in a shopping mall or local community, the number of items on a menu or exhibits in a museum, the number of categories in a supermarket, or the number of tourist destinations in a country. Beinhocker (2004) estimated that the Yanomamo communities in the Amazon traded some 300 different items, and the Masai in Africa traded perhaps 800 items. Variety matters, as De Vries (2008) noted in a discussion of living standards in London in the early years of the Industrial Revolution where increasing assortment variety led to increasing workforce participation and thus to increased income. Van Herpen (2002:1) pointed out that McDonalds increased the number of menu items from 13 in the early 1970s to 43 items in the late 1990s. She went on to note that "supermarkets of the month" in the *Progressive Grocer* contained between 25,000 and 88,000 SKUs. Anderson (2006) in his book on The Long Tail estimated Amazon to carry 3.7 million different book titles.

In practice the count in a supermarket is often allocated across first level categories (width) and then within each category by subcategories (depth). A similar hierarchical process is often adopted for other contexts – broad categories in shops, shop groupings in a mall, malls in a region or exhibits grouped by type or period, then aggregated within museum, then across museums in a city. The notions of width and depth and the counts of the number of distinct elements at each level of aggregation are common to all of the assortments arising in the analysis of a marketing system. And taken as a whole these counts provide a measure of variety and thus of diversity for the assortment.

3.5.4.2 Disparity: Inherited Property from Categorization

Disparity refers to the property of difference among categories. Ideally, categories should be defined according to some objective criteria (or chosen dimensions) with which disparity can be measured. Pre-defined categories then become the basis of measuring variety and other properties of assortment. However, the multidimensionality of the category space and the non-lineal relationship between categories and sub-categories make it difficult to calculate or even define the disparity measure. Disparity answers the question: "how different from each other are the types of things that we have?" it refers to "the manner and degree in which the elements may be distinguished" (Stirling 2007, p. 709). Stirling (1998) suggests that disparity is context-dependent.

A measure of disparity is a measure of how different the items in an assortment are from each other. A number of possibilities have been suggested, the simplest of which is known as the Hamming measure, proposed by Richard Hamming (1950) in a study of error correcting computer codes. In the assortment disparity context, the measure draws on the idea that the items in an assortment can be given a distinct identity through the presence or absence of each of a defined set of attributes. The Hamming measure is then the number of attributes that differ for each of a pair of assortment items, if necessary, normed by dividing by the number of attributes considered.

This measure formed the basis for the measures proposed by Hoch et al (1999) and is discussed in some detail by Van Herpen (2002). Bookstein et al (2003) suggested an extension to allow some fuzziness in the presence or absence of an attribute. Other approaches have considered weighted attribute comparisons. Similar measures have proposed by ecologists eg the index suggested by Sorensen (1948) for assessing the similarity of two samples of species. In data mining the Jaccard index has found application, defined for each pair of elements in an assortment as the size of the intersection of two attribute sets divided by the size of their union. This leads directly to an index of dissimilarity or distance when subtracted from 1. A more complex approach was suggested by an ecologist, Weitzman (1993) who used a dynamic programming model to derive a set of distance weights for each pair.

In general, disparity measures yield a matrix D of distances d_{ij} between vectors associated with each of the items in an assortment, where the definition of distance can range from the simple (Hamming) or Jaccard to the complex (Weitzman) and where the attributes are expressed in interval or ratio scale could include intersection, Euclidean, street block or similar measures. The latter would then make possible a multivariate analysis of the distance matrix to reduce dimensionality.

3.5.4.3 Balance

Borrowed from Stirling's (1998) work, balance refers to the pattern of quantity apportionment cross the relevant categories. It is the answer to the question: how much of each type of thing are there in the assortment? In other words, it is a measure that concerns the market shares from a macro perspective.

The derivation of market share from volume of patronage to a destination is similar to the calculations employed in the retailing context, where SKU is used as the unit of quantity. SKUs present a suitable type of categorization scheme for defining assortments since they naturally represent distinct categories. In modeling consumer choices, the SKU approach can disclose some features of consumption that brand approach cannot illustrate (Fader and Hardie 1996). To some extent, brand can be considered as an aggregated level based on SKU, that is, if co-branded SKUs are excluded. Although SKU is probably the most obvious unit of measure, in some special circumstances, other metrics may also provide unique insights. For example, weight can be used to measure the volume of consumption for foods.

A set of choices for measuring balance has been found in literature of various fields, including the Herfindahl Index, entropy, and a whole group of biological evenness measures.

Comparing Herfindahl Index and the entropy measure, Jacquemin and Berry (1979) conclude that the entropy measure is superior to Herfindahl Index in measuring corporate diversification. The entropy measure can be easily decomposed into additive elements that are plausible for both interpretation and analytical purposes.

An obstacle to using entropy as the balance measure lies in the problem with the definition of zero term (Starr, 1980). Accordingly, there are two criteria that the measure of balance should fulfill: (1) it should be consistent (or monotonic) with the common understanding of evenness; and (2) it should be able to incorporate the zero term, which means if there is no observation found for a certain category, then that category should have a consistent contribution to the balance measure in any sample.

The zero term can be defined as: if there is no observation, then the category's contribution to overall balance would be zero. Under such a definition, using the entropy measure, the more evenly distributed the volume is, the higher the balance. In this case, both aforementioned criteria are met.

Hence, balance in an assortment is measured by the entropy of its constituent items, at both individual and aggregate system level.

3.6 Relational Properties

This section will be devoted to the relational properties of assortments. One of the aims of measuring relational properties is to discover the structure of assortments, which arguably is a reflection of the functioning of the marketing system. Structure in human communities and in assortments can be seen as recurring patterns of social relationships rather than focusing upon the attributes and actions of single individuals or organizations (Wasserman and Galaskiewicz 1994).

A structural approach is emphasized in this section.

3.6.1 Structures and Relational Data

One of the most important characteristics of structures is that they are concerned mainly with relations among the three types of data—attribute, relational, and ideational—that Scott (1991) highlights. Although it is possible to simply classify a relationship as complementary, substitutable or independent between any pair of categories in an assortment, it would also be important to examine the overall picture and see how a group of categories related to each other. This macro picture may disclose centrality, connectivity and other features such as hierarchical interactions that are not available in conventional relationship definitions.

The nature of relationship depends on how items in an assortment interact with each other. In this study, two basic types of interaction are considered: association and sequence. Association and sequencing have been identified as the two major aspects in market basket analysis (Brand and Gerristen 1998), which is a typical assortment analysis that has already been adopted in the retailing sector and the field of data mining. To explore the interaction between items, the basic constituent data unit is now a dyadic relationship between pairs, upon which networks emerge.

Association and sequence can only be measured through the responses of customers in acquired assortments, so they are not properties of categories that can be easily or directly measured by the supplier's offerings.

Although the structural aspect of association and sequence is emphasized in this section, it should be noted that network analysis is not the only method suitable for uncovering information contained in these two properties. For example, Sequence is also the key input for latent trait analysis, which is used in the evaluation of prospects for cross-selling of financial services (Kamakura, Ramaswami, & Srivastava, 1991).

3.6.1.1 Association

Association measures the extent to which items in an assortment appear together in the choices made by buyers. Clusters are possible where items can be grouped in such a way as to maximize internal or within group/cluster links while minimizing external links between groups or clusters. Some items will appear more frequently together than might be expected in random pairings. Others will appear less frequently. These patterns might differ between buyer segments or over time, and may well be influenced by external events such as major promotions or price shifts.

Association has also been used in suggesting product bundles and making recommendation for potential purchases from history data. In the field of data mining, researchers have long been interested in the relations between items in the shopping basket, which lead to the so-called "association rules". It is from these rules that people found products of two totally different categories might have a high probability of appearing together in the same shopping basket.

3.6.1.2 Sequence

Sequence in the choices of items in the assortment focuses on the order in which choices are made by buyers. Sequence as an information input has been found useful in analyzing the purchase of consumer durables such as electronic appliances. The inclusion of this measure is also suggested in the recommender system of music and research papers (Herlocker et al. 2004).

Comparing to the widely used association information, sequence in assortments is under-researched. The reasons are several folds: First of all, there is no matching information at the supplier's side (except for the sequence of new product introductions), in other words, it is mostly reflected in consumer's choices. The marketplace is somewhere buyers and sellers interact. Hence for researchers on markets, it is important to know how both parties respond to the information or related patterns presented by assortments, otherwise, the usefulness of such information might be compromised. Second, due to the difficulty and costs of capturing a sequence of events, it is much harder to identify regularities related to purchase sequence in consumer behavior. Last but not least, an understanding about the implications of sequence in items purchased is still limited.

3.6.2 Network Analysis and Data Matrices

Connecting the structural properties of assortment to a network perspective brings a group of measures that are well-established in network analysis, and are available through computer programs (Huisman and van Duijn 2005). Although all social research data might be held in some form of data matrix, the data matrix for network analysis (i.e., relational data) is different from that of variable analysis (i.e., attribute data). In variable analysis, attribute data can be organized in a case-by-variable matrix. The relational data must, instead, be seen in terms of a case-by-affiliation matrix. The rectangular case-by-affiliation matrix is generally termed an 'incidence' matrix, while the square matrices that are derived from the incidence matrix are termed 'adjacency' matrices (Scott 1991: 42). In the case-by-case adjacency matrix, the individual cells show whether or not particular pairs of individuals (cases) are related through a common affiliation. The other adjacency matrix, so called affiliation-by-affiliation matrix, shows whether particular pairs of affiliations are linked through common agents.

The affiliation-by-affiliation matrix, as suggested by Scott (1991), "is extremely important in network analysis and can often throw light on important aspects of the social structure which are not apparent from the case-by-case matrix" (p. 41). This type of adjacency matrices is also of great importance to the understanding of assortment properties. Given any "shopping basket" data, where cases would be individuals (or households depending on the research question) and affiliation would be the products (or categories of services, ideas, experiences, etc.) acquired, an affiliation-by-affiliation matrix would be easy to understand and viable to construct with certain algorithms.

3.6.3 Network Measures and Their Implications

There are three groups of network measures that are of most interest at this stage: density, centrality, and component measures. Most of the network measures are rooted in graph theory, which has been brought into the analysis of relational data in the early 1950s by Cartwright, Harary, and their coauthors (for a history of network analysis, see Chapter 2 of Scott 1991). Researchers suggest that other mathematical approaches, such as algebraic method and multidimensional scaling, might be used together with graph theory in network analysis to allow new features to be discovered. Although it is intuitive to use established network measures for analyzing relational data in assortments, what is of concern here is how ideas such as isolates, connectedness, and centrality. can be related to meaningful properties of assortments.

The simplest density measure for nodes in a network is degree, which describes the number of links connected to the node/point. Indicating direct connections to many other points, a high density of a point under the assortment context may imply a high accessibility of the item/category or that the item is bought or acquired with many other items. Density of the whole assortment network, which can be calculated through point density, is difficult to interpret unless comparison between similar networks is needed. Similar ideas also apply to centrality measures, where both point centrality and graph centrality are of interest; the former highlights the structural importance of an item in the assortment, while the latter gives information of how the whole network is structured and may disclose topological features of the assortment at analysis as a whole. Relevance of density and centrality measures is also supported by tourism studies. For example, destination characteristics including centrality and intermediacy are found to be important predictors of aggregate patterns of destination choices (Fleming and Hayuth 1994).

Some characteristics of assortment are industry specific, thus care is needed in measuring those properties from a perspective of pattern structure. In other words, even when a structural property is measured free of context, it should be ontologically reasonable, and the question should be asked what it means if an assortment has such a property. Take "centrality" as an example. Besides what is referred to as a type of position in spatial distributions, centrality can also have implications in the choice process. To some extent, a destination that seems to have centrality property within a trip may be analogical to the dominating option among choices. Bettman et al. (1998) suggest that consumers may use this dominated option to justify their choices. However, it is a quite different strategy to variety-seeking, although the results may be the same in the sense of heterogeneity within an assortment that acquired. In summary, although some general measures for the properties of assortments are proposed, their suitability for application would always depend on the context of certain marketing systems.

Component measures fit with the idea of subsets in an assortment and can become powerful tools in structural partitioning of the assortment. Comparisons can then be conducted with density and centrality between the subsets. Like many other measures, structural measures rely heavily on the researcher's interpretation. The idea of implementing graph theory into the measurement of assortments does not rest on any single measure, but the whole analytical philosophy that involves both visual and algebraic detections of patterns, as well as the interpretations and implications that followed. With these limitations in mind a number of network based measures are proposed.

3.6.3.1 Overview of Network Measures

One of the most important aspects in examining patterns of assortments is to look at the structural properties of assortments at some level of aggregation. A network-related methodology is proposed now for such an analysis.

Alderson (cf. Wooliscroft et al. 2006, p.79) states that "the structure of any system can be reduced to the primitive attributes of componency, seriality, and concurrence." Each of the primitive attributes has important implications theoretically and practically. Componency means items constituting the system are identifiable. Seriality describes the attribute that "components may be arranged in series and each may function in turn in a process or reaction involving the whole series." Finally, concurrence may be regarded as "a set of vectors running to or from a common point". These system attributes can be largely represented in properties of a network, thus not surprisingly they are reflected in the network element under Layton's (2007) definition of a marketing system (see Table 2-1 in Chapter 2).

In the current study, networks are used as the base of an analytical method. However, as can be found in the social network literature, networks have been a substantial research subject for a long time, which brings some important implications to the present study. As suggested by Zuckerman (2003), it is often useful to distinguish between "social" and "economic" networks and to explore the causal impact of the social network on the economic network. While insightful at the macro level, this perspective may be too simplistic since relations between these two types of networks could be very dynamic. In addition, interactions at the local level should never be underemphasized. This is probably the reason why researchers suggest under many circumstances the analysis of economic networks must be informed by a particular theory of the firm (Zuckerman 2003). In any of its applications in social science, a network is not context free. As to this study, major efforts will be devoted to both structural properties at macro level and the choice process of individual consumers.

Researchers into economic networks have noticed that some networks are "primordial", that is, they are given rather than chosen. Primordial networks have an important role in this study. For example, transportation networks are given at the time tourists make their decisions. Hence the patterns detected are constrained or influenced by these primordial networks. Since the sequence of occurrence is a precondition of causal relationship, some of the analysis will be based on different types of primordial networks.

In 1990s, network analysis in social relationships started to gain increasing popularity, though the methodological foundations can be dated back to as early as mid-1930s and are rooted in a branch of mathematics—most characteristics of social network originate from graph theory—on which some of the definitions and measures of properties of assortments are based. According to de Nooy et al. (2005), a network consists of a graph and additional information on the vertices or the lines of the graph, while a graph is a set of vertices and set of lines between pairs of vertices. In their definition, the additional information, however, is irrelevant to the structure of the network "because the structure depends on the pattern of ties" (de Nooy et al. 2005, p.7). Using slightly different terms, a more concise definition proposed by Zuckerman states that it is "a set of nodes and the patterns of ties among such nodes" (2003, p.546). The current study focusses on the structural relations of those nodes (i.e., items/destinations in the trips/assortments, and the frequencies with which origin/destination combinations occur in the trips made by visitors), and so while a graphical orientation is chosen, it should always be kept in mind that further statistical analyses can be carried out using the additional information.

Also, to simplify discussion, when dealing with contemporaneous assortments the focus is on undirected graphs instead of directed graphs, with the latter proving essential in a study of serial choice. This type of simplification is acceptable for two reasons: the first is that undirected graph is the foundation for directed graph analysis; second, to measure assortments as the output of a marketing system, structural analysis in the current study pays more attention to the aggregate patterns of individual choices, thus direction or sequence may be less relevant. A network analysis of directed graphs is explored in the next chapter. In both cases (contemporaneous and serial) the network/graphical analysis can be carried out for the population of visitors as a whole or for specific subgroups where comparative measures will often be of interest.

Normally the nodes of a network in a network analysis are active players, where for example the actors in a supplier's network in a given marketing system are each decision makers. In the present study of assortments, however, the nodes of a network are constituent categories/products of assortments. The question is: Will the structure reflected by association and sequence of categories be similar to the structure of the network of players? This implies a discretionary usage of network measures.

But there are also researches that use items or static products as nodes of the network. For example Pan and Sinha (2007) investigate the stock market using relations between stocks to form an association adjacency network based on correlations. They suggest that the emergence of strongly coupled components in such a network is a signature of market development.

Empirical measures normally need to adapt to the context of application. For this reason, detailed network analysis approaches will be discussed in the next five chapters after the contextual setting of the empirical study is defined. In this section the relevant network concepts are outlined.

3.6.3.2 Centrality and Centralization

Sometimes simple measures can be quite informative; nodal degree is one of those simple informative measures. Defined as "the number of lines that are incident with it" (Wasserman and Faust 1994, p.100), nodal degree is a property of node rather than the whole graph (i.e., the graphical/structural presentation of an assortment). If a given node has a degree of 0, then no nodes are adjacent to it, and it is an *isolate*. On the other hand, maximally a given node can have a degree of $g - 1$, where g is the total number of nodes in the undirected graph.

Some properties of the whole graph can be derived from the degrees of nodes. One of them is the mean nodal degree, which is a statistic that reports the average degree of the nodes in the graph. In the context of assortment, mean nodal degree represents the overall degree of association of items in an assortment. Intuitively, assortment with higher mean nodal degree could be more stable than the one with a lower mean nodal degree, because even if one of the links of a node (item) has been deleted, the item can still be in the assortment given its remaining links with other items. However, this may not be true if the links are defined as substitutability rather than complementary relations, which means care should be taken on modelling the assortments into networks.

It should be noted that even though measures like degree of node are focusing on individual actors (i.e., nodes, products/services, destinations, etc.), a network perspective that brings in the relations between the item of interest with other items is more proper than the traditional preference evaluation that fails to consider the influence of context.

Another derived measure, which might also be of interest to the study, is the variability of the nodal degrees. According to Iacobucci's definitions in Wasserman and Faust (1994), a graph is said to be *d*-regular if degrees of all its nodes are equal, where *d* is the constant value for all the degrees. The *d*-regularity can be thought of as a measure of uniformity. Since it is very rare to find uniformity in reality, the variability of nodal degrees, which is also a measure of graph centralization, is of interest.

Denoting degree of node *i* as $d(n_i)$, we can calculate the variance of the degrees as:

$$S_D^2 = \frac{\sum_{i=1}^{g}\left(d(n_i) - \bar{d}\right)^2}{g},$$

Where, $\bar{d}$ denotes the mean degree, $\bar{d} = \frac{\sum_{i=1}^{g} d(n_i)}{g} = \frac{2L}{g}$

g is the total number of nodes, and

L is the total number of lines.

While measures related to degree concern properties of a graph from the perspective of each node, density is a measure that "considers the number and proportion of lines in a graph as a whole" (Wasserman and Faust 1994, p.101). Given that the maximum possible number of a graph (i.e., undirected graph, excluding loops) is determined by the number of nodes, the density of the graph, which is the proportion of possible lines that are actually present in the graph, can be calculated via the ratio of the number of lines present, L, to the maximum possible. Hence, if the density of a graph is denoted by Δ:

$$\Delta = \frac{L}{g(g-1)/2} = \frac{2L}{g(g-1)} = \frac{\bar{d}}{g-1}$$

In other words, the density of a graph is the average proportion of lines incident with nodes in the graph. This measure can be used to evaluate and compare cohesiveness of subgroups and to construct block-models and related simplified representations of networks (Wasserman and Faust 1994).

Nodal degree is probably the most popular centrality measure of nodes in a network. Some other centrality measures have also been used, such as betweenness centrality, closeness centrality and Bonacich centrality. These four centrality measures have dominated empirical usage ever since they were proposed (Everett and Borgatti 2005).

Related to the measurement of node centrality is the concept of overall "centralization" of a network. The general procedure involved in any measure of network centralization is to look at the differences between the centrality scores of the most central node and those of all other nodes. Centralization, then, is usually expressed as a ratio of the actual sum of differences to the maximum possible sum of differences (Scott 1991).

High degree centralization in the association network suggests that only a small number of nodes in the network have high centrality scores, and that relatively few possible product bundles can be generated without those few highly central products.

3.6.3.3 Structural Equivalence

Network analysis can be used to examine similarities between two network structures. An interesting concept related to the comparison of networks for similarities is "structural equivalence". In the strict sense, two networks are structurally equivalent if they have identical ties to and from all nodes (Wasserman and Faust 1994). A more realistic notion is approximate structural equivalence (Hwang, Gretzel and Fesenmaier 2006).

While centrality indicates the "prominence" of individual actors in a network, structural equivalence analysis focuses on a comparison of graphs and subgraphs. Despite its focus on subgraphs or whole graphs, the equivalence comparison does not confine to these entities – they can also be applied to individual actors.

To some extent, equivalence of networks is established through measures of positions and roles of actors. While network position refers to a collection of actors who are similar in ties or interactions (i.e., roles) embedded in the network, network role refers to associations among relations that link social positions. Hence, modeling the association among relations is the basis for the equivalence analysis. This qualitative step is critical for the whole modeling process. In this study, this is done when the boundary of assortments (and at the same time, the marketing system they embedded in) is defined. Two most commonly used measures of equivalence are correlation coefficient and Euclidean distance, with the former focuses on similarity in pattern and the latter is more proper for measuring the identity of ties.

3.6.3.4 Cohesion and Clustering Coefficient

Researchers have long been interested in the possibility of cohesive subgroups in the network. Wasserman and Faust (1994) define cohesive subgroups as "subsets of actors among whom there are relatively strong, direct, intense, frequent, or positive ties" (p.249). A special case of cohesive subgroups is clique, a concept in the social network context, represents a circle of friends or acquaintances in which every member knows every other member. This inherent tendency to clustering can be quantified by the clustering coefficient (Watts and Strogatz 1998) and transitivity (Wasserman and Faust 1994).

Several known random network models such as the small-world networks have their theoretical clustering coefficient. The clustering coefficient has also been extended to bipartite networks (Newman, Strogatz and Watts 2001) and weighted networks (Borgatti, Everett and Freeman 2002).

In a weighted (valued) network, denoting Ci as the clustering coefficient of node i, the following formula gives its value

$$Ci = \frac{\text{Sum of weights between direct neighbors of node } i}{\text{Number of possible pairs between direct neighbors of node } i}$$

The clustering coefficient of the whole network is the average clustering coefficient across all the nodes.

3.6.3.5 Network Topology and Continuous Function of Structural Properties

Besides the quantitatively defined structural properties such as degree and centrality, topological characteristics of networks can also suggest important characteristics or properties. For example, many studies that apply network analysis choose discrete patterns as their subject, including topologies like random, scale-free, and hierarchical networks (e.g., Stocker et al. 2002), or stars and chains (e.g., Lue et al. 1993).

Another interesting and different approach is demonstrated by Watts and Strogatz (1998), who illustrate the influence of network structure on the speed and extent of disease spreading as an explicit function of randomness, a continuous variable that distinguishes network structures. This ‘small-world’ network model challenges some of the stereotyping ideas held on structural properties of network, so that instead of considering change of connectedness as the sole contributor for content spreading, researchers should pay more attention to previously ignored subtle structural features. The small-world phenomenon highlights the key role of short cuts, which largely shorten the lengths between pairs of nodes. Watts and Strogatz (1998) propose that the small-world phenomenon “is probably generic for many large, sparse networks found in nature” (p.441).

3.7 An Analytical Framework with Assortment Measures

The appropriateness of empirical measures can only be tested through applications. This section outlines several possible directions for the application of the proposed assortment measures.

Theoretically, three different types of research can be conducted with the assortment measures. One is to assume a stable categorization system and compare the responses (acquired assortments) of different customer groups, in which case implications are to be found in the difference between customer groups. It is possible to compare measures on the same set of responses but with different categorization schemes, where categorization schemes are the focus of research questions. Another possibility is to investigate the position of some certain categories in the whole system using longitudinal data, from which can be implied the origin and evolution of product categories. This could shed some lights on the evaluation of innovation and new product entry.

The first type of research is important for managers to understand consumer behaviors in the context. The second type can be useful for category management or other category-related decisions for both suppliers and buyers. The third type is of value to policy makers as it may suggest important positions in the market. An example of such a position is the one that draws most of the volume to the market. If the association measure suggests that the association between this one and some other category is stable, then any retailer or service provider must stock such an option.

The analytical framework presented here is a combination of type one and type three researches as classified above, that is, we aim to test the applicability of the proposed measures through cross-sectional and longitudinal comparisons under a relatively fixed categorization scheme.

3.7.1 Market Segments and Promotional Effects

Assortment has been related to most of the marketing research streams, including segmentation (Bordley 2003; Ansell, Harrison and Archibald 2007), pricing (Bell and Lattin 1998), product line management, channel management (Cadeaux 1992), and promotion (Manchanda, Ansari and Gupta 1999; Mehta 2007). Some of these studies deal with variety in the assortments, some deal with the inter-relationships between categories. However, none have used both diversity and relational properties.

It is a commonly accepted proposition that the purchase of one product can influence purchases of other products. Promotion of one category may increase the sales of the category while influencing other categories. Thus the connectedness among products has interested many researchers. Shocker, Bayus, and Kim (2004), for instance, highlight the relevance of "other products". They suggest that in the real world, buyer demand for a product can depend directly and indirectly on the marketing efforts of "other products" in different categories. The authors offer a behavioral rationale for the existence of the effects of "other products" marketing efforts and propose a taxonomy of possible inter-category relationships.

Vindevogel et al. (2005), however, argue that promotion strategies based on the associations found in market basket analysis may not work because associated products do not necessarily show positive elasticities. One example is that consumers tend to buy several products from the same category during a single shopping trip. This behavior is known as "horizontal variety seeking", and can result in association rules between substitute products, which are expected to show negative cross-price elasticities. Arguably, it is not the association rules that are misleading, rather, the promotion effects have to be investigated through longitudinal or time-series data.

3.7.2 Frequency Distribution of Variety

Whereas average variety is the most frequently used indicator of the variety property of assortment at the system level, other descriptive statistics may also provide insights to understand the assortment and the system in which it embedded. A viable way to evaluate the variety property of system level assortment is to look at its frequency distribution.

Pielou (1974) emphasizes that frequency distributions can and should be used to describe the population patterns of countable individuals.

3.7.2.1 Power Law

Probably the most universal pattern of frequency distribution in a network context is the one called “Power Law”. Early observations of a power law have been found in the economics literature, which can be traced back to Pareto and others. From then on, power law effects have been widely reported in different contexts and under different perspectives. This suggests that there might be some common features between a portfolio of products and an assortment of species, and power law is probably the most eligible candidate.

From a market point of view, Anderson (2006) distinguishes the market into two general segments using a power law distribution. The first segment, which can be illustrated by “hits” in the music industry, is called “Head” according to its position on the power law curve; the second segment, which stands for niches in the market, is called “Tail”. Besides an application in the music market, Anderson (2006) also describes the existence of this Head-Tail structure along dimensions of time and space. For example, he states “another sort of ‘hit’ is major cities,” which is because “if you chart population clusters around the globe, you’ll get a power-law” (p. 149).

But being a ‘hit’ within the “Head” is not the ultimate destiny of a city, nor is it for other types of components that exemplify a power-law. Within a ‘hit’ or “niche”, it is highly possible that a mini-structure of power-laws would be found, and platforms like Internet, which can aggregate information and make information of niches available to consumers in addition to the widely accessed information of hits, will perhaps have a major impact on the assortments observed and the evolution of marketing systems.

Why and how power laws come into being in different contexts is still under investigation, however, some insightful explanations have been given. In particular, Papatheodorou (2004) provides a theoretical basis for a core-periphery configuration of market and spatial distribution in the tourism sector. In his view, this asymmetric configuration (which is consistent with the head-and-tail structure in a power law distribution) results from market and spatial dualism. By “dualism”, he refers to the co-existence of large and small sizes of enterprises, mass and customized markets, oligopoly and monopolistic competitions, as well as forces leading to agglomeration and de-glomeration. In each case, the inequalities arise from the operation of a “preferential attachment” process, in which new entrants to an existing structure are either attracted to an existing aggregate in proportion to the size of that aggregate or form a new aggregate/cluster (Mitzenmacher 2003). This process has been shown to lead to a power distribution of aggregates/clusters by size and number (Newman 2005).

The relationship between phenomena of different aggregation levels can also be understood from a complex system point of view, which emphasizes both local and global features, as well as interactions within and between local parts. To some extent, many of the global patterns are emergent and result from local interactions (Bonabeau 2002).

In the sense of local interaction, the consumers’ decision process may be equally as important as the competition dynamics of suppliers. However, the former has been rarely explored. Traditional choice modeling focuses on the probability of purchase at individual level and assumes that choices consumers made are independent of each other. This approach thus excludes the interactions at the choice level and has been criticized by researchers (e.g., Bettman et al. 1998; Wind 1977).

3.7.3 System Properties

Assortment gives an additional dimension of measurement for a marketing system under investigation. There are no two same marketing systems, but some marketing systems function in similar ways. Since the primary function of a marketing system is to offer customer assortments of products, services, experiences and ideas (Layton 2010), it is possible that comparison over assortments of different marketing systems may provide insights into the marketing systems and how well they function. Being a meaningful economic indicator, profit has always been the dominant measure of the functioning of marketing systems, counting on benefits to stockholders of participants in the marketing systems and leading to conclusions on the efficiency or even effectiveness of the marketing systems. However, from a socio-economic perspective, as more and more people are concerned, profit is not and should not be the only measure of efficiency. As an additional dimension of measurement on the functioning of the marketing system, unlike profit, assortment is scale-free and can be used for sensible comparisons within the marketing system as well as between systems parallel to the focal marketing system.

It is arguable that properties of assortments can be used as a tool to generalize the role and/or measurement of assortments in the marketing systems in which they are embedded. The marketing system perspective incorporates context with actors but this doesn't mean measures based on marketing systems are context-free. We should always keep in mind that any analysis of assortment or marketing system that carried out is very sensitive to the level of aggregation. This is demonstrated by Layton's (2008) comments that "the properties of the whole [of a marketing system] at any one level of aggregation flow not just from the system under study but from systems above and below." Practical implications of assortment properties at different aggregate levels may even lead researchers to distinguish them as different properties. A good example of this comes from the "width", "breadth", and "depth" of assortments in retail management (Hart and Rafiq 2006).

3.8 Summary

This chapter reviews some major aspects of assortment that have been researched in empirical studies. Based on the review of empirical measures and investigation of their conceptual characters, two groups of assortment measures are proposed. The first group involves diversity measures, including variety, disparity, and balance. The second group is called relational properties, which have two features at the moment: association and sequence. A tentative analytical framework is then followed.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

Having laid out in previous chapters a theoretical framework of measures of assortment in a marketing system, this chapter outlines the methods used in exploring the nature and application of the proposed measures of assortment in a selected marketing system.

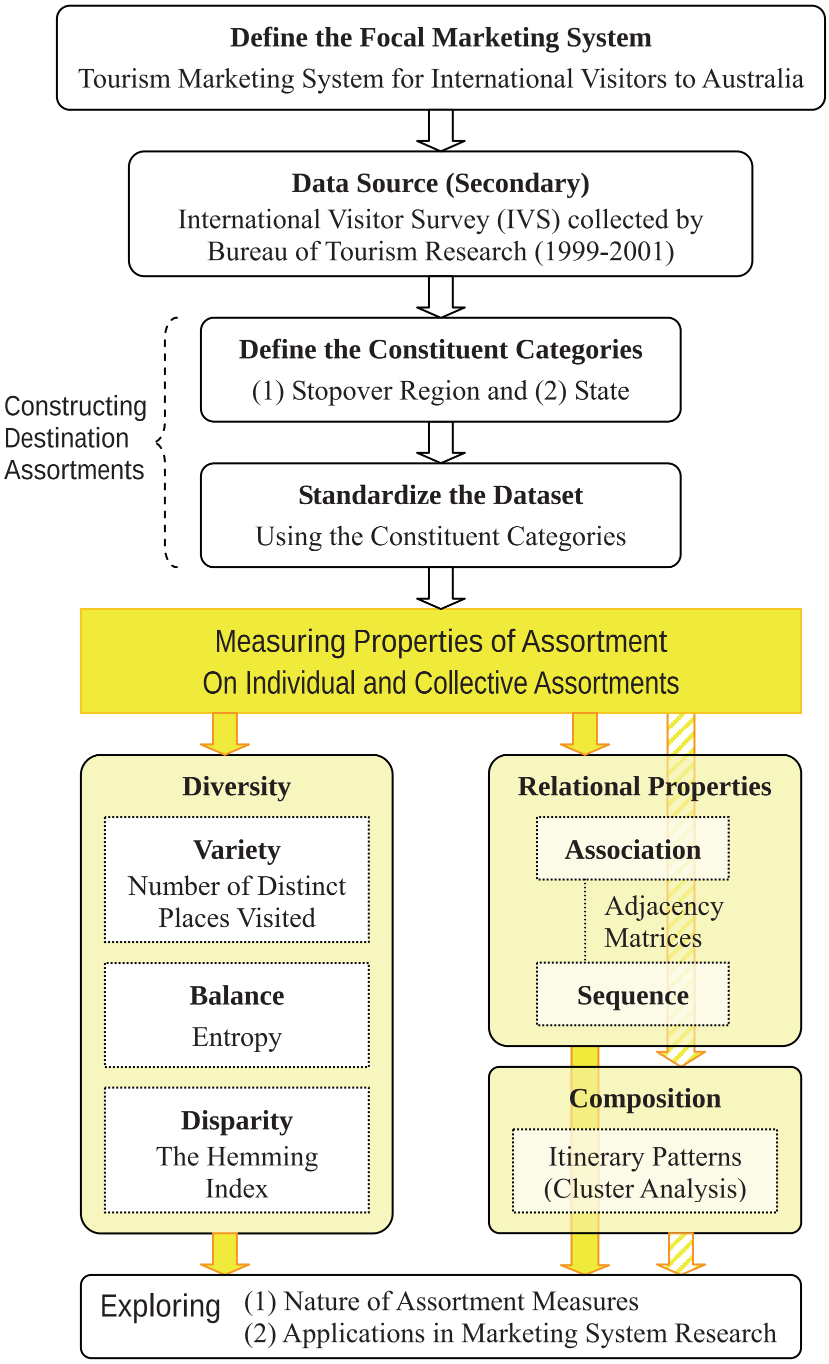
As mentioned earlier, given that the lack of empirical studies in marketing system research could be a big obstacle for further knowledge development, it is critical to find operational measures that can be applied to empirical studies in a broader context than the retailing sector. At the same time, although the measures proposed in Chapter 3 are intended to be generally applicable, the interpretation of assortment measures and patterns relies heavily on the contextual settings.

The assortments discussed in the empirical analysis of this study are acquired assortments. The choice of focus on acquired assortments is based on two considerations. First is the possibility of extending the research findings in part at least to offered assortments. Second, with a narrow time frame, the offerings in the market would be relatively stable, while measures and patterns associated with acquired assortments would show more interesting results through the dynamism of customers.

The chapter starts with an introduction to the tourism marketing system in Australia, the focal system of our empirical study, and then defines the destination assortments to be analyzed in the context of the focal system. Following that, the usage of the data source is justified and methods for operationalizing the measures proposed in Chapter 3 are presented. The chapter concludes with a brief discussion of the further exploration of the nature and application of the proposed assortment measures.

A schematic representation of the empirical study is depicted in Figure 4-1.

Figure 4-1: The Empirical Study



4.2 Australian Tourism Marketing System for International Visitors: The Focal System

Assortments are embedded in marketing systems. The purpose of this section, therefore, is to describe the focal marketing system of the research and set the background for an interpretation of the assortment patterns, both structural and non-structural, to be found in the data.

The tourism sector is considered to be a viable context for exploring the concept of assortment, extending its application and implication beyond the scope of retailing. A preliminary examination of the tourism marketing system in Australia gives positive indications of the fit between the research questions and the contextual setting. On the substantial meaning and implications, it is arguable that strategies related to assortment, such as bundling or cross-selling, can be adopted in the tourism sector. On the methodological side, early applications of assortment-related techniques have also been found. For example, Fukuda and Morichi (2001) apply market basket analysis to recreational travel behavior.

Besides being the context of the empirical study, the defined focal system also provides a theoretical background for the selected variables that can be used to further explore the nature and applications of the concept and measures of the assortment.

4.2.1 Tourism Marketing System

The tourism marketing system is a complex system (Woodside and Dubelaar 2002). A tourism consumption system (TCS), focused on the tourist as a decision-maker contributing to a tourim marketing system, is defined as "the set of related travel thoughts, decisions, and behaviors by a discretionary traveler prior to, during, and following the trip" and investigated with events taken place at different temporal stages of discretional trips by Woodside and Dubelaar (2002). Their central proposition is that there are underlying principles governing tourists' thoughts, decisions and behaviors across tourism activities, implying that "behavior patterns should be visible in the consumption of tourism offerings" (p. 120).

Being conscious that specific principles may vary according to contexts, Woodside and Dubelaar (2002) identify four major categories of factors that govern behavior patterns of visitors to Prince Edward Island, Canada: distance to destination for the traveler, first versus repeated visits, use of visitor information guides, and prime motive for trip. The conceptual framework of a tourism consumption system is based partly on Moutinho (1987), who provides a thorough review of consumer behavior in tourism, covering tourism-specific aspects such as major influences on individual travel behavior (culture, social class, reference groups, and role and family influence), as well as general marketing aspects such as purchase intention, satisfaction, perceived risks, and decision-making processes.

Similar to the product assortment presented by a shopping cart in the retail context, tourism products that have been consumed in a major trip (an international trip in this context) may contain information that has links with the consumer's life style, cultural orientation, and other features that are related to the consumer's characteristics.

4.2.2 Destination Assortments: A Geographic Perspective

Trips are one of the most researched and typical elements of acquired assortments in the tourism context. However, there are many possibilities of defining assortments on trips. Layton (2007; 2008) suggests that as the output of marketing systems, assortment is not limited to collection of tangible products, but should also include other attributes and components of the output such as service, experience and ideas. Given a limited knowledge of assortment, it is more feasible to start from just one type of assortment in terms of its defining attribute as a set, and then gradually extend it to include multiple attributes. In other words, a target of exploring the properties of acquired assortments and their relations to the evolution of a tourism marketing system does not imply an exhaustive coverage of all aspects of the output of the tourism marketing system. In particual the quality of service provided, experiences gained and perhaps the new ideas encountered in an international visit, will not, but perhaps could be, included in this study.

A geographic perspective is taken for defining the categorical space of assortments in the tourism marketing system. As a result, trips made by visitors are simplified as collections of ordered destinations according to the time of visit. With the geographic feature being the main attribute of trips, places visited by tourists constitute an important aspect of the output of the tourism marketing system, reflecting the fundamental spatial structure of the system.

As for the current study, there is another reason to favor destination assortments: assortments offered using geographical definitions are quite consistent over the years, in particular at certain levels (e.g., country), and there will not be a sudden proliferation of destinations. This allows an examination of a relatively small number of external factors, as compared to segmentation factors (i.e., consumers' characteristics), while having some confidence that these external factors have covered the major forces that drive changes of assortments offered/acquired.

Geographic perspective is of practical importance to tourism marketing as well. As suggested by Ashworth and Goodall (1990), places have been promoted to potential tourists as the projection of favorable images. Later on, the term "geographical marketing" has been used in reference to the marketing of destinations. It has also attracted interests of policy makers who made it a frequent inquiry or even part of their functions.

As pointed out in Chapter 1, unit/category definition is important as a foundation of measuring assortment. The same is also true in the tourism context. Lew and

McKercher (2006) express concern about the definition of “destination”. They ask whether the site is promoted in the advertising campaign designed for the tourism packages as a criterion for being a “destination”. In many studies, an acceptable distinction between destinations and attractions has been made, with the latter referring to a lower, more detailed, level of the aggregation hierarchy. In this sense, an interesting phenomenon that has been observed is that spatial patterns of tourist behavior within a destination, for example, a city, may also follow a similar track to destination choices (Flognfeldt 1992), that is, many tourists would visit multiple attractions after arriving in a destination (Debbage 1991); some would tour around first while others might go directly to special attraction sites (Cooper 1981). Although the boundaries of destinations or attractions could be arbitrary, the hierarchical structure in tourist spatial behavior is clearly implied and at the same time confirmed in various studies.

4.2.3 Australia’s International Visitor Movements

The boundary of the chosen focal system in this section is defined by limiting the participating individuals to international short-term visitors. Although the infrastructure of a tourism marketing system is not used exclusively for international visitors, this group of travelers is certainly of interest to both government and industry players. International visitors help to generate revenue for the nation’s service trade account and are a major source of customers for local tourism operators.

Unlike many other studies that involve international visitors, this study does not distinguish leisure travelers (i.e., the generally referred tourists) from other travelers. The motivation is to include as many customers as possible that are served by the identified infrastructure, the physical boundary of the focal marketing system.

4.2.3.1 Overall Trend

As the main service provider, the focal marketing system supports an increasing volume of international short-term visitors over the years. Short-term visitors are visitors who stay in Australia for less than 12 months in this trip. Using data issued by Australian Bureau of Statistics (ABS), Figure 4-2a illustrates this general trend with number of short-term arrivals during the period from January 1976 to December 2008. By definition, short-term visitors would leave the destination country after a short period of time of arrival. As expected, the departure number generally matches the arrival number with a short but noticeable time lag (Figure 4-2b).

The apparent periodic fluctuation in the original data series of short-term arrivals implies that there exists a seasonal effect. After adjusted for seasonal effect, the derived data series (i.e., the seasonally adjusted figures) comprise two components: trend and the irregular component. The trend figure reflects the factors that affect the system in general. For example, the year 1998 saw a drop in the number of visitors. This might be an effect of the 1997 financial crisis in some Asian countries, which are major sources of international visitors to Australia. The irregular components could also be of interest, as shown in Figure 4-3, an irregular component has contributed to a higher than trend number of arrivals during September 2000, the time period when the 2000 Sydney Olympics took place.

Figure 4-2 Volume of Short-term Visitors to Australia 1976-2008

Figure 4-2a: Short-term Visitors Arriving, 1976-2008: Trend and Seasonal Effect

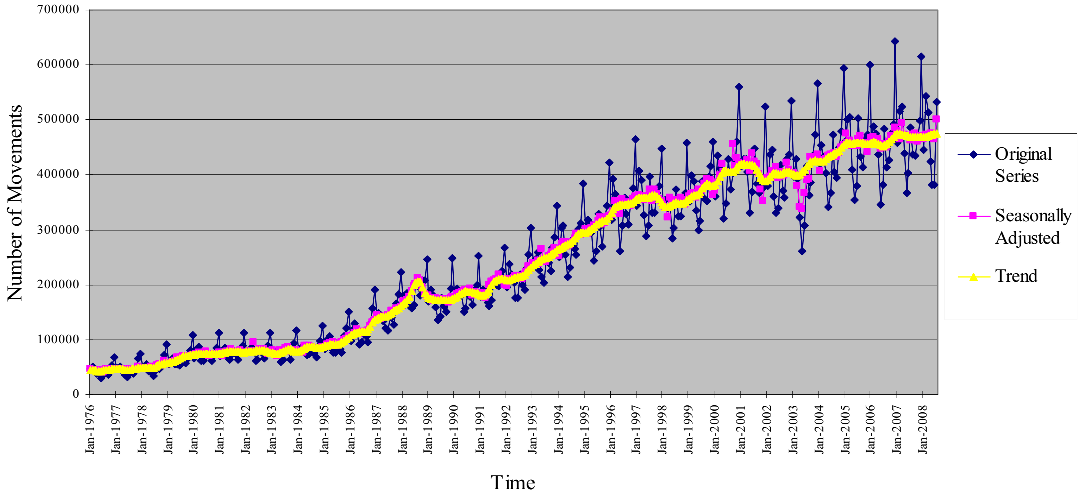
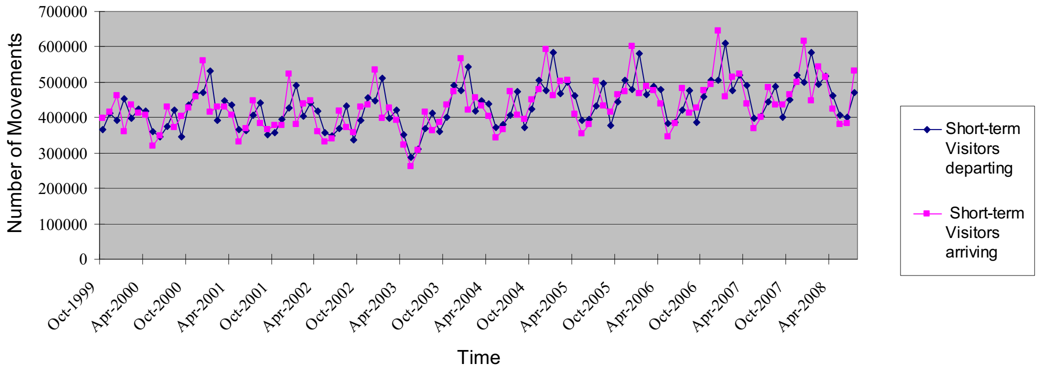
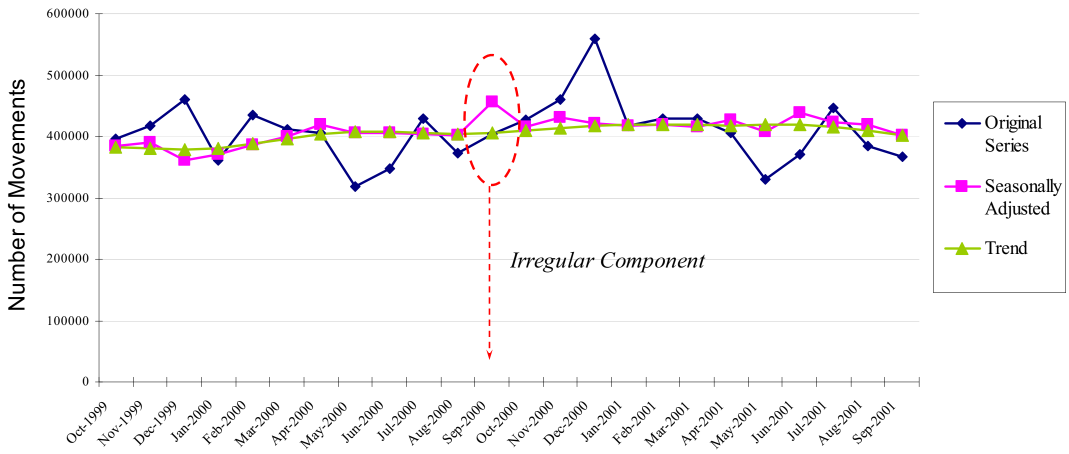


Figure 4-2b: Short-term Visitors: Departure vs. Arrival, 1999-2008



4.2.3.2 Period 1999-2001 and the Sydney 2000 Olympics

Figure 4-3: Short-term Visitors Arriving: Oct-1999 to Sep-2001



The Sydney 2000 Summer Olympic Games, officially known as the Games of the XXVII Olympiad, took place between 13 September and 1 October 2000 in Sydney, New South Wales, Australia. It was the second time that the Summer Olympics were held in the Southern Hemisphere, the first one being in Melbourne (1956). An international multi-sport event like the Summer Olympics is the most widely participated, if not the most popular sports event in the world, attracting travelers from all around the world.

It is likely that the macro picture of tourism industry can be affected by such an event. Figure 4-3 shows that after seasonal adjustment, the number of visitors arriving in Australia during the 2000 Sydney Olympics period stands out. The Olympics as an irregular component generates higher than normal number of visitors. The question is: besides this obvious fact, how have the marketing system and the assortment measures been influenced? In a wider context the Olympics are similar to a massive promotional event impacting some of the elements of an assortment – what changes? To explore the question, the time boundary of the focal marketing system is 1999-2001.

4.3 The Data

Secondary data is used for the empirical study, although it is generally the primary data that is pursued by marketing and tourism researchers. This could be mainly due to a concern that the usefulness of secondary data may be limited in several important ways including relevance and accuracy (Malhotra et al. 2006). For example, the data used here have been collected during the years between 1999 and 2001, a situation that the data may be considered outdated for use in a current study. However, ultimately the selection of data source should depend on the nature of the research problem. The goal however is to understand the marketing system through assortment measures and patterns. And given the limited research on the phenomenon, data obsoleteness is not a concern at this stage.

Another reason of requiring primary data is that the information contained in secondary data may not be in accordance with the definition of constructs in the research question. In this study, the aim is to examine the system and have a glance of the assortment rather than a few constructs. While limiting in terms of customer characteristics that might have been of interest the opportunity to explore such a large data base was attractive.

Analysis of marketing systems and assortments can benefit from larger sample size and comprehensiveness of the data set. For a data source that has such merits, it is rarely the case that data are collected by the researcher for a sole research objective. The Australian Bureau of Statistics (ABS) provides a set of publications related to tourism sector in Australia. The main source for this study is the International Visitor Survey (IVS), which represents the most comprehensive source of information on international visitors to Australia. At the same time, other data sources were also reviewed and relevant information was picked up for the background or as factors included in analysis.

4.3.1 International Visitor Survey: A Brief Introduction

The International Visitor Survey (IVS) is considered as the major source of information on the characteristics and travel patterns of international visitors to Australia. Its data collection method involves face-to-face interviews conducted with visitors when they depart the country, and therefore is also referred to as the "exit survey". Besides Australia, exit surveys have also been adopted to understand travel behavior by many other countries, including Canada (Woodside and Dubelaar 2002) and Malaysia (Oppermann 1992, 1995). The IVS in Australia began in 1969 and was administered intermittently during the 1970's; since 1981, it has been conducted annually with the exceptions of 1982 and 1987 (Bureau of Tourism Research 2003).

Despite being a secondary data source, the IVS has several advantages that make it suitable for this study. First, directed by an independent research organization (Australian Bureau of Tourism Research) and carried out by a large professional marketing research firm (A.C. Nielsen), it has been considered as a highly credible source of information. Second, the data collection methods are designed to make the information collected as accurate as possible. Most items in the questionnaire are related to objective answers, which are less likely to contain interpretation bias. Third, the IVS is part of the historical records that can be matched and traced with other background information. This feature of IVS suits well to the marketing system perspective, where assortments should not be cut off from their context. At the same time, it provides the opportunity to investigate the evolution of the marketing system over time. Hence, the currency of a secondary source becomes less of a concern in this study. Fourth, the quota sampling approach provides researchers with access to reasonably representative samples of international travelers to Australia.

The IVS is jointly funded by the Commonwealth, State and Territory Governments under the guidance of Australian Standing Committee on Tourism. The survey uses Computer Assisted Personal Interviewing (CAPI) and is conducted in the departure lounges of the seven major international airports: Sydney, Melbourne, Brisbane, Cairns, Perth, Adelaide, and Darwin (Bureau of Tourism Research 2003). Variables surveyed include places visited, purpose of visit, length of stay, brief description of expenditures, and demographic characteristics of the tourists. IVS has been a major source for various studies. Sample questionnaires are included in Appendices A to C.

It should be noted that only destinations that the visitor spent overnight are recorded in IVS. The focus on overnight stays has been widely adopted in tourism research, in particular research in international tourism. Some researchers have commented that "tourism is defined in terms of overnight stays" (Shaw and Williams 1994, p. 35). Such distinction can also be justified through the behavioral difference of visitors between overnight stays and day trips.

4.3.2 Data Collection Methods at IVS

The target population of IVS is comprised of international short-term visitors aged 15 years or over. The Australian Bureau of Statistics (ABS) defines short-term visitors as visitors who stay in Australia for less than 12 months in this trip.

A random stratified sampling method is used for IVS (Tideswell 2001). The total numbers of interviewed international visitors by country of residence was distributed across airports by selecting monthly samples of departing flights and visitors on those flights to achieve a representative sample of visitors from overseas countries and all flights from all Australian international airports. Quotas of visitors for the survey interview were based on the actual figures for international air traffic volume to Australia for the previous quarterly period (Ahn 2005). Thus, although the greatest share of the total sample was drawn from the Sydney airport, representative samples of interviews proportionate to traffic volume were completed in all seven Australian international airports: Melbourne, Brisbane, Cairns, Perth, Adelaide and Darwin.

Procedures were taken to match the representative quotas and to avoid sampling bias to the largest possible extent. For example, interviews were scheduled to meet certain flights selected by the IVS research each month. Flights were selected in each airport to meet country of residence quotas. Interviews were completed face-to-face with international visitors in the departure lounge after they have been through customs and immigration proceeding. Interviewers were required to take a random sample in a departure lounge, creating a more accurate picture of the overall visitor market. The substantial majority of visitors arrived in the lounge area more than one hour before the departure of their flight. However, to avoid the sampling bias as much as possible, care was taken to interview early, middle and late arrivals to the departure lounge (Ahn 2005).

All questions were prepared in each of six major languages: English, German, Indonesian/Malay, Japanese, Korean, and Mandarin. These six languages accounted for the native languages used by most visitors to Australia. Two to three rounds of revisions were completed before the research team conducting the survey were comfortable with the clarity of the questions in the survey instrument. The process of clarifying the questionnaires included two rounds of translation and back-translations. In addition, six versions of draft survey instruments were pre-tested by ten-to-twelve respondents in each round of translation and back-translation (Ahn 2005). Very few visitors were screened out due to a language barrier (2%), where the eligibility of the visitors would not be ascertained, and less than 1% of visitors refused to take part in the survey. Overall, the cooperation and completion rates were above 90% for respondents who proceeded to participate in the survey (Ahn 2005).

The interviewer used Computer Assisted Personal Interviewing (CAPI) to directly capture information from the respondent into laptop computers, as well as English and foreign language show cards and maps of Australia to assist them with the interview. The average length of the interviews in 2002 was approximately 17 minutes and the total elapsed time per interview is 50 minutes. The elapsed time includes all interview activities at the airport including selecting flights and downloading data as well as the actual interview time (Ahn 2005).

4.3.3 Data Cleaning

The dataset contains that part of IVS conducted during the period from October 1999 to September 2001. The data are aggregated on a quarterly basis. Altogether 8 consecutive quarters, from Quarter 4 of 1999 to Quarter 3 of 2001, are covered in the dataset used for analysis. The dataset originally contains information of 32,574 individual travelers.

Among the 32,574 international short-term visitors in the dataset, 254 don't have information about destinations visited. Given that destination information is critical to the research, these respondents are therefore excluded from the current study. As a result, a total of 32,320 respondents are included in the analyses presented in this study.

Sample size of each quarter is listed in Table 4-1. Although doubt may arise on the effect of sample size to the representativeness of the sample, it is arguable that the sample sizes are large enough to give reasonably accurate estimations of the properties of acquired destination assortments.

Table 4-1: Sample Size by Quarter

Quarter	*Original Sample Size*	*Effective Sample Size**
99Q4	4301	4272
00Q1	4352	4305
00Q2	3875	3834
00Q3	3545	3527
00Q4	4504	4471
01Q1	3846	3811
01Q2	3792	3768
01Q3	4359	4332
Total	**32574**	**32320**

* Cases without stopover records are taken out.

The destinations visited were recorded according to the coding themes given by Tourism Research Australia, an affiliation of Australian Tourism Commission. An original document of coding instructions is provided in the Appendix. In the coding themes, destinations are referred to as "stopover regions". During the years of 1999-2001, a maximum of 112 different labels of stopover regions were used. Although the region labels are quite consistent, there were a few changes in almost every year.

For the purpose of comparability and reporting clarity, the following adjustment were made to the inconsistent labels: (1) combine labels “111” and “112” in 1999 and 2000 as “112”; (2) recode all the “in transit” destinations as “other” while keeping their original state information. The influence of the latter is negligible since less than 0.02% (six visitors) of the total respondents was involved in those stopover regions. To determine the extent of influence of the first adjustment, the analysis on the dataset was run before and after the adjustment. The difference in key results is also within the 0.05% magnitude.

4.4 Measuring Properties of Destination Assortments

4.4.1 Define the Constituent Categories of Assortment

After data cleaning and standardization, a list of 98 stopover regions that exemplified the most fundamental categories emerged to be considered for destination assortments. The Original coding schemes and the final list are given in the appendix. Each stopover region is also affiliated to a state, which becomes the constituent category for destination assortments at a higher aggregate level. Including Australian Capital Territory (i.e., Canberra), there are 8 states involved in the study.

4.4.2 Diversity

One important characteristic of the assortment concept is that it includes more than one item, be it product, brand, or destination. In tourism, the phenomenon that involves multiple items in an assortment has also caught attention of researchers. Previous studies have identified a range of reasons why tourists choose multi-destination trips. These include multiple-benefit seeking, heterogeneity of preferences, risk/uncertainty reduction, economic rationalism, visiting friends and relatives, type of travel arrangements, travel mobility, travel time constraints, and destination familiarity (Hanson and Hanson 1981; Stewart and Vogt 1996; Tideswell and Faulkner 1999).

The growing proliferation of approaches to tourism behavior has triggered interests in finding new paradigms, methods, and models that can illuminate the decision making process underlying destination choice (Stewart and Vogt 1996). It is surprisingly consistent in research considerations across many fields about the link between assortments (i.e. the multi-category collections) and diversity.

Lue, Crompton and Fesenmaier (1993) develop a conceptual model for multi-destination pleasure trips. Similar to that proposed by Russell et al. (1999) on multi-category consumer choices, they suggest a typology of pleasure trips (Figure 4-1) according to the strategies adopted by the travelers in response to their diversified needs. In a way, this model (hereafter the LCF model) highlights the role of variety in the destination assortment.

Figure 4-4: Typology of Pleasure Travel Patterns

Number of Destinations Visited	Purpose or Benefits Sought: Single	Purpose or Benefits Sought: Multiple
Single	1 A single benefit from a single destination [Specialization]	2 Multiple benefits from a single destination [Benefit Diversification]
Multiple	3 A single benefit from a multiple destinations [Destination Diversification]	4 Multiple benefits from multiple destinations [Mixed Strategies]

Source: Adapted from Lue, Crompton, and Fesenmaier (1993), p293.

4.4.2.1 Number of Distinct Places Visited

The variety measure is operationalized as the number of distinct places visited in the current study. The term “variety-in-trip” is used (it could be used as a measure of travel extent) to refer to the count of distinct places visited by individual travelers; in other words, variety-in-trip is the measure of variety of the destination assortment acquired by individual travelers. In the following discussion, variety-in-trip and “number of distinct places visited” are used interchangeably.

At the macro level, when the individual assortments are aggregated into an overall assortment for the specific system, variety of the overall assortment can still be measured as the count of distinct places that have been visited by at least one visitor for at least once. The variety of the overall assortment, however, is not a direct sum of the variety of the individual assortments involved, nor could it be described with any other forms of linear relationship. On the contrary, it is the result of overlapping individual assortments and a reflection of some underlying interactions between the items.

To avoid confusion, in this study the variety of the overall assortment (i.e., at the system level) will be called “variety coverage”. This measure is meaningful for the assessment of the marketing system. For example, given a group of consumers, it would be interesting to find out how many different items the aggregate assortment of this group of consumers would cover. It is the simplest way to get an idea of the discrepancy of assortments (as from the insights of Alderson and other researchers) through comparison of variety of the overall assortment offered and the overall assortment acquired. As with all the post hoc analysis, since the assortment acquired is always a subset of the overall assortment offered, this approach cannot uncover the discrepancy that is caused by unmet needs. To measure discrepancy of assortment caused by unmet needs, assortment desired should be used instead of assortment acquired. Assortment desired is far more difficult for data collection than for assortment acquired. However, how to collect data on assortment desired is beyond the discussion of this study.

4.4.2.2 Balance via Time Budget Share, Visitor Share and Stopover Share

As defined in Chapter 3, balance refers to the pattern of quantity apportionment cross the relevant categories. In other words, it is a measure that concerns the market shares from a macro perspective.

The reason for using entropy as the measure of balance has been discussed in previous chapters. Basically, entropy is probably the best measure in this circumstance because that it changes monotonously with the diversification process (Jacquemin and Berry 1979).

After the categories constituting assortments are defined, it is easy to calculate the balance in the assortment once the unit of quantity is determined. Though the names of the unit of quantity are not always identical in different contexts, their share some common characteristic, which makes them comparable across contexts, and ultimately, generalizable. For example, in the supermarket case, SKU can be used, where the unit of quantity is the same as the category defined. Sometimes, however, a universal unit may be used, for example, the amount of money paid. In the tourism context, stopover regions are the closest to SKUs in the supermarket.

From the perspective of resource allocation among categories, balance in essence is a measure derived from market share information. Traditionally in tourism, one of the most frequently used measures of the market share of a specific destination is the "share of visitation", as a percentage of the total visitors. To be consistent with other market share information, in this study we normally refer to it as "visitor share" instead of "share of visitation". Visitor share also has a parallel part in the retailing context, that is, when the shopping baskets are analyzed using binary data of categories. Binary data, which indicates simply "buy" or "no buy" of a product category, is prevalently used in data mining, recommender system, and other data savvy applications of assortment analysis.

The different bases of calculating balance are summarized in Table 4-2. In later chapters we will investigate all three types of balance corresponding to the three types of market share data: universal unit based, SKU-type unit based, and binary data based.

Table 4-2: Examples of Market Share Information in Different Contexts

UNIT OF QUANTITY	***CONTEXT***	
	Retailing	***Tourism***
Universal Unit	Money Sales Share	Time Budget Share
SKU	SKU Share	Stopover Share
SKU-binary (presence or absence)	Customer Share	Visitor Share

Denoting the market share of the *i*th destination as p_i, the balance of the system assortment can be calculated using the entropy formula: $-\sum p_i \ln p_i$

4.4.2.3 Disparity and the Hamming Index

Disparity, which measures how different the categories are, is part of the diversity measure group that reflects the inherited distance structure of the categorical space on which the assortment is defined and measured. With the destination assortment, the simplest proxy of disparity could be the geographical distance among destinations. A slightly more sophisticated proxy of disparity could be attained through the Hamming Index, proposed by Richard Hamming (1950). In the general assortment context, the approach draws on the idea that the items in an assortment can be given a distinct identity through the presence or absence of each of a defined set of attributes. The Hamming Index is then the number of attributes that differ for each of a pair of assortment items, if necessary, normalized through dividing by the number of attributes considered. Instead of presence or absence, weights could be used in the attribute-based framework. Hence the geographical distance among destinations can be considered as a weighted index with just one attribute, the spatial or geographical attribute.

It is always interesting to know whether the patterns of acquired assortments could be influenced by the inherited distance structure. For example, will the closer in disparity mean the higher possibility in association among categories? Previous research has shown that geographical distance might not be a driving force of association in the multi-destination trips at the continent segment level, that is, cities that are geographically close are not necessarily combined in trips (Hwang et al. 2006). Acknowledging that the relationship could be sensitive to the actual measures used for disparity, we take a tentative exploration with the Hamming Index. Further details of the relationship between disparity and other assortment properties are discussed in Chapter 8.

4.4.3 Relational Properties

The relational properties take the form of square matrices. They can be looked at as one-mode networks where predefined categories are used as row and column dimensions. The presence and strength of the relationship to be measured is then recorded as the value in the cells of the matrix.

4.4.3.1 Association and Sequence Matrices: An Illustrative Example

In this section, we illustrate how the network perspective of structural measures can be applied to assortment through an artificial example.

The usefulness of matrix approach to relational data of assortment can best be illustrated through a concrete example. Figure 4-5 contains some artificial data on trips of individuals. Each trip comprises a series of destinations in order of time visited. Destinations included in each trip, as well as the length of trip (i.e., number of destinations in the trip), may vary across different individuals. As shown in the incidence matrix (i) of Figure 1, individual visitors are treated as the ‘cases’ and destinations as the ‘affiliations’. This incidence matrix of assortment, however, is different from the commonly used rectangular matrix in network analysis and case-by-variable matrix in that ‘affiliations’ are not used as the column dimension of the matrix and, the information contained in each cell is not a binary digit indicating the presence or absence of each destination in a trip but, rather, the name of a destination. There are three reasons for using this type of incidence matrix instead of the traditional rectangular one: (1) it is the natural way of recording assortment data, which looks like what appears on a receipt from supermarket on a shopping trip, (2) it is parsimonious when a long list of ‘affiliations’ is involved, and (3) it contains sequence information whenever relevant.

Transforming the incidence matrix (visitors by destinations) into adjacency matrix (destinations by destinations) requires determining the affiliation dimension. The affiliation feature in this case is the destination, and it can be generalized to most of the constituent categories of assortments.

(i) Incidence matrix

Destinations visited in time order

Visitors					
	1	L2	L1		
	2	L1			
	3	L1	L3	L2	L1
	4	L2	L2		
Visitors	5	L3	L1	L2	
	6	L1	L1	L2	
	7	L2	L1		
	8	L3	L2		
	9	L3	L2	L1	
	10	L2	L3	L1	

(ii) Sequence (adjacency) matrix: destinations-by-destinations

	L1	L2	L3
L1	1	2	1
L2	4	1	1
L3	2	3	0

(iii) Association (adjacency) matrix: destinations-by-destinations

	L1	L2	L3
L1	-	7	4
L2	7	-	5
L3	4	5	-

Figure 4-5: Matrices for Destination Assortments

Two types of affiliation-by-affiliation matrices are generated from the original incidence matrix: one is the sequence matrix (ii), which is an adjacency matrix with directed data, while the other is the association matrix (iii) that contains undirected information in the cells. Both are valued matrices. The sequence matrix is calculated from the original incidence matrix using an algorithm that counts all the directed pairs. A directed pair is a direct link (i.e., with a distance of 1) between two destinations, the departing site and the arrival site. The association matrix, on the other hand, counts the presence of pairs in the trips, regardless of the direction and distance. In other words, a cell (a,b) shows the number of cases (individual trips) that contain both destination a and destination b. The association matrix is then, by definition, a symmetric matrix.

The adjacency matrices can then be used as inputs for measurement or further analysis. In Figure 4-5 (ii), loops are allowed in the sequence matrix, which may not be relevant in many circumstances, though the information is kept in the example since sometimes there is a substantial meaning of the diagonals in adjacency matrices and it is easy to adjust this for the purpose of the particular research by adding or deleting the diagonals.

4.4.3.2 Algorithms for Generating Association and Sequence Matrices

With the understanding of what the association and sequence matrices are, steps can be taken to generate the needed matrices from empirical data. The idea of the algorithm used to calculate the sequence matrix is very simple: first the original data are transformed into ordered pairs of destinations, and then the pairs are counted and recorded in the corresponding cells.

We follow a two-step approach to calculate the association matrix from the original incidence data. First a standard $n \times m$ case by destination matrix (A) is generated, with n cases and m destinations (categories). Then the final $m \times m$ association matrix is computed with operation A'A.

4.4.3.3 Analytical Interpretations of Association and Sequence Matrices

Empirical studies contribute to knowledge development through theories generated from empirical regularities. The importance of empirical examination of the proposed measures lies in that without a contextual background, it is very hard to talk in general about the interpretations.

Although all adjacency matrices can be represented in a graph (network) form, not all graph terms are suitable for analyzing any relational data. The applicability of network measures on certain relational data depends on two criteria: the conceptualization of the relations represented by the network and the empirical context of the network. This is especially true for the association network of assortments, which can be considered as a projected unipartite network from a bipartite network, that is, the customer-product affiliation network. Although previous studies have investigated bipartite networks similar to the customer-product network, such as the movie actor collaboration network (Watts and Strogatz 1998), scientific collaboration network (Barabasi et al. 2002), and board of directors network (Davis et al. 2003), the various affiliation types make most interpretations context-specific. For example, contrary to the highly dense interactions among actors in the same movie, researchers on the same project, and directors on the same board, customers who bought the same product vary largely in their extent of interaction. While the recommender systems popular in online shopping environment provide constantly the information of other people's choices on the basis of shared interest in a item, such a communication channel of easy information flow may not be available in other marketing systems. Therefore in many marketing systems, including our tourism marketing system, it is reasonable to assume that lack of direct link between two products means that they are not reachable to each other, and that having two customers share the choice of another product will not have much impact on the situation. As a result, paths with length longer than one in the association network are very difficult to interpret. Hence, for the association network of assortments, caution should be taken on interpreting all the path related measures such as geodesic distance, or even the two centrality measures: closeness and betweenness. Destinations with high betweenness centrality scores in the sequence matrix can be conceptualized as "hubs" that control the flows between other destinations (Hwang, Gretzel and Fesenmaier 2006).

In the association matrix, a destination with a high weighted degree centrality score can be understood as one from which many other destinations can be easily reached. The higher the weight of a link, the higher the possibility is that the two destinations at each end co-occur in a trip network, regardless of whether the connections between the particular destinations are direct or exist through links with other destinations. Hence the centrality scores are interesting to suppliers who consider product bundling strategies. Degree centralization measures the variability of degree centrality scores of the whole network. High degree centralization in the association network indicates that a small number of destinations appear in a large number of destination combinations realized through multi-destination trips.

The clustering coefficient of a node measures the cohesion among the neighbors of the particular node. For a node with a given nodal degree, the star structure is the one with the lowest possible clustering coefficient, while a complete graph is the one with the maximum clustering coefficient score. Hence, a node with low clustering coefficient in the sequence matrix can be interpreted as a hub or base camp in the trips. On the other hand, high clustering coefficient of a node suggests a locally cohesive group that the possibility of extending the assortment to any of the other nodes in the group is high, which is a useful notion for effective product recommendation. To a certain extent, this suggests that the sequence network represents a key mechanism that drives the association network.

On the other hand, in the association matrix, the clustering coefficient alone is very hard to interpret. As a projected unipartite network from the bipartite network, the association network has inherited the high clustering coefficient, but the actual score could be influenced by the variety distribution as well as many other factors of which at the moment we don’t have much knowledge. Therefore, instead of reporting the numerical measures, the underlying logic of modeling through random graphs is adopted, with which the segmentation approach of analyzing assortments is justified. Particularly for the association matrix, random graphs modified with segment-based partitions seem to fit better with the real graph. In the future, test could be run on the deviation of observed association networks from the adapted random predictions, so that the fitness of different segmentation models can be measured and compared.

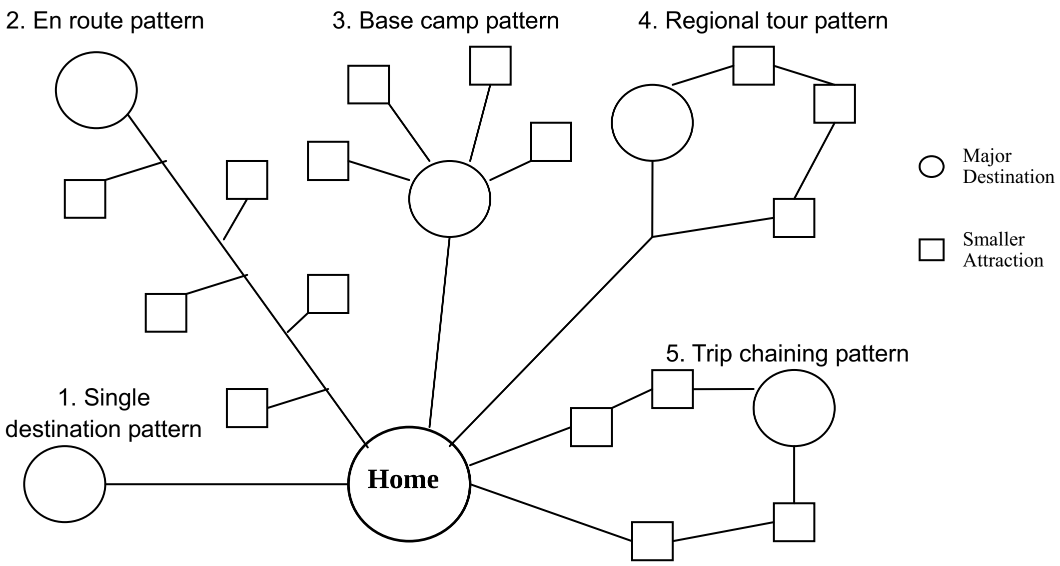
For association and sequence matrices, detailed procedures in the analytical framework are explained in the context in Chapter Five and Chapter Six.

4.5 Itineraries of Tourists

The typology shown in Figure 4-4 gives us a picture of different types of dependence among destinations, which takes into account tourists' psychological goals underlying the choices. Based on the typology, Lue, Crompton and Fesenmaier conceptualize five spatial trip patterns: single destination, en route, base camp, regional tour, and trip chaining. These patterns are illustrated in Figure 4-6. As a follow-up, Stewart and Vogt (1996) explore the possibility of applying the LCF model to assess the potential interest of visitors to a specific destination while visiting an identified region.

The topological structure (as that shown in Figure 4-6) and distance are both relevant predicting factors to the destination assortments we are trying to investigate. This is supported by Tideswell and Faulkner's (1999) regression analysis, which concludes that distance from the tourist's original country to Australia is the most important factor in predicting the extent (i.e., diversity) of multi-destination travel.

Figure 4-6: Spatial Patterns of Pleasure Vacation Trips



Source: Adapted from Lue, Crompton and Fesenmaier (1993), p.294

Contrary to the wide acceptance of the idea of itinerary typology, its application in empirical studies still confines to the small-scale and mostly qualitative inquiries. The reason lies in that there has been no efficient way of detecting the typologies in large datasets. Further methodological development is needed. Adapted partly from Tideswell (2001), a framework incorporating efficient quantitative analysis and easy qualitative classification of trip typologies is proposed in this study. Using network analysis procedures, classification of typologies is based on the aforementioned sequence measure of assortment.

4.6 Boundaries of Assortment and Exploratory Themes

4.6.1 Quarterly Aggregation as Unit of Analysis

In Chapter 2, the important influence of boundary of the assortment (both contemporaneously and temporally) was addressed on a study of assortments and the marketing systems in which they embedded. Normally the time interval for the unit of analysis is chosen according to the length of the cycle, especially if there is some type of natural cycle. In tourism analysis, the most commonly used time intervals are month, quarter, and year. Widely recognized as a major factor in the pattern of tourism economy, seasonality is also thought to be influencing destination assortments. Stewart and Vogt (1996), for example, find dominant trip patterns are different from season to season. Although sometimes seasons are defined slightly different from quarters with summer starts in December and continues in the two first months of the next year (Tourism Research Australia 2008), in this study quarter still constitutes a reasonably good substitute for season. There are two reasons for this: first, the IVS uses exit survey to collect the data, which means there is a time lag between the time of core travel experience and the time of data collection. This time lag offsets partly the difference between definitions of quarter and season. Second, being a natural component of the calendar year, it is more consistent with yearly statistics, which has been adopted for report and analysis by most economies and industries. Hence, in this study, quarter is used as a major temporal interval for patterns of destination assortments. As what has been well supported in tourism literature, quarterly aggregation is used as a basis for both cross-sectional and longitudinal analyses.

To avoid overloading of information, in the section of data introduction, the overall background of the whole period (i.e. eight quarters from Quarter 4 of 1999 to Quarter 3 of 2001) is presented instead of using quarter by quarter information. At the same time, for the section of common itinerary analysis, to be consistent with the works of Tideswell (2004) and Collins (2006), yearly data of 2000 is used for comparison purpose.

4.6.2 Exploratory Themes

As stated in previous chapters, the current study is concerned with assortment acquired from a defined set of destinations in Australia. It aims at exploring the properties of assortment and their roles in the functioning and evolution of marketing systems, in this case the tourism marketing system. As a result, a longitudinal, multi-facet, exploratory methodology is taken.

In Chapter Five, as well as setting out the measures of diversity we demonstrate how they might be utilized and for this we need to compare measures across groups and over time. With the measures, the impact of internal or external forces to the focal marketing system can be captured. Chapter Six and Seven unfold the patterns of acquired assortments across segments and under the influence of external forces. According to our best knowledge, this has never been done before. Chapter Five also discusses in more detail the logic underlying random network modeling for the association measure.

The assortment measures—disparity, variety, balance, association, and sequence—are now empirically defined. However, we understand very little about the nature of these measures. Previous studies in other fields suggest the existence of strong positive relationships between the diversity measures (Stirling and Wilsey 2001). This is the path then that is taken, that is, to explore the empirical relationships among the measures.

Further, it is possible to explore the applicability of assortment measures proposed in the research. For example, what the possible segmentation variables and external factors are that may interact with destination assortment measures or patterns. Segmentation factors include demographic variables (such as age, gender and nationality), behavioral indicators (such as Internet users vs. non-users), and other factors (e.g., length of stay or purpose of visit) that can differentiate customer groups in terms of their aggregate assortment patterns. External factors, on the other hand, refer to those forces that drive the change of assortment patterns. In each case interest centres on the way assortments change for different segments and, the process underlying the measures of assortment that are most discriminating.

4.7 Summary

The empirical explorations of this study are based on the International Visitor Survey (IVS) data collected at the exit point in major Australia airports. In this chapter, we first briefly describe the focal marketing system together with the destination assortments, followed by a detailed discussion on how assortment measures are to be calculated, in particular structural measures; a set of possible analytical themes are then proposed on the relationship among the measures themselves and between the measures and other factors.

CHAPTER 5: ACQUIRED DESTINATION ASSORTMENTS: A DESCRIPTIVE OVERVIEW

5.1 Introduction

In Chapter Three several measures of assortment were highlighted in an attempt to capture some important aspects of assortment. Specifically, these were three measures that characterize diversity in assortment and two of relational properties resident in an assortment, namely association and sequence. Several main applications of those measures were also suggested on the basis of literature review and theoretical extensions.

To determine whether the proposed measures were empirically applicable, Chapter Four outlined approaches to operationalize the measures in the context of an international inbound tourism setting, where destination assortments chosen by international visitors to Australia are studied.

Prior to exploring some viable applications in Chapters 6 and 7 and the nature of the proposed measures in Chapter 8, it is important to put the empirical analysis into context through a descriptive overview of the respondents and their acquired assortments in the chosen focal marketing system, that is, the Australian inbound tourism system.

Section 5.2 profiles the respondents included in the current research along with their travel behavior in Australia. Section 5.3 lays out the dimensional space for assortment construction. In Section 5.4, a series of descriptive cross-tabulations are presented on relationships between a group of factors and number of distinct places visited as the operationalized measure of variety in the destination assortment. Section 5.5 provides a brief examination of the balance measure at the collective information level. While interpretations on the association and sequence matrices are further explored in later chapters, Section 5.6 builds the foundation of analysis with the description of data matrices and several relevant aspects, including data-mining and network analysis.

5.2 Respondent Profile

As previously outlined in Chapter 4, in total, 32,320 respondents to the IVS from October 1999 to September 2001 are included in the study. This section profiles these respondents based on some key assortment properties, demographics and other variables of interest.

5.2.1 The Contribution of Multi-destination Travelers

In tourism as well as customer choice studies, single-category and multi-category choices are normally separate research topics, featuring different research questions, settings and designs. Tourism researchers, for instance, have long tried to understand multi-destination trips, but few of their studies include single-destination trips. Under the assortment concept, however, it is clear that single-destination trips are a special case of destination assortments. Hence, part of the goal of this study is to map the relationships between single-category and multi-category assortments, so that a holistic and generalizable framework of assortment measures can be proposed.

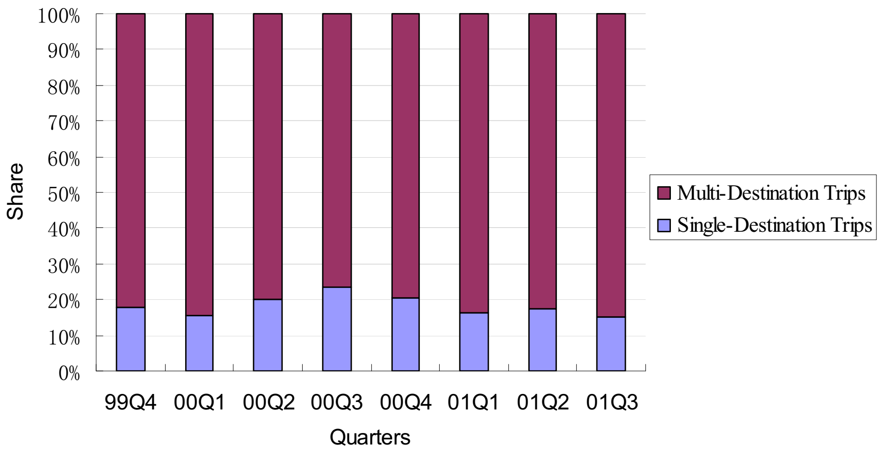
Table 5-1 lists the number of respondents who took a single-destination trip or multi-destination trip in each of the eight quarters. Overall, there were more single-destination visitors than multi-destination visitors. It should be noted that from the information in Table 5-1, it seems that there could be some type of seasonal trend, with the second quarter of a year has a more equal presence of both categories of visitors. More issues related to the longitudinal patterns of assortment change will be discussed in Chapter 7.

Table 5-1: Sample Size in Each Quarter

Quarter	*Effective Sample Size*	*Single-destination Visitors*	*Multi-destination Visitors*
99Q4	4272	2247	2025
00Q1	4305	2112	2193
00Q2	3834	2136	1698
00Q3	3527	2109	1418
00Q4	4471	2486	1985
01Q1	3811	1968	1843
01Q2	3768	2029	1739
01Q3	4332	2231	2101
Total	**32320**	**17318**	**15002**

Despite that a majority (53.6%) of the respondents stayed overnight in just one destination, of all the sales (operationalized as the number of stopovers) in the system, only a small portion of them were contributed by the single-destination visitors (Figure 5-1). The single-destination visitors are still important because their choices may represent the typical popularity structure of the destinations and are critical inputs for later analysis on patterns of overall assortments.

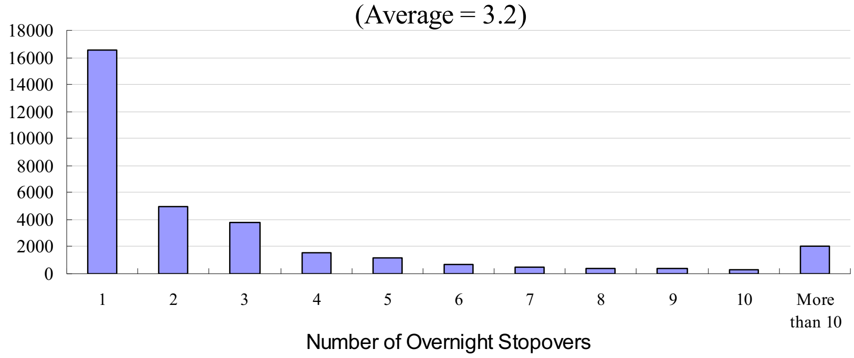
Figure 5-1: Share of Total Sales (Stopovers)



5.2.2 The Extent of Travel

The multi-destination trips bring up the research interest in travel extent, which has been a key construct in multi-destination research (e.g., Tideswell and Faulker 1999). Several measures of travel extent, including number of stopovers, number of nights stayed in Australia, have been proposed by various researchers. Figure 5-2 shows the distribution of the number of stopovers among the respondents. Several assortment measures, mainly the three diversity measures and in particular the variety measure (i.e., number of distinct places visited), are also related to the extent of travel.

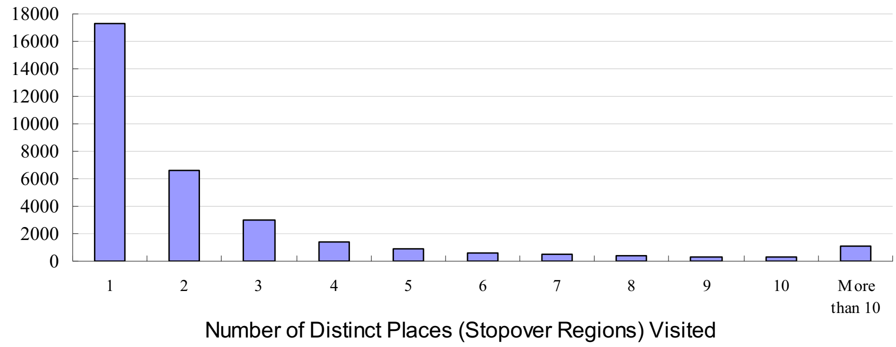
Figure 5-2: Profile of Number of Stopovers in Australia
(Average = 3.2)



As discussed in Chapter Four, the three measures of travel extent, namely number of stopovers, number of distinct places visited, and number of nights stayed, are interrelated. Tideswell (2001) shows that the number of stopovers and the number of nights stayed are highly correlated. For a trip without repeat visits to the same destinations, its number of stopovers made should be equal to its number of distinct places visited. There are two types of repeat visit according to the IVS interview instruction. One is the change of accommodation within the same stopover region, and the other is return visit to a previously visited region.

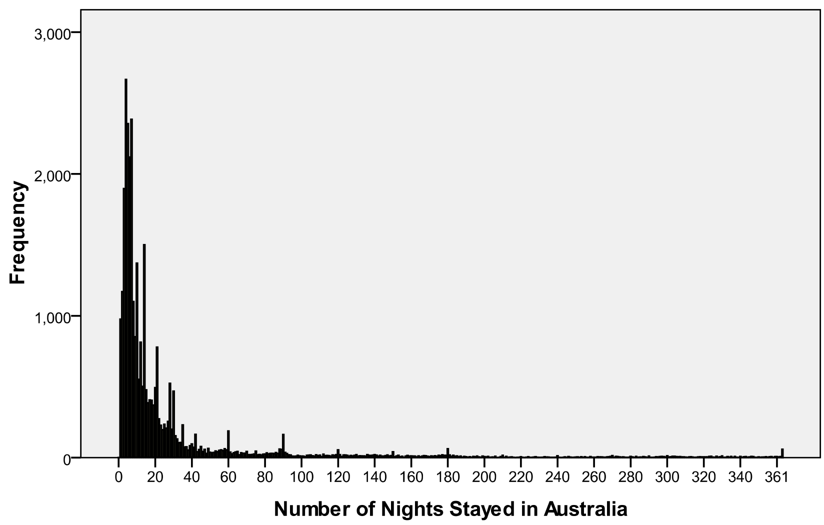
Among the 32,320 respondents in our sample, the most stopover extensive trip contains 76 stopovers, but only 33 distinct regions. The most diversified trip in terms of variety only, has visited 39 distinct regions within its 61 stopovers. Although it seems that there is a large difference between measuring stopovers and distinct places visited, the actual distribution pattern of these two measures are quite similar to each other, and so is the number of nights stayed. As shown in Figure 5-3 using the variety measure, there is a fast declining in number of respondents as the travel extent increases.

Figure 5-3: Number of Visitors with Different Variety (number of distinct places visited) in Their Trips (Av.=2.5)



A glance at another possible measure of travel extent, number of nights stayed in Australia, is shown in Figure 5-4. On average, the respondents spent 30 nights in Australia in this trip. The spikes in the graph are interesting perhaps corresponding to specific vacation periods.

Figure 5-4: Profile of Travel Extent (Number of Nights Stayed)

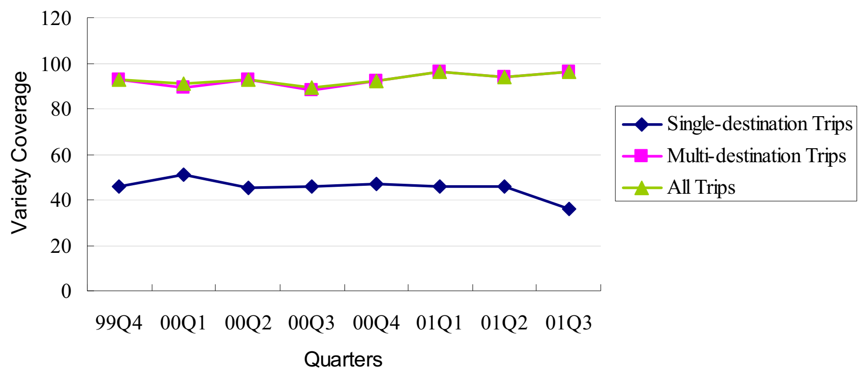


The extent of travel is a construct used at individual traveler level. The variety measure, however, also has an implication at the collective/system level. During the period over quarter 4 of 1999 to quarter 3 of 2001, a total of 98 stopover regions were visited by the respondents. Table 5-2 shows the number of stopover regions included in the collective assortment of each quarter. Quarter 3 of 2000, the period when the 2000 Sydney Olympics took place, saw a lesser extensive travel propensity in terms of number of distinct places visited. It seems to be that time and a strong promotional factor are influential for the variety property of the collective assortments. Further discussion of the change in assortment patterns over time will be carried out in Chapter six.

Table 5-2: Number of Distinct Destinations Visited in Each Quarter

Quarter	*99Q4*	*00Q1*	*00Q2*	*00Q3*	*00Q4*	*01Q1*	*01Q2*	*01Q3*
# of Places Visited	93	91	93	89	92	96	94	96

Figure 5-5: Number of Distinct Places Visited at System Level



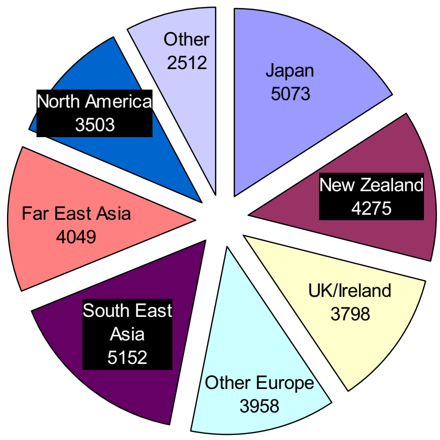
5.2.3 Source of Visitors

Among the 126 countries/areas of residence recorded in the sample, the top 20 countries/areas account for 89.94% of the respondents (Table 5-3). The breakdown of respondents according to the main geographic markets is presented in Figure 5-6. The patterns shown are consistent with the overall patterns of international visitation to Australia, that is, the dominance of Japanese and South East Asia markets.

Table 5-3: Top 20 Countries of Visitors

Country of Residence	*N*	*% (n=32320)*
Japan	5073	15.7
New Zealand	4275	13.2
United Kingdom	3427	10.6
USA	2811	8.7
Singapore	2108	6.5
Hong Kong	1267	3.9
Malaysia	1206	3.7
Germany	1167	3.6
Taiwan	1162	3.6
Indonesia	889	2.8
Korea	867	2.7
China	721	2.2
Canada	692	2.1
Papua New Guinea	600	1.9
Netherlands	571	1.8
Thailand	557	1.7
India	485	1.5
Switzerland	411	1.3
South Africa	397	1.2
Sweden	382	1.2
Total	29068	89.9

Figure 5-6: Number of Respondents, Region of Origin (total n = 32,320)

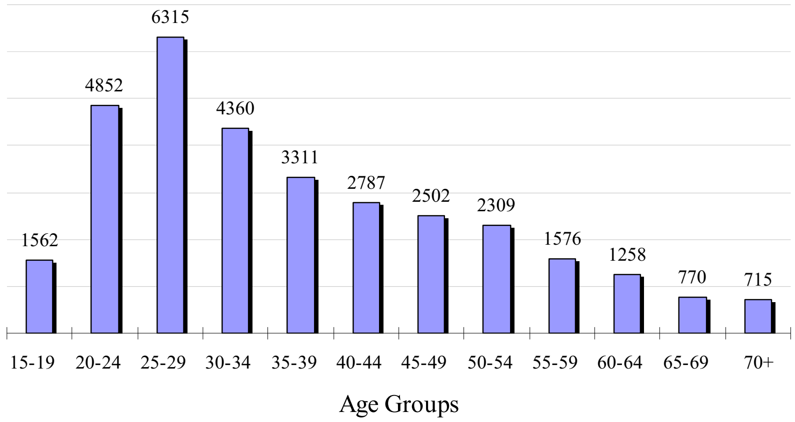


Main constituent countries of some regions
[South East Asia]: Singapore and India
[Far East Asia]: The Greater China, Korea
[Other]: Africa, the Middle East, Islands, PNG, and other

5.2.4 Demographics of Respondents

There are slightly more male respondents (53.3%) than females in the sample (Table 5-4). Visitors aged 25 to 29 represented the largest group among the 12 age groups, followed by its nearby groups, the 20 to 24 bracket and the 30 to 34 bracket (Figure 5-7).

Figure 5-7: Number of Respondents by Age



* Total n = 32317 (3 respondents refused to answer this question. Except for this variable, all other variables are based on n=32320)

Table 5-4: Profile of Respondents, Gender

Sex	*N*	*%*
Male	17218	53.3
Female	15102	46.7
Total	32320	100.0

5.2.5 Other Characteristics of Respondents

Besides demographics, it has been suggested in a diversity of literature that some characteristics of customers, such as behavioral, psychological, motivational or even social characteristics may influence the assortments they acquire. In the tourism marketing system context, some are highlighted here that are related to important aspects of destination choices. These include benefits sought (i.e. reason of visit), destination familiarity, and travel party influence.

As shown in Table 5-5, holiday was the number one reason of the respondents for visiting Australia, followed by visiting friends and relatives. Together with visiting for the reason of business, visitors chosen the top three reasons accounted for 85.3% of the total respondents. Over half of the respondents visited Australia on a sole purpose, while multiple purpose visits also took a significant portion of 48.9%.

Table 5-5: Profile of Respondents, Reason of Visiting Australia

Variables		*N*	*%*
Main Reason of Visit	Holiday	15821	49.0
	Visiting friends and relatives	6934	21.5
	Convention/Conference	836	2.6
	Business	4792	14.8
	Employment	362	1.1
	Education	2326	7.2
	Exhibition	106	.3
	Other Reasons	1143	3.5
	Total	32320	100.0
Number of Reasons	1 reason only	16522	51.1
	2 reasons	14280	44.2
	3 reasons	1383	4.3
	4 reasons	128	.4
	5 reasons	6	.0
	6 reasons	1	.0
	Total	32320	100.0

Table 5-6 summarizes the respondent profile on destination familiarity from two aspects: previous experience with Australia and information search through Internet. Prior to coming to Australia, visitors used various sources to get information for their trip. A small but important proportion (22%) of respondents confirmed that they looked up the Internet for information for this visit. Over half (57.5%) of the respondents also have experienced Australia before this trip.

Table 5-6: Profile of Respondents, Experience and Knowledge

Variables		*N*	*%*
Previous Experience	First visit to Australia	13724	42.5
	Return visit to Australia	18596	57.5
	Total	32320	100.0
Internet Usage	No or Don't Know	25207	78.0
	Yes	7113	22.0
	Total	32320	100.0

Independent travel has always been an important and growing sector of worldwide tourism (Hyde and Lawson 2003). To the travel industry, the definition of independence depends on whether the traveler has booked travel-related service package from a travel retailer. As shown in Table 5-7, the composition of independent travelers and package travelers in our sample is consistent with the industry trend, with the majority (71.8%) being independent travelers.

In a long-haul trip like an international visit, influences from the immediate travel party could be important. Although only a small portion (11.2%) of the total respondents stated that they arrived in Australia with a group, during their stay, however, 46% of the total respondents had had some kind of travel companion.

Table 5-7: Profile of Respondents, Travel Party

Variables		*N*	*%*
Arrived on an Inclusive Tour Package	Yes	9120	28.2
	No	23200	71.8
	Total	32320	100.0
Arrive with a Group	Yes	3630	11.2
	No	28690	88.8
	Total	32320	100.0
Immediate Travel Party Description	Unaccompanied traveller	17439	54.0
	Adult couple	7837	24.2
	Family group - parents and children	2718	8.4
	Friends and/or relatives travelling together	3286	10.2
	Business associates travelling together	1040	3.2
	Total	32320	100.0

5.3 Categorical Space for the Destination Assortments

As discussed in earlier chapters, an empirically measurable assortment must be based on distinct categories clearly defined in advance. Two main levels of distinct categories constituting destination assortment are included in this study: stopover regions (also referred to as destinations in the study) and states.

Like the situation in many other marketing systems, patronage to the categories is not evenly distributed. Table 5-8 lists the top 10 stopover regions visited by the respondents.

Share of visitation is shown next to the number of respondents for each of the ten stopover regions. With 54% of the total respondents including Sydney in their itinerary, there is no doubt that Sydney is the most popular destination among the visitors.

Table 5-8: Top 10 Stopover Regions Visited

Stopover Region	***N (respondents)***	***% (n=32320)***
Sydney, NSW	17447	54.0%
Melbourne, VIC	7516	23.3%
Gold Coast, QLD	6161	19.1%
Tropical North Queensland, QLD	5745	17.8%
Brisbane, QLD	5622	17.4%
Perth, WA	3952	12.2%
Adelaide, SA	2726	8.4%
Petermann, NT	1946	6.0%
Whitsundays, QLD	1679	5.2%
Sunshine Coast, QLD	1662	5.1%

Comparing the list in Table 5-8 with the overall pattern of international visitors to Australia during 1999-2002 (Table 5-9), it is found that such an uneven distribution is quite stable through the years. In other words, although some visitors did venture into some lesser-known regions, international visitors to Australia, in general, tended to focus their visitation on capital cities (such as Sydney and Melbourne) and key tourist regions on the eastern seaboard (e.g., Tropical North Queensland).

Table 5-9: Popular Regions Visited in Australia, 1999-2002

REGION VISITED	1999		2000		2001		2002	
	000	%	000	%	000	%	000	%
Sydney, NSW	2303.4	56	2616.3	58	2575.6	58	2468.1	56
Melbourne, VIC	1010.9	25	1088.5	24	1169.1	26	1162.9	26
Gold Coast, QLD	900.3	22	868.7	19	881.3	20	786.1	18
Tropical North Queensland, QLD	762.3	19	768.7	17	817.7	18	781.1	18
Brisbane, QLD	699.1	17	724.4	16	732.5	17	719.0	16
Perth, WA	527.0	13	581.2	13	548.7	12	542.1	12
Adelaide, SA	296.4	7	332.6	7	328.9	7	277.9	6
Petermann, NT	260.4	6	293.2	6	291.1	7	240.5	5
Whitsunday Islands, QLD	198.1	5	201.2	4	227.6	5	209.8	5
Sunshine Coast, QLD	202.3	5	212.6	5	230.2	5	204.9	5
Hervey Bay/Maryborough, QLD	178.7	4	195.1	4	216.3	5	191.4	4
Northern Rivers, NSW	183.1	4	201.6	4	221.2	5	190.3	4
Alice Springs, NT	216.5	5	215.1	5	234.7	5	185.4	4
Canberra, ACT	182.4	4	208.6	5	190.6	4	174.6	4
Darwin, NT	181.5	4	204.8	5	200.7	5	158.1	4
TOTAL, All Visitors (Age 15+)	4108.8	100	4530.1	100	4434.6	100	4420.3	100

Source: Bureau of Tourism Research, 2003; Based on visitors aged over 15 years and overnight stays.

It is interesting how this popularity structure in the system had come into its current being. Like many other complex systems, history certainly played a role in it, so did some mechanisms that we don't fully understand. On the other hand, some factors have been suggested by previous research as reasons for different popularities of destinations. For example, Hwang et al. (2006) find that city size seems to directly influence the likelihood of a city serving as an important airline hub. It is highly possible that such a position could increase the chances of the city being visited by more international travelers. In other words, the inherited attributes of categories may have an impact on assortment patterns based on these categories.

5.4 Balance at a Glance

In our definition, balance is a measure that deals with the "how much" question in assortment and is based on the proportion each constituent category gets. In other words, market share pattern of the distinct categories has to be known before we can calculate the balance.

We measure the market share of each destination using three types of volume of visitation considerations: stopovers, visitors, and nights of stay. While both using stopover region (an equivalent to SKU in the tourism context) as the unit of quantity, the difference between the first two types of volume lies in that some visitors may have made repeat stopovers to the same region consecutively or inconsecutively. All three types of market share are generalizable to other industrial sectors or marketing systems, as illustrated previously in Table 4-2.

Figure 5-8 compares the quarterly results of balance using all three types of market share measures. As predicted, the results using stopover share and visitor share are almost the same as each other. The overall balance with the night share, however, assumes a much smaller value than the other two types of balance (Figure 5-8a). In two separate figures, one dealing with single-destination trips only (Figure 5-8b), and the other with multi-destination trips (Figure 5-8c), we repeat the comparison between balance calculated with the three types of market share information. It seems that, compared to the stableness of balance in the single-destination trips over time, balance in multi-destination trips are more sensitive to any change in the system, for example, the 2000 Sydney Olympics in our study. At the same time, the overall balance shares the pattern of change with multi-destination trips.

In Chapter 6 and Chapter 7, we discuss some possible applications of our proposed assortment measures. For the choice of the base of balance measure, we recommend that it should depend on the problem of interest, especially from the perspective of tourism operator or host destination government. In this study, we choose to focus on the balance based on visitor share (or share of visitation) for three reasons: first, though the overall trend is similar across all three balance types, the nights share balance seems to contain larger degree of noises than the other two; second, stopover (SKU) balance is almost equal to the visitor balance; and third, it is the volume of visitors that concerns the parties involved in destination marketing the most.

Figure 5-8: Comparison of Balance with Different Volume Measures, (a) All Trips

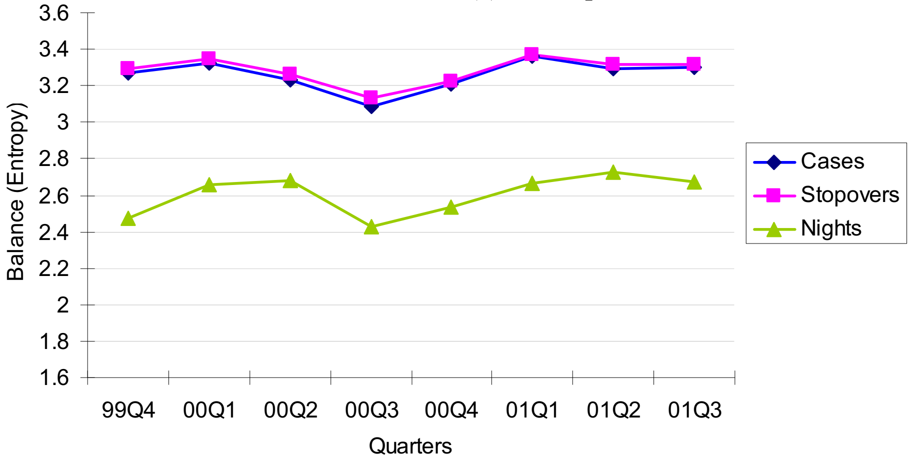


Figure 5-8(b): Trips that included only one stopover region (Variety-in-trip=1)

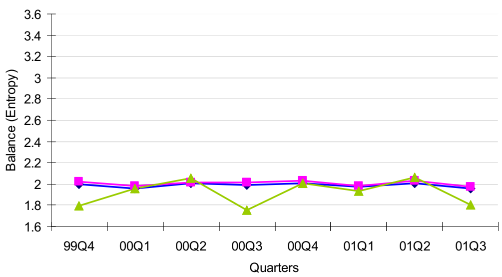
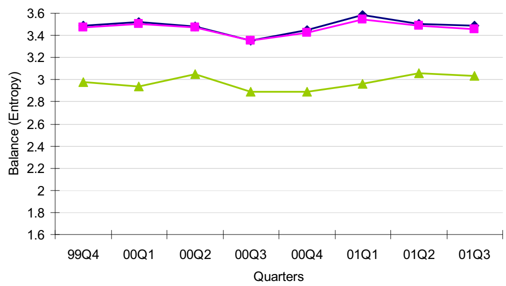


Figure 5-8(c): Multi-destination Trips (two or more distinct places visited)



5.5 Patterns of Association and Sequence Relations in Destination Assortments

5.5.1 Sequence of Acquisition

Table 5-10 gives part of the sequence adjacency matrix, where the strength/frequency counts of each ordered origin/destination combination are entered. As shown in the

Table, from the total 32,320 respondents, 24 left South Coast (coded as "101") for destination Illawarra (coded as "102"), 131 traveled from South Coast to Sydney (coded as "104"), and so on.

Table 5-10: Part of the Overall Sequence Matrix of Destinations

Site Labels	***101***	***102***	***104***	***105***	***106***	***107***	***108***	***109***	***110***	***112***	***113***	***114***	***115***	***…***	***T#****
101	100	24	131	15	3	2	4	4	7	6	4	0	0	…	479
102	27	10	138	5	0	1	1	5	2	5	3	2	0	…	269
104	126	106	595	42	33	21	32	66	348	399	338	198	13	…	7989
105	10	2	37	8	5	8	7	1	0	0	0	1	0	…	180
106	5	1	34	3	2	2	5	3	2	0	1	1	1	…	93
107	0	1	35	4	2	3	5	1	1	0	0	0	1	…	161
108	2	1	45	5	3	7	9	12	0	0	0	1	1	…	158
109	2	3	86	0	4	4	4	33	10	3	3	27	11	…	263
110	2	4	332	0	2	1	2	4	42	170	38	23	0	…	742
112	4	4	247	0	1	0	0	10	87	239	353	52	0	…	1327
113	3	5	303	1	1	2	0	0	35	194	152	35	0	…	1709
114	1	3	120	1	2	3	1	18	27	30	105	108	3	…	564
115	100	24	131	15	3	2	4	4	7	6	4	0	0	…	121

* Total counts of transitions made from an origin to any of the other destinations.

The last column of Table 5-10 provides row summaries, which represent the aggregate number of all the connecting trips made from an origin (the row label) to any other destinations. As we can tell from the table, 104 (Sydney) and 113 (Northern Rivers/Tropical NSW) are the two largest sources of transition trips among the 13 places listed here, with 7989 and 1709 trips, respectively, initiated from them to other destinations (including the origin destination as loops are counted in). It is also interesting to note that the probability of going from one destination *i* to another destination *j*, calculated as the cell value *aij* divided by the row sum *ri*, is quite different among the receiving destinations. Using the transition probability matrix derived from the sequence adjacency matrix (hereafter the sequence matrix), further insights of potential latent traits could be gained through methods such as Hidden Markov Models or Gravity Model. Specialized on modeling spatial mobility, gravity model is widely used in the location choice and infrastructure analysis of tourism (Jeng and Fesenmaier

2002), retailing (Eagle 1984), and transportation (Ellis and van Doren 1966).

To complement the above descriptions, Figure 5-9 depicts the strength of the sequence links measured by the value presented in the adjacency matrix, or the frequency of the ordered pairs of destinations constituting the multi-destination trips. As can be seen from the pattern in the figure, the sequence matrix is roughly symmetric, though symmetry is not a default feature for the directionality of trip movements. Further analysis shows that the percentage of symmetric pairs in the sequence matrix was 73%, while the percentage of reciprocated ties was 60%. An examination of the transition probability matrix depicted in Figure 5-10 shows even more interesting patterns. In particular, the destinations that had high probability of receiving travel flows seem to concentrated on a few stopover regions (i.e., the vertical “lines” in Figure 5-10), and higher transition probability normally took place among destinations in the same state (block-like clusters near the diagonal).

Figure 5-9: Strength of Sequence Linkages

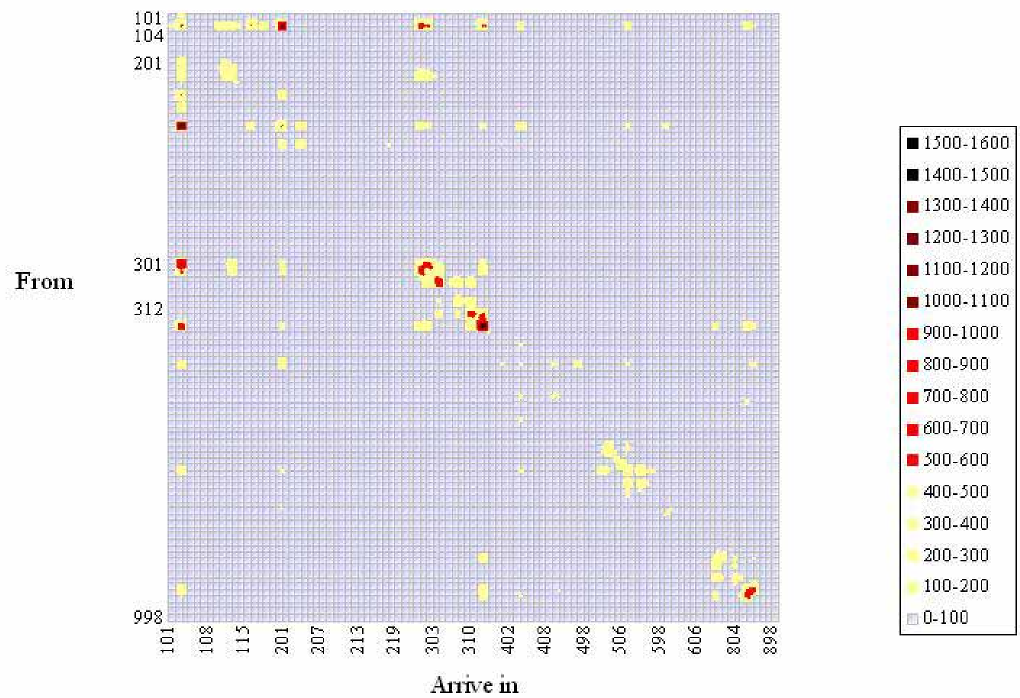
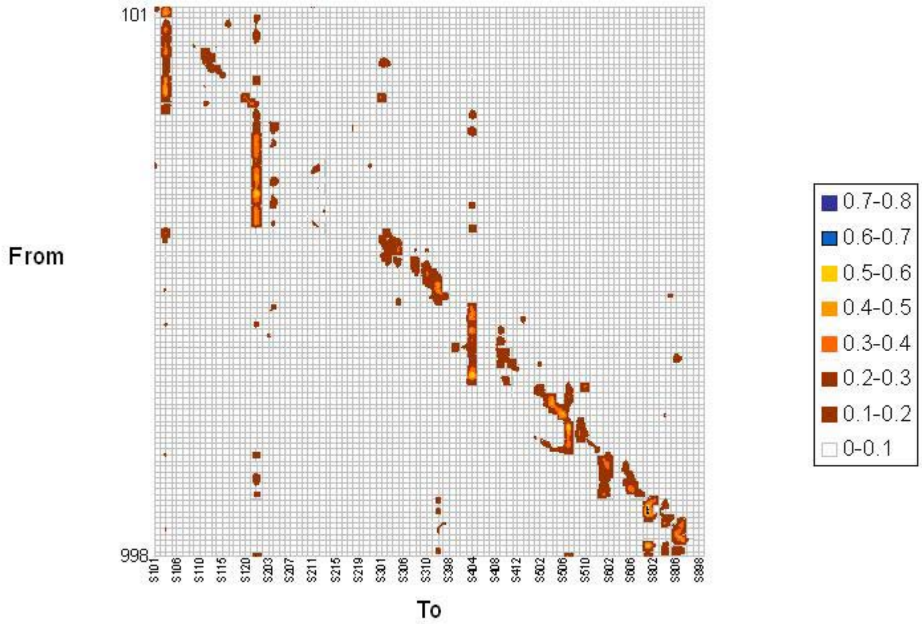


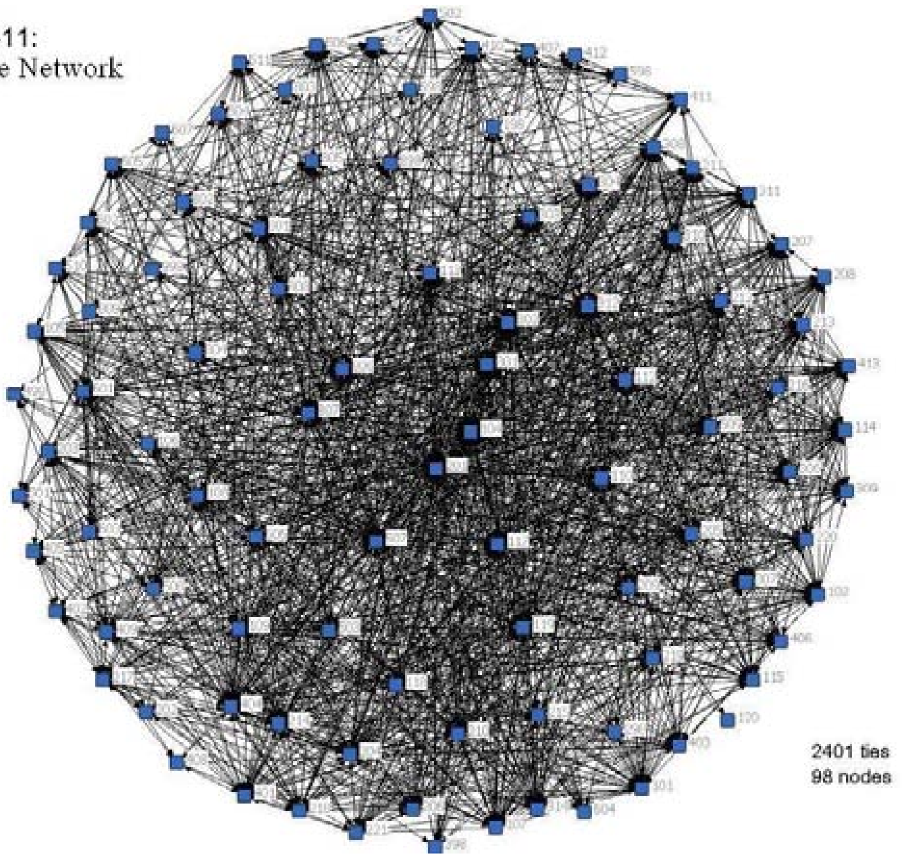
Figure 5-10: Transition Probability of Stopover Regions



An adjacency matrix is a widely used data format for one-mode networks, where the row and column dimensions are the same and represent the same type of nodes, in this case, destinations. In mathematical terms a network is represented by a graph. The overall sequence network is a dense, one-component graph as shown in Figure 5-11. In other words, every destination is linked to every other destination. The longest geodesic distance in the overall sequence network of our sample is three, which means from any destination, it only takes less than four steps to reach any other destination in the system. In addition, most destinations are directly linked to each other, and as such a geodesic distance of one is dominant throughout the system.

The above description is based on the following graph terms: A path from node (vertex) *a* to node *b* is an ordered sequence of distinct vertices in which each adjacent pair is linked by an edge. A geodesic from *a* to *b* is a path of minimum length. And finally, the geodesic distance between *a* and *b* is the length of the geodesic.

Figure 5-11:
Sequence Network



An adjacency matrix can always be presented as a graph or network. The transition probability matrix derived from the sequence matrix is illustrated in Figure 5-12. Since patterns in the dense overall network are hardly discernable, probabilities smaller than 0.02 are discarded. As a result, the number of ties in the network is reduced from 2401 to 761. The highest transition probabilities are marked in red in Figure 5-12 and listed in Table 5-11. All seven transitions share the pattern of leaving from a less popular destination for a major city in the same state. This pattern could be formed due to the accessibility and cost of travel routes.

Table 5-11: Seven Highest Transition Probabilities

From	*To*	**Transition Probability**
Kangaroo Island, SA	Adelaide, SA	0.64
Spa Country, VIC	Melbourne, VIC	0.59
Illawarra, NSW	Sydney, NSW	0.51
Peel, WA	Perth, WA	0.57
Daly, NT	Darwin, NT	0.57
Kakadu, NT	Darwin, NT	0.53
Arnhem, NT	Darwin, NT	0.75

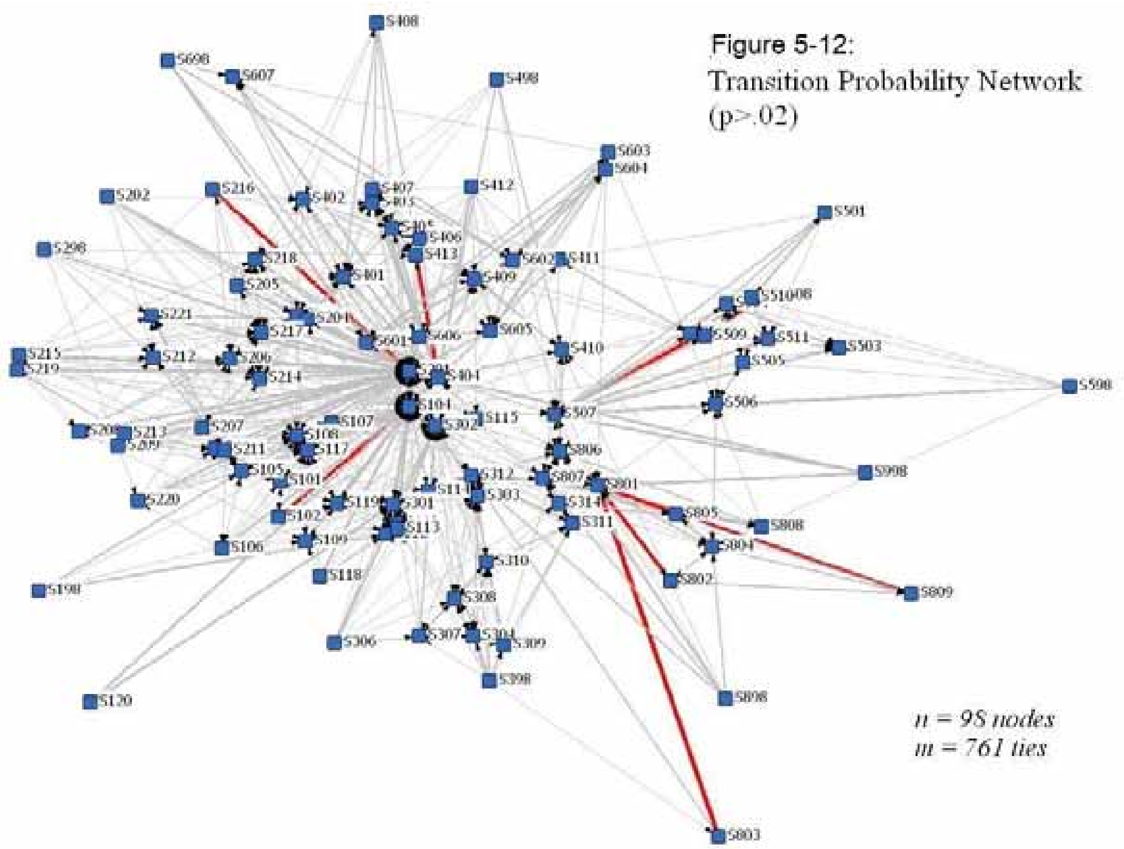
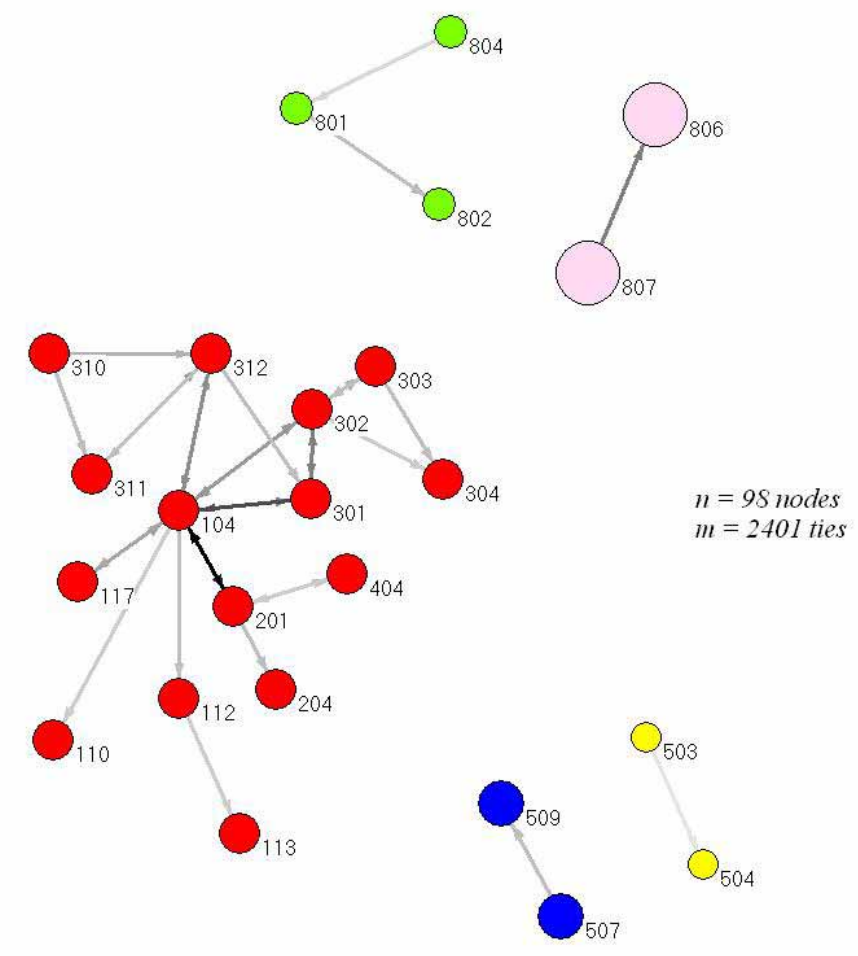


Figure 5-12:
Transition Probability Network ($p > .02$)

For a highly connected system, attribute or value of the network components (including both nodes and links) provides important information for finding interesting groups that cannot otherwise be found in binary data. In other words, in many situations the weighted (or valued) graph is of more interest than an un-weighted graph. Given that there were more studies based on un-weighted networks than their weighted counterparts, a viable approach is to transform weighted networks into un-weighted ones. Weighted networks can be analyzed with thresholds of weights, which act as cut-off values, to dichotomize the weighted network into un-weighted ones. The derived un-weighted networks are sub-networks of the original weighted network.

A very general and efficient approach to determine the important sub-networks in a given network is to find the “islands”. For example, if the weights of interest are assigned to the links, the weight of each link can be shown as a height. Then on immersing the network into (metaphorical) water up to selected level one gets islands. Varying the level gets different islands. Some software programs such as Pajek (de Nooy et al. 2005) have developed very efficient algorithms to determine the islands hierarchy and to list all the islands of selected sizes.

Figure 5-13: Islands in the Sequence Network of Multi-destination Trips



With the help of Pajek program, Figure 5-11 shows the "islands" discovered in the weighted digraph (i.e., directed graph) of the sequence matrix. The ties shown in the figure are the locally dense connections. The largest island is also the densest one, with the pair of Sydney (104) and Melbourne (201) holding the strongest connection.

The islands highlight the patterns of most popular connections (ties). The interpretation of islands in this context should be based on both connectedness and direction. For a tentative interpretation, it is possible to focus on three types of nodes/destinations in the graph: global hub, local hub, and popular local destination. A "hub" is defined as a destination with links to multiple other destinations and some of the links are tree-like links. If except for other hubs, the destinations a hub connects to all locate in a single state, then the hub is called a local hub; otherwise, it is a global hub. From Figure 5-13, Sydney (104) is the hottest global hub of all trips, while Brisbane (302) posits as a local hub. Melbourne is also a global hub, which connects three states: Victoria, New South Wales, and South Australia. Tropical North Queensland (312) seems to have a connective pattern similar to that of Brisbane. The difference, however, is that Tropical North Queensland manifests more property of being a sink than being a source. Hence it is more a popular local destination than a hub.

Gold Coast (301) takes a very interesting position in the largest island. It looks like a backup hub to Sydney. Two interesting points about the Gold Coast from Figure 5-13. First of all, it is strongly connected to Sydney (i.e., they are mutually reachable) with a strength only second to the Sydney-Melbourne link in the whole graph. Second, it is connected to both Brisbane and Tropical North Queensland as is Sydney. And third, despite the link between Gold Coast and Tropical North Queensland being a weak link in the island, Gold Coast is in a structurally equivalent position as Sydney. In other words, Gold Coast can be considered as a substitute to Sydney for the Queensland focused trips.

Besides those mentioned above, it is highly probable that the more isolated islands are comprised of complement destinations, and therefore a re suitable for product bundling. The attractiveness of such bundles should be higher than the other bundles with lesser valued ties. In addition, and not surprisingly, Darwin (801) represents a small-scope local hub in the state of Northern Territory.

The above discussions are consistent with knowledge of the positions of those destinations in the Australian tourism marketing system. The implication of using such an approach is that it provides empirical measures for both identifying and interpreting the positions of the products in a marketing system. The merits of the assortment measures are that they provide empirical foundations for qualitative discussion and thus are important for bridging quantitative analysis and strategic implications. The advantages of assortment measures in such situation will be further discussed in later chapters.

The analytical framework proposed here combines network analysis and other generally applicable methods. Hence, the generalizability of the measures as well as analytical methods related to the measures can be high even outside of the retailing and tourism sectors. These methods are exploratory and open as well, leaving space for extension to further studies. For example, when really large networks are involved in the analysis, reduction may be necessary. One of the network reduction procedures is facilitated by strongly connected nodes. In such as procedure, every pair of strongly connected nodes is shrunk into a node. This exemplifies some type of aggregation and can be used for analysis across different categorization levels.

5.5.2 Association of Destinations in the Assortments

Part of the association adjacency matrix is shown in Table 5-12, where value in a cell equals the count of respondents (trips) who included both the row and the column destinations of the cell. The practical relevance of association matrix (which represents contemporaneous choices) lies in the observation that under many circumstances such as that in the retail shopping basket, the order of the items/destinations chosen may be less relevant as long as those items/destinations go together with each other.

Table 5-12: Part of the Overall Association Matrix

	101	102	104	105	106	107	108	109	110	112	113	114	115	117
101	0	59	332	32	18	13	20	14	48	89	82	33	6	89
102	59	0	221	20	5	10	13	14	24	43	42	19	6	55
104	332	221	0	148	74	103	121	177	606	958	1316	387	68	1097
105	32	20	148	0	11	16	17	13	21	33	40	18	6	66
106	18	5	74	11	0	5	11	13	16	21	14	8	4	17
107	13	10	103	16	5	0	14	12	9	21	21	16	7	39
108	20	13	121	17	11	14	0	21	19	22	33	22	3	38
109	14	14	177	13	13	12	21	0	35	41	42	50	22	37
110	48	24	606	21	16	9	19	35	0	269	257	82	16	72
112	89	43	958	33	21	21	22	41	269	0	567	111	22	123
113	82	42	1316	40	14	21	33	42	257	567	0	219	22	177
114	33	19	387	18	8	16	22	50	82	111	219	0	12	79
115	6	6	68	6	4	7	3	22	16	22	22	12	0	15
117	89	55	1097	66	17	39	38	37	72	123	177	79	15	0

Both association and sequence matrices can be used as input data for further analysis. The directions, however, are different. With transition probabilities and island discovery being the major approaches used for sequence matrix analysis, modeling of category interdependence through two potentially insightful approaches, random graph theory and data mining, is suggested for the association matrix and discussed in the following sections.

5.5.3 Random Graph Theory and Association Networks

5.5.3.1 Random Graph Theory

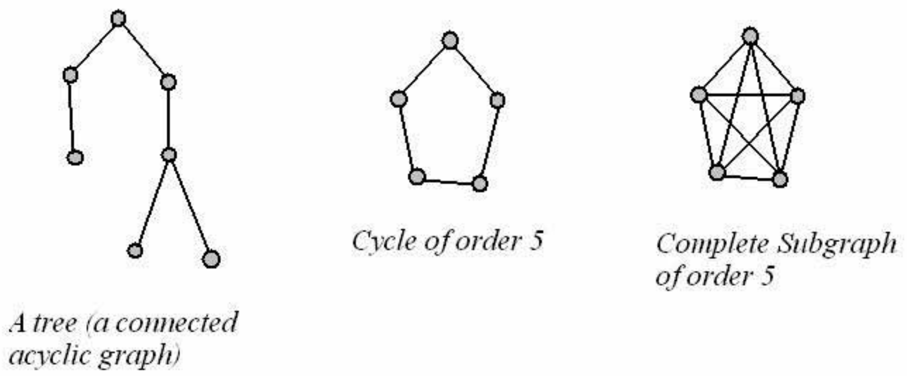
Researchers are always interested in patterns that deviate from independence or random. The independence or random models provide useful benchmarks in detecting interesting patterns. In addition, patterns deviating from the assumption of independence usually imply mechanisms that once known would lead to new theories relevant to both researchers and practitioners. To find some viable base models for comparison with the association matrix, this section briefly reviews random graph theory from the network perspective.

Random graph theory is a group of theories that study the random graphs, graphs in which the edges are distributed randomly. The theory of random graphs was first discussed in late 1950s by Paul Erdös and Alfréd Rényi, who found that probabilistic methods were often useful in tackling problems in graph theory (Albert and Barabási 2001). Hence the Erdös-Rényi model focuses on the connection probability p at which n edges that link N labeled nodes are chosen randomly from the $N(N-1)/2$ possible edges. Eventually a fully connected graph would be obtained for $p \rightarrow 1$. The main goal of their model is to determine at what connection probability a particular property of a graph will most likely arise.

Several properties were considered over the years. In this study, the focus is on the random network properties that are most relevant to the assortment context, especially association networks. In particular, three general properties of random networks are considered: sub-graphs, degree distribution, and clustering coefficient.

Real networks often are large and have complex structures. Sub-graphs, whose nodes and edges are subsets of the original graph, constitute a useful tool in decomposing the complex structure and profiling the graph evolution. The simplest examples of sub-graphs are cycles, trees and complete sub-graphs (Figure 5-14). A cycle of order k is a closed loop of k edges such that every two consecutive edges and only those have a common node. A tree of order k, on the other hand, is a graph with k nodes and k-1 edges, and none of its sub-graphs is a cycle. A complete sub-graph of order k contains k nodes that are completely connected, that is, with all the possible $k(k-1)/2$ edges.

Figure 5-14: Examples of Simple Subgraphs



These types of simple sub-graphs are of interest for their determined network features that can be calculated through formulas. An example of such feature is average degree. The average degree of a cycle is equal to 2, since every node is linked to and only to two other nodes. The average degree of a tree of order *k* is (2-2/*k*), approaching 2 for large trees. Finally, a complete graph of order k has an average degree of *k*-1.

The relationship between sub-graphs and the system is another reason for investigating characteristics of sub-graphs. Average degree, for example, does have some critical values in relation to the connection probabilities that can be traced through the evolution of the system. Some rigorously proven conclusions on the appearance of special sub-graphs in a random graph are available in the classic book of Bollobás (1985), as reviewed by Albert and Barabási (2001):

For a random graph *G* with *N* nodes and connection probability of *p*,

(a) The critical probability of having a tree of order *k* is $p_c(N) = cN^{-k/(k-1)}$

(b) The critical probability of having a cycle of order *k* is $p_c(N) = cN^{-1}$

(c) The critical probability of having a complete sub-graph of order *k* is $p_c(N) = cN^{-2/(k-1)}$

Another angle of investigating the appearance of sub-graphs issue is to assume that the connection probability $p(N)$ scales as N^z, where z is a tuneable parameter than can take any value between -∞ and 0. As z moves from -∞ to 0, the evolution of the sub-graph appearance in graph G follows a path that changes from trees to cycles and finally to complete sub-graphs. For z less than -3/2 almost all graphs contain only isolated nodes and edges. When z passes through -3/2, trees of order 3 suddenly appear, and as z approaches -1, the graph contains trees of larger and larger order. As long as $z < -1$, the graph is union of disjoint trees, and cycles are absent. Cycles appear when z passes through -1, and complete sub-graphs of order 4 appear at $z = -2/3$. As z continues to increase, complete sub-graphs of larger and larger order continue to emerge, and finally when z approaches 0, the random graph approaches the complete graph of N nodes (Albert and Barabási 2001, p.11).

Though the Erdös-Rényi model provides important insights for analyzing networks, networks in the real world rarely follow it. Rather, real networks possess interesting properties that have been found in networks of different kinds, for example, the World Wide Web, power grid, and biological organisms. Clustering coefficient, average path length and degree distribution are the three widely used evaluators of repeating special features in some network types, the most important of which could be the small-world model (Watts and Strogatz 1998) and the scale-free model (Barabási and Albert 1999). To this extent, the three network measures are also called topological measures (e.g., Albert and Barabási 2001; Huang et al. 2007).

5.5.3.2 Bipartite Graphs and the Association Network

The applicability of the random graph theories reviewed in Section 5.6.3.1 to assortment research, in particular association networks derived from the assortment, can be justified in two aspects: modeling approach on assortment in the literature using random graph theories, and the nature of the association networks.

The key to the solution of using graph theory for the analysis of assortments is the bipartite network. A bipartite network is also called a two-mode network, in which two types of nodes are represented separately and only nodes of different types can be connected, via a relation that can interpreted as belongs to or chooses. A small example used by Watts (2003) shows the inherited bipartite network in the product assortments of the marketing system: When you go to Amazon.com to buy a book, underneath your selection it lists "people who bought this book also bought…." This is a very typical piece of association information that can be derived from any assortments. In addition, it is embedded in a network that has customers as one type of nodes and books as the other. A more general concept is the affiliation network, which incorporates the context of relations under examination. However, in-depth discussion of affiliation networks is beyond the scope of this study and will be left as a direction for future investigation.

An empirical application of bipartite graph on customer-product relationship has been carried out by Huang, Zeng and Chen (2007), using a generating function formalism approach developed by Newman, Strogatz, and Watts (2001). Due to the lack of theory that directly deals with random bipartite graphs, the approach they adopt uses projected unipartite customer and product graphs for comparison between the random bipartite graph and the observed customer-product graph. Three network measures, namely average degree, average path length, and clustering coefficient are selected as topological measures that quantify the features of the projected unipartite graphs. With the topological measures, Huang et al. (2007) find that for a given degree distribution, the random model deviates significantly from the actual graph, and the deviation patterns are consistent across different context settings.

Probably not a coincidence, the product graph projected from the customer-product transaction graph is identical in definition to the association network derived from assortments. It has been applied in collaborative filtering to generate recommendation for customers, and therefore is useful in enabling or improving business decision making.

As for the theoretical benchmarks, the reason why a generating-function approach (Newman et al. 2001; Huang et al. 2007) that utilizes a random bipartite network to project the unipartite networks is more appropriate than the approach that directly uses the random unipartite networks lies in the nature of association networks. In fact, each customer who has purchased multiple products will result in a complete (i.e., fully connected) sub-graph in the projected product graph. Hence the association network is guaranteed to have larger clustering coefficients than a random unipartite network of the same size and number of edges.

The association network is comprised of (potentially) overlapping complete sub-graphs of a range of orders. Each complete sub-graph represents an individual assortment that is included in the aggregate assortment on which the association network based. The order of each complete sub-graph is equal to the variety of the individual assortment it represents.

The deviation of actual graph from the random graph suggests there might be some nonrandom mechanisms that lead to the characteristics of the association network. Very few theoretical mechanisms are available for the phenomenon. The one that is available, the preferential attachment principle underlying the scale-free network (Barabási and Albert 1999), however, is not relevant to the current study since the system size is fixed and relatively small. The finite size effect would probably make the topology undistinguishable (Watts 2003); at the same time, preferential attachment is not a mechanism that works alone, in fact, growth and preferential attachment are needed simultaneously to reproduce the stationary power-law degree distribution that characterizes a scale-free network (Albert and Barabási 2001).

Although the exact mechanisms are yet to be discovered, some insights might be gained through approaches that have used the same type of data as input. As such, Huang et al. (2007) turn to a group of methods related to recommender systems. Providing automated product suggestions to potential customers, recommender systems are widely used in real-world online shopping environments. Through different recommendation algorithms, including user-based algorithm, generative-model based algorithm, and graph partitioning-based algorithm, a few theoretical models are generated. These models are then compared with the random graph and the actual graph in terms of topological measures. Although none of them seems to fit perfectly with the observed graph, they do perform better than the random model. To this extent, the mechanisms underlying these methods are worth exploring.

It should be noted that, this study is more concerned with identifying interesting patterns through measures of assortment, which could be analyzed and probably modeled in future research, than with testing hypothesis or casting predictions. Hence instead of modeling the mechanisms of nonrandom phenomena, the main approach taken is to first identify assortment patterns and then explore the change of patterns in relation to internal and external factors through cross-sectional and longitudinal comparisons.

Mechanisms underlying the various recommendation algorithms mentioned above are based on certain theories. The user-based model is a classic collaborative filtering model. It predicts a target consumer's future transactions by aggregating the observed transactions of similar consumers. The generative model, on the other hand, uses latent class variables to explain the patterns of interactions between customers and products. Having been used for modeling unobserved customer and product heterogeneities (Allenby and Ginter 1995; Rossi et al. 1996), the latent classes actually imply market segments, which in definition consist of homogenous customers or/and products.

Compared to the previous two models, the partition-based algorithm proposed by Huang et al. (2007) is more arbitrary but effective too in some contexts. Instead of focusing on customers or products for the definition of market segments, the partition-based algorithm deals with both customers and products simultaneously, and the partitions obtained are bipartite sub-graphs of similar number of nodes (vertices). The assumption of partition-based algorithm is that clusters represented by the bipartite partitions would have high clustering coefficients.

In summary, these algorithms suggest different approaches of getting segment-like clusters based on unobserved customer preference structure. The clusters could be obtained through customer similarity with predefined attributes as in the user-based algorithm, latent classes as in the generative model, or a partitioning procedure similar to the idea of correspondence analysis as in the partition-based algorithm. In addition, the validity of the clusters should be reflected by the topological network measures through bipartite customer-product graphs.

5.5.3.3 Descriptive Features of the Association Network

Contrary to the sequence network, the association network only has one island all through the weights, which suggests a single stable core at different levels of density.

The following figures show the emergence of dense parts in the association network by applying different levels of cutoff value (thresholds). Like island detection, threshold is also a way of uncovering the hidden dense structure in the network. The density here is based on simple weights of ties in the network. As indicated in Chapter Four, weights in the association matrix represent the number of visitors who had included the pair of destinations in their trips.

Threshold can be used as a tool to evaluate the potential sales (market share) of assortments. The largest complete sub-graphs in an association network would imply the optional maximum categories to be included in an acquired assortment that has a potential volume of sales over the defined threshold.

Figure 5-15a: Association Network, Cutoff value = 500

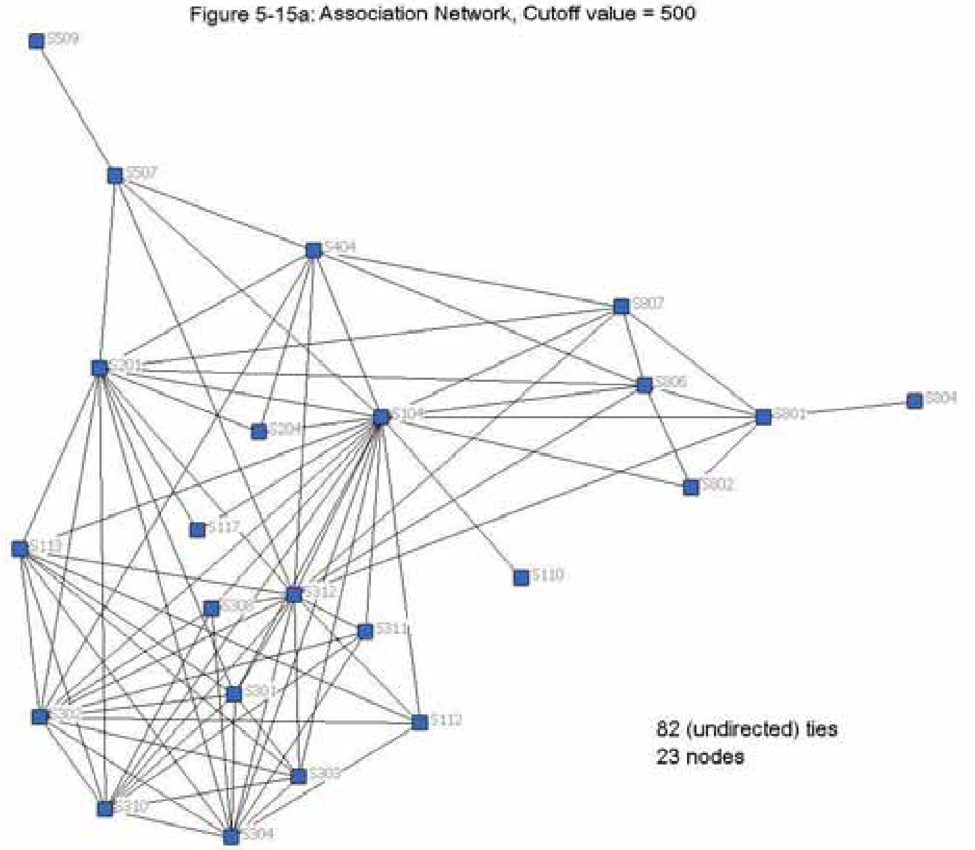


Figure 5-15b: Association Network,
Cutoff value = 1000

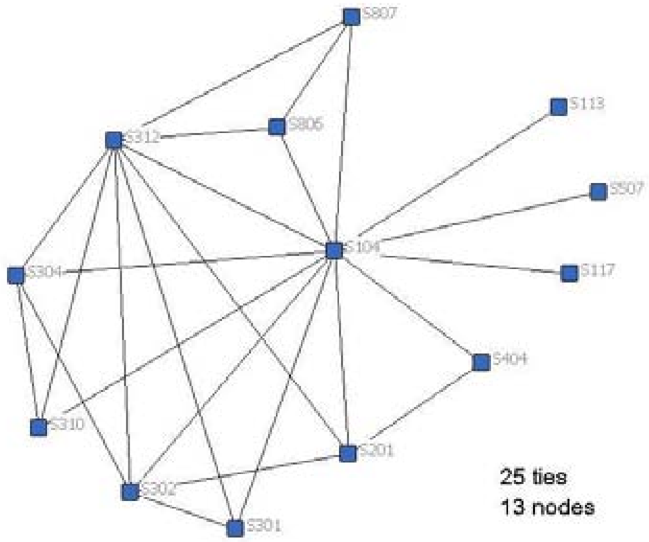
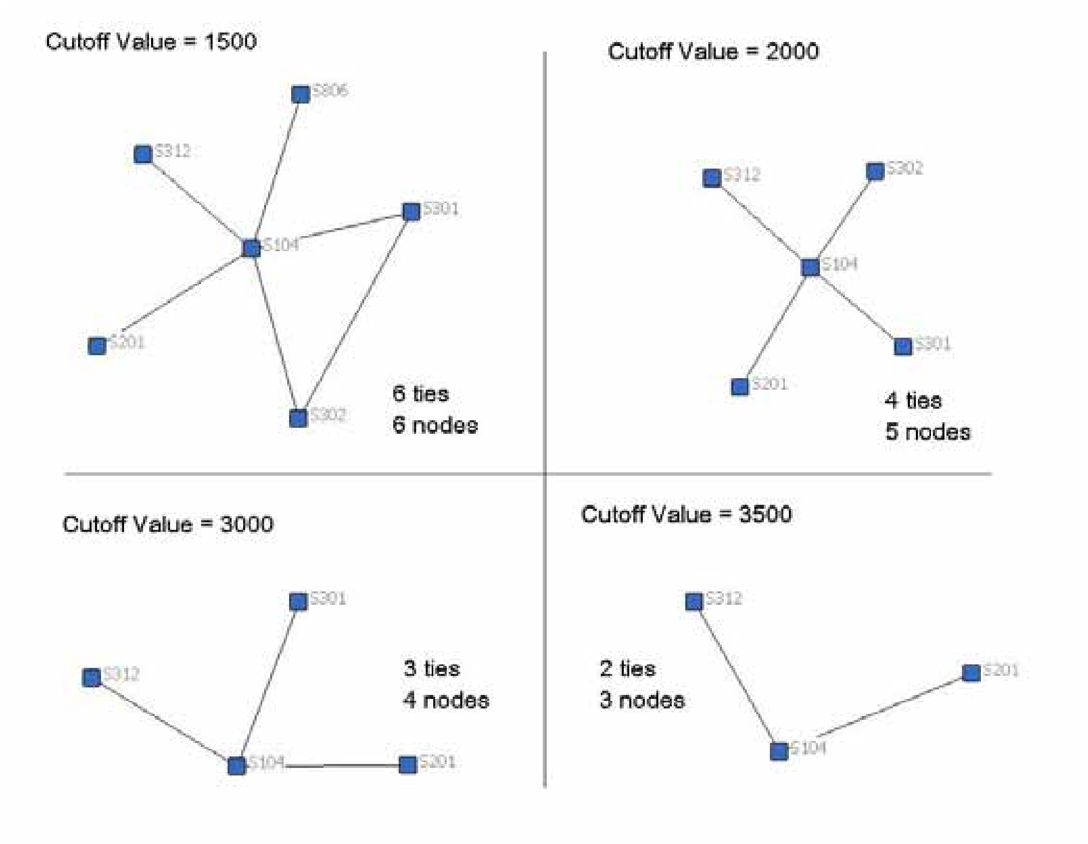


Figure 5-15c: Association Network, Evolving Through Thresholds



5.5.4 Association Rules and Data Mining

Similar to the efforts made with random graphs, some interesting probability models can be used to directly deal with the value in the cells of association matrix. As indicated earlier in Chapter Four, the prevalence of multi-destination trips implies the insufficiency of focusing only on single choices, as well as the inappropriateness of assuming general independence between choices.

A brief evidence of the deviation of observed association matrix from the independence assumption can be provided by the following test. Assuming the frequency with which one item is chosen is independent of the frequency with which another has been chosen, the expected value in the cells of the association matrix can then be calculated with

$$Ea_{ij} = N \cdot p_{ij} = N \cdot p_i \cdot p_j$$

Where p_i and p_j are the probability of item i and j being chosen independently. A Chi-squared test of goodness-of-fit is run on the overall association matrix of our sample, and the result shows that such an independence model can confidently be rejected (Chi-square = 994638.44; df = 4654; p < .001).

Somehow, it is not enough just to know that the associations are not the result of independent choices, which is why the data mining approach is brought in to gain further insights of the information contained in the association matrix. With the increasing computation power, thanks to faster computers and better algorithms, data mining techniques provide an efficient way to find association rules in large datasets. As the number of rules generally presented in a dataset is usually large, criteria are developed to screen out the most important rules. The three frequently used criteria in mining association rules are lift, confidence, and support.

Lift is a measure that compares a nested model against the base model on certain relationships. The direct result of such comparison is an association rule or a set of association rules. A typical association rule can be expressed through the lift over the independence model. For example, in our sample, while only less than 0.7% of the total respondents visited Philip Island, the proportion increased to 2.3% among visitors to Melbourne, giving a lift of 3.46 (2.3%/0.7%).

Besides measuring the strength of an association, the lift measure is also very useful in evaluating results of segmentation or other marketing activities. For example, suppose a pair of items in the association matrix has been chosen by 10% of the total respondents, but a certain segment in the sample has 20% of people in that segment chosen the same pair, then the segment would have a lift of 2 (i.e., 20%/10%).

An observed property of the lift measure is that it tends to be high with the rule involves two less popular items. Hence the association rule may not be interesting to managers even if it has a high lift. Some approaches and measures have been developed to facilitate the selection; two widely used measures are confidence and support; they are also useful interpretation tools. A high support means that the chances of the pair of items being chosen in one transaction (in our case, a trip) are high, since support is measured as a percentage of the total transactions. A high confidence, on the other hand, measures how often one item appears in transactions that contain another particular item. In the example given earlier, the confidence of Melbourne visitors also went to Philip Island is 2.3%, while the confidence of people who patronized Philip Island also included Melbourne in their trips is 80.4%.

A list of top ten association rules as measured by lift is given in Table 5-13. Before ranking the rules according to their lifts, screening criterion of higher than 1% of support is applied.

Table 5-13: Top Ten Association Rules according to Lift with Support Greater than 1%

Pair of destinations	*Labels*	*Lift*
Kakadu, NT—Katherine, NT	S802-S804	32.91553
Darwin, NT—Kakadu, NT	S801-S802	20.86349
Darwin, NT—Katherine, NT	S801-S804	20.31197
Outback, SA—Alice Spring, NT	S410-S807	17.44373
Katherine, NT—Alice Spring, NT	S804-S807	15.16002
Kakadu, NT—Alice Spring, NT	S802-S807	14.31674
Outback, SA—Petermann, NT	S410-S806	13.32775
Petermann, NT—Alice Spring, NT	S806-S807	13.22805
Hervey Bay/Maryborough, QLD—Whitsundays, QLD	S304-S310	12.70275
Fitzroy, QLD—Northern, QLD	S308-S311	12.57611

To trace the change in the marketing system, it is also convenient to use a simple index that reflects the departure of observed frequency of paired destinations in the association matrix from the expected frequency under independence assumption. The index is calculated as the difference between observed and expected frequency divided by the expected frequency. By definition, it can be attained that

$$\frac{O-E}{E} = lift - 1$$

It is worth noting that the approach of data mining is very preliminary since only pairs are measured in the association matrix. That is, the mined out rules can only have at most two items. Intuitively, more interesting findings could be gained if rules of more than two items are included. However, as the requirement on computing power grows exponentially with the number of items, and as an understanding of the simple pairwise rules is still limited, this study will not expand beyond two-item rules.

5.6 Summary

This chapter profiles the respondents in the sample while at the same time puts the assortment measures in context. Detailed discussion on the analytical framework with network analysis techniques is also presented. The suitability of using network for analyzing the association and sequence properties in the assortment lies in the accordance of such properties with the underlying meaning of network and its two criteria: (1) they capture the patterns of interest; and (2) they have particular theoretical or empirical meaning (Zuckerman 2003).

CHAPTER 6: ANALYZING AUSTRALIAN TOURISM MARKETING SYSTEM 1999-2001 USING ASSORTMENT MEASURES: THE SEGMENTATION APPROACH

6.1 Introduction

As discussed in previous chapters, two types of factors that influence patterns of assortments are of interest, where differences shown in assortment patterns partitioned according to these factors can promote theory development and managerial practice. The first type are "segmentation factors", which may include demographics, nationality, Internet usage, destination familiarity, and the second type are "external factors". These factors are neither features of the tourist nor characteristics of the trip, but may have a major impact on the marketing system in the short run, and ultimately lead to evolution of the system and changes of output (i.e., assortment) patterns.

The ability of assortment measures to capture segment differences is explored in this chapter. The chapter commences with a discussion of segmentation approaches in the context of a tourism marketing system. In Section 6.3, a series of descriptive cross-tabulations are presented on relationships between a group of factors and number of distinct places visited as the operationalized measure of variety in the destination assortment. The remainder of the chapter diagnoses assortment patterns illustrated by the relational measures across different types of segments. A brief summary on the suitability of assortment measures for such analysis is presented at the end.

6.2 Segmentation/Internal Factors

Factors such as demographics and behavior variables have been widely used for segmentation since these factors indicate possible homogeneity among the customers and convergence in product preference and purchase.

As discussed in previous chapters, it is not always the best choice to use all five measures at the same time for a research question. The average variety in individual assortments is probably the most universally applicable measure among the five measures. The balance measure gives an overall indication of the market share structure among the product categories, but it is hardly comparable across systems when the difference between their constituent categories is large. Hence, the balance measure is most suitable for tracing the change of the same system, or comparing the market structure of sub-systems that have identical or similar constitution of categories.

Most numerical measures derived from association and sequence matrices share the same comparability problem with the balance measure, which is why a modeling approach facilitated by random models is desirable in future research. Qualitative results, which can be generated through standard quantitative procedures in network analysis, however, are not restrained by the comparability problem.

It is also worth noting that, some relations between measures and segmentation variables can be influenced by the size of sub-groups. Hence, caution should be taken interpreting the difference in numerical measures across systems of various sizes.

6.2.1 Segmentation, Customer Groups and Product Groups

Conventionally, there are two different ways of defining market segments. From a market structure perspective segments are distinct fragments in the market for a given product category (or an industrial sector). Each segment contains people who are relatively homogeneous in their needs, their wants, and the product benefits they seek. At the same time, each segment seeks a different set of benefits from the same product category (Mullins, Walker, Jr., and Boyd, Jr. 2008). The product category refers to the primary market that contains those segments.

On the other hand, market segments can simply be defined as distinct subsets of people with similar needs, circumstances, and characteristics that lead them to respond in a similar way to a particular product or service offering or to a particular strategic marketing program. Although the two definitions look similar, they have a different focus, that is, while the former is rooted in the conceptualization of product categories, the latter utilizes customer characteristics in distinguishing the segments.

Nevertheless, effective segmentation factors should be responsive to both customer characteristics and product characteristics. That is to say, with a defined set of segments, it should be able to define customer groups and product groups simultaneously where there are more similarity within groups and more difference across groups.

6.2.2 Theoretical Background for the Selected Segmentation Factors

Two categories of segmentation factors are found to be important in determining assortment patterns of destination/attraction sites. The first group of factors includes demographic characteristics of tourists, in particular those related to family life cycle (Oppermann 1995), social class (Cooper 1981), country of origin and religion; the second group, which many argue to be even more influential, consists of factors related to the character of the trip, such as length of stay, main purpose of visit (Shoval and Raveh 2004), and mobility of the stay (Debbage 1991). Familiarity with the destination is also included in many studies, however, results are mixed.

6.2.2.1 Demographics

Although the limited availability of comparable data has hampered the comparative analysis of different groups of international travelers, demographic variations in international travel do seem to exist according to a number of studies reviewed by Pearce (1987). Age and sex have been the two dominant demographic statistics used in such studies. For example, it is found in Pearce's 1978 study that "there are proportionately more male travelers of all nationalities visiting South Korea and correspondingly fewer in Jamaica and Bali with the proportion of male travelers decreasing between these extremes whatever the nationality concerned" (Pearce 1987: 51). Reasons why such demographic variations exist in destination assortment patterns are based more on speculation than on theory or empirical generalization as "there is no evidence yet of a sufficiently large study being done to show the actual travel patterns of different personality groups to a variety of destinations" (Pearce 1987: 54), which still remains a research gap.

Nationality or country-or-origin is another demographic factor that should be considered in examining assortment pattern variations. In an attempt to examine international tourists' multi-city trip patterns within the United States, Hwang et al. (2006) find multi-city patterns are different for groups of tourists with different origins and varying levels of familiarity with the destination (first-time visitor vs. repeated visitor). Their results capture some interesting phenomena, for example, Asian tourists were more likely to visit multiple destinations, include more cities during their visit, but stayed for a much shorter time than their European or Latin American counterparts.

In the literature, most relevant to our context are studies that focus on leisure travelers, or the so called "tourists" in its narrow sense. Given that the goal here is to understand the whole system, all visitors of various purposes are included in the study. Nevertheless, studies that focus solely on leisure travelers are still highly relevant. Most theories that derived from leisure travelers are generalizable to all travelers. On the other hand, leisure travelers did constitute the majority of our sample (70.5%).

6.2.2.2 Information Search (via Internet)

In a paper on how to improve service quality of tourism products, Faché (2000) states that financial and emotional risks, together with risks related to decisions under complex and interdependent situations, are factors that drive tourists' demand for information.

Fodness and Murray (1997) advocate that the information search behavior of tourists be used as a criterion to segment leisure tourism market. Segmentation then leads to homogenous groups classified on the basis of individual usage of multiple information sources, in particular the degree and direction of their search behavior. They classify sources of tourism information along two dimensions: commercial/noncommercial and personal/impersonal. Under this classification system, information search is conceptualized as "the result of a dynamic process wherein individuals use various amounts and types of information sources in response to internal and external contingencies to facilitate travel planning" (p.506).

The emergence of new information sources, in particular the Internet, has had enormous impact on almost all marketing systems. With the Internet, more than technology has changed. For example, Smith (2006) comments that the ways in which consumers live and shop have changed radically too. This could mean the society is much more heterogeneous and consumer tastes are much more splintered, which makes active involvement more important to consumers. At the same time, big hubs in the overall assortment of any marketing system still exist and prosper as much as in the past. The tails grow stronger, and heterogeneity may not be a drawback to mass marketing.

However, internet literacy and accessibility are not evenly distributed. Research has shown significant differences in profiles of Internet users in different countries. One related example is the "digital divide", which exists among countries with different levels of economic development, technology advances, incomes and telecommunication infrastructure. As suggested by Lazonder et al. (2000), larger difference may exist between users and nonusers than among users, and activities like "locating information" and "retrieving information" can distinguish novice and experienced users of World Wide Web. Thus interaction between culture and Internet usage patterns provides an interesting perspective for examining consumer behaviour pattern change. However, it is not feasible to explore all the aspects in one study, though it is worth noting that Internet usage is not a factor independent of others as to its influence on assortment patterns.

6.2.2.3 First-time and Return Visitors

As a dimension of prior knowledge, destination familiarity may affect the pattern of acquired assortments directly through higher perceived accessibility of the destination, or indirectly through travelers' information search behavior, which, in turn, leads to different assortment patterns. Prior knowledge is arguably a multidimensional construct (Kerstetter and Cho 2004) and as one of the dimensions, familiarity may differ in its effects from other dimensions such as expertise (Gursoy and McCleary 2004). To avoid confounding effects, instead of dealing with prior knowledge, the focus is on familiarity, which is defined as whether the destination country (i.e., Australia) has been visited in the past.

Regarding how the extent of travel can be influenced by whether the traveler has been to the destination country before, two alternative predictions that go to just the opposite directions exist. One direction follows the accessibility theory and suggests that exploration of the destination is stimulated to a greater degree by novel surrounds than by those which are already know well, as a result first-time visitors would be expected to visit more places than repeat visitors (Pirie 1979). At the same time, evidences that conflict the accessibility theory have also been found. In addition, Hwang et al. (2006) suggest that the origin of the tourist has a moderating effect on the relationship between destination familiarity and travel extent.

Besides the travel extent, the selection of destination would also be influenced by destination familiarity. Return visitors may choose more "off the beaten track" destinations and could be loyal to certain most favored itineraries. On the other hand, it would be easier to market more accessible destinations to novelty visitors. Hence, central destinations in the assortment networks of repeaters and first-timers should be different.

6.2.2.4 Package or Independent Travelers

According to the type of travel arrangement made prior to arrival at Australia, the respondents are classified into one of two groups, package travelers or independent travelers.

Independent travelers, as the definition suggests, are less constrained than package travelers by the need to adhere to strict travel arrangements such as accommodations, transportation, the places they must visit, etc. In other words, independent travelers are generally more flexible in their movements than package travelers.

Previous studies have explored the influence of trip arrangement type on the variety in trip, but the results are mixed. While it is commonly believed that the free-independent travelers (FIT) are more active and travel more extensively than their package and group tour counterparts, observations that deviate the notion (Debbage 1991) and that confirm the tendency (Oppermann 1992) both exist.

Type of travel arrangement can affect other aspects of destination assortments too. Based on data obtained from an earlier year (1997) in the same database (IVS) as the current study, Tideswell (2004) finds that the type of travel arrangement also influences the overall travel itinerary configuration of multi-destination leisure travelers.

6.2.3 Other Segmentation Approaches

Using characteristics of customer for segmentation is just one of the many types that have been used. New segmentation approaches have emerged from fields such as graph theory. For example, Huang, Zeng and Chen (2007) use the network measures to make partitions of the market data, implying that sub-graphs could be relatively accurate proxies of segments. At the same time, old approaches have been revived and extended to new aspects. In a tourism context, for example, market segments based on the dominant movement patterns of tourists are investigated (Xia et al. 2009).

6.3 Number of Distinct Places Visited and Customer Groups

In the respondent profile section, several variables are identified that may affect the acquired assortments. Ideally, their influence should be reflected in assortment measures. To get some preliminary insights as to the reaction of acquired assortments to the suggested variables, this section examines the relationships between those variables and one of the assortment measures—variety. It is worth noting that the aim is not to test which factors affect the travel extent, as that in Tideswell and Faulker (1999), instead, interest lies in general assortment pattern differences that exist between customer groups.

The following tables indicate the number of distinct places visited cross classified by demographics, destination familiarity, purpose of visit, and travel party characteristics.

6.3.1 Demographics: Gender, Age and Region-of-Origin

Comparing to other aspects of assortment, variety in the acquired assortment has attracted much more attention in research and therefore has more established theories in explaining the driving forces of its patterns.

A preliminary examination of the relationship between region of origin and number of distinct places visited generally supports the risk theory of variety-seeking. It suggests that there is a positive relationship between the risk associated with a trip and variety included in the assortment acquired. Long-haul travelers would generally travel more extensively than their shorter-haul counterparts due to the higher investment in time and money involved in the trip. Consistent with this theory, respondents from UK/Ireland, other Europe and North America visited more destinations on average (3.8, 5.4, and 2.8 respectively) than the remaining country of origin groupings (Table 5-10). On the other hand, seventy-one percent of respondents from New Zealand and seventy-three percent of South East Asia markets stayed in just one stopover region.

According to the literature, the choice travelers made on destinations are likely to be influenced by the family life-cycle. The idea of family life-cycle has been explored extensively by Young and Willmott (1973), who focused on the concept of the symmetrical family. From their studies of leisure in the London region, they argued that social class was far less of an influence on leisure behavior than are age, marriage and gender.

However, some early insights can be gained through the cross comparison. While there seems to be no significant difference between male and female respondents in terms of their tendency for variety-seeking, age groups do show some variation in the number of distinct places visited. Originally in the survey, respondents were coded into 12 age groups as shown in Figure 5-6. However, a preliminary examination shows that assortment features across some nearby age groups are similar to each other. Hence similar groups are combined to form a four-group partition of age. An overview of the relationship between the four age groups and number of distinct places visited is shown in the last part of Table 6-1. Specifically, the most active age group was the group of visitors aged 20 to 34, with an average of 2.9 destinations visited. More than fifty percent of this group and the group aged 60 and over were multi-destination travelers.

Table 6-1: Number of Distinct Places Visited by Demographics

	Number of Distinct Places Visited						Total	Av.
	1	2	3	4-5	6-10	11+		
Region of Origin	% of Respondents							
Japan	49	33	12	3	1	1	100	1.9
New Zealand	71	18	5	3	2	-*	100	1.5
UK/Ireland	34	19	13	12	15	7	100	3.8
Other Europe	29	13	8	12	23	15	100	5.4
South East Asia	73	18	6	3	1	-*	100	1.5
Far East Asia	61	19	10	9	1	-*	100	1.8
North America	44	21	13	11	9	3	100	2.8
Other	65	19	7	5	3	1	100	1.9
Gender	% of Respondents							
Male	55	20	9	7	6	3	100	2.5
Female	52	21	9	7	7	3	100	2.6
Age	% of Respondents							
15 to 19	67	16	6	5	4	3	100	2.2
20 to 34	49	21	9	7	8	5	100	2.9
35 to 59	59	20	9	7	5	1	100	2.1
60 and over	48	22	12	9	7	2	100	2.5
Total	54	20	9	7	6	3	100	2.5

-* less than 0.5%

Shoval and Raveh's (2004) effort in categorizing tourist attractions shows the feasibility of using features in individual trips other than demographics to differentiate assortment patterns. They were able to describe attraction clusters according to the length and main purposes of tourist trips. To the extent of segmentation analysis, trip characteristics play the same role as demographics, and so does the behavioral aspects discussed in the following sections.

6.3.2 Destination Familiarity: Experience and Information Search

Customers' decisions are influenced by their knowledge of the products they are about to acquire. Two of the main ways in getting the needed knowledge are through experience and information search.

Contrary to other studies (e.g., Tideswell 2001), where no significant difference in variety-seeking is detected between first-time and return visitors to Australia, in this study, respondents who did not have experience of Australia prior to this trip had shown a much stronger tendency to visit multiple destinations than their counterparts (Table 6-2). Risk theory may also play a role here. In other words, with the uncertainty involved in an unfamiliar foreign country, first-time visitors may choose to explore the country to reduce risk.

The variety-in-assortment pattern related to information search over Internet is consistent with the generally held theory that information need is positively related to the variety in the assortment acquired. As shown in Table 6-2, respondents who used the Internet to get information for this trip on average visited more places than those who didn't use the Internet (3.5 for Internet users compared to 2.2 for non-users).

Table 6-2: Number of Distinct Places Visited by Experience and Information Search

	Number of Distinct Places Visited						Total	Av.
	1	2	3	4-5	6-10	11+		
Experience with Australia	% of Respondents							
First -time Visitor	38	23	12	10	11	6	100	3.4
Repeat Visitor	65	18	7	5	3	1	100	1.9
Internet Usage	% of Respondents							
No or Don't Know	58	20	9	6	5	2	100	2.2
Yes	39	21	11	11	12	7	100	3.5
Total	54	20	9	7	6	3	100	2.5

6.3.3 Reasons for Visiting Australia

Table 6-3 shows that holiday travelers were not only the dominant group among all short-term visitors, but also were the most extensive travelers, followed by visitors who came to Australia for employment. At the same time, the benefit-seeking explanation of multi-destination trips seems to be supported by the growing average number of distinct places visited with the increased number of reasons.

Table 6-3: Number of Distinct Places Visited by Reason of Visit

	Number of Distinct Places Visited						Total	Av.
	1	2	3	4-5	6-10	11+		
Main Reason of Visit	% of Respondents							
Holiday	40	23	12	9	10	6	100	3.3
Visiting friends and relatives	63	20	8	6	3	1	100	1.8
Convention/Conference	65	23	7	3	2	-*	100	1.6
Business	70	19	6	4	1	-*	100	1.5
Employment	51	20	7	10	7	5	100	2.9
Education	67	17	6	5	5	2	100	2.0
Exhibition	56	22	8	10	1	4	100	2.4
Other Reasons	86	7	3	2	2	1	100	1.5
Number of Reasons	% of Respondents							
One Reason	56	20	8	6	6	3	100	2.5
Two Reasons	51	22	10	8	7	3	100	2.5
Three Reasons	51	18	10	9	7	5	100	2.9
Four or More Reasons	44	19	12	7	7	11	100	4.1
Total	54	20	9	7	6	3	100	2.5

-* less than 0.5%

6.3.4 *Independent Travelers and Travel Party Influence*

Contrary to intuition, package travelers on average visited more places than independent visitors (2.8 compared to 2.4), probably due to the fact that 60% of independent travelers actually stayed in just one destination (Table 6-4). A large portion (65%) of travelers who came with a group seemed to fall in the category of 2 to 10 destinations visited, while only 40% of travelers who arrived in Australia alone were in this category.

Adult couples and friends/relatives groups were the most exploratory types of immediate travel party. Not only were they lesser likely to be single-destination travelers (with only 37% and 43% respectively), but they shown stronger presence in the more extensive trips.

Table 6-4: Number of Distinct Places Visited by Travel Party Influences

	Number of Distinct Places Visited						Total	Av.
	1	2	3	4-5	6-10	11+		
On a Tour Package	% of Respondents							
Arrive on an inclusive tour package	38	28	14	10	7	3	100	2.8
Independent traveler	60	18	7	6	6	3	100	2.4
On a Group Tour	% of Respondents							
Travel with a group	34	33	16	12	4	1	100	2.4
Travel alone	56	19	8	6	7	4	100	2.5
Immediate Travel Party	% of Respondents							
Unaccompanied traveler	62	18	7	5	5	3	100	2.2
Adult couple	37	25	14	10	9	5	100	3.1
Family group - parents and children	56	23	9	7	4	1	100	2.0
Friends/relatives travelling together	43	22	10	9	10	6	100	3.2
Business associates travelling together	62	23	8	6	2	-*	100	1.7
Total	54	20	9	7	6	3	100	2.5

-* less than 0.5%

6.4 Relational Measures of Assortments on Selected Customer Groups

While assortment measures may shed light on segmentation decisions in marketing the critical question is: Will the assortment measures differ among segments? At the same time, it is also important for the differences to be interpretable.

6.4.1 The Selected Segmentation Factors

An important contribution of this study is the multi-characteristic concept of assortment, which features an extension of assortment property discussion beyond "width" and "depth". As reviewed in previous chapters, there is rich literature on the variety in the assortments, but relatively little is known on the other properties of assortment, in particular an integrated examination of these assortment properties is lacking and whether they could be influenced by internal or external factors.

The last section discussed variety patterns and their relations to some segmentation factors. This section will continue with the other three aspects of assortment property: balance, association, and sequence. As the disparity measure is fixed with the predefined categories, it is not discussed in this part of the study. From the literature and earlier discussions in this chapter, the following groups of segmentation factors have been identified for a general discussion of internally driven variation in assortment relational patterns:

1. Demographics: Region-of-Origin
2. Destination Familiarity: Experience and Information Search
3. Type of Travel Arrangement: Package Traveler vs. Independent Traveler

To further justify the relevance of certain segmentation variables and levels in the variables to acquired destination assortments, a set of correspondence analyses were carried out. Correspondence analysis is a simple but powerful tool of finding relations between objects and variables. The unique benefits of correspondence analysis lie in its ability for representing objects and variables in joint space (Hair et al. 2006). Moreover, it can accommodate both non-metric data and nonlinear relationships. The result of this technique is a perceptual map that is normally easy to interpret. The appropriateness of such a procedure is further supported by Faust (2005), who suggests that correspondence analysis presents an interpretable joint display of actors and events in an affiliation network, though careful specification is required of which of a number of possible solutions is used for the display.

Although correspondence analysis can be used independently on assortments, which may become a sole new project like that of Hoffman and Franke (1986), given the focus of this study is on assortment measures, it is only used here for a preliminary examination of segmentation variables and levels. Incorporating inputs from the researcher's judgment and other issues discussed above, the final decisions on selected segmentation variable are presented above in the three groups of factors.

Preliminary examination with correspondence analysis seems to support the hypothesis of structural assortment pattern would change with destination familiarity, as two clusters of destinations are formed and each close to either repeaters or first-timers in the perceptual map.

6.4.2 Relational Properties of Assortments vs. Segmentation Factors

As discussed in earlier chapters, except for variety, all the other assortment measures are interpretable only when they are compared to some benchmark or across comparable assortments.

Share of visitation (i.e., the proportion of number of visitors) is chosen as the basis for the entropy measure of balance. This is consistent with a managerial interest in the share of visitation in the tourism industry. As shown in Table 6-5, independent travelers (Balance = 3.335, Variety = 2.4) were more diversified as a group than package travelers (Balance = 3.059, Variety = 2.8) in the destinations visited. This is consistent with that predicted by the theory. In other word, independent travelers are less constrained in their scope of travel compared to package visitors. First-time visitors were also more diversified in scope of travel than repeat visitors, with the balance of their collective assortments being 3.336 and 3.147, respectively.

Also consistent with previous prediction from theory is the difference in balance between Internet users and those who didn't use Internet for information in this trip. Specifically, Internet users were more diversified in scope of their destination choices.

Table 6-5: Balance of the Collective Assortment of Selected Customer Groups

	Destination Familiarity		*Internet Usage*		*Trip Arrangement*	
	First Visit	Return Visit	User	Nonuser	Package	Independent
Balance	3.336	3.147	3.517	3.152	3.059	3.335
Variety	3.4	1.9	3.5	2.2	2.8	2.4

It is hypothesized that the difference in assortment patterns between customer groups could be projected to distinguishable patterns in the structural measures. With network analysis techniques, the sequence property is operationalized in the following terms: degree centralization, betweenness centralization, clustering coefficients, and average path length. Similarly, an association matrix of the assortment is depicted with degree centralization and clustering coefficient.

Generally, among the three selected factors, destination familiarity had the smallest effect in distinguishing sequence property of acquired assortments. The other two factors, Internet usage and type of travel arrangement showed more power in differentiating sequence structure of customer groups. There was no apparent difference between the pairs of customer groups in the central destinations used in their trips. However, first-time visitors were more involved in exploring neighbor destinations than return visitors, as shown in the higher clustering coefficient and smaller average path length among reachable destinations. Internet users and package travelers, on the other hand, used more extensively the hot transition hubs (as reflected by a higher betweenness centralization) while involved less in local chaining tours (Table 6-6).

Table 6-6: Descriptive Network Measures of Selected Customer Groups: Sequence Matrix

	Destination Familiarity		*Internet Usage*		*Trip Arrangement*	
	First Visit	Return Visit	User	Nonuser	Package	Independent
Degree Centralization	57.13%	59.69%	52.90%	60.48%	50.97%	58.10%
Betweenness Centralization	12.71%	15.85%	15.37%	14.14%	15.29%	12.56%
Clustering Coefficient	24.805	17.13	18.464	30.436	18.364	26.397
Average Path Length*	1.903	1.979	2.008	1.864	2.128	1.846

(*Among Reachable Pairs)

As discussed in earlier chapters, degree centralization in association network can be interpreted as the variability of closeness between all pairs of destinations. An interesting pattern is discovered between package travelers and independent travelers (Table 6-7). For package travelers, a few pairs of destinations were much “closer” than the rest of pairs, while the closeness of destinations was more evenly distributed among independent travelers.

Table 6-7: Descriptive Network Measures of Selected Customer Groups: Association Matrix

	Destination Familiarity		*Internet Usage*		*Trip Arrangement*	
	First Visit	Return Visit	User	Nonuser	Package	Independent
Degree Centralization	23.26%	25.06%	24.23%	22.49%	35.80%	18.81%
Clustering Coefficient	82.134	27.678	47.989	59.582	65.966	158.881

A tentative explanation for the difference in degree centralization of association matrices is that the groups with higher degree centralization were groups who were more certain about their destinations either through information acquired (Internet user) or provided (package travelers), or previous knowledge (return visitors). However, at this early stage of research, this proposition needs to be further refined and probably tested in a confirmative research design in the future.

6.5 Region of Origin Segments

6.5.1 The Rationale for Region-of-origin Segments

Segmenting the market of international visitors according to country-of-origin is a common practice in the tourism industry. With normally shared language, culture and distance to the destination country, an origin country is generally comprised of relatively homogeneous customers and can be targeted through special marketing campaigns. Theoretically, the origin-linkage-destination system, which brings together tourist generating regions (origins), receiving regions (destinations) and the associated linkages, has also been argued as one of the main research subjects in tourism (e.g., Pearce 1987). It is suggested that such a perspective can contribute to the planning, development and management of tourism industry (Pearce 1987).

From tourist behavior perspective, it is also suggested that destination assortment patterns might be influenced by the tourist's country of origin. One of the most important concepts used in explaining the influence is accessibility, defined as the ease of traveling from an origin to a destination (Pirie 1979). The accessibility theory takes an economic rationalism point of view, under which tourists' choices of destination assortments (both size and composition) can be considered as a strategy for minimizing cost. Hence, greater accessibility to one location is less likely to lead to very extensive travels as opportunity costs associated with postponing visits to additional ones are smaller than in the case of poor accessibility. The accessibility theory overlaps with the risk management theory in explaining travel extent except that the former provides a more holistic view through the ability to take both positive and negative evaluations. Hence, when looking for a proper segmentation factor to evaluate the assortment measures, accessibility theory provides a sufficient theoretical base. Particularly, country of residence is selected as the primary segmentation factor in investigating destination assortments since it subsumes various aspects of accessibility, including physical distance and perceptions of accessibility.

A typical way of examining country of origin segments of tourist market is to use the regional or continental aggregations. Previous researches have compared behaviors in a certain destination country by tourists from different regions. It is observed that tourists from different continents tend to differ in their multi-destination visit patterns in the United States (Hwang, Grezel and Fesenmaier 2006). Similarly, Tideswell (2001) reports seven important country/region markets of international visitors to Australia. This study follows the same type of region-of-origin divisions as that of Tideswell (2001) because of the common data source used: the Australia's International Visitor

Survey data.

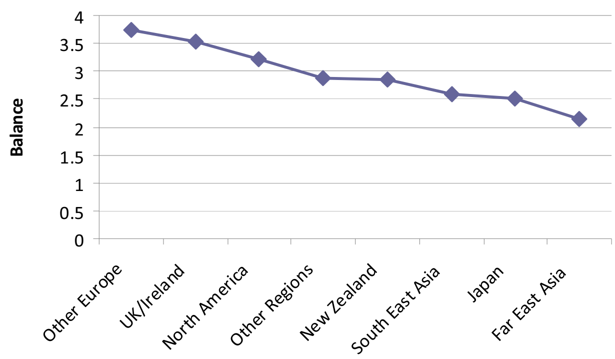
Hwang et al. (2006) triangulate their conclusion with traditional statistical analysis and network analysis. Their network analysis is based on the "origin-destination frequency matrix", which is equivalent to a symmetric (sum) version of our sequence matrix. Centrality measures, in particular the betweenness centrality play an important role in the analysis and interpretations. One of the conclusions drawn from network analysis is that different country-of-origin groups seem to use different cities as their hubs of transportation.

6.5.2 Assortment Properties of Region-of-origin Segments

Apparently, visitors from different origins did differ in their destination assortment patterns, which were reflected by not just extent of travel, but the structural properties of their collective assortment.

As the balance measure of assortment indicates, travelers from other European countries appear to be the most diversified as a group in terms of destinations visited. In contrast, Asian visitors were more focused and consistent in their selection of destinations (Figure 6-1).

Figure 6-1: Balance of Region Markets



Sequence destination networks have been used in previous studies for analyzing different travel patterns of tourists. Contrary to the observations made by Hwang et al. (2006) on trip patterns of tourists from other continents to the United States, there was no apparent difference among the regional markets in the sample on which destinations are more central (being the hub, etc) than other destinations (Table 6-8). Melbourne dominated as the most popular transition hub for all visitor origins except for the “Other Countries” group. However, as for the overall structure, visitors from European countries, in particular European countries other than UK and Ireland had shown a lower tendency in concentration of transition hubs (Betweenness centralization = 13.05%).

Table 6-8: Structural Properties in Assortments of Region-of-origin Segments

Region-of-origin Markets	Sequence Matrix				Association Matrix	
	Degree Centralization	Betweenness Centralization	Clustering Coefficient	Average Path Length*	Degree Centralization	Clustering Coefficient
Japan	47.34%	28.06%	11.484	2.469	51.05%	16.253
New Zealand	42.07%	22.75%	3.175	2.455	54.49%	4.836
UK/Ireland	58.70%	19.52%	14.364	2.073	34.92%	32.491
Other Europe	51.33%	13.05%	12.024	1.976	23.05%	42.650
South East Asia	44.27%	22.52%	9.708	2.471	58.68%	16.367
Far East Asia	35.44%	24.29%	18.075	2.688	56.31%	36.874
North America	59.36%	25.48%	8.271	2.157	43.69%	18.831
Other Countries	38.87%	18.82%	6.379	2.484	50.17%	9.197

* Among reachable pairs

Islands indicate the dense parts of the network in terms of weight. By analyzing each island, it is possible to find out whether the thick links are connected or not, and what the patterns of links are. A network with one island is like a mountain with a single peak. Through island discovery, the shape and components of the peak emerge from the original network. This procedure retains important information in the sequence measure while achieving analytical efficiency through data reduction.

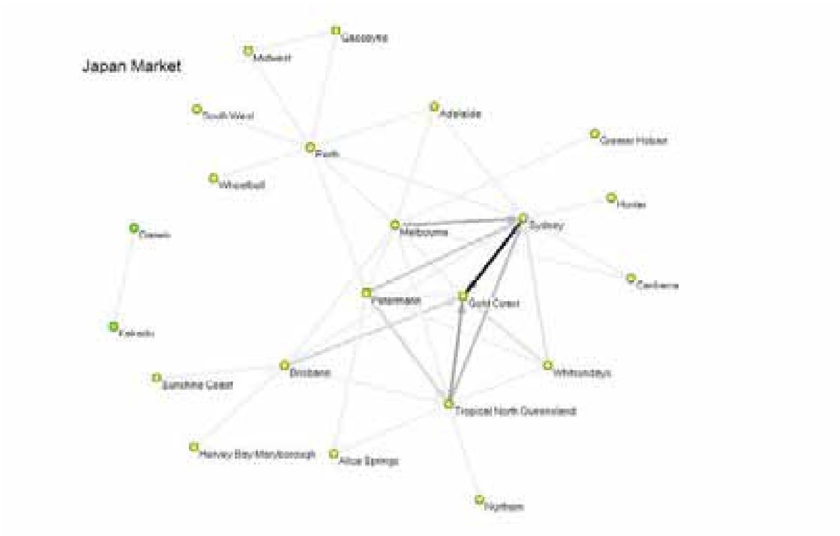
The following Figures illustrate islands detected in each region-of-origin market. Due to interpretation difficulty, structure in the collective assortment labeled as "Other Countries" is not reported. Also, caution should be taken when use the results of certain region-of-origin markets as the heterogeneity in them may be high, and at the same time it may be difficult to link the results to practical actions.

Examinations with the figures show that network of European visitors presents more chain-like patterns, while that of Japan and other Asian countries has more cycles, especially triangles. In addition, the network of Japanese visitors seemed to have more local centers than those of all the rest groups.

The assortment of visitors from New Zealand shows similar diversity patterns to that of Asian countries, but its structural properties seems to be closer to those of their European counterparts. This makes sense as the drivers for diversity patterns and relational patterns might be different. Whether this is a general proposition of assortment properties would depend on further evidence acquired in the future.

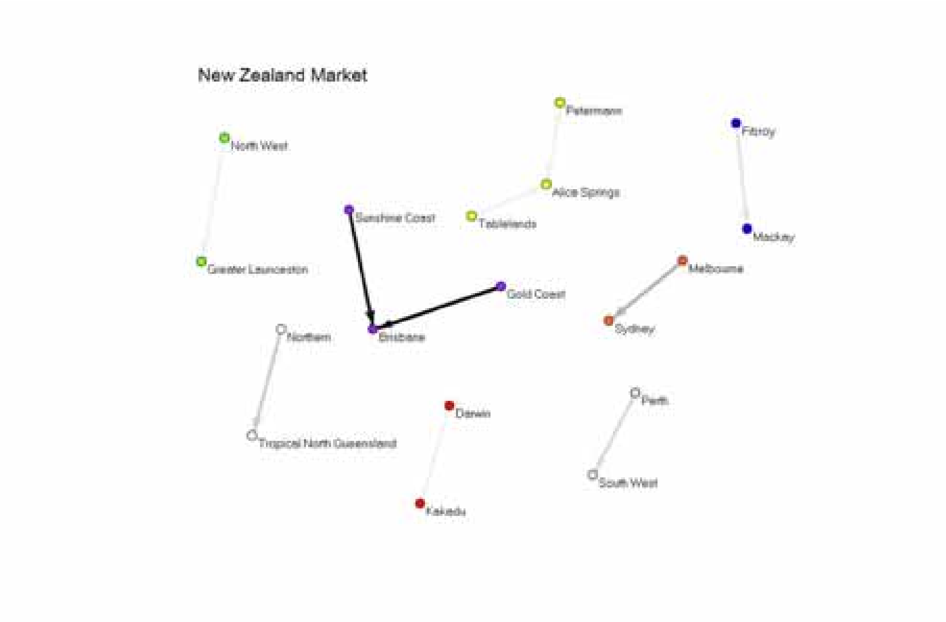
6.5.2.1 Japan Market

Figure 6-2a: Islands in the Japan Market



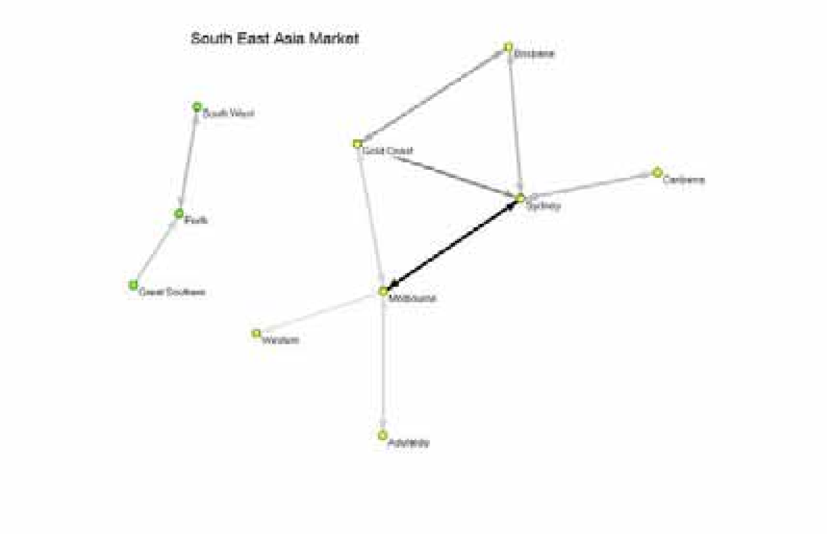
6.5.2.2 New Zealand Market

Figure 6-2b: Islands in the New Zealand Market



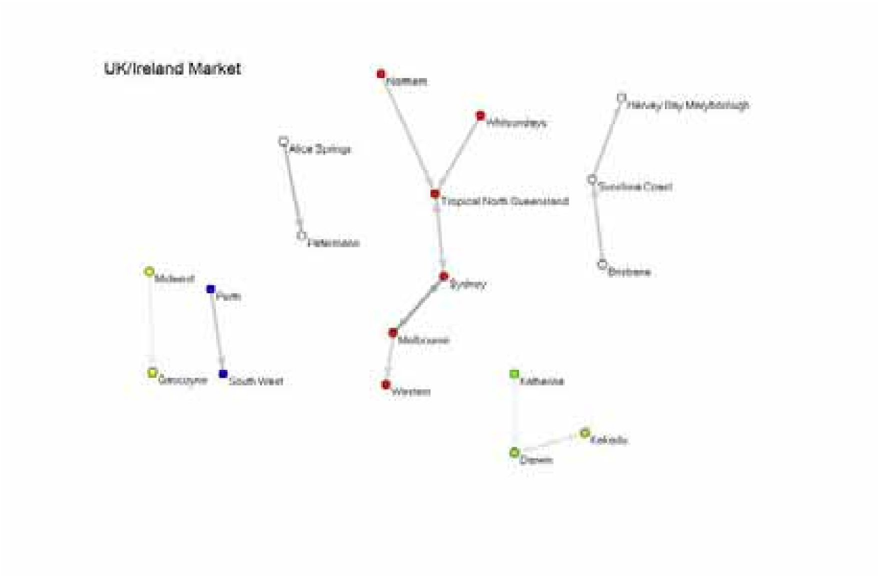
6.5.2.3 South East Asia Market

Figure 6-2c: Islands in the South East Asia Market



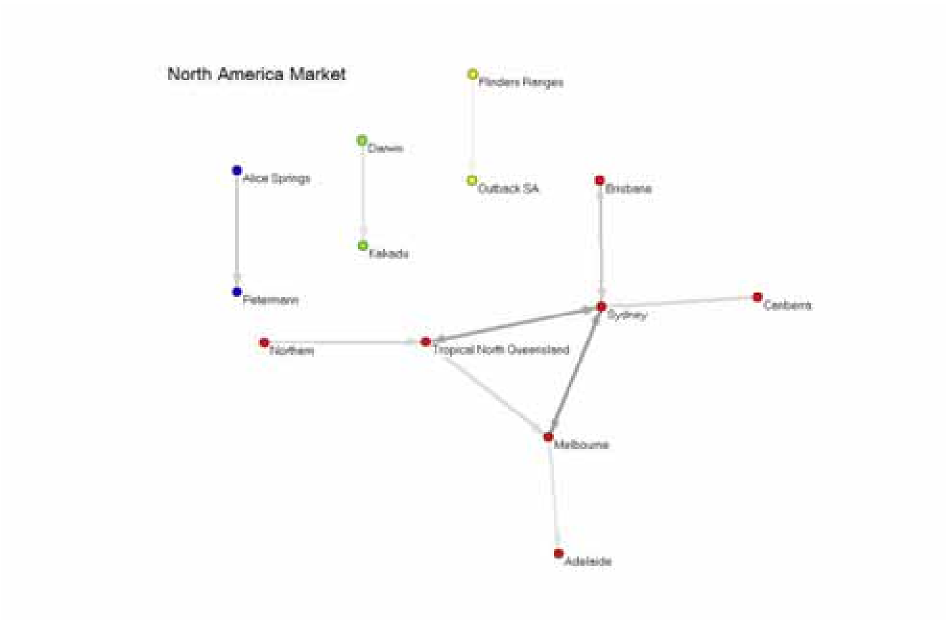
6.5.2.4 UK/Ireland Market

Figure 6-2d: Islands in the UK/Ireland Market



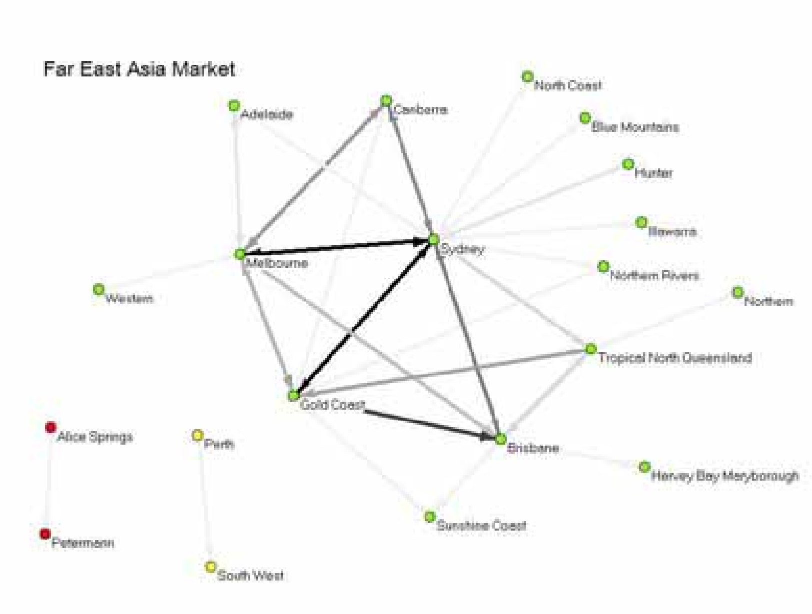
6.5.2.5 North America Market

Figure 6-2e: Islands in the North America Market



6.5.2.6 Far East Asia Market

Figure 6-2f: Islands in the Far East Asia Market



6.6 Segments of Itineraries

So far, the focus is on direct differences in assortment patterns that may be present between levels of segmentation factors. In practice, these variables are rarely used separately. Rather, viable segments are often defined with a set of segmentation variables, and the effectiveness of the selected variables normally relies on the homogeneity of customers in their preference or purchase behaviors.

In this section, another segmentation approach is taken from the customer-product relationship perspective. Usage of assortment measures in the validation of quantitative segmentation procedures is discussed.

6.6.1 Cluster Analysis as a Segmentation Tool

Aggregate assortments contain information that can possibly be used to distinguish markets or market segments. In the literature, categories that constitute the assortment space are commonly referred to as product markets (e.g, Rosa et al. 1999). While whether the relationship between two categories is complementary, substitutive, or independent captures the attention of researchers on cross-category purchases, the evolution and performance of product markets seem to be the focus of market competition researchers. From an assortment perspective, these two research streams could be two sides of a coin. The market performance of an individual product category rarely evolves alone. The association between categories as indicated in the acquired assortments, or inherited from other affiliation mechanisms, suggests co-evolution that frequently interacts with the social matrix in which the categories are embedded.

Bargeman et al. (2002) develop a typology of vacation behavior using the sequence data embedded in vacation histories. It can also be considered as an effort of segmenting customers. In finding similarity within groups and differences between groups, segmentation efforts can come from several directions: the usage of products, decision-making process towards products, and the preference of customers. Either way, the idea of segmentation is to make the marketing system function more efficiently and effectively.

As discussed earlier, product markets are the basis of industrial structures. Conceptually, markets and industries are not the same things. Industries are groups of firms producing similar or identical products, while markets are meetings of sellers and buyers—of suppliers and consumers (Samuelson and Nordhaus 1985). Formally, markets can be defined as sets of customers served by sets of suppliers, where both sets are defined in terms of products and services and geographic location (Brooks 1995: 537). Hence, a more logical way of defining market segments through product categories is to examine the products and customers simultaneously. Cluster analysis is one of those techniques. But since cluster analysis may produce many different solutions, the clusters derived should be validated through other approaches (Hair et al. 2006).

Product bundles have been suggested as a viable strategy that can be built on assortment measures for serving customers efficiently. The implementation of such strategy, however, is not always successful (Lai and Yang 2004) and could hurt consumption (Gourville and Soman 2001). On the other hand, with a given customer group, one can always measure the properties of their collective assortment. The research question then become: Can the assortment measures be used as a validation tool for market segments? The answer is probably yes. The usefulness of network analysis lies in the ability of checking the multi-destination trip clusters. When network is used as a validity check of cluster, a valid itinerary should emerge in the association and sequence network as components (islands) share the same core association network.

Successful implementation of cluster analysis also depends on the selection of clustering variables. It is decided that products/destinations would be used as the clustering variables, but still, a consistent property of the destinations should be used as the measurement of these variables. In the tourism context, one of the possible choices is the trip index.

Pearce and Elliot (1983) suggest the possibility of using the trip index to classify multi-destination trips. For example, a "tour" could be a trip with no individual destination's trip index exceeds 10 percent. However, what actually observed from our study is that even with really diverse trips Sydney still dominates the time spent.

On the other hand, theoretical trip typologies such as that developed by Lue et al. (1993) still have difficulty in finding their way to empirical studies of large sample. Looking at the trip index alone is not enough to identify the typological patterns, additional information is needed. In this sense, properties of assortment, in particular the structural properties provide useful information that complements the trip index in identifying the typological patterns. Hence, following Tideswell's (2001) approach, trip index is used for cluster analysis in this study.

6.6.2 The Trip Index

For each destination, its Trip Index can be calculated in the following manner:

$TI = D_n / T_n$

where TI = the Trip Index

Dn = the nights spent at this destination (*n* stands for "nights")

Tn = total nights spent on the trip (*n* stands for "nights")

The Trip Index was first proposed in 1981 in an unpublished report by Douglas G. Pearce for a research on Westland National Park in Westland, New Zealand (cf. Pearce and Elliott 1983). The initial goal of designing the Trip Index was to create a quantitative measure that could to some extent objectively evaluate the attractiveness of a particular place in a given region. However, after some successful implementations of the Trip Index, researchers start to see its broader applications, that its use is not restricted to individual destinations, and "it could also be applied to build up an overall picture of the different nodes and destinations in a regional tourist system" (Pearce and Elliott 1983, p. 9).

Depending on the focal marketing system of the research, the Trip Index can be used to (1) classify destinations according to specialized functions or images within the system such as gateways, stopovers or principal destinations; and (2) highlight features of tourist trips for the development of meaningful typologies. Tours, for example, would have a different pattern of index allocation than that of highly concentrated trips.

The Trip Index, to its essence, is a relative measure of time. Since time is an important factor in travel planning and it affects travel patterns, the Trip Index is useful as a relatively objective criterion to complement the time budget theory and research in tourism, which traditionally was supported and conducted merely with qualitative methods.

Previous research has established the trip index as a unified scale for segmentation through cluster analysis (e.g., Tideswell 2001). Trip index, to some extent, can be considered as a unidimensional measure of customer-product relationship and a type of input for the balance measure of assortment in the tourism context. Counterparts of the trip index in other marketing systems as well as alternatives in the tourism context can be easily found. For example, a similar index in the retail context is the expenditure share of a product category in the shopping baskets.

Unlike many other quantitative measures, which are ideally suitable for theoretical considerations but practically hard to implement due to the difficulty of data collection, the Trip Index does not have a problem of data availability since it only requires a few simple questions to get the information needed for calculation. Over the years, many governments have included related questions in their standard visitor survey.

Trip Index can also be used for trend analysis and forecasting. As Yun, Joppe and Choi (2008) review in their report, a group of tourism indices, including Trip Index, have been broadly used to measure the industry's performance at every level, from international to the state to a destination. It has become a common understanding that information preserved in choice sets of customers (in this case tourists) can be calibrated into eligible performance indicators of the embedded marketing system.

6.6.3 Identifying Common Itineraries through Cluster Analysis

A smaller sample from IVS 2000 is chosen for the cluster analysis. Yearly aggregated data is used so that further comparison to other similar studies can be conducted. To identify popular common itineraries, in their studies, Tideswell (2001, 2004) and Collins (2006) both focus on international visitors who travelled for leisure purposes with two to ten stopovers made in Australia. Similar but slightly different screening criteria are adopted. More specifically, the respondents selected for cluster analysis in this part of the study are those who visited two to ten distinct places (i.e., variety instead of stopovers) for Holiday, Visiting Friends or Relatives (VFR), or Business purposes. These three purposes of visit are the top three reasons quoted by the respondents, accounting for 85.3% of all 32,320 respondents and 84.6% of the 16,137 respondents in IVS 2000. To a certain extent, the sample used should be more representative of the whole system than those used in the other studies and more accurately defined according to the concept of multi-destination trips.

Using the two screening criteria, a total of 6,132 short-term international visitors who departed Australia during the year 2000 are drawn from the original dataset, among them 4117 (67.1%) were in Australia for holiday, 1276 (20.8%) for visiting friends or relatives, and 739 (12.1%) for business.

The primary purpose of cluster analysis techniques is to group objects based on the characteristics they possess. A useful exploratory tool, cluster analysis is not able to confirm the validity of the groupings. Hence the researcher must check the validity by ensuring that theoretical justification exists for the cluster analysis, and following up by profiling and discriminating between groups.

As noted by Hair et al. (2006), non-hierarchical clustering methods have gained increased acceptability and usage as they offer several advantages over hierarchical techniques, for example, the results from non-hierarchical methods are less susceptible to outliers in the data, the distance measure used, and the inclusion of irrelevant or inappropriate variables. In addition, non-hierarchical methods can analyze extremely large data sets. However, one limitation of non-hierarchical methods is that replication of the results is difficult if the observations are reordered or the random selection process is uniquely initialized each time. In other words, the benefits of any non-hierarchical method are realized only with the use of nonrandom (i.e., specified) seed points, and validation of the results needs to be carried out.

Similar to the procedure used in Tideswell (2001, 2004), a combination of both hierarchical and non-hierarchical clustering methods is used for common itinerary identification. First, two separate, random samples of 500 cases are drawn from the comparable dataset of 6,132 respondents from IVS 2000. Then hierarchical cluster analysis is performed on the two random samples using the Average Linkage (within-group) method based on Euclidean distances, where cluster centers are calculated according to the selected solutions. Finally, these cluster centers are used as initial seed points for the non-hierarchical k-means clustering approach conducted over the full dataset. The two sets of cluster centers generated through the two random samples are highly consistent with each other. In fact, when applying them as initial cluster centers in the k-means clustering on the 6,132 respondents, only 2 respondents are placed differently in the 9 cluster partitioning.

The merit of this procedure is that it takes the benefits of non-hierarchical methods while at the same time facilitates the two important decisions that affect the quality of results: determination of the number of clusters and the seed points. A 9-cluster solution is opted because of its wide acceptance in similar studies (Tideswell 2001, 2004; Collins 2006).

The 9-cluster solution of common itineraries in the year 2000, based on k-means clustering of 6,132 respondents, is presented in Appendix D. A full list of all cluster centers across all regions is provided in Appendix E.

The same procedure is also used to generate a range of solutions in terms of cluster numbers. In particular, solutions of 8 to 12 clusters are considered. Results show that the 9-cluster solution is the most stable and consistent across the two random samples and the total 6,132 respondents drawn from IVS 2000.

Cluster segmentation is a generalizable approach that can be used for data from various types of marketing systems. Not surprisingly, such an approach has also been used to analyze market basket data, though minor adjustments may be needed in the selection of underlying measure for clustering variables. For example, the trip index is used in the tourism context, but most market basket analysis uses the category purchase incidence data, or the binary choice data (e.g., Chib, Seetharaman, and Strijnev 2002; Mild and Reutterer 2003). In addition, the modeling approach, in part, is restrained by the complexity and high computing power requirement associated with large number of categories.

Table 6-9: Destination Profiles for the Nine Itinerary Segments of Multi-destination Visitors

Cluster	Description	Regional Destinations	Cluster Center	N (n= 15,002)
1	Tropical North Queensland Focused	Tropical North QLD	.45	2217 (14.8%)
		Sydney, NSW	.22	
		Gold Coast, QLD	.07	
		Petermann, NT	.04	
		Melbourne, VIC	.04	
2	Gold Coast/ Sydney	Gold Coast, QLD	.55	2056 (13.7%)
		Sydney, NSW	.29	
		Brisbane, QLD	.04	
		Melbourne, VIC	.03	
3	Around Australia	Sydney, NSW	.12	3930 (26.2%)
		Melbourne, VIC	.06	
		Tropical North Queensland	.05	
		Brisbane, QLD	.04	
		Canberra, ACT	.04	
		Darwin, NT	.04	
		Northern Rivers, NSW	.03	
		Whitsundays, QLD	.03	
		Perth, WA	.03	
4	Sydney Focused	Sydney, NSW	.68	2398 (16.0%)
		Melbourne, VIC	.07	
		Brisbane, QLD	.03	
		Tropical North QLD	.03	

5	Perth Focused	Perth, WA	.66	981 (6.5%)
		Sydney, NSW	.06	
		South West, WA	.06	
		Melbourne, VIC	.04	
		Great Southern, WA	.02	
6	Brisbane Focused	Brisbane, QLD	.65	999 (6.7%)
		Sydney, NSW	.10	
		Gold Coast, QLD	.06	
		Tropical North QLD	.03	
		Melbourne, VIC	.03	
7	SE QLD Focused	Sunshine Coast, QLD	.62	263 (1.8%)
		Brisbane, QLD	.11	
		Gold Coast, QLD	.11	
8	Melbourne/ Sydney	Melbourne, VIC	.67	1592 (10.6%)
		Sydney, NSW	.15	
9	Adelaide Focused	Adelaide, SA	.70	566 (3.8%)
		Sydney, NSW	.08	
		Melbourne, VIC	.06	

The most common itineraries in 2000 are similar to those identified in the other three years (i.e., 1997, 1999, and 2004), especially those of 1999. All eight itineraries identified from IVS 1999 are found in the 2000 sample too. The only difference between the 1999 and 2000 itineraries is that there is one more popular itinerary in 2000, the "SE Queensland Focused" itinerary as labeled by Collins (2006). The "SE Queensland Focused" itinerary is found again in the 2004 results, together with another seven itineraries identified in 2000; the one that disappears is "Adelaide Focused", the least popular among all nine common itineraries identified in 2000. The high consistency of the common itineraries found suggests the plausibility of the clustering approach using the Trip Index. Appendices F, G and H show the itineraries discovered in 1997, 1999, and 2004.

The consistency of the identified common itineraries across slightly different sample types also gives confidence to expand the approach to include more multi-destination trips. Both Tideswell (2001, 2004) and Collins (2006) exclude trips with more than ten stopovers in their studies as these trips accounted for only a small portion of the visitors. Given that the goal of this study is to examine the marketing system and its outputs, a wider coverage of respondents is preferred.

Taking a step further cluster analysis can be applied to all the 15,002 multi-destination respondents of the sample (The sample size distribution across the eight quarters is listed in Table 5-1). To test the convergence of clustering partitions, three different sets of cluster centers are used: final centers of the 6,132 respondent sample and the cluster centers generated through hierarchical clustering with the two random samples of 500 respondents. Details of these samples are given earlier in this section. The degree of convergence again is very high: among the 15,002 respondents, only three are classified differently in the three sets of cluster results. Note that this version of clusters would include slightly different members than those in the earlier yearly clusters of 2000, since all multi-destination trips are used instead of leisure and business trips with only two to ten distinct destinations. Besides that it is the whole marketing system not leisure travels that is of interest, the reason of using the full spectrum of the sample is two-fold, to keep large enough samples for quarterly analysis and to leverage the highly converged cluster patterns. In fact, the convergence rate of k-means clustering drops sharply when further screening is applied on the sample.

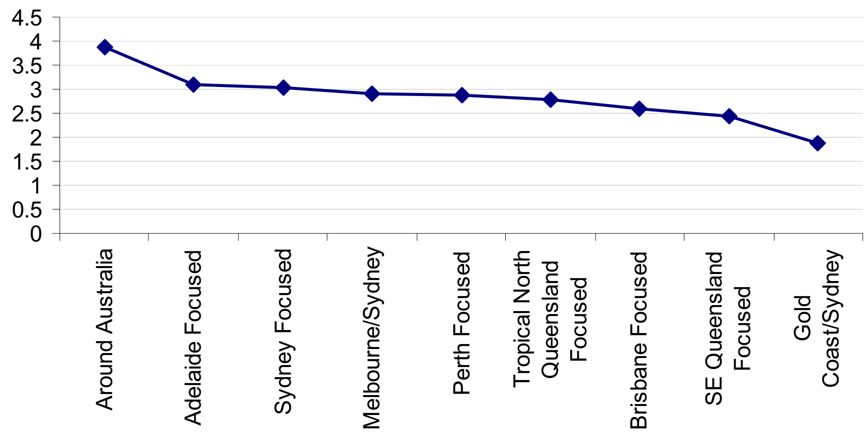
The final profile of the 9-cluster solution of all multi-destination respondents is presented in Table 6-9.

With trip indices of destinations as the basis for cluster analysis, it can be argued that the key of the common itineraries is the time concentration. In particular, the results show that there are consistent patterns of visitors spending most of their time in a single place and use it as a base camp for exploring peripheral sites.

Table 6-10: The Variety Property of Itinerary Segments

Clusters, all multi-destination trips	*Average Number of distinct places visited*
Tropical North Queensland Focused	3.9
Gold Coast/Sydney	2.5
Around Australia	7.1
Sydney Focused	3.5
Perth Focused	3.2
Brisbane Focused	3.0
SE Queensland Focused	2.9
Melbourne/Sydney	3.2
Adelaide Focused	3.6
Overall	4.3

Figure 6-3: Balance in Segments of Common Itineraries



Targeting customer segments with selected assortments entails an in-depth analysis of complementary cross-category purchase interdependencies at a segment level (Reutterer et al., 2006). Facilitated by the proposed assortment measures, results of the analysis on itinerary segments are presented below.

Average path length in sequence matrix indicates the easiness of reaching all other destinations in the system from any given destination. The smaller the average path length, the easier it is to reach all the nodes in the network. As shown in Table 6-11, the three smallest average path lengths are those in "Around Australia" (APL=1.888), Melbourne (APL=2.271), and Sydney (APL=2.357), respectively. It can be interpreted as that if a traveler wants to find an itinerary that can reach any place with the least effort, s/he should take a trip that is similar to the composition of the "Around Australia" trip, or go with the less effective but more efficient choice—use Sydney or Melbourne as the base camp of her/his stay.

The sequence property in itinerary assortments presents high clustering coefficients for all the Sydney related itineraries, including "Gold Coast/Sydney" (26.666), "Sydney Focused" (28.269), and "Melbourne/Sydney" (21.648). This feature suggests that locally dense cliques exist in these itineraries. It could be that it was more convenient to explore neighboring destinations from Sydney as it did have the information and transportation infrastructure that needed.

Table 6-11: Descriptive Network Measures of the Common Itinerary Segments

Common Itineraries	Sequence Matrix				Association Matrix	
	Degree Centralization	Betweenness Centralization	Clustering Coefficient	Average Path Length*	Degree Centralization	Clustering Coefficient
Tropical North Queensland Focused	38.19%	14.05%	13.459	2.477	55.69%	50.949
Gold Coast/Sydney	33.91%	17.11%	26.666	2.726	50.58%	66.602
Around Australia	57.09%	11.27%	15.121	1.888	18.51%	47.232
Sydney Focused	57.88%	29.07%	28.269	2.357	54.81%	42.277
Perth Focused	40.72%	25.13%	8.733	2.642	57.88%	16.409
Brisbane Focused	39.65%	16.62%	9.152	2.571	50.67%	16.071
SE Queensland Focused	27.84%	14.30%	2.780	3.014	53.93%	23.427
Melbourne/Sydney	63.83%	44.70%	21.648	2.271	41.26%	6.516
Adelaide Focused	51.65%	35.41%	6.332	2.492	59.21%	14.324

Itineraries that focus on major cities, in particular cities that acted as air transportation hubs, tend to have higher betweenness centralizations. That is, the central destinations in these itineraries controlled more travel flows than in resort-focused itineraries. The betweenness centrality score is consistent with the profile suggested by the trip index, that is, for every itinerary, the destination with the highest betweenness centrality is also the one with the highest trip index. To this extent, the clusters are validated by the assortment measures.

As discussed in Chapter Three and Chapter Five, literature on bipartite networks suggests clustering coefficient of the association matrix (i.e., projected unipartite product network) be used as a typological measure for comparison structures of networks. An obstacle to the application of such an idea is the scarce knowledge available on the driving mechanisms. From observations of the itinerary assortments, it seems to be that the more complementary pairs contained in an assortment (in this case the itinerary), the higher the clustering coefficient of the whole network would be. Substitutive product pairs are less likely to be included in one assortment, and therefore there would be fewer links in the association network between these pairs.

6.6.4 Core Structures of Assortment in Each Itinerary Segment

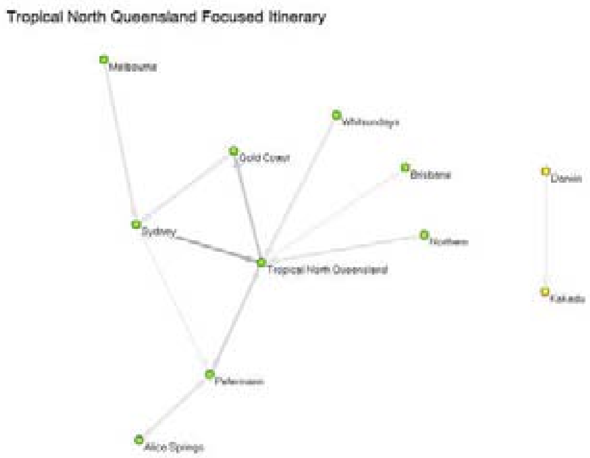
Comparing the cluster results of the extended sample and the limited-in-scope sample drawn from IVS 2000, structural patterns of the collective assortments derived from the yearly sample are more in line with the patterns expected from the member destinations of the itineraries. In particular, the structural cores are more concentrated on the destinations where the majority of time was spent. The structural cores in this case are identified through dense ties and islands. In other words, for the smaller clear cut sample, the dense ties are more concentrated and there are fewer islands in each itinerary network. This on the one hand suggests the viability of assortment measures, in particular the structural measures for validating segments; on the other hand, it implies that reason of visit and travelers with extremely extensive trips could influence the assortment patterns, and as a result, make the distinguishable property less dominant.

The final graphs of the dense cores of each itinerary are from the overall multi-destination trip sample. The reason for using these graphs instead of those derived from yearly data is that by incorporating a little more complexity, side effects can be detected without losing the key information.

The following figures show the densest parts/subnetworks in the sequence networks of the common itineraries. As described in Chapter Five, these subnetworks are obtained through the Island detection procedure in the software program Pajek.

6.6.4.1 Tropical North Queensland Focused

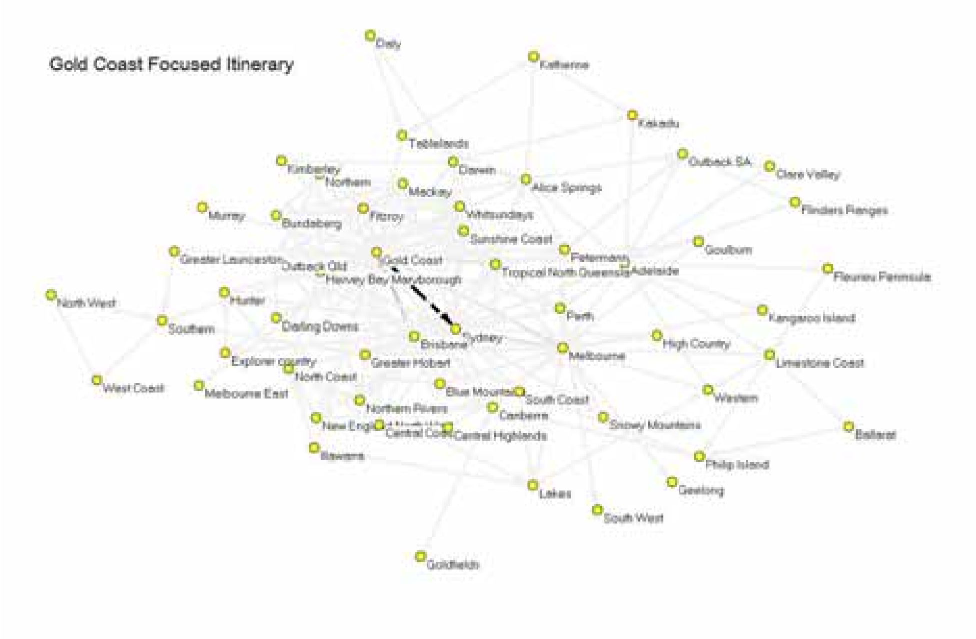
Figure 6-4a: Islands in the Tropical North Queensland Focused Itinerary



6.6.4.2 Gold Coast Focused

With the highest clustering coefficients (26.666 and 66.602 for sequence and association respectively) among all itinerary segments, the “Gold Coast Focused” trips created a large strong component with a highly intensive connection between Gold Coast and Sydney.

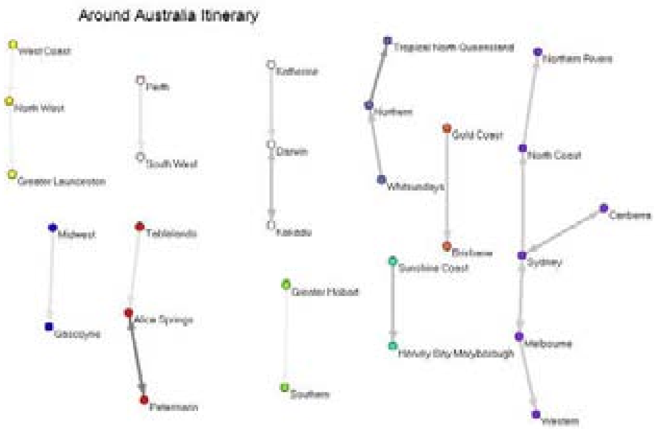
Figure 6-4b: Islands in the Gold Coast Focused Itinerary



6.6.4.3 Around Australia

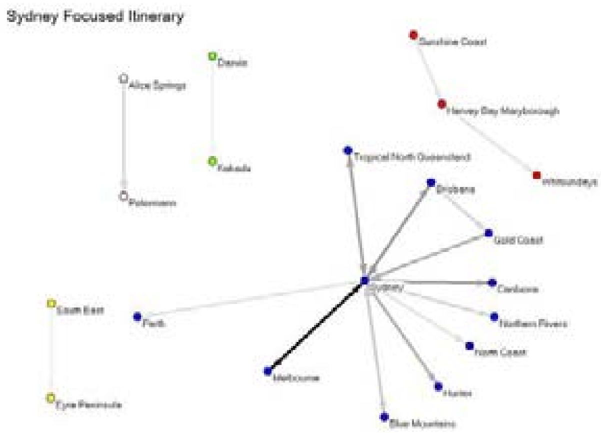
This reflects a chain-like spatial pattern of trips. A possible modification to the Lue et al. (1993) model is that the chaining pattern actually might have a lot of locally dense parts that are bridged by structural brokers. One minor pattern in the "Around Australia" network is that related to Canberra. Appeared as a pendant to Sydney in the middle of a chain, the trip to Canberra could be an en route trip.

Figure 6-4c: Islands in the Around Australia Itinerary



6.6.4.4 Sydney Focused

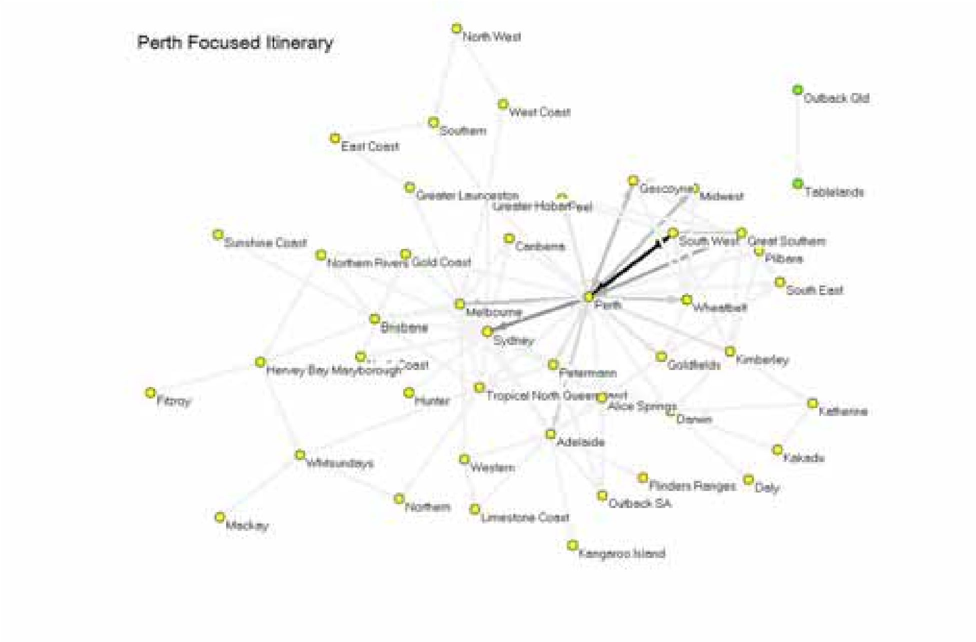
Figure 6-4d: Islands in the Sydney Focused Itinerary



6.6.4.5 Perth Focused

In this itinerary, Perth connected the destinations in the western part of Australia into a big component.

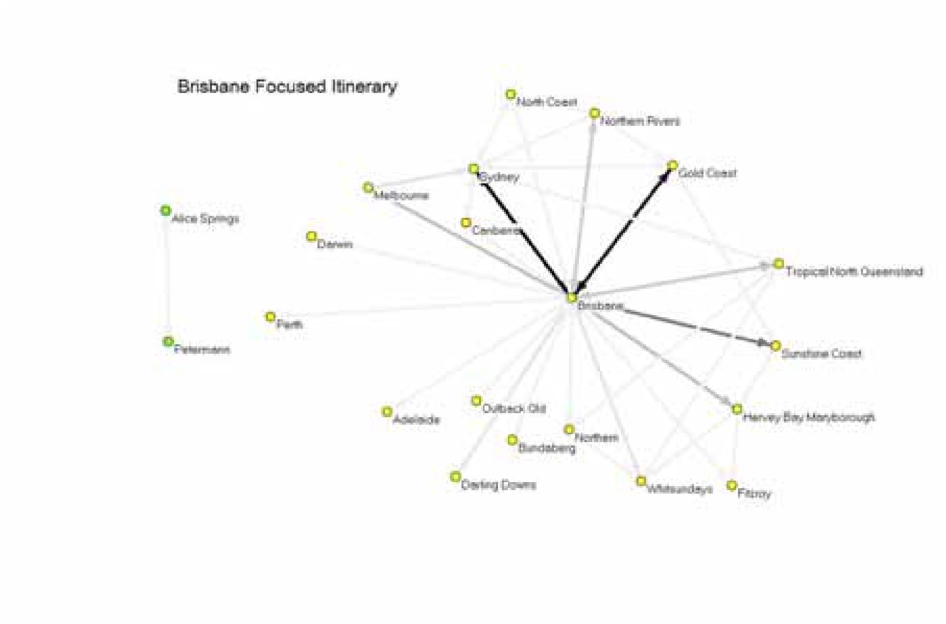
Figure 6-4e: Islands in the Perth Focused Itinerary



6.6.4.6 Brisbane Focused

In this itinerary, Brisbane seemed to the transition hub for the tourist resorts in Queensland, Australia and a link to some other major cities such as Darwin, Perth, and Adelaide. Also in this itinerary, Darling Downs of Queensland was a major destination for visit besides those generally popular ones.

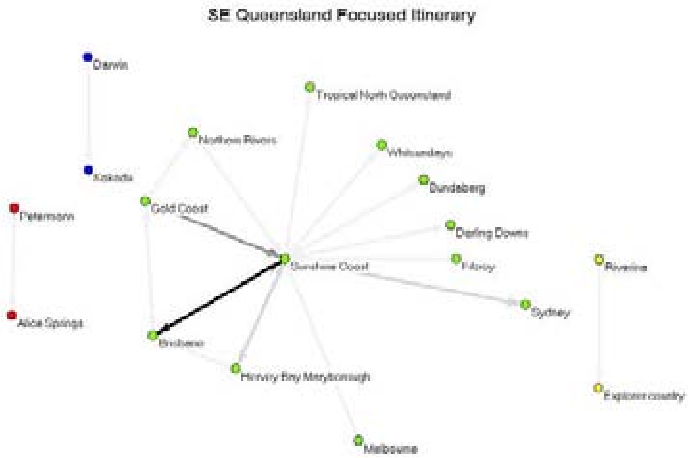
Figure 6-4f: Islands in the Brisbane Focused Itinerary



6.6.4.7 Southeast Queensland Focused

Brisbane has been used as the main gateway to Sunshine Coast, the core destination in this itinerary. Again, travelers who spent a lot of time in a place (in this itinerary, Sunshine Coast) tended to use the place as the base camp.

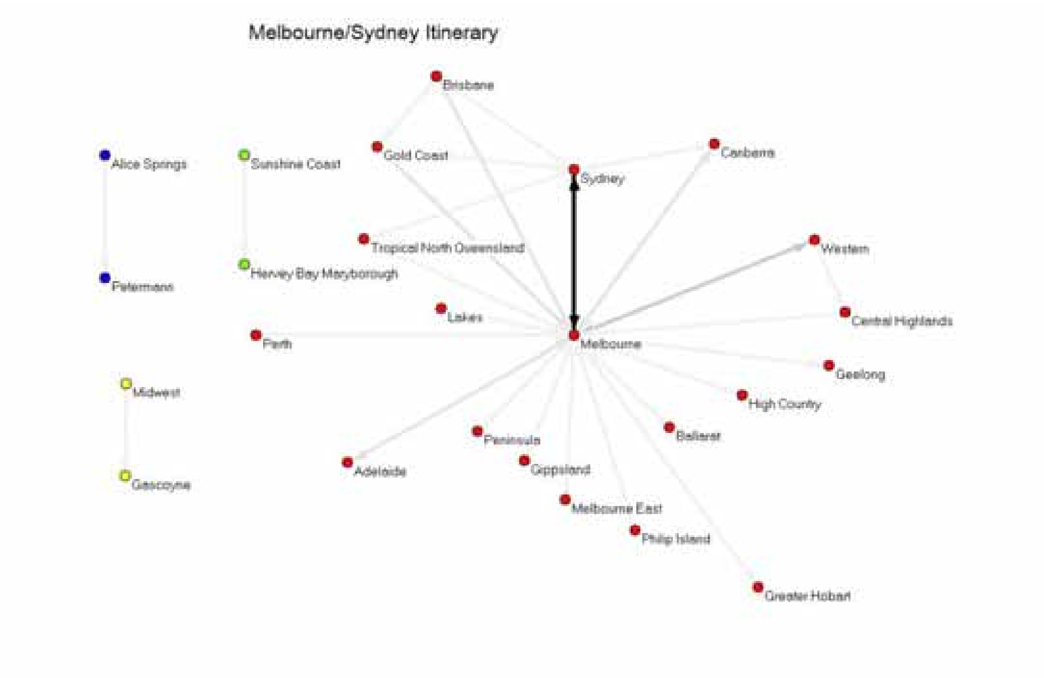
Figure 6-4g: Islands in the SE Queensland Focused Itinerary



6.6.4.8 Melbourne/Sydney

There are triangles among major cities, and at the same time, Melbourne acted as the base camp for tourist resorts in Victoria. Lakes, Peninsula, Gippsland, Melbourne East, Philip Island, Ballarat, High Country, Geelong, Central Highlands, and Western are all locations in the state of Victoria.

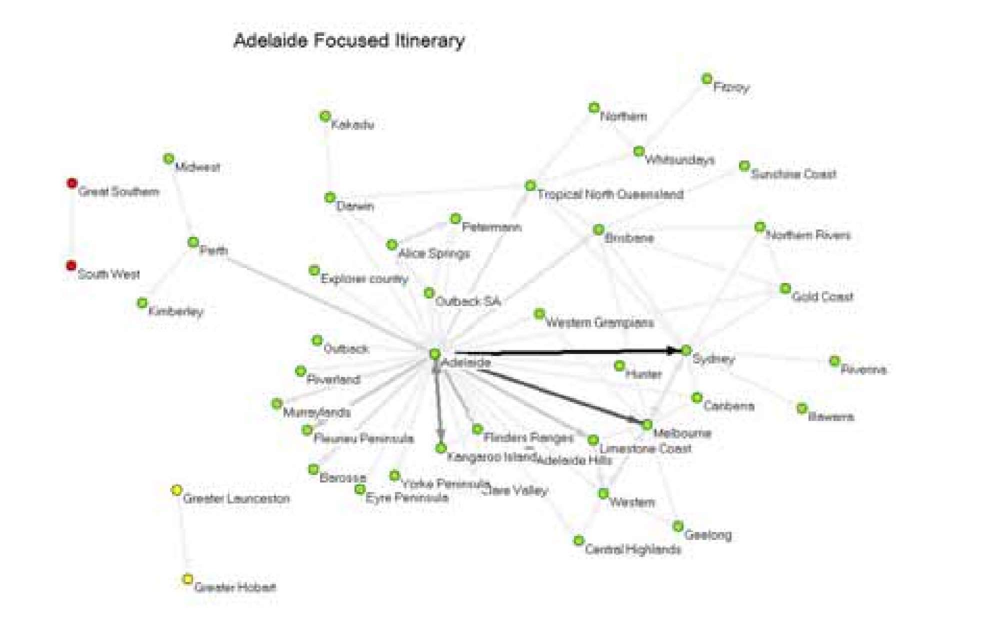
Figure 6-4h: Islands in the Melbourne/Sydney Itinerary



6.6.4.9 Adelaide Focused

The two densest links are the links from Adelaide to Sydney and Melbourne, respectively. What appeared in the assortment measure approach but not in the trip indices of the itinerary are the smaller attractions around Adelaide. The role of Adelaide as a base camp is apparent.

Figure 6-4i: Islands in the Adelaide Focused Itinerary



6.7 Summary

In this chapter, assortment properties are examined across segments derived from different segmentation approaches. The relational properties of assortment provide a viable way of validating segments defined with exploratory quantitative techniques, in particular the cluster analysis.

The results also provide tentative empirical supports for the theoretical typology developed by previous researches (Lue et al. 1993). Base camp trips appeared to be the most popular way of organizing visits to places surrounding the focal destination, while trip chaining pattern had been used mostly for multi-state trips. Highly connected cliques were likely to take place in regional tour pattern, in particular in the states rich of tourist resorts.

It is supported that assortment measures can be used in differentiating and validating segments in the marketing system. In return, segmentation approaches are useful in identifying influential factors for assortment patterns as described by the proposed measures.

CHAPTER 7: ANALYZING AUSTRALIAN TOURISM MARKETING SYSTEM 1999-2001 USING ASSORTMENT MEASURES: A TENTATIVE LONGITUDINAL EXPLORATION

7.1 Introduction

A substantial contribution of the assortment study is to help understand and track the evolution of marketing systems. Thus, besides cross-sectional comparison of measures of assortment, longitudinal analyses of such measures are considered.

Section 7.3 presents a comparison of popular itineraries in 1997, 1999, 2000, and 2004. Secondary data are acquired for itineraries in 1997, 1999, and 2004. Yearly data from the sample of this study are considered for comparison purpose. Specifically, from respondents who have been interviewed in 2000 by IVS, a sub-sample is drawn of those Holiday, VFR, and Business travelers who visited two to ten distinct stopover regions in Australia. These two screening criteria are applied for comparison with similar samples of international visitors in IVS 1997 (Tideswell 2001, 2004), 1999, and 2004 (Collins 2006).

Except for the yearly data used in Section 7.3, quarterly assortments are used in Section 7.4 and Section 7.5 for analyzing the promotion effects of the 2000 Sydney Olympics and the influences of other factors such as the seasonal effect. Using quarter as the unit of time provides an opportunity to examine the extent of measured change in acquired assortments and gain an insight into the evolution of the tourism marketing system subjected to a massive promotional shock (the 2000 Sydney Olympics), in relation to marketing campaigns, economic factors, cultural factors, and other drivers.

7.2 Theories of Change in Assortment Patterns and Evolution of Tourism Marketing System

Short-term assortment pattern change and long-term evolution of the system are both relevant to players in and administrators of the marketing system. Existing theories that conceptualize or explain these changes are quite fragmented. However, as this section shows, they do provide some viable insights in exploring longitudinal changes in assortments and their implications for the understanding of the marketing system.

7.2.1 The Resort Life Cycle

As a foundation for analyzing evolution of destinations, a conceptual model of resort cycle was raised by Butler in 1980 and has later on been confirmed through longitudinal studies. According to Butler, six stages can be distinguished in the evolutionary path of a resort tourist area. These six stages are marked as exploration, involvement, development, consolidation, stagnation, and post-stagnation that may be either decline or rejuvenation. Two types of parameters are used to define the stages in Butler's model, namely visitor numbers and infrastructure. Studies are divided into two streams based the resort cycle. One branch is to evaluate the applicability of such a model to different destinations (e.g., Agarwal 1997); the other, however, tends to use it as an assumption for investigation of propositions related to other fields of inquiries such as corporate strategy (e.g., Debbage 1990).

Although it is not without problems, the resort cycle remains to be a valid framework for evaluating aggregate patterns of destination visits in the long-run, and it is helpful in explaining why destinations are added or deleted from what will be available to tourists.

7.2.2 External Factors on Changes of Assortment Patterns

Firm strategies as well as marketing campaigns are external influences on the assortments acquired by customers. They are external relative to the characteristics of customers. At a higher level, factors external to the focal exchange set of the marketing system could also change the pattern of assortments and lead to evolution of the system. The former are normally activities initiated by suppliers. The latter, on the other hand, include changes in contextual elements, which may be subject to the social, technological and institutional environments.

Among all the contextual elements of the destination assortment, transportation infrastructure is the closest to what exemplifies the structure of viable linkages in a given focal tourism marketing system. Although transportation infrastructure is normally considered as relatively fixed or largely constrained, it could contain relational/positional properties, for example the centrality of a place, that can vary according to geometry and transportation-building (Fleming and Hayuth 1994). To this extent, the evolving structural relationship of destinations may be moderated by policy influences, innovations in transportation modes, and price adjustments brought by the transportation sub-sector.

Previous studies found that corporate strategies have significant impacts on the evolution of tourism destinations. For example, Debbage (1990) emphasizes the importance of suppliers' strategies at later stages of resort life cycle, pointing out that imperfect competition may have a major role in determining whether a resort would decline or rejuvenate. The argument is supported by the empirical investigation of the Paradise Island resort cycle, which is also in line with the increasingly oligopolistic structure of the international tourist industry by that time.

7.2.3 Innovation as a Reason for Diversity in Assortments

The dynamics of innovation and the marketing system have always interested researchers. A possible way of examining their relationships is through assortment patterns.

Intuitively, innovation should have an important role in shaping marketing systems from both the supply and demand sides. Through product innovation of firms, new choices could be added to the available assortments in market, while under other less radical situations (with more incremental improvements) old components in an assortment could be modified or enhanced. At the same time, equipped with innovations in searching techniques, consumers can not only find much more precise reflections of their needs in the market, but also participate in co-creating the products through interactions with suppliers (Vargo and Lusch 2004).

Stamboulis and Skayannis (2003) describe an interactive learning process for the evolution of the tourism industry, where information and communication technology is a driving force for changing power relationships or structures. According to them, the proliferation of destinations and services result partly from the flexibility tourists gained and their willingness to explore alternative activities instead of the conventional mass tourism. The transformation of the tourism industry, especially transformation of the intermediaries, however, is most likely a response to tourists' initiatives and demands.

Contrary to intuitive speculations, innovation, or even product innovation, as referred in research traditions, seems to have little to do with the growing abundance and variety of products seen in the tourism market. Hjalager (2002) gives several example of product innovations in tourism. These are: loyalty programs, environmentally sustainable accommodation facilities, and events based on local traditions. None of them can be directly related to the variety of products. What can be implied is that evolution of assortments caused by innovation is subtle and gradual and will probably be very difficult to capture in a short period of time.

7.3 Change of Itinerary Patterns 1997-2004

Depending on the length of the time period included for the examination of the marketing system, short-term or long-term implications of assortment change can be explored. The dataset of this study only contains eight quarters, so the short-term effects would be the focus of analysis in this chapter. Despite the short-term focus, a tentative analysis of a longer time evolution of destination assortments is conducted using information from published sources. The aim is to lay out a brief background for the focal analysis.

In Chapter Six, nine common itineraries undertaken by the respondents are discovered through cluster analysis on the basis of trip indices of destinations. The common itineraries are treated as segments, and therefore assortment measures are applied on them for cluster validation and pattern detection purposes. Though it is suggested that the measures proposed are better indicators for pattern comparisons, arguably, at least in the context of tourism marketing system, itineraries are themselves types of assortments and changes in their positions in the marketing system over time are of interest.

7.3.1 Sources of Itinerary Information Over Time

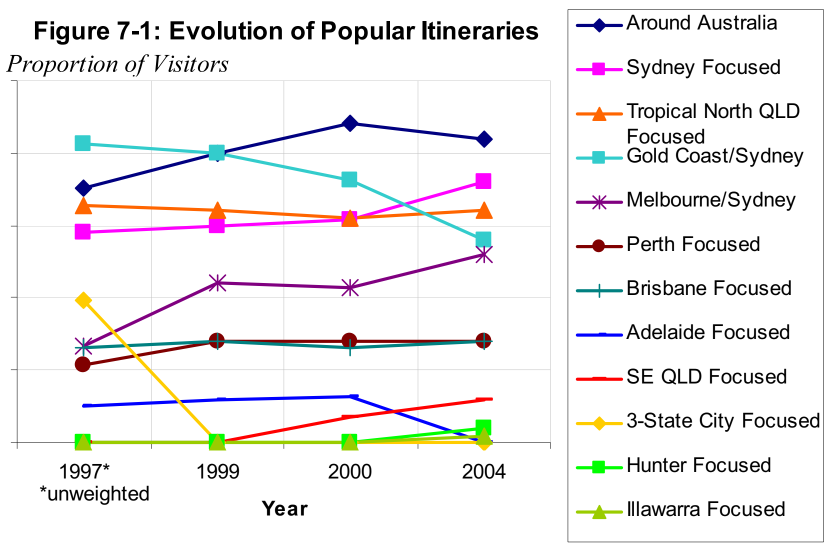
With information drawn from different sources, the itineraries of tourists in Australia in years 1997, 1999, 2000 and 2004 are defined. The 1997 itineraries come from results reported by Tideswell (2001, 2004); popular itineraries in 1999 and 2004 are summarized by Collins (2006); and finally the 2000 clusters are calculated by the author using similar techniques. Itinerary information of all four years can be found in Appendices F-I. The comparison is considered appropriate since these itineraries are based on the same type of data source, the International Visitor Survey of Australia, and literally use the same clustering approach. Moreover, the itineraries are highly consistent over the years in terms of the member destinations and their trip indices.

These results provide an opportunity to make an exploratory examination on the evolution of the system level assortment.

7.3.2 Comparison of Common Itineraries in 1997, 1999, 2000 and 2004

Figure 7-1 illustrates the emergence and disappearance of the common itineraries over the years. Popularity of the itineraries is measured by the proportion of visitors. Following Collins (2006), except for the 1997 itineraries where certain information is unavailable, weighted data are used so that the proportion is based on the estimation of real number of visitors rather than the sample figure. Originally in Chapter Six, leisure travelers and business travelers were both included for cluster analysis. The inclusion is justified as the clusters converge almost perfectly. In this section, to make the comparison more rigid, business travelers are deleted from each itinerary group before the popularity proportion is calculated.

Figure 7-1: Evolution of Popular Itineraries



As suggested by the proportion of visitors, the seven most popular itineraries, namely "Around Australia", "Sydney Focused", "Tropical North Queensland Focused", "Gold Coast/Sydney", "Melbourne/Sydney", "Perth Focused", and "Brisbane Focused" are relatively stable over time. In contrast, the less popular ones are more dynamic, with some new itineraries emerging and some disappearing.

Interesting changes seemed to have taken place in 2000. Specifically, all the three itineraries with a major involvement of Sydney encountered a change in popularity (or market share), which carried on to 2004. The “Melbourne/Sydney” itinerary’s position strengthened, so did the position of the “Sydney Focused” itinerary. The loser seems to be the “Gold Coast/Sydney” itinerary, which is holiday-oriented (in 2000, 91.5% are holiday visitors) and package-dominated (in 2000, 80% of visitors who took this itinerary arrived in Australia on a package, the highest of all clusters).

Another interesting itinerary is the “SE Queensland Focused” cluster, which was not found in the 1999 itinerary summary. According to the IVS data, the time when this itinerary first gained popularity, as measured by the proportion of visitors, was roughly during the 3rd quarter of 2000, when the Sydney 2000 Olympics took place.. The itinerary is dominated by the Sunshine Coast, Queensland, a region where part of its attractive current accommodations was transferred direct from the Sydney 2000 Olympics Village. It could be that these facilities and the promotion effect of the Sydney 2000 Olympics have together driven up the popularity of this itinerary.

7.4 The Promotion Effect of the 2000 Sydney Olympics

An important influencing factor on the changing patterns of tourism assortment to be explored is the 2000 Sydney Olympics. The Olympic Games is a major event to any host country, especially to the country’s tourism industry. From the marketing systems point of view, it also serves as a major external change in the environment. Similar to that of an ecosystem, where a particular change in environmental conditions may increase the diversity of one subset of organisms within a community while decreasing the diversity of a different group of organisms, diversity in some assortments may rise while that in other assortments may drop. Huston argues “it is virtually impossible to understand variation in the total number of species in a community unless changes in the major functional groups of species can be understood" (1994, p. 8). The same idea can be applied in analysis of marketing systems, that is, in trying to understand how the concept of assortment works in the general society by exploring its role and changes in sub-systems.

The implication of the 2000 Sydney Olympics is different to other situations of promotion as it actually creates awareness of a widely demanded destination. As a very special big event, the Olympics can be considered a promotion without economic incentives to the customers but has implications for the infrastructure of the marketing system. Similar situation could be found in other marketing systems, for example, the launch of a new product category in the retailing settings. As a result, the relational features are of particular interest when evaluating the promotion effects.

Though the key destination involved in this event is Sydney, it is reasonable to expect that other destinations might also be influenced to a more or less extent. Similar situations have been observed in other marketing systems (Ramanathan and Dhar 2010). For example, Mulhern and Padgett (1995) find that more than three-fourths of shoppers specifically seeking to redeem a promotion purchased one or more regularly priced items and spent more money on such items than on the promoted ones.

Besides their effect on the system and individual destinations, the influence of promotion activities can also be differentiated at segment level. Bucklin and Gupta (1992) find that for segments based on purchase histories, the promotion activities are sensitive to some segments, but not to others.

In the following discussion, the influence of the 2000 Sydney Olympics is assessed with two diversity measures—variety and balance—and then the relational properties. These are looked at quarterly in order to pick the impacts of the Olympics. The section concludes with the effects from the perspective of segments and individual destinations.

7.4.1 Olympics Effect on Diversity Measures

Table 7-1 summarizes the average variety in and balance of the quarterly assortments. The balance is calculated using the stopover volume (sales) share data. In the quarter when the Olympics took place, the average number of distinct places visited was significantly lower than that in the rest quarters. Statistical evidences are found in both ANOVA test (F = 16.020, p < .001) and Post Hoc Comparisons (for all the pairwise comparisons involving Quarter 3 in 2000, the mean differences are significant at p = .05 level). Moreover, the quarters right before and after the Olympics also saw visitors including fewer destinations in their trips compared to other quarters.

Table 7-1: Variety and Balance of Quarterly Assortments

QUARTER	***99Q4***	***00Q1***	***00Q2***	***00Q3***	***00Q4***	***01Q1***	***01Q2***	***01Q3***
Variety	2.54	2.69	2.37	2.17	2.36	2.65	2.56	2.74
Balance	3.296	3.345	3.265	3.129	3.226	3.368	3.320	3.313

Scope of destinations included at the system level was also affected by the Olympics event. As shown by the balance measure, the scope of destinations visited in Quarter 3, 2000 was less diversified than that of other quarters. Despite the influence of the Olympics, the balance of the acquired assortments in the remaining quarters is quite stable over time.

The discovered effects of the Olympics on the number of distinct places visited and the extent of diversification in the scope of destinations chosen are not at all surprising. In fact, it is expected that a significant portion of visitors arrived during that period were attracted by the Olympics, therefore the visitation would be more concentrated.

7.4.2 Olympics Effect on Relational Measures

Of the six relational measures reported in Table 7-2, three seem to have picked up the

Olympics event. Particularly, Quarter 3 in 2000 stands out from all quarters on the average path length of the sequence network and degree centralization of both sequence and association matrices.

Table 7-2: Relational Measures of Quarterly Assortments

	99Q4	*00Q1*	*00Q2*	*00Q3*	*00Q4*	*01Q1*	*01Q2*	*01Q3*
Sequence Network								
Degree Centralization	50.15%	52.43%	56.36%	41.24%	52.86%	51.93%	49.40%	49.70%
Betweenness Centralization	18.63%	15.43%	25.96%	25.15%	24.46%	20.57%	20.01%	22.90%
Clustering Coefficient	7.500	7.387	8.665	8.628	8.488	8.348	8.512	11.193
Average Path Length*	2.203	2.079	2.24	2.338	2.259	2.206	2.301	2.228
Association Network								
Degree Centralization	35.55%	28.99%	41.77%	47.14%	36.98%	36.28%	40.66%	39.00%
Clustering Coefficient	20.079	14.103	15.249	17.840	15.877	15.481	21.875	26.601

*Among reachable pairs

The sequence network of the assortment became less concentrated during the Olympics season (41.24%). Normally a drop in degree concentration of the sequence matrix can be explained through two scenarios: the first is that the centrality score (i.e., nodal degree) of the most centered nodes drops significantly while relatively small change takes place for the rest of the nodes; the second, on the other hand, suggests a relocation of ties among the nodes so that the nodal degrees become more evenly distributed. In the case of the Olympics, it seems more likely that the situation has followed the first scenario. An examination on Sydney's centrality score over the quarters confirms the theory. In particular, the nodal degree of Sydney dropped to the lowest during the Olympics season, while its share of degree actually reached the highest among all quarters (Table 7-3).

Table 7-3: Degree Centrality Scores of Sydney, by Quarter

	99Q4	*00Q1*	*00Q2*	*00Q3*	*00Q4*	*01Q1*	*01Q2*	*01Q3*
Degree Centrality	57	63	54	45	54	56	54	58
Share of Degree	0.041	0.042	0.044	0.047	0.043	0.039	0.042	0.043

The average path length feature in the sequence network, in the context of the Olympics effects, is consistent with the degree centrality distribution of the same network. Because of the drop in centrality score of the most popular destinations (hubs), some nodes lost their direct links to the hubs, so it is more difficult to find a short path between pairs of nodes; as a result, the average path gets longer (2.338). Generally, extensive usage of effective hubs in a network would have positive effects on the efficiency of the network in terms of reachability between its nodes. This suggests that in certain contexts, such as the destination assortments in the tourism marketing system, average path length can be used as an indicator for efficiency of the system. The lower the average path length, the higher the efficiency of the system becomes for the connection between any pair of its nodes.

Degree centralization in an association matrix deals with the possibility of locations being included in a multi-destination trip. As discussed in earlier chapters, to some extent, degree centrality of association shares a similar conceptualization with the closeness centrality in the sequence matrix. Particularly good is that in contexts where the sequence measure is not applicable or applicable but obscure for observation and meaning, the degree centralization of the association matrix provides a measure for efficiency of the system. High degree centralization in the association matrix suggests that a large portion of multi-item individual assortments (e.g., shopping baskets, books checked out from the library in one occasion, multi-destination trips, etc) have included one or more of a few popular items, such as Sydney and Melbourne in the context of this study. The Olympics might have encouraged cancellation of certain direct links between Sydney and other places, but it definitely hasn't impacted the city's popularity among international visitors, on the contrary, the popularity of Sydney had actually increased among multi-destination travelers.

7.4.3 Exploring the Promotion Effect on Individual Destinations

Discussions in Section 7.4.2 suggest a closer look on individual destinations for the impact of the 2000 Olympics would be necessary. Literature on promotion and multi-category choices generally argues that the influence of promotion is not limited to the category under promotion, but would probably extend to other categories as well. At the same time, positions of individual destinations in the trips would also be of interest to the event organizer, the government, and participants in the industry. Hence, besides Sydney, which was the main site hosting the 2000 Olympics, several other destinations are also included in the examination of the Olympics effect.

7.4.3.1 Market Share

A simple but widely used descriptor of the position of a product is its market share. Although market share is not an assortment measure, one of the proposed diversity measures – balance – does have a mathematical relationship with market share. As defined in Chapter Three, denoting p_i as the market share of product *i*, the entropy measure of balance can be calculated as

$$B = -\sum p_i \ln p_i$$

If indeed the Olympics would have some promotion effects on the destinations involved, then it is expected that there would be some changes in the market share of destinations due to this big event.

For a glance at the overall effect, Figure 7-2 shows the market share change of each destination by dividing the eight quarters into three periods: Before Olympics (the three quarters before Quarter 3, 2000), During Olympics (Quarter 3 and Quarter 4 in 2000), and After Olympics (the three quarters in 2001). As depicted in Figure 7-2(a), the average market share of five of the six most popular destinations increased during the Olympics period. The biggest benefiters seemed to be Sydney (No. 1 in the market share ranking of all quarters) and Tropical North Queensland (No. 4 in the popularity ranking), followed by Perth and Brisbane. Another gateway city, Darwin in Northern Territories, also showed a major positive shift in market share during the Olympics season. Although many destinations were affected negatively, the concentration of positive effects on the most popular ones is the system structure change underlying the decrease in balance measure as mentioned earlier in Section 7.4.1. The question then is: is this immediate reaction a lasting effect?

Comparison of average market share after the Olympics and before the Olympics shows a quick rebound of the Olympics effect, as shown in Figure 7-2(b). Although Sydney remained and probably would continue to be the most popular of all destinations, it did lose part of its market share to other destinations. So far, the biggest winner seemed to be Tropical North Queensland, which retained most of its market share gain from the Olympics effect (Figure 7-2(c)). Other impacts not included, such as the infrastructure enhancement and awareness of the country, the lasting influence of the Olympics on most of the destinations, in particular those less popular ones, was small.

Figure 7-2 (a): Change of Market Share During Olympics Compared to Before Olympics

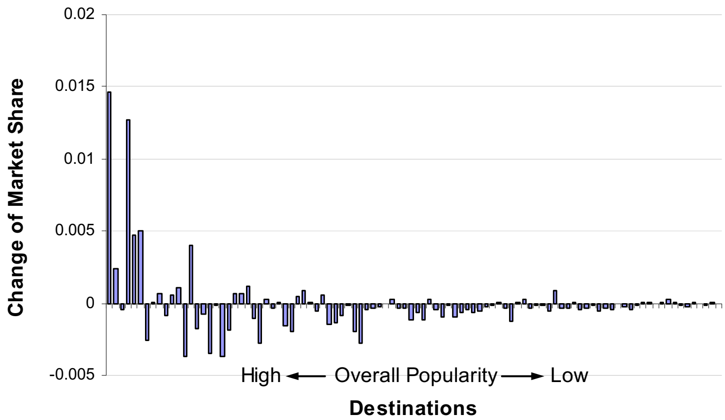


Figure 7-2 (b): Change of Market Share After Olympics Compared to Before Olympics

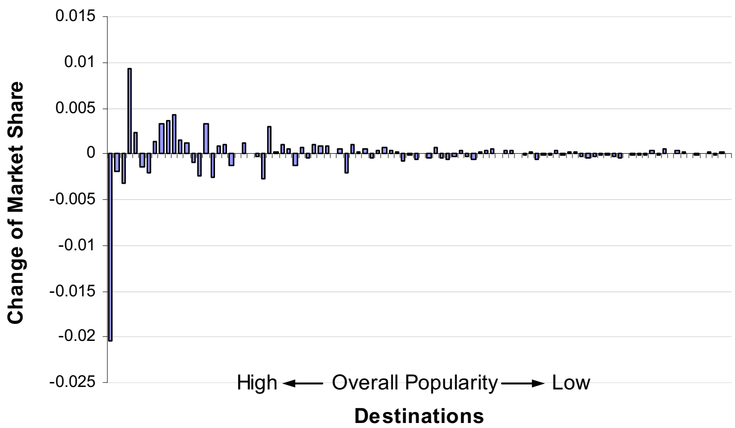
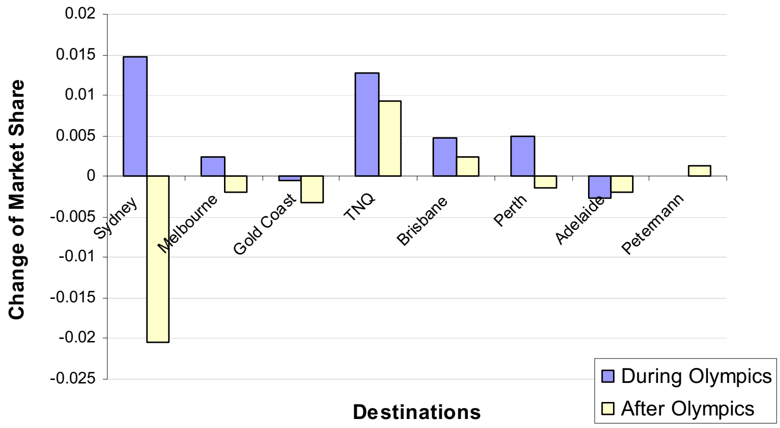


Figure 7-2(c):The 8 Most Popular Places, Market Share Change (Compared to Before Olympics)



To understand a little more about why some destinations benefited more than others from the promotion effect of the Olympics, eight destinations with the highest overall market share during the research period are used for a closer examination. In the order of their overall popularity, the eight destinations are: Sydney (New South Wales), Melbourne (Victoria), Gold Coast (Queensland), Tropical North Queensland (Queensland), Brisbane (Queensland), Perth (Western Australia), Adelaide (South Australia), and Petermann (Northern Territories). Besides their undoubted importance, the reason of including only the top eight most visited destinations is that the list is stable and simple enough for the data-crowded procedures. Particularly, these eight destinations were also the most popular ones in each quarter.

A preliminary observation on various aspects of the eight selected destinations is that compared to single-destination trips, multi-destination trips seemed to be more responsive to the Olympics stimuli in terms of which destinations were chosen. In particular, based on information from multi-destination trips, at least three destinations have shown a peak market share during the Olympics period, while no such pattern is detectable from single-destination trips. The three destinations are Gold Coast, Brisbane, and Tropical North Queensland. Interestingly, all three destinations belong to Queensland, a state with known reputation for hosting famous tourist resorts such as the Great Barrier Reef.

Although no firm conclusion can be drawn at this moment on to what extent and why multi-destination trips and tourist-oriented destinations were more responsive to the Olympics than their counterparts, the observations do suggest two possible directions for future investigation. The first is a typological distinction between destinations according to their responses to internal and external drivers. For example, as presented in Figure 7-3, the pattern of Sydney's market share along different levels of travel extent (i.e. variety-in-trip) apparently differs with that of Tropical North Queensland (Rationale of decomposing the overall market share along the variety-in-trip level is discussed in Chapter 8). The second is a further understanding of individual destinations' responses through the assortment measures that focus on multi-destination trips – that is, the relational measures. Section 7.4.3.2 discusses the patterns in association rule change induced by the Olympics.

Figure 7-3(a): Sydney, Decomposed Market Share

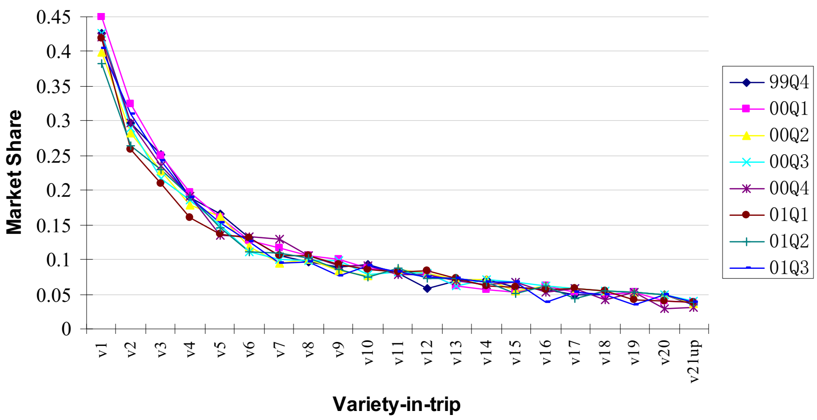
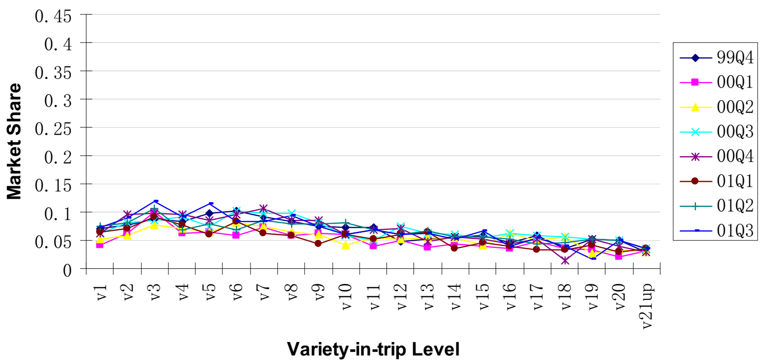


Figure 7-3(b): Tropical North Queensland Decomposed Market Share



7.4.3.2 The (O-E)/E Index

In Chapter Five the (O-E)/E Index was introduced to measure the magnitude of deviation of the association matrix from the independence model. It would be interesting to know whether the 2000 Olympics had an impact on the deviation pattern. Based on the quarterly association matrices, three 98-by-98 matrices are constructed with the value in their cells representing the deviation index in periods before, during, and after Olympics respectively. To avoid information overloading, the focus will still be on the indices related to the top 8 most frequently visited destinations.

Like the association matrix on which it based, the (O-E)/E index also measures a type of pairwise relationships among destinations—that is, to what extent a pair appears more or less frequently than their independence allows. Using the eight most popular destinations, the pattern of the (O-E)/E indices before the Olympics is shown in Figure 7-4(a), followed by a comparison of the change took place during the Olympics seasons (Figure 7-4b) and a longer term effect (Figure 7-4c). It seems to be that almost all the (O-E)/E indices were negatively influenced during the two quarters when the Olympics were held. The longer-term effect, as shown by the change of the indices after the Olympics compared to those before the event took place, seems to be a mixture of negative and positive influences on different pairs of destinations. The overall magnitude of the longer-term effect was also larger than that during the Olympics.

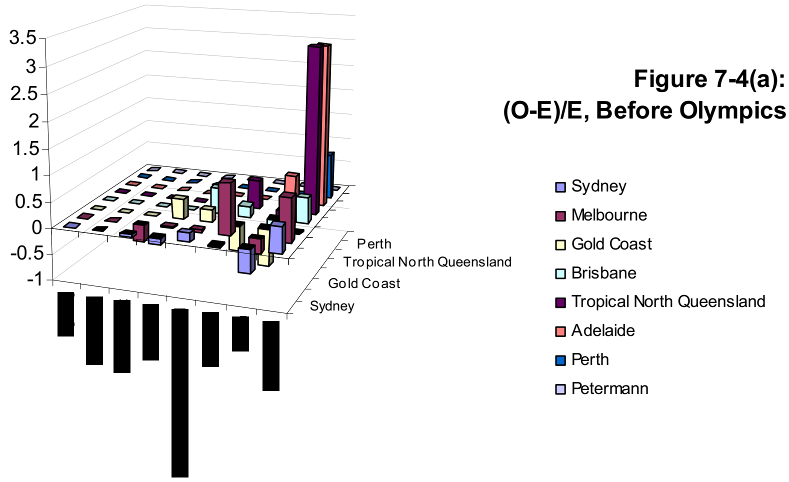


Figure 7-4(a): (O-E)/E, Before Olympics

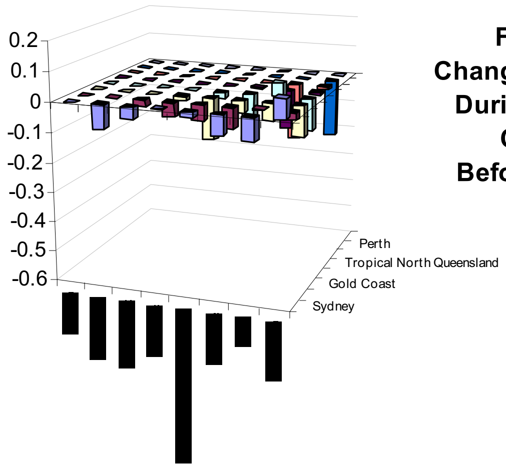


Figure 7-4(b): Change of (O-E)/E, During Olympics Compared to Before Olympics

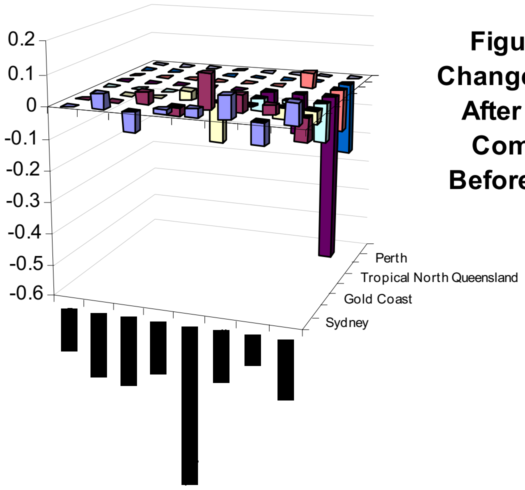


Figure 7-4(c): Change of (O-E)/E, After Olympics Compared to Before Olympics

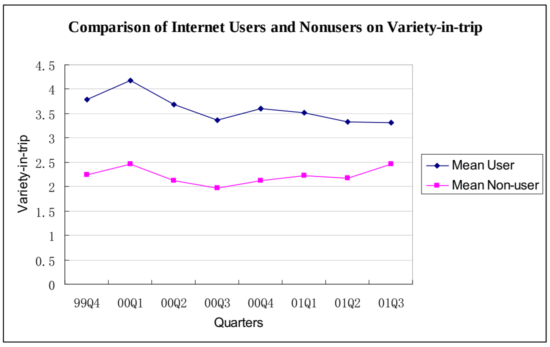
How did the patterns of (O-E)/E Indices differ at the period before, during, and after the Olympics? Were the effects path-dependent? To answer these questions, a set of statistical significance tests are carried out on the whole system (i.e., all the destinations instead of the top eight) according to the directions suggested by the aforementioned observations. In particular, Quadratic Assignment Procedure (QAP), a statistical technique based on permutations of the data set (Hurbert and Golledge 1981), is adopted for the analysis using the network analysis software UCINET (Borgatti, Everett, and Freeman 2002). Compared to other techniques, QAP is more suitable for the test of significance on structural similarities between networks (Krackhardt 1987; Krackhardt 1988).

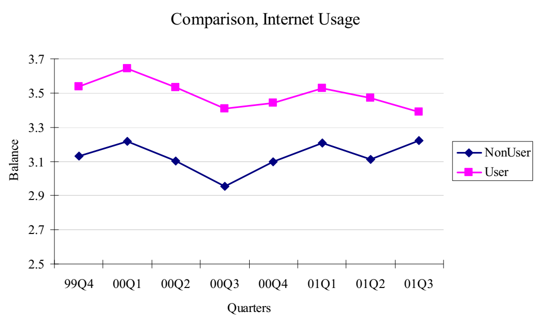
As the results of the QAP correlations show, there was some consistency in the structure of deviation from independence magnitude of all destinations over the time. The evidence is that the patterns of (O-E)/E indices were significantly correlated to each other. The Pearson correlation coefficients are 0.419, 0.351, and 0.214 for the pairs of After Olympics/Before Olympics, During Olympics/Before Olympics, and After Olympics/During Olympics, respectively ($p < .001$). On the other hand, though all the three correlations are significant, patterns in the time period before the Olympics and the period after it are more consistent with each other than with the pattern of the Olympics seasons. The tourism marketing system is relatively resilient even with the influence of a big event like the Olympics. The change that did take place, operationalized as the difference matrix between the After Olympics matrix and Before Olympics matrix, is highly influential to the resulting pattern after the Olympics (Pearson correlation coefficient = .791, $p < .001$), and is significantly affected by the pattern existed before the Olympics, though the influence of previous status in this case was mostly negative (Pearson correlation coefficient = -.343, $p < .001$)—that is, there was an effect of flattening the deviation from independence due to, at least partly, the Olympics. The correlation between the (O-E)/E matrix during the Olympics and the change is insignificant (Pearson correlation coefficient = .011, $p = .203$). The Olympics event indeed was a special time period with special patterns that would be gone once the event was gone.

7.4.4 Olympics Effect with Segmentation Variables

Based on the idea that promotions may affect some segments but not others, the Olympics induced longitudinal patterns in different assortment measures for different types of customer groups or segments are examined. Results of statistical tests on the Olympics effect in selected pairs of customer groups are included in Appendix J.

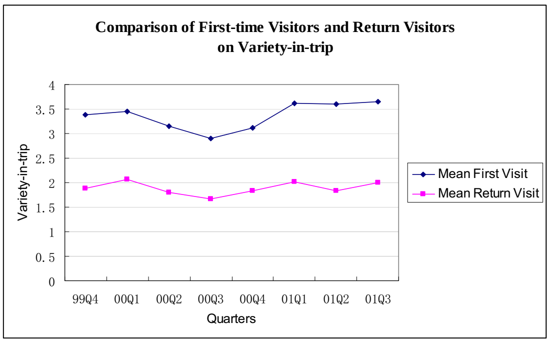
Figure 7-5: Comparison of Internet Users and Nonusers on Variety and Balance by Quarter

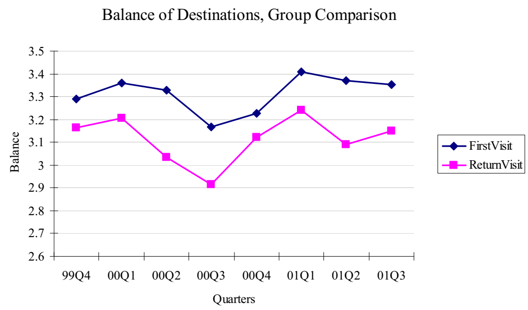




As shown in Figure 7-5, both Internet user and nonusers responded to the Olympics stimuli. The Internet users were consistently more diverse in their trips. However, the gap between Internet users and nonusers is narrowing down over the time. This trend has been reflected in both average variety-in-trip and balance. It may imply that although Internet usage has been found to be a major differentiator in destination assortments of international visitors to Australia, in the future the difference between users and nonusers may not be discernable. A possible explanation is the increased penetration of Internet in the origin countries of the visitors. An increase in proportion of Internet users in the sample may also have contributed to the observation.

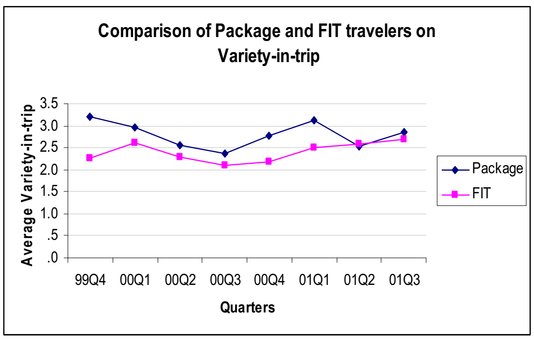
Figure 7-6: Comparison of First-time and Return Visitors on Variety and Balance by Quarter

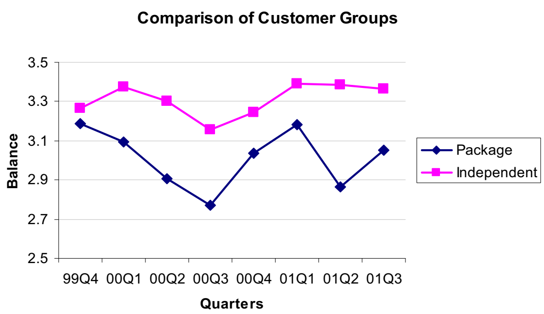




According to the average variety-in-trip, the response of first-time visitors to the Olympics was stronger than that of return visitors. That is, it is observable that the visitors who came to Australia for the first time during the Olympics season visited fewer places than the first-time visitors who came at the other quarters. It could be that the Olympics had actually been a major attraction to many of these first-time visitors. The Balance changes show similar patterns. During the eight quarters, first-time visitors traveled consistently more extensively in terms of the number of distinct places visited and the balance of their resulted system assortment was higher than that of the return visitors.

Figure 7-7: Comparison of Package and FIT Travelers on Variety and Balance by Quarter





Interesting patterns are found when comparing package travelers and independent travelers. First of all, the difference between the average numbers of distinct places visited of the two groups is not as big as that between Internet user and nonusers or between first-time and return visitors. Second, contrary to the other two pairs of partitions, where balance and average variety-in-trip are consistent in the direction of difference between groups, package travelers and independent travelers show an opposite relationship in the balance gap to that of average variety-in-trip. In other words, while package travelers normally had a higher average variety-in-trip than independent travelers, the assortment balance of package travelers was generally lower than that of independent travelers.

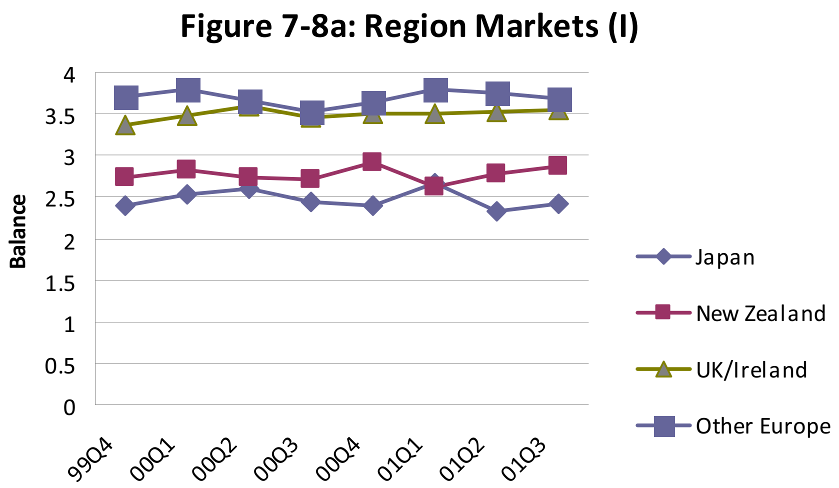
The observation has some further implications. In tourism literature, mixed results are found on the relationship between type of travel arrangement and extent of travel. However, these results are based on the commonly employed measure of travel extent, that is, variety (in this case, number of distinct places visited) or similar variables such as length of stay. As a result, the commonly used hypothesis on the relationship is that independent travelers are less constrained in their itineraries so they would visit more places. This could be a misunderstanding or misinterpretation of the flexibility associated with independent travelers. Having flexibility doesn't mean that the customer would be variety-seeking. Rather, as shown in the above figure, the independent travelers are more likely to show flexibility in their choices of destinations. It can still be said that travel arrangement influences the extent of travel, but the influence is in contents rather than in size.

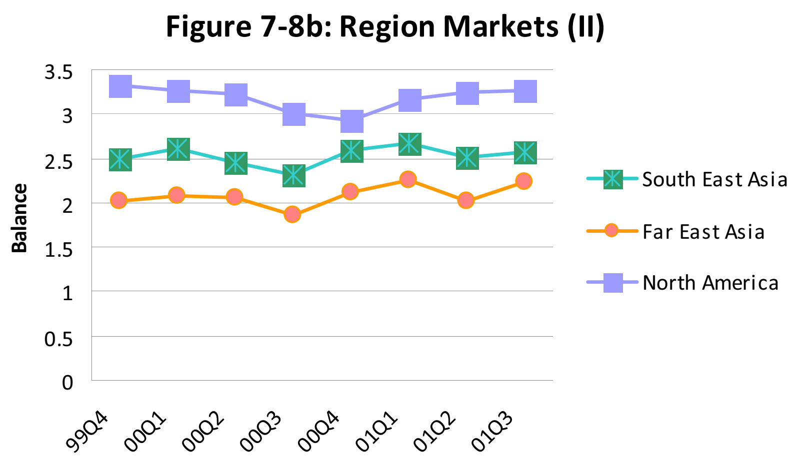
To this extent, the balance and variety measures of assortment are complementary to each other.

7.4.5 Olympics Effect Shown in Region-of-origin Markets

This section examines the Olympics effect in different region-of-origin markets. As the Figure 7-8 (a) and (b) show, different region-of-origin markets reacted differently to the Olympics. While there seemed to be not much influence on the markets of Japan, New

Zealand and UK/Ireland, the rest of the groups showed a reaction of more concentration in places visited.

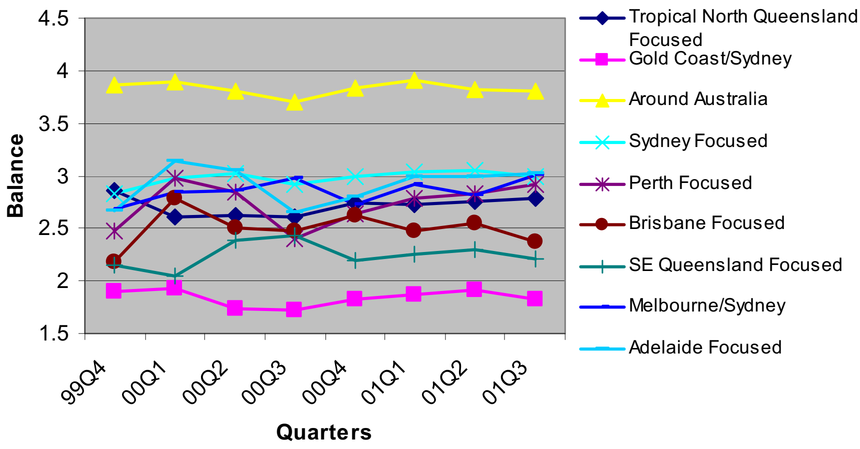




7.4.6 Influence of the Olympics on Common Itineraries

The final part of the Olympics effect on different segments focuses on the nine itineraries identified in Chapter Six. As shown in Figure 7-9, although generally the balance of most itineraries has been negatively influenced during the Olympics period, there are two itineraries that showed an opposite pattern: the "Melbourne/Sydney" itinerary and the "SE Queensland Focused" itinerary. Considering the increasing popularity of these two itineraries from 2000 on (Figure 7-1), a tentative explanation could be that if a system's reaction to the internal or external drivers is to get more diversified, then its potential for growth would be relatively high.

Figure 7-9: Balance Evolution of Itineraries

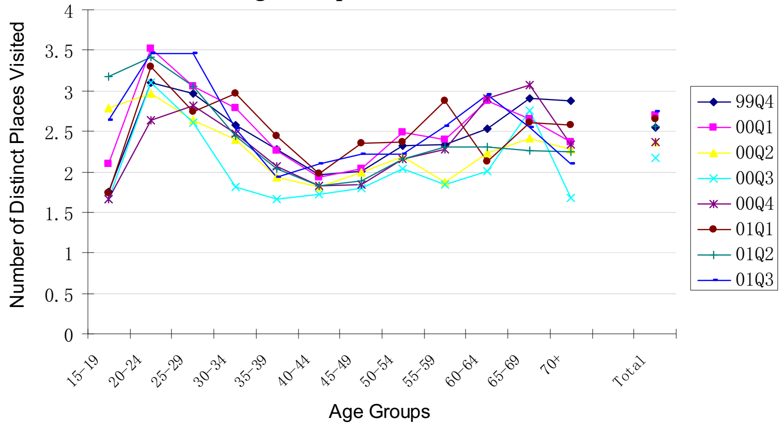


7.5 Seasonal Effect

Despite its important influence, the 2000 Sydney Olympics was not the only factor that contributed to the assortment pattern change in the marketing system during the sampled period. In the tourism context, one of the external factors is the season. Although matured techniques in isolating seasonal effects are available, eight quarters are normally considered insufficient for applying the techniques. However, at this exploratory stage of assortment analysis, some brief examinations would probably benefit future research. Hence, a quick screening of quarterly match with the proposed measures is carried out, and results indicate that there seems to be some interesting patterns with different age groups.

First, it is found that the pattern of variety characteristic across the age groups is not all stable over the time, as shown in Figure 7-10.

Figure 7-10: Average Number of Distinct Places Visited across Age Groups in Each Quarter



To get a closer and clearer look, the eight quarters are paired according to the specific season they belong to, as shown below in Figure 7-11. Three trends can be detected: the first is that in the two years when the samples were collected, pattern in each season is quite consistent; second, the older travelers, namely age groups with people 55 and over, illustrate a less stable pattern in terms of their variety-in-trip; and third, though the trend in season remains similar, there was a bigger gap between the two years in quarter three than any other quarters. The last point is not all surprising though, given that Quarter 3 of year 2000 was when the Olympics took place, and its effect of encouraging more concentrated trips which, in turn, reducing the average number of distinct places visited, is shown in earlier discussions of this chapter.

Figure 7-11a: Average Variety-in-trip across Age Groups, 4th Quarter of the Calender Year

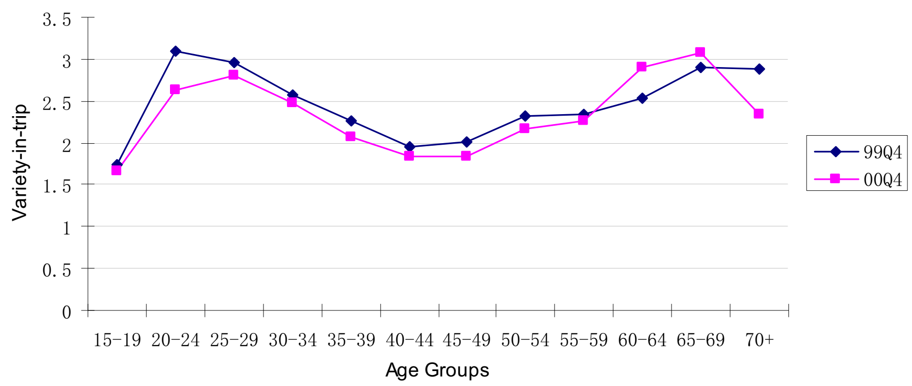


Figure 7-11b: Average Variety-in-trip across Age Groups, 1st Quarter of the Calender Year

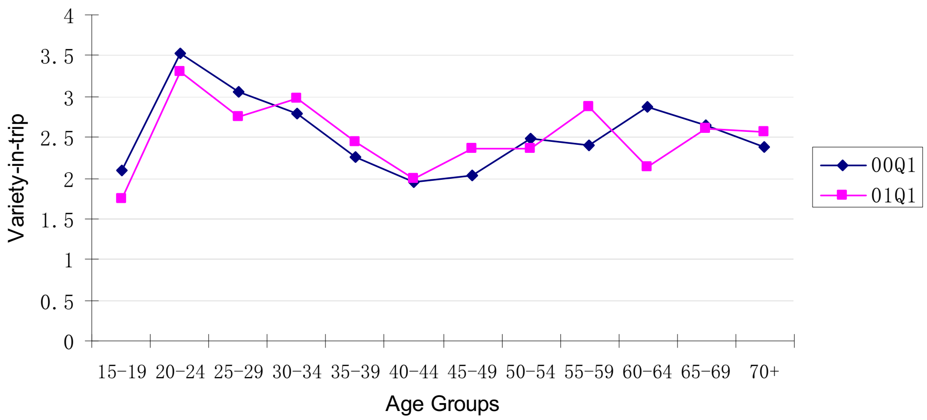


Figure 7-11c: Average Variety-in-trip across Age Groups, 2nd Quarter of the Calender Year

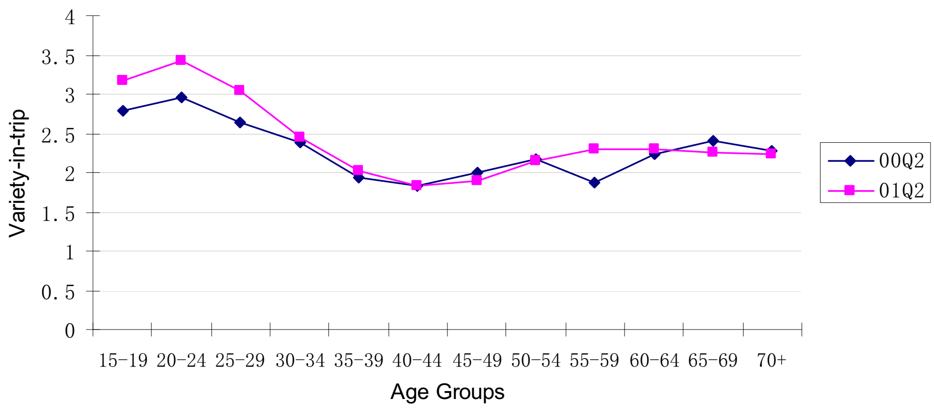
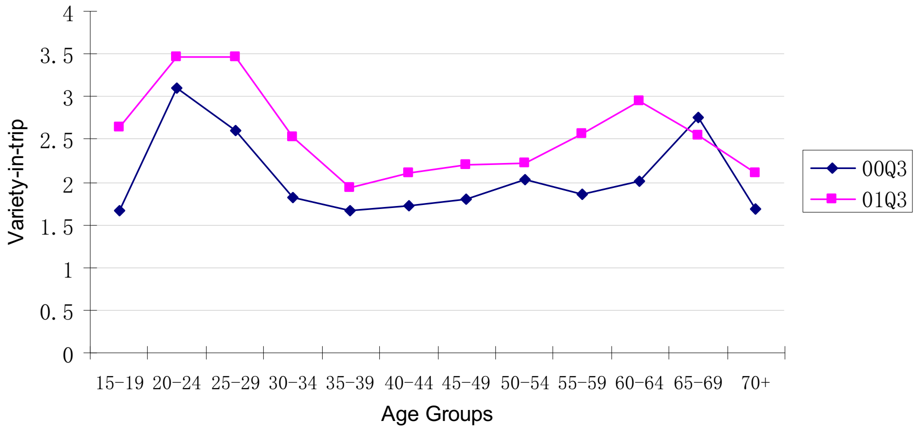


Figure 7-11d: Average Variety-in-trip across Age Groups, 3rd Quarter of the Calender Year



Still, with 12 age groups, the information shown in the above figures is a little bit hard to describe and comprehend, thus they are combined into 4 groups and the result is shown in the figures below. The 20 to 34 group is on average the most variety-seeking among all groups. In addition, the 20 to 34 group and the 35 to 59 group are similar to each other and to the overall pattern of seasonal trend except that the 35 to 59 group has a much lower average variety-in-trip. These two middle-age groups visited less places during the last three quarters of the year 2000.

The most interesting patterns are found in the oldest group and the youngest group. A strong seasonal impact is reflected in the charts. In particular, older travelers tended to travel more extensively during the last quarter of the year, while teenager international travelers have shown repeated peaks in terms of variety-in-trip during the second quarter of the year.

Figure 7-12a: Comparison of Average Variety-in-trip, 4 Age Groups

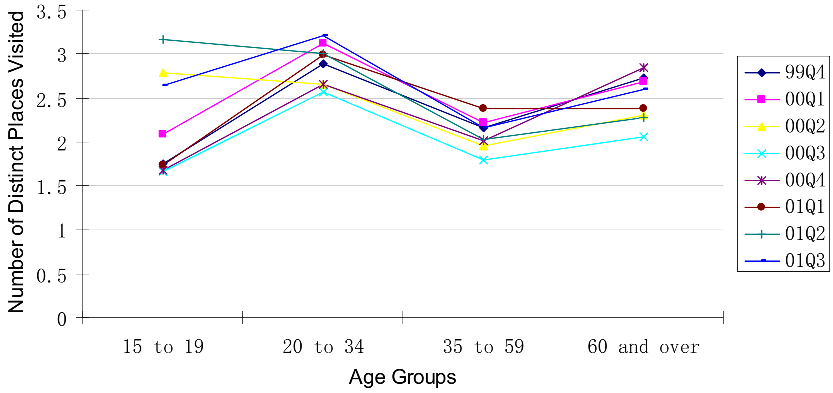
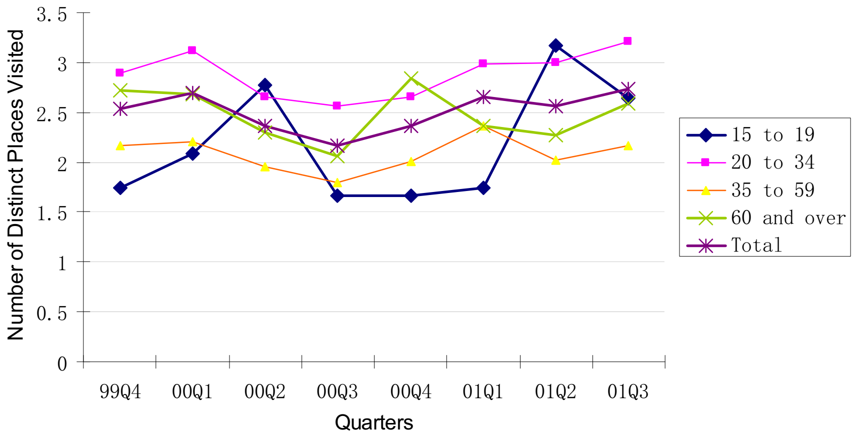


Figure 7-12b: Seasonal Trend in Age Groups



7.6 Summary

The Olympics has a positive effect on the market share of popular destinations during the seasons it took place. At the same time, it also negatively affected some other destinations. However, for most of the destinations, the effect has been offset in the after Olympics seasons.

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CHAPTER 8: EXPLORING NATURE OF DIVERSITY AND RELATIONAL MEASURES WITH DESTINATION ASSORTMENTS

8.1 Introduction

Having illustrated in Chapters 6 and 7 the applications of proposed assortment measures in cross-sectional comparison between segments and change of assortment in response to certain drivers over time, this chapter explores the nature of the proposed measures in the Australia Tourism context as well as a broader context. The aim is to find out how the measures are inter-related as well as the implications of these inherited relationships.

8.2 Nature of Diversity Measures

It is commonly stated (cf. Stirling 1998, 2007) and empirically tested (e.g., Stirling and Wilsey 2001) in the literature that ‘variety’ and ‘balance’ are two closely related aspects of the “dual concept” of diversity, especially ecological diversity. Though variety and balance are inter-related, many authors in ecology suggest that they should be treated separately (Magurran 1988). In this study, the reason for adopting two (i.e., variety and balance) or even three (when disparity is included) separate measures of diversity is that they not only reflect conceptually different aspects of assortment, but their suitable situations of application differ as well. In particular, balance is considered more as a system level pattern indicator while variety has both system and individual level implications.

In this section, properties of variety and balance are explored. The discussion of disparity is covered in the next section together with the relational properties.

8.2.1 Frequency Distribution of Variety

Whereas average variety is the most frequently used indicator of the variety property of assortment at the system level, other descriptive statistics may also provide insights for the understanding of the assortment and the system in which it embedded. A viable way to evaluate the variety property of system level assortment is to look at its frequency distribution. As Stirling (1998) states, “the form of a probability distribution is often as important as its mean value or its variance.” (p. 16)

Some known statistical distributions have found their usage in modeling or extracting empirical parameters from variety distribution of different systems. For example, as part of the assumptions in the Negative Binomial Distribution (NBD) model, Poisson distribution has been used widely in the marketing literature to model the number of transactions made by individual customers (e.g., Uncles, Ehrenberg and Hammond 1995; Fader, Hadie and Lee 2005; Batislam, Denizel and Filiztekin 2007), while in the ecology literature, the logarithmic or log-series distribution is often applied to species diversity data (Best, Rayner and Thas 2008).

To get a better understanding of the frequency distribution of variety, descriptive statistics of the distribution of the number of distinct places visited are analyzed, followed by a procedure fitting the observed distribution with some theoretical distributions. The fitting procedure is conducted using the Easyfit 5.0 computer program developed by MathWave Technologies (2008).

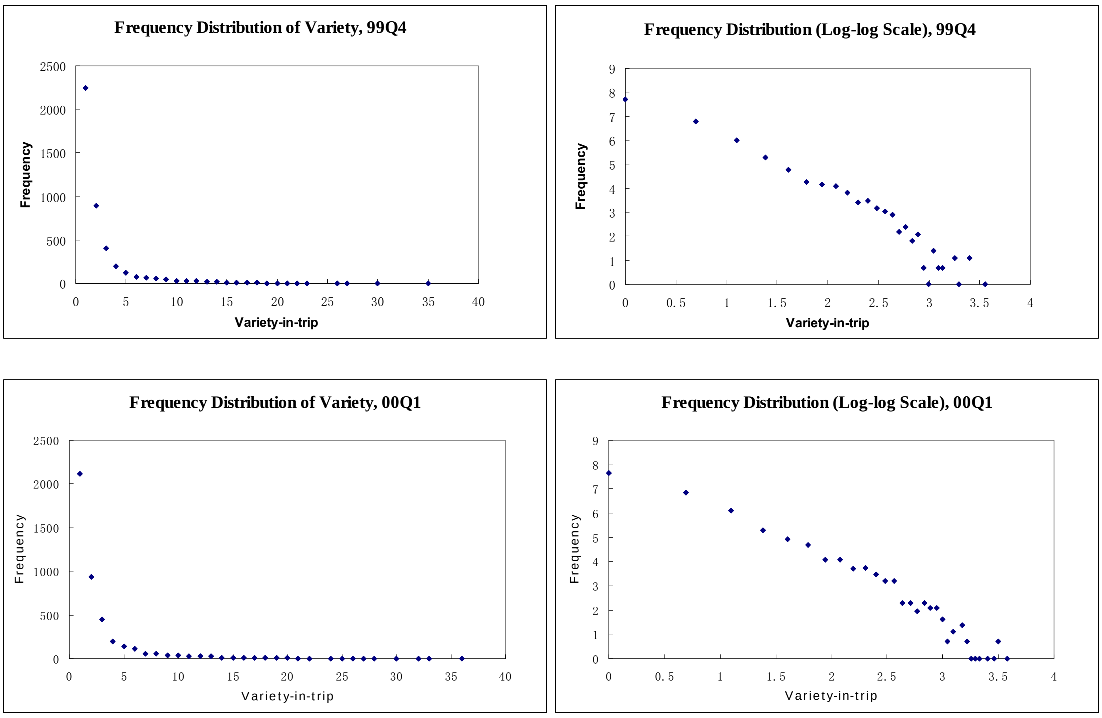
The standard descriptive statistics are shown in Table 8-1. An obvious pattern can be identified even at a glance, which suggests that the third quarter of 2000 has seen people travel to fewer places (mean = 2.17, the lowest among all quarters) with a highly skewed and peaked distribution on the variety in their trips. This is not a normal distribution, nor does it look like a Poisson, since the former is symmetric and the latter has a property of mean equals to variance.

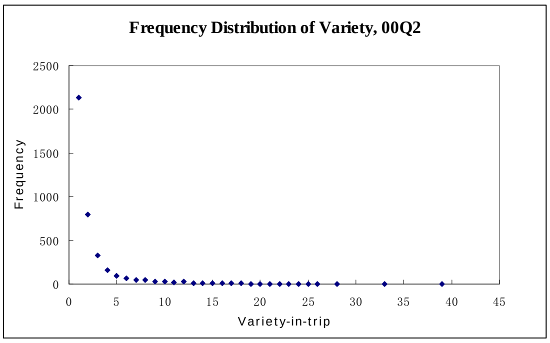
Table 8-1: Descriptive Statistics of Number of Distinct Places Visited

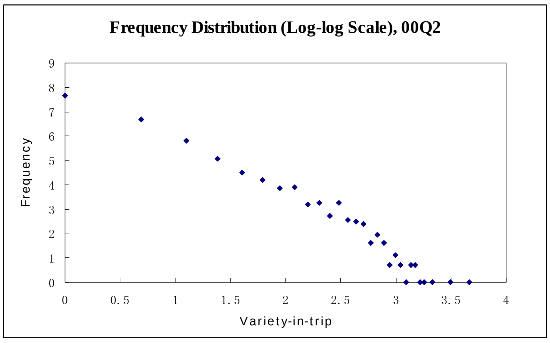
	Descriptive Statistics				
	Max	Mean	Std Dev	Skewness	Kurtosis
Quarter 4, 1999	35	2.54	3.03	3.71	18.98
Quarter 1, 2000	36	2.69	3.23	3.75	19.61
Quarter 2, 2000	39	2.37	2.88	4.16	24.99
Quarter 3, 2000	34	2.17	2.50	4.23	26.07
Quarter 4, 2000	38	2.36	2.80	4.08	24.51
Quarter 1, 2001	36	2.65	3.19	3.54	16.95
Quarter 2, 2001	33	2.56	3.23	3.75	18.21
Quarter 3, 2001	35	2.74	3.43	3.61	17.00

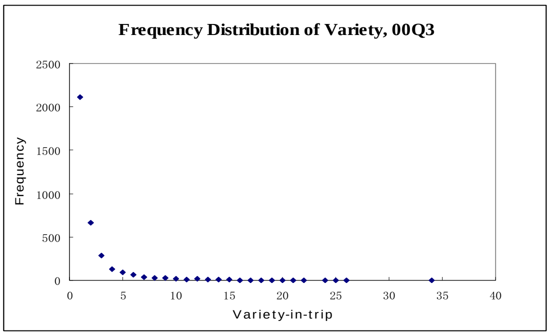
A closer examination shows that the frequency distribution of variety seems to follow a power-law or similar distribution, with a heavy-volume head and a long tail. Frequency distributions of variety of all the eight seasons in the dataset are presented below in Figure 8-1. For each quarter, the left side graph shows the distribution with original scales, while the right side graph shows the same distribution on a log-log scale (using *e* as the base).

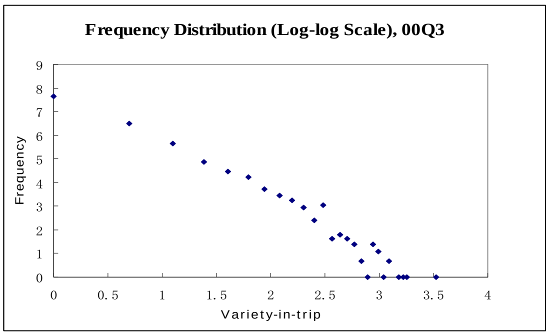
Figure 8-1: Frequency Distribution of Variety by Quarter

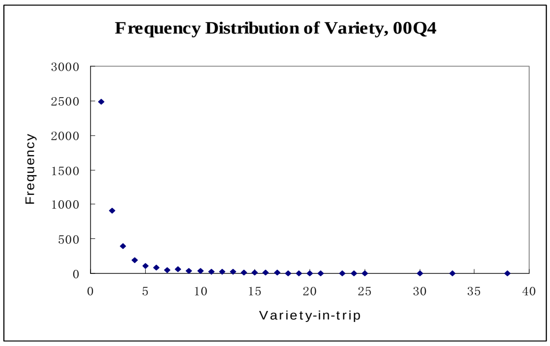


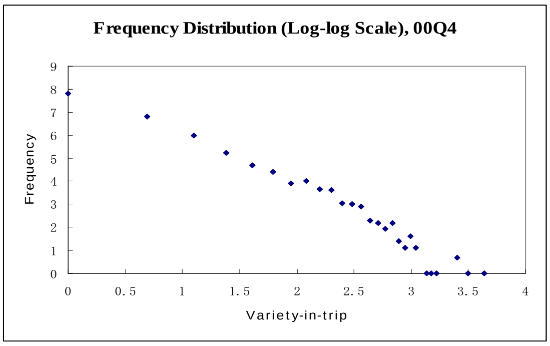

Frequency Distribution of Variety, 00Q2
Frequency
Variety-in-trip

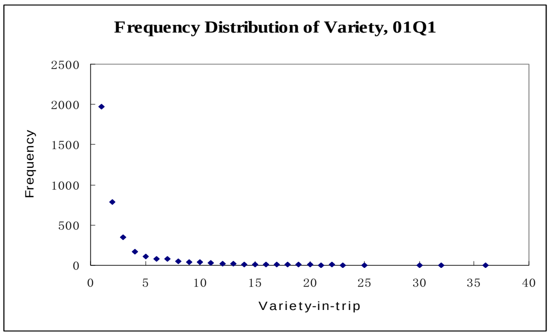

Frequency Distribution (Log-log Scale), 00Q2
Frequency
Variety-in-trip

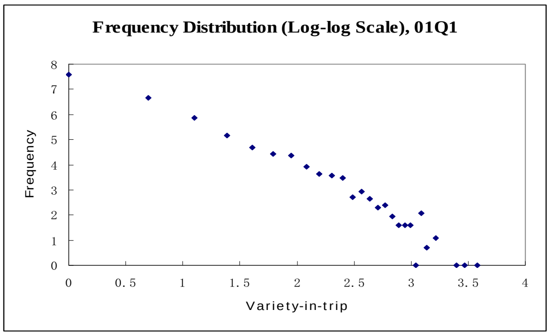

Frequency Distribution of Variety, 00Q3
Frequency
Variety-in-trip

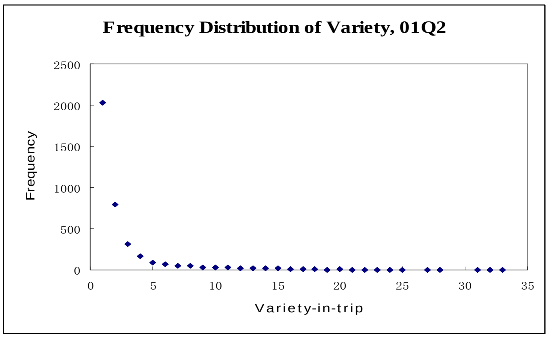

Frequency Distribution (Log-log Scale), 00Q3
Frequency
Variety-in-trip

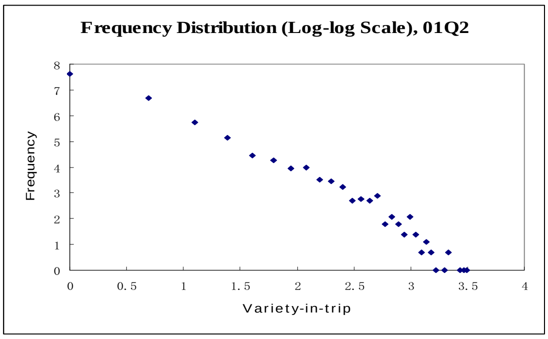

Frequency Distribution of Variety, 00Q4
Frequency
Variety-in-trip

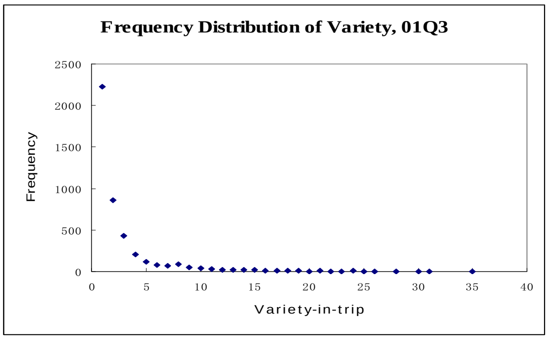

Frequency Distribution (Log-log Scale), 00Q4
Frequency
Variety-in-trip

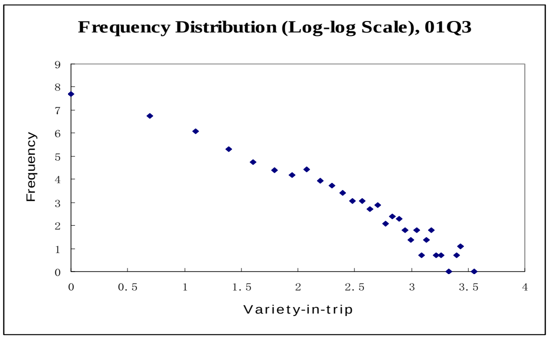

Frequency Distribution of Variety, 01Q1
Frequency
Variety-in-trip


Frequency Distribution (Log-log Scale), 01Q1
Frequency
Variety-in-trip









Power-law distribution has been commonly observed in large scale complex systems. It is suggested from the complexity economics perspective that agent driven self-organization in the complex system could be the driving force (Beinhocker 2007). However, the power-law phenomenon may not be observable when the number of agents is finite and relatively small (Newman 2005).

Since the distribution is widely observed in nature, various indices have been constructed to describe the distribution. One approach is to fit the observed data with some known theoretical distribution. For simplicity purpose, we follow a common distribution that has been used in ecology, that is, the logarithmic or log-series distribution, which is often applied to species diversity data (Best, Rayner, & Thas, 2008).

Using the software package called Easyfit (MathWave Technologies., 2008), the frequency distribution is fitted with the logarithmic distribution (log-series distribution) for which the probability distribution of the observed variable x follows

$$P(X = x) = -\frac{\theta^x}{x\ln(1-\theta)}, \qquad x = 1, 2, \ldots$$

The parameter θ has been used in ecology to construct the Index of Diversity, and the distribution is commonly accepted as also suitable for modeling the numbers of items of a product bought by a buyer in a given time period. Although not much has been established in the theoretical foundation, both applications represent some type of empirical regularity, which is also part of the goal of this study. To illustrate how the parameter can be interpreted in empirical studies, a good example is the Index of Diversity in ecology. Index of Diversity is defined by the ratio n/θ, where n is the number of species that occur just once in the sample of a mixed-species population, and it is commonly found that, for some θ, the numbers of species occurring twice, thrice, …are approximately $\frac{1}{2}n\theta$, $\frac{1}{3}n\theta^2$, …(Upton & Cook, 2006, p. 246).

Two series of frequency distribution data are fitted with the log-series distribution, and results are shown in Table 8-2. The θ parameter shares with the average variety in the direction of change, while it is the single factor that describes the distribution. Hence, for systems with similar variety frequency distribution, the θ parameter can be a candidate measure for system level variety.

Table 8-2: The Parameter of Variety Frequency Distribution

	θ (Fitted with Log-series)	
	Number of Distinct Places Visited (Variety-in-trip)	Number of Stopovers (SKUs)
99Q4	0.80665	0.86413
00Q1	0.82394	0.87671
00Q2	0.78367	0.84909
00Q3	0.75077	0.82435
00Q4	0.78293	0.84487
01Q1	0.81912	0.87599
01Q2	0.80967	0.87163
01Q3	0.82829	0.88724

Overall, the frequency distribution of variety-in-trip of each quarter fits well with the logarithmic distribution. The subgroups, however, do not follow uniformly of the same distribution. This does not deny the usability of the power-law like distributions, as few real-world distributions follow a power law over their entire range, and in particular not for smaller values of the variable being measured (Newman 2005).

Although most of the subgroups still show a strong tendency in following the logarithmic distribution, two types of subgroups deviate from others in discernable ways. One of them represents travelers on a group tour; the other type includes people who were first-time visitors to Australia; the variety frequency distributions of both group travelers and first-time visitors have a mode of 2 in all eight quarters, while the other subgroups all show a mode of 1. It is not surprising though, for group travelers to be more apt to choose multiple destinations than their counterpart, since a group normally would have more than one needs or benefits sought. A possible interpretation of the variety-seeking of the first-time visitors is the need to reduce the uncertainty or risk associated with a previously unknown destination.

Table 8-3 lists the fitting results of selected grouping variables that generate consistent differences between the comparable groups. Besides Internet usage and destination familiarity, gender is also included for comparison purpose. The travel arrangement factor is also examined, but no distinct pattern is shown, so the results are not presented in the table. As expected, the male and female travelers are quite similar to each other in terms of the number of distinct places included in their trips, though female visitors seemed to have slightly higher variety. Internet User and first-time visitors both had a much higher θ than their counterparts. The Olympics effect is also shown in the comparison of θ parameter between different quarters. In particular, the variety of the system is lower during the Olympics season as indicated by the parameter.

Table 8-3: Variety Distribution Parameter of Selected Customer Groups

Quarter	θ of Log-series on Variety Distribution					
	Male	Female	Internet User	Internet Nonuser	First Visit	Return Visit
99Q4	0.805	0.808	0.895	0.765	0.876	0.688
00Q1	0.820	0.829	0.909	0.796	0.880	0.731
00Q2	0.778	0.790	0.891	0.743	0.861	0.659
00Q3	0.748	0.754	0.875	0.707	0.843	0.610
00Q4	0.770	0.797	0.887	0.742	0.860	0.670
01Q1	0.809	0.830	0.883	0.762	0.888	0.717
01Q2	0.795	0.825	0.873	0.753	0.887	0.670
01Q3	0.825	0.832	0.872	0.798	0.889	0.715

8.2.2 The System vs. Individual Variety

Both system and individual levels are important to the assortment research. System level assortment measures would normally indicate some macro patterns, while individual level assortment properties might have been the variables for micro-marketing research and therefore are sources of knowledge for further theoretical development. This macro-micro approach has long been advocated in the marketing literature. For example, McAlister and Pessemier (1982) suggest that an emphasis on the managerial implications favors macro models that use collective information, where Bass (1974) states that “the randomness which characterizes individual behavior tends to be washed out by aggregation” (p. 9).

Not all assortment measures have the same applicability at both system and individual customer level. Except for variety, all the other four properties of assortment primarily deal with patterns emerged through aggregation of individual assortments. Therefore the discussion of this section will be focused on variety.

As proposed in Chapter Four, the difference between measuring variety for system assortment and individual assortment is distinguished with two different but related measures. In particular, the variety of individual assortments is the number of distinct places visited by individual travelers and is referred to as "variety-in-trip" or to a broader context "variety-in-basket", while variety at the system level is measured as the number of distinct places visited by one or more of all the travelers included in the system and is referred to as "coverage". The coverage measure is also generalizable to other contexts, such as the number of distinct activities participated by a group of Disney Theme Park visitors and the number of distinct stores in a shopping mall patronized customers in a certain period of time. It should be noted that most of the specific measures discussed in this study are measures of acquired assortments, though similar properties also exist in the offered assortments. Normally the coverage of acquired assortments would be close to the variety offered since if the gap between coverage and the variety offered by the marketing system is large, then the marketing system is not effective and the categories that have been left out should probably be deleted from the system.

As discussed in Section 8.2.1, there are some other empirical measures, such as the θ parameter of the log-series distribution, which may also be suitable as an indicator of the system level variety. There are two major merits with the θ parameter. First of all, it is simple. Second, for a specific frequency distribution, there is one and only one corresponding θ parameter. The drawback of this measure is that it lacks somewhat in substantial meaning. For this reason, what might be important are the empirical relationships between the θ parameter and other measures with substantial meanings, such as coverage and average variety. These relationships are depicted in Figure 8-2 using major types of customer groups by quarter as the units of analysis (i.e., systems).

As predicted from their mathematical definitions, the two measures that are related to the frequency distribution, average variety and the θ parameter, have a positive but nonlinear relationship (Figure 8-2a). The discussion in the last paragraph shows the managerial importance of coverage, it would be interesting to know whether and how coverage would change with other commonly adopted variety measures such as the average variety-in-basket among customers included in the system or subsystem under investigation. With no priori knowledge of the theoretical relationships between coverage and the frequency distribution of individual level variety, it is worthwhile to conduct some empirical explorations. Hence, system level coverage is plotted against the two variety distribution measures in Figure 8-2b and Figure 8-2c. According this mini-sample of systems, it can be found that the coverage is relatively stable across all units and at different average variety levels. The larger variation of coverage at higher θ parameter values suggests that there might be some other underlying mechanisms that influence the coverage but not the θ parameter.

Figure 8-2a: Relationship between Average Variety and the θ Parameter

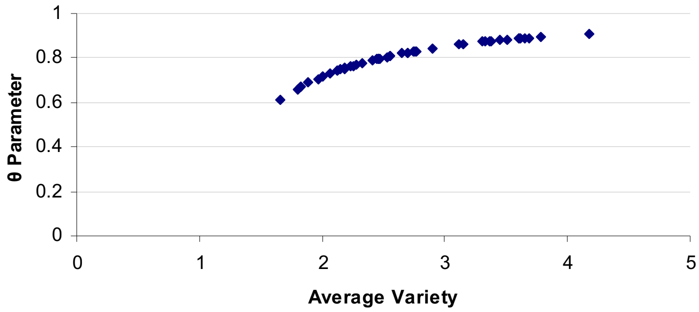


Figure 8-2b: Relationship between Coverage and Average Variety

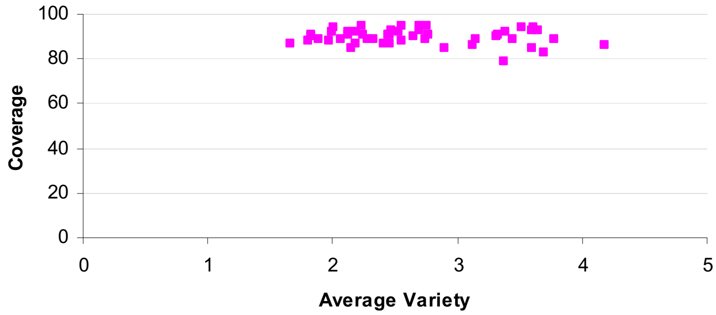
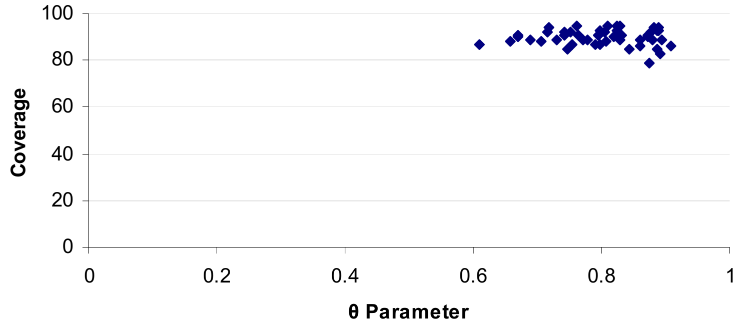


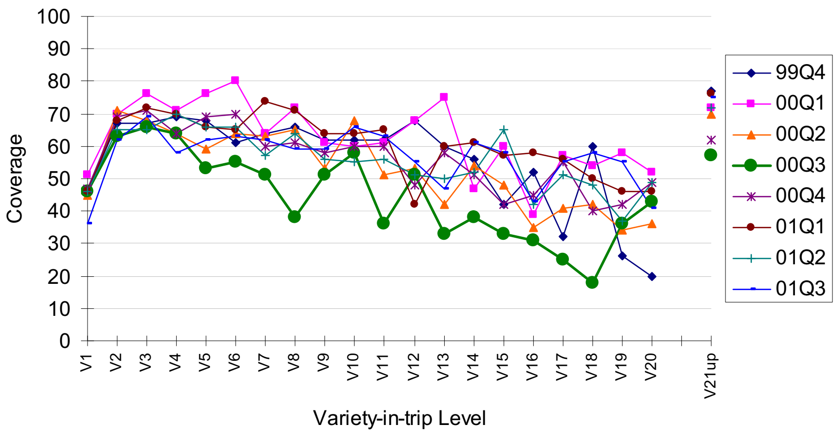
Figure 8-2c: Relationship between Coverage and the θ Parameter



What could be the driving mechanisms for coverage (i.e., variety in the aggregated assortment)? As previous research normally takes the perspective of either single-choice assortments or multi-category assortments, would it mean that variety in individual assortments could still be a driving mechanism but the relationship is more categorical than formally mathematical? In other words, is there any systematic difference between single-category assortments and multi-category assortments? Furthermore, is the aggregate assortment of all multi-category assortments a homogenous group in terms of the properties of interest? For example, in the tourism context, are all aggregate assortments based on multi-destination trips similar to each other on their assortment properties? These questions put variety-in-basket in the position of an analytical dimension.

A possible approach in applying the variety-in-basket dimension is to stratify the overall assortment into assortments of different variety-in-basket levels, or in other words, to decompose the market into markets of identical variety-in-basket. As discussed in Chapter Five, this approach is justifiable from the network theory perspective—that is, at a variety-in-basket of *n*, each individual assortment would be a complete sub-graph of order *n* in the association network. Coverage along the variety-in-trip level is depicted in Figure 8-3.

Figure 8-3: Coverage at each Variety-in-trip Level



As depicted in Figure 8-3, after variety-in-trip exceeds three, there is a gradual declination in the variety coverage of the system assortment with the increase of variety-in-trip. However, looking at the severe fluctuation of variety coverage along the variety dimension, it is more accurate to conclude that although the general trend appeared to be robust in the sample, there was some randomness in this trend. In particular, a trip with an n variety would fall with high possibility in variety levels close to n. An alternative way to describe the trend would be that using the assortments cumulated to certain variety-in-trip levels. The results from the cumulative approach are presented in Table 8-4.

Table 8-4: Number of Destinations Covered in Aggregate Assortment Cumulated to the Corresponding Level of Variety-in-trips

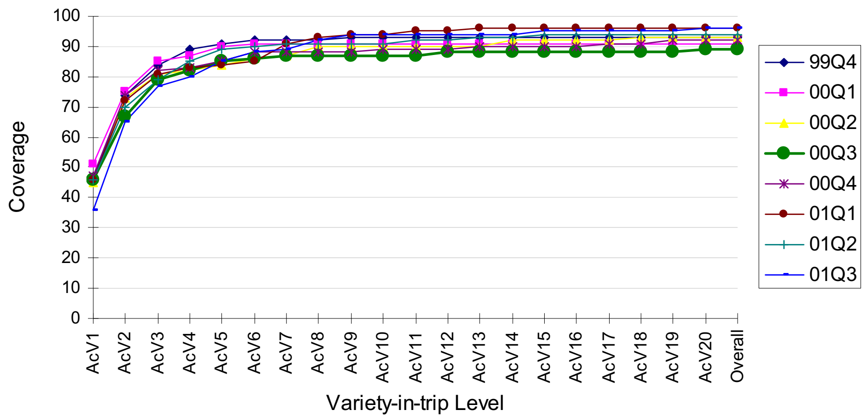
Quarter / *Variety*	*99Q4*	*00Q1*	*00Q2*	*00Q3*	*00Q4*	*01Q1*	*01Q2*	*01Q3*
1	46	51	45	46	47	46	46	36
2	74	75	73	67	74	72	70	65
3	84	85	81	79	82	81	79	77
4	89	87	82	82	83	83	85	80
5	91	90	84	85	85	84	89	85
6	92	91	86	86	88	85	90	88
7	92	91	87	87	88	91	91	89
8	92	91	90	87	88	93	91	92
9	93	91	90	87	88	94	91	94
10	93	91	90	87	89	94	91	94
11	93	91	90	87	89	95	92	94
12	93	91	90	88	89	95	92	94
13	93	91	90	88	90	96	93	94
14	93	91	92	88	90	96	93	94

15	93	91	92	88	90	96	94	95
16	93	91	92	88	90	96	94	95
17	93	91	92	88	91	96	94	95
18	93	91	93	88	91	96	94	95
19	93	91	93	88	92	96	94	95
20	93	91	93	89	92	96	94	96
…	**…**	**…**	**…**	**…**	**…**	**…**	**…**	**…**
Overall	***93***	***91***	***93***	***89***	***92***	***96***	***94***	***96***

The influence of variety-seeking on the system can be better illustrated through the variety coverage of the cumulated system assortment. Other factors being equal, it is more costly to pursue higher variety individual assortments than the low variety ones. As shown in Figure 8-4, when variety-in-trip exceeds nine, the variety coverage of the acquired system assortment flattens out, meaning that those extremely high variety trips don't imply more variety for the marketing system to be effective.

This result has important implications for assortment and marketing system research. First of all, it suggests that 9 or 10 of the number items in the assortment is a reasonable cutoff point for research sample. Second, this is also a reasonable scope of strategic focus. Third, it is consistent with the consumer behavior and psychology theory that more choices may not always be better. In particular, customers with the needs of higher variety can be fulfilled through the same product offering that small-variety shoppers appreciate. From the marketing system perspective, the implication is that the aggregate acquired assortment may stabilize at some variety-in-basket level that is not necessary to be large.

Figure 8-4: The Cumulative Pattern of Coverage along the Variety-in-trip Level



It should be noted that while the observed pattern in variety-in-trip level and cumulated system assortment coverage is quite consistent over the time, there is a possible alternative explanation to that of customer behavior or preference. That is, there are normally much fewer people who have pursued extremely extensive assortments such as trips (Tideswell 2004; Collins 2006), hence the influence of these customers would be small compared to the customers with smaller variety-in-basket. An alternative explanation of the pattern shown in Figure 8-4 is provided by the ecology literature, where asymptotic relationships between local and regional species richness have been reported and interpreted as evidence of local saturation though the confounding effect of sample size bias may still exist (Caley and Schluter 1999).

8.2.3 The Empirical Relationship between Balance and Variety

From the marketing system perspective, it is desirable to have a measure that can be directly linked to the performance of the system, something similar to the ecological diversity, which is considered as a community attribute related to stability, productivity, tropic structure and migration (McIntosh 1967; McNaughton 1977; Tilman 1996; Caley and Schluter 1997; Stirling and Wilsey 2001).

However, there is still no universal theory on the implication of diversity to the performance the system. Despite of its wide acceptance, the relationship between species diversity and ecological stability has been the focus of a long-standing dispute in ecology (Tilman 1996). One of the reasons that led to empirical misusing of diversity and the dispute, according to Stirling and Wilsey (2001), is that the nature of relationships between species richness and abundance is presumed. As both species richness and abundance are measures of system level diversity in ecology, part of the dispute is on whether to use one of them or some other index to operationalize ecological diversity in research.

Besides the issue of measure selection, another source of dispute is about the mechanisms of the stabilization process related to diversity. McNaughton (1977) summarizes the commonly used theory as that species diversity mediates community functional stability through compensating interactions to environmental fluctuations among co-occurring species, and additionally, fluctuations in the abundances of species with different adaptive modes may be a mechanism stabilizing community function in a varying environment. On the other hand, it is suggested from simulations and experimental studies that diversity can change with key ecological processes such as competition, predation, and succession, each of which alters proportional diversity through changes in evenness without any change in species richness (Stirling and Wilsey 2001). The most critical part of the issue can probably be transformed into the question that asks which component of diversity—since it is generally agreed that richness, evenness and other diversity indices are all inter-related components of diversity (Stirling 1998, 2007)—would be the most important in the ecological process and/or ecosystem under research (e.g., Wilsey and Potvin 2000).

The same type of issue may also exist in measuring the diversity properties of assortments in the marketing system. Although comparison between different marketing systems can not be carried out at the moment, using the current dataset, a test of empirical relationships between different components of diversity in assortment, in this case balance and variety, is possible. Table 8-5 shows the comparability of diversity indices used in ecology and the proposed diversity measures of assortment.

Table 8-5: Comparable Diversity Indices in Ecology and Assortment Measurement

Ecological Diversity			*Definition*	*Assortment Measures*
Concept Name (after Stirling, 1998)	Names Used in Testing Empirical Relationship (after Stirling and Wilsey, 2001)	Index Name (after Stirling,1998)		
Variety	Richness	Species Count	S (number of species/categories)	Variety (Coverage)
Balance	Evenness (Species Abundance or Equitability)	Shannon Evenness	$\frac{-\sum p_i \ln p_i}{\ln S}$	
Dual Concept (Variety+Balance)	Proportional Abundance	Shannon-Wiener	$-\sum p_i \ln p_i$	Balance

Unlike the deep tradition and proliferation of diversity research in ecology, obtaining different datasets of assortment for the estimation of diversity measures is not practical at the moment, so the only possible way is to generate the data by sampling the current dataset. Ideally, random sampling would be preferred, but the amount of work is huge, due to the time limit, a brief examination on quarter-variety subsamples is conducted. Specifically, each quarterly assortment is divided into 21 mini-samples according to the variety-in-trip level and, as a result, 168 mini-samples are obtained. A possible confounding effect that might exist with this sampling approach is the influence of sample size. As shown in Section 8.2.1, the frequency of individuals decreases largely with the increase of variety-in-trip. Although somehow it is suggested in the ecology literature that balance measure calculated as entropy is relatively sample-size independent (Sanders 1968), caution should be taken in interpretation of results with the specific sampling approach adopted in this part of analysis.

The overall relationship between balance and variety (i.e., coverage, as this part of discussion focuses on measures at the system level) is depicted in Figure 8-5a. The overall pattern can be divided into three parts. The first is the pattern with the single-destination mini-systems, which show a surprisingly consistent balance value of around 2 regardless of the number of coverage (Figure 8-5b). The second part is a positive (and almost) linear relationship between coverage and balance for systems that include the most extensive trips, that is, the variety-in-trip is equal to or greater than 10 (Figure 8-5d). The third part contains those systems that have multi-destination trips with moderate extensiveness (1< Variety-in-trip < 10); there seems to be no relationship between coverage and balance in this part of the systems (Figure 8-5c).

Some interesting questions arise with the discovered empirical relationship patterns between balance and coverage. Like variety, balance of assortment also has both macro and micro level substantial meanings. In the context of acquired assortment, the difference between balance and variety in their macro-micro implications is that while variety links individual consumer behaviors with the overall market scope, balance brings together performance (i.e., market share) of individual products/categories and a (potential) system performance indicator. Generally, except for the really straightforward measures such as count of species, the application of empirical measures depends largely on their reactions to different stimuli and the interpretability of these reactions—that is, whether they are related to other known variables or whether they have implications in performance. In other words, the usefulness of a certain measure depends on its empirical property in the designated research setting.

Among the two diversity measures for system level assortment, coverage has a clear substantial background and is straightforward for interpretation. Balance, on the hand, is the one that needs further examination on its empirical property. The cross-sectional and temporal reactions of the balance measure to segmentation approaches and stimuli such as the Olympics have been briefly discussed in Chapters 6 and 7. The limitation of those discussions, however, is that they focus on the measure itself and have not linked the measure to other performance indicators. Linking balance to coverage is the first step taken in examining the empirical property of balance in assortment research.

Figure 8-5a: Relationship between Balance and Coverage (System Variety), Overall

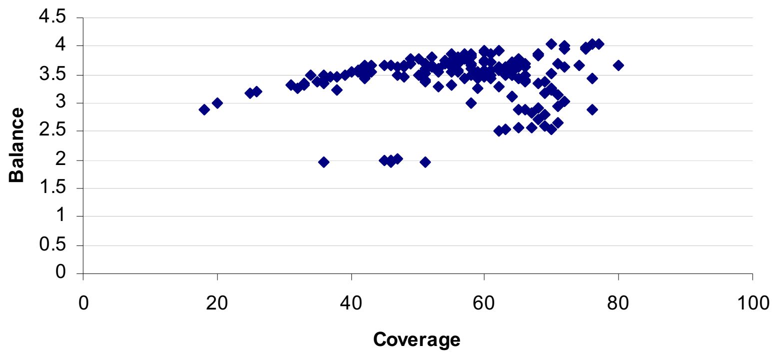


Figure 8-5b: Relationship between Coverage and Balance, Variety-in-trip = 1

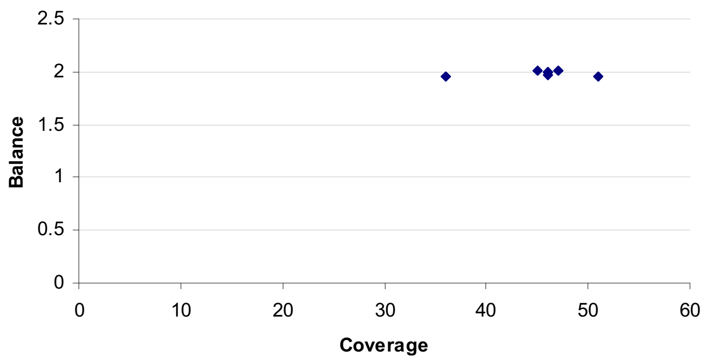


Figure 8-5c: Relationship between Coverage and Balance, 1< Variety-in-trip < 10

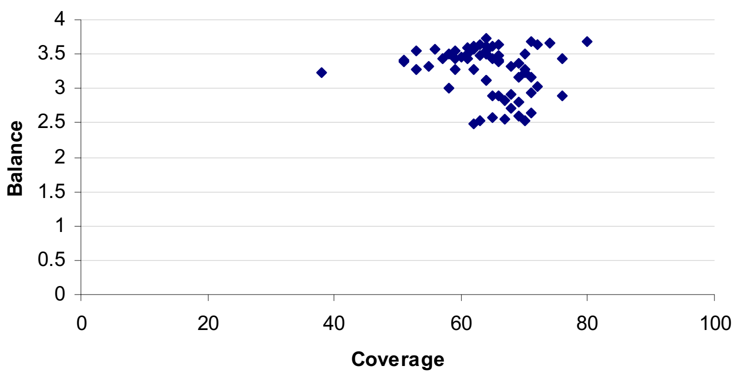
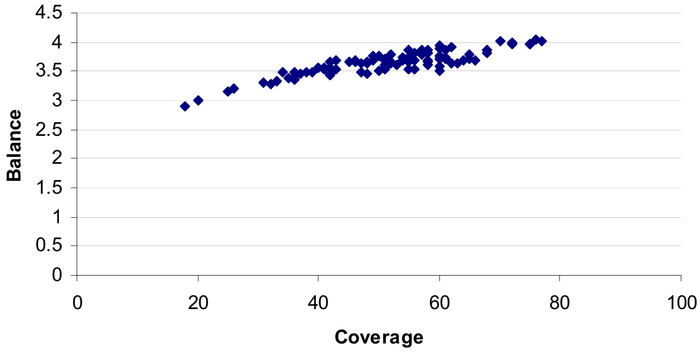


Figure 8-5d: Relationship between Coverage and Balance, Variety-in-trip ≥ 10



The rich ecological diversity literature provides another angle for evaluating the balance measure in assortment. In particular, ecologists have long been theorizing and testing the relationship between the three indices listed in Table 8-5. Borrowing the log-transformed, first-order models used by Stirling and Wilsey (2001), a set of tests are conducted on these three indices with the destination assortment data. The three indices are denoted as *B* (balance, the Shannon-Wiener Index), *J* (evenness, the Shannon Evenness Index), and *S* (coverage, destination count). To make it on the same scale as *B* and *J*, *S* is log transformed and the result is denoted as log(*S*).

Unlike the high correlations between the measures found in ecology, results on destination assortment data show there is little correlation between balance and log(*S*) ($r = -.003$, $p = .972$) and a moderate correlation between balance and evenness ($r = .790$, $p < .001$). The multiple-regression model with balance as the dependent variable and evenness and log(*S*) as the independent variables, on the other hand, is quite similar to that found in the ecology context. Specifically, the model is highly significant and explains almost all of the variations in *B* ($B = -3.604 + 3.977 \times J + 0.903 \times \log(S)$; $R^2 = 0.996$, $F = 21146.917$, df = 2,165, $p < .001$). If the apparently different samples on single-destination trips are taken out, the fitness of the multiple-regression model is further improved ($B = -4.087 + 4.223 \times J + 0.970 \times \log(S)$; $R^2 = 0.998$, $F = 48286.005$, df = 2,149, $p < .001$).

The results of the statistical analysis suggest that coverage is not generally the common cause of variation in either balance or evenness. Evenness and coverage seem to be acting as balance components that may represent different functioning mechanisms in the marketing system. A closer examination on the relationships among the triple produces some interesting patterns as shown in Figure 8-6 and Figure 8-7.

Figure 8-6 examines the relationship between balance and the other two indices when only the trips with less then 10 distinct places visited are included. It is shown in Figure 8-6a that in these systems, the coverage, or the overall variety generated by the system assortment was generally high and could not explain the variation in balance. The evenness measure shown in Figure 8-6b, in contrast, had strong positive relationship with balance. In brief, the variation of balance can be solely explained by evenness, or the standardized index of abundance, when trips with variety-in-trip less than 10 are considered.

Figure 8-6a: Relationship between Coverage and Balance
1< Variety-in-trip < 10

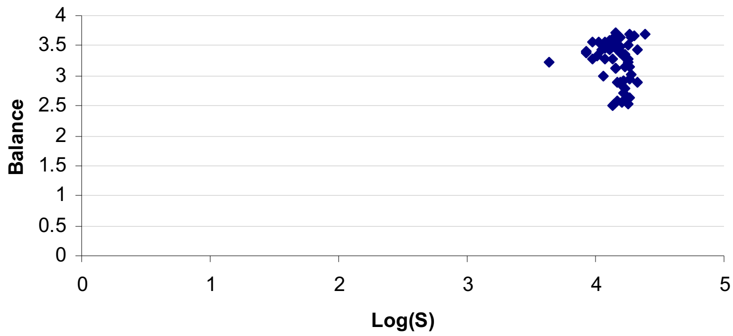
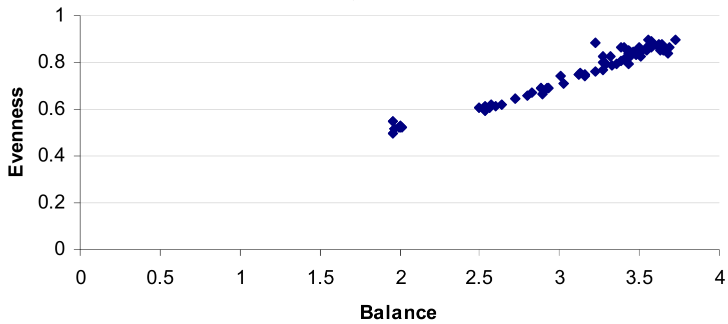


Figure 8-6b: Relationship between Balance and Evenness,
Variety-in-trip < 10



Balance of destination assortments that comprise only of trips with ten or more distinct places visited is plotted against log(S) and Evenness in Figure 8-7. For this group of assortments, evenness holds almost constant (Figure 8-7b), and the variation in balance is explained almost all by variety coverage (Figure 8-7a).

Figure 8-7a: Relationship between Coverage and Balance
Variety-in-trip ≥ 10

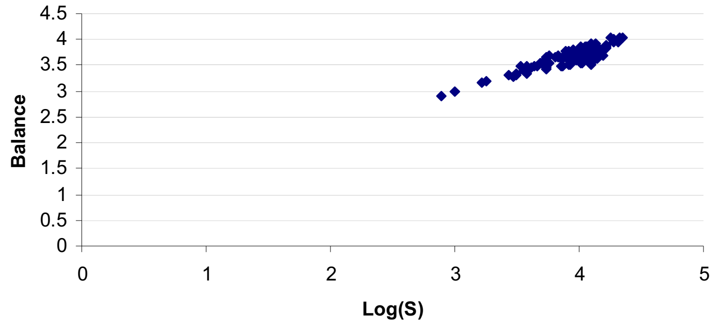
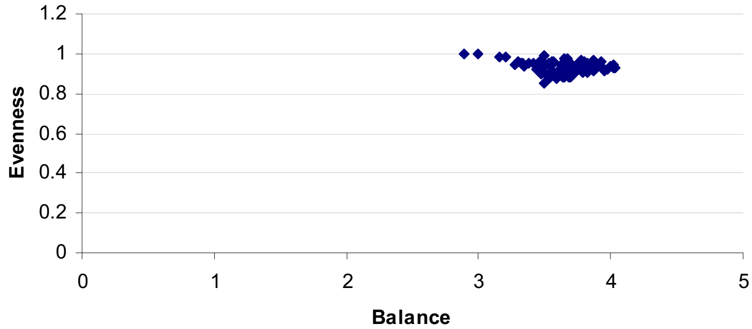


Figure 8-7b: Relationship between Balance and Evenness,
Variety-in-trip ≥ 10



8.3 Nature of Relational Properties

With network analysis techniques, the structural and typological aspects of the two relational properties of assortment have been explored in earlier chapters. This section, therefore, is devoted mainly to the inter-relationships between relational properties of assortment and the diversity properties.

Micro-macro relationship in the marketing systems is one of the main targets of this research. Although all the measures are defined from a macro (i.e., system) perspective, they all have their micro level implications. As stated in Section 8.2.3, the micro aspect of variety is the variety in the individual assortment, such as a shopping-basket or an international trip; the micro element of balance, on the other hand, is related to the individual product categories that define the assortment space. Furthermore, according to its definition, disparity measures the underlying and sometimes hidden structure of the component product categories of assortment. At the same time, the proposed relational measures of assortment also have their component measures with substantial meanings—that is, the nodal measures of the constituent product categories.

Micro-marketing research has traditionally been focusing on the component measures, such as the market share for balance, even though sometimes they may take a different form than the usual ones. An example is the Trip Index discussed in earlier chapters. The trip index, in essence, is a market share measure that uses the time (nights) spent as the unit of measurement. This is worth noting since most of the managerial implications of the assortment measures would rely on the knowledge accumulated in the micro-marketing research.

On the other hand, the macro aspects of the assortment measures bring together the component indicators and contribute to the understanding of market dynamics and other policy concerns. In addition, knowing the inter-relationships among components can also help in designing the system.

This section explores the relationships between assortment measures from two methodological considerations: the structure comparison and the relationships between different measures on the components (i.e., the product categories). Interpretations and implications are presented after the analysis.

8.3.1 Disparity vs. Sequence and Association

As suggested in earlier chapters, disparity between the categories that constitute the assortment space can be represented using the Hamming Index. Given a defined set of attributes, a Hamming Index matrix can be constructed, where each cell records the number of attributes that differ for a pair of assortment items/categories.

Although it is possible to create a single Hamming Index matrix combining several types of attributes, a more theoretical development oriented approach is to use one matrix for each theoretical construct, so that the construct can be treated as a separate variable with a number of categorical levels, and hypothesis test can be conducted on the relationship between the particular constructs and the resulted assortment networks.

To roughly illustrate the possible insights that can be gained from exploring relationships between disparity and other measures, in the Australian tourism marketing system context, two disparity variables are used, one is the key tourism resource type, and the other is perceived physical distance using state affiliation as a proxy. The first variable contains five attributes: capital, coast, resort, outback, and wine; the second variable has eight attributes each representing a different state. Apparently these attributes are very simple and perhaps too arbitrarily chosen at this stage. This is acceptable given the purpose of this study is not to determine the appropriate attributes for disparity definition, but to illustrate the usefulness and nature of the proposed aspects of assortment. In the future, more sophisticated attributes based on more solid theories could be used. The Quadratic Assignment Procedure (QAP) analysis is then employed for statistical test of the relationship between the two disparity variables and other measures. Detailed discussion of QAP analysis can be found at Wasserman and Faust (1994).

As shown in the results of QAP, sharing the same type of key tourism resource is not significantly correlated with either the sequence matrix ($p = .335$) or the association matrix ($p = .118$). Moreover, a QAP correlation run on the disparity in key tourism resource and the transition probability matrix also shows no significant relationship ($p = .298$). The transition probability matrix is derived directly from the sequence matrix but has a different substantial meaning. Calculated as the cell value divided by row sum in the sequence matrix, the transition probability matrix presents information on the local weight distribution, which is largely a property of the egonet. The sequence matrix, on the other hand, shows the global weight allocation structure. The aforementioned correlation results can be tentatively interpreted as that the tendency of multi-benefit seeking has no significant influence on the overall choice of direct links (the sequence matrix), choice of next stop at most of the destinations (the transition probability matrix), and which pair of destinations are combined in a trip (the association matrix), in the order of randomness from high to low.

Interestingly, the results on the state affiliation disparity variable seem to support the intuition that destinations in the same state are more likely to be linked, as shown in the QAP correlations between state affiliation disparity and transition probability (Pearson correlation coefficient = .352, $p < .001$), sequence matrix (Pearson correlation coefficient = .165, $p < .001$), and association matrix (Pearson correlation coefficient = .104, $p < .001$). This result is consistent with that shown in the descriptive analysis in Chapter Five, which suggests that high transition probability normally happens between destinations in the same state. The reason of such patterns could be that travelers are concerned with cost and convenience when select the destinations in their trips and transportation path.

8.3.2 Variety vs. Relational Properties

Discussions presented in Section 8.2 and earlier chapters suggest the possibility of using individual level variety as an analytical dimension. The theoretical foundation for this approach is that the choice of variety in the individual assortment such as a shopping basket is an addressable behavior of customers (Smith 2006). At the same time, it is found in the analysis of the balance measure that variety-in-basket can be a factor for classifying situations with different mechanisms.

Table 8-6 lists the key network measures of the association and sequence matrices along the variety-in-trip level. As shown in Table 8-6, the highest clustering coefficient in both sequence and association networks appears at variety of two; when variety increases, the clustering tendency of the assortment decreases dramatically for the first few levels of variety and then slows down when the variety-in-trip exceeds four. Heterogeneity in customers' preference seems to be not so relevant when only one or two items are purchased—with a relatively large number of travelers chosen to visit only one or two places, their choices were clustered around some highly connected cliques. At the same time, opportunities for road less traveled might increase when the travelers visited five or more distinct places, as it was less likely to form cliques in the networks. In other words, the clustering coefficient of the sequence matrices implies something for the transportation system that provides the infrastructure of the tourism marketing system. There is a possibility that this can be contaminated by the size of the assortment.

Also, travelers seemed to have used the highly popular hubs most extensively at the variety level of three, as illustrated by the 67.23% and 58.33% degree centralization of association and sequence network respectively. At the same time,

Table 8-6: Relational Properties of Stratified Assortments along Variety Level

Variety	Association Networks		Sequence Networks	
Level	Clustering Coefficient*	Degree Centralization	Clustering Coefficient*	Degree Centralization
v2	19.591	49.59%	12.228	49.59%
v3	14.875	67.23%	6.706	58.33%
v4	10.948	63.96%	4.230	47.98%
v5	8.343	61.06%	2.999	43.96%
v6	7.159	61.21%	2.387	52.79%
v7	7.070	57.20%	2.239	45.43%

v8	8.220	60.29%	2.408	47.16%
v9	7.049	53.31%	2.011	35.85%
v10	6.761	53.60%	1.698	39.84%
v11	6.427	56.19%	1.687	31.21%
v12	6.223	50.02%	1.519	32.35%
v13	5.690	45.85%	1.335	31.31%
v14	4.703	45.10%	1.032	31.19%
v15	4.968	42.61%	1.081	26.27%
v16	4.366	44.18%	0.992	21.52%
v17	4.409	45.19%	0.918	20.98%
v18	3.672	42.96%	0.807	26.63%
v19	3.272	44.78%	0.597	20.04%
v20	3.384	41.24%	0.639	21.24%
v21up	12.938	23.13%	2.093	33.96%

* The transitivity measure is used here as the clustering coefficient. The transitivity of a node is calculated as the number of triangles within the node and its neighbors divided by the possible number of pairs among its neighbors. The transitivity of the whole network is the average of all individual node transitivity.

Generally, a network with relatively small degree centralization is more likely to have a chain-like structure than star structure. The clustering coefficient, on the other hand, indicates the likelihood of finding triangles in the network. To supplement the above observations on sequence and association properties at different variety level, an island detection procedure is conducted on sequence networks of selected variety levels (Figure 8-8). Consistent with what the numerical measures suggest, the pattern became more chain-like when variety reaches four.

Figure 8-8a:
Islands in Sequence Network,
Variety = 2

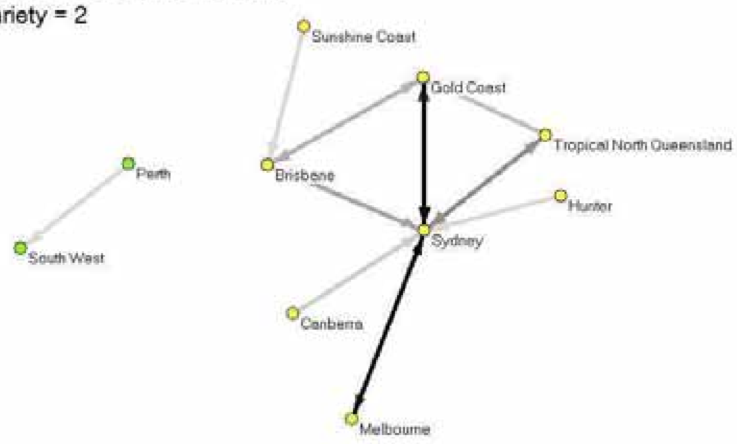


Figure 8-8b:
Islands in Sequence Network,
Variety = 3

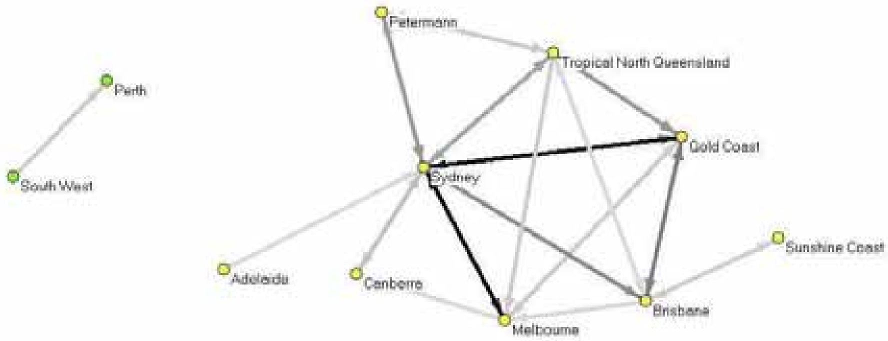
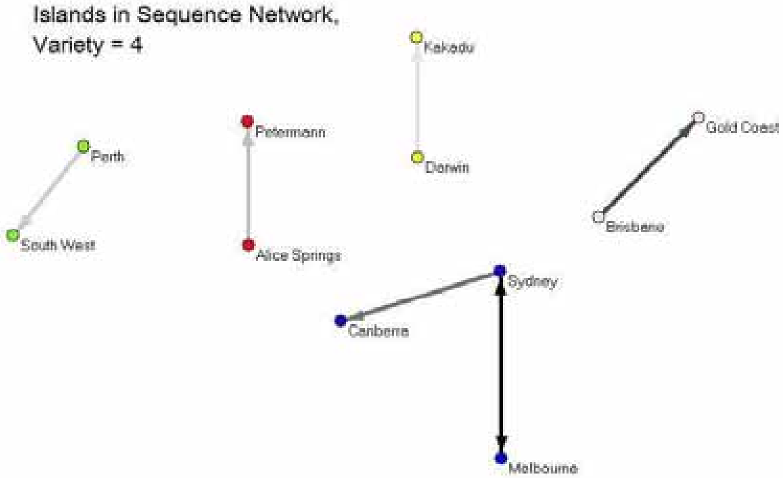


Figure 8-8c:
Islands in Sequence Network,
Variety = 4



Internal consistency is detected when comparing the stratified networks. All pairwise correlations among the stratified networks are significant (p < .001). Despite the distinguishable difference between destination networks at different variety level, the change took place in a gradual fashion and flattened out at around variety of nine, as shown in Figure 8-9.

Figure 8-9a: Similarity Across Stratified Sequence Networks

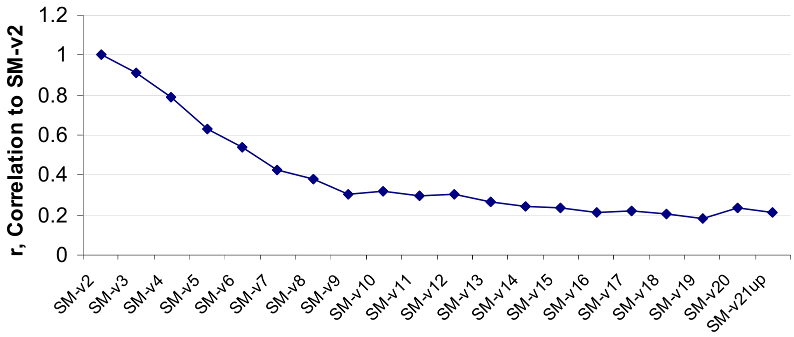
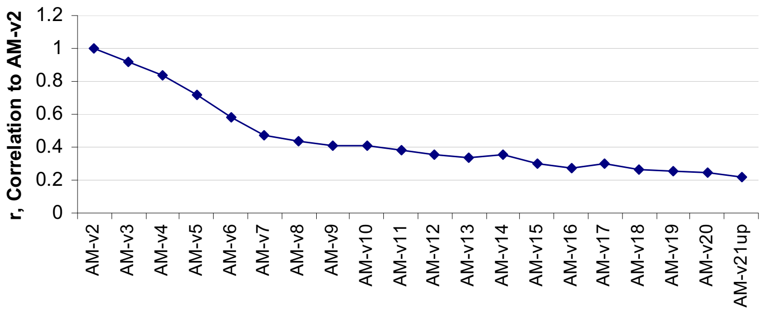


Figure 8-9b: Similarity Across Stratified Association Networks



8.3.3 Relationship between Sequence and Association

In the context of the empirical study of this research, as shown in previous chapters, a set of network measures in the association and sequence matrix are included for analysis and interpretation of assortment differences across segments and over the time.

One of the measures used is the degree centrality in the association matrix. It is argued that the degree centrality in the association matrix reflects the same concept underlying the closeness centrality in the sequence matrix, which by definition is how close a destination is to all the other destinations in the network. This type of theoretical overlapping between sequence and association networks is important for several reasons. First, some characteristics of one side of the relational properties (i.e., sequence or association) may not be directly measurable due to data constraints. In this situation, a substitutive measure from the other side may be available as the two sides can have different data collection strategies. Second, sequence is a property not all assortments have, while association is a universal property of assortment that can be found in many different marketing systems. However, as shown in the discussion of bipartite networks, modeling and interpreting association data is not always easy compared to the widely used (and more precise) modeling of sequence data such as Latent Trait Modeling in the financial products and consumer durables contexts (e.g., Kamakura et al. 1991; Kamakura et al. 2003) and easy interpretability network embedded systems such as the destination networks (e.g., Hwang et al. 2006).

As shown in their definitions, though sequence and association are different types of assortment properties, they have some inherited relationships. In particular, a tie in the association network represents a path in the sequence network regardless of the length of the path. Hence the sequence matrix and association matrix are identical if only trips with two stopovers made in two distinct places respectively are considered. The question is: to what extent are the two networks similar to each other, especially when multi-destination trips with all variety levels are included. QAP correlation shows that the sequence and association networks have high structural similarity (Pearson correlation coefficient = .817, $p < .001$). That is, 66.7% of the variation in the association matrix is accounted for by the variation in the sequence matrix. It is much easier to collect information on the direct next possible purchase in practice, therefore if this empirical relationship holds, then it would be much easier to model the customer-product relationship, as discussed in Chapter Five.

8.3.4 A Resource-based Explanation of Assortment Properties

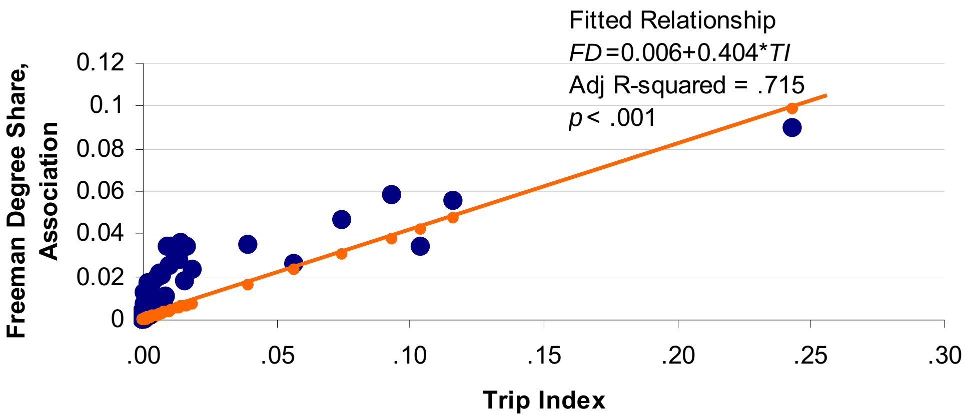
The assortment decision is also a resource allocation decision. Customers often face budget constraints when making purchase decisions. The most typical budget constraints are time and money. In tourism research, these concerns can be investigated through the traveler's time resource allocation, or time-budget. The time-budget approach collects information on the duration of travelers' stay in their selected locations, one of the three main types of knowledge in understanding multi-destination travel behavior as commented by Tideswell (2001). The other two are destinations chosen and sequence of visit to those destinations.

Previous research generally considers time-budget as a methodological approach, where the tourists' activities (including the locations of those activities) are systematically recorded by using diaries, questionnaires and interviews (Pearce 1988). It is arguable, however, that this then largely experimental approach may offer new insights in theoretical development. For example, in the context of international resort tourism, Debbage (1991) finds that the space-time constraints are more important than the socioeconomic descriptors in explaining the different typologies of spatial behavior.

Under the resource-based theme, the decisions for resource allocation can be one of the main drivers of the assortment pattern emerged from customer's choices. As one of the component measures of balance in the tourism context, the trip index weights the time resource travelers put on a certain destination and it is applicable to both individual travelers and any groups of travelers.

To understand the influence of resource allocation on the structure of the association and sequence matrices, the trip indices of all the destinations are correlated with centrality scores of the destinations in both association and sequence matrices. Since association and sequence are both multi-item assortment features, for comparability purposes, the trip indices used in this analysis are the average trip indices across all multi-destination trips. As predicted, the correlations between trip index and the network centralities are very high. Particularly, the higher the trip index, the higher the degree centrality of a destination in the association network (Pearson correlation coefficient = .847, p < .001), indicating higher possibility of being included in a multi-destination trip. In addition, the more time tourists spent in a destination, the more likely this specific destination had been used as a base camp or a transition hub and, as a result, had a higher betweenness centrality score (Pearson correlation coefficient = .801, p < .001).

Figure 8-10: Relationship Between Balance and Association Network



Further potential application of the resource-based view in assortment research is supported by research on recommender systems (Zhou et al. 2007). In particular, weights can be assigned to product nodes according to customers' resource allocation considerations, and it is argued that this approach helps to improve the accuracy of the recommender systems.

8.3.4.1 Single-item vs. Multi-item Assortments: The Weight Estimation Consideration

Single-item assortment is a special case of assortment. The holistic assortment concept proposed in this study aims to incorporate research on both single-item and multi-item assortments. Although most of the previous discussions in regard to the two types of assortments deal with the difference between them, there are also situations when the two focuses may complement each other or be used to improve efficiency of identifying needed information.

The complementary nature of single-item and multi-item assortments is based on the hypothesis that, embedded in the same marketing system, there might be some commonalities between single-item and multi-item assortments. An immediate test of this hypothesis is through the trip index.

For single-destination trips, the average trip index is equal to the share of visitors for each destination. The single-destination trips and multi-destination trips have similar trip index distributions since the correlation between their trip indices is very high (Pearson correlation coefficient = .985, $p < .001$). This implies that to a certain extent, for example, the resource allocation weights, single-item assortments can be used to predict the weights of the whole system without being influenced by the effect of variety-in-basket.

8.4 Exploring Measures at Different Levels of Categorization

Level of aggregation in the categorization scheme provides another opportunity for exploration. There are a few established methods that have been applied to variables that have multi-level features. Multi-level regression, for example, is one of them. But given that there is no viable dependent variable for such an analysis at the moment, instead of a formal multivariate analysis, descriptive methods are used.

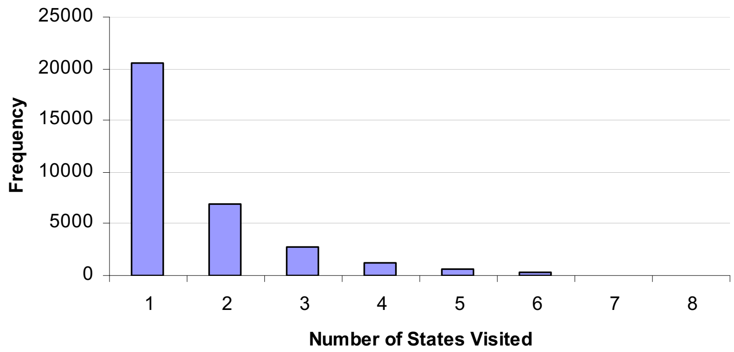
As briefly discussed in Chapter 2 and 3, in the retailing context, the most researched levels of aggregation are those related to the "width" and "depth" of the assortment. Generally, the width refers to the number of product lines, while the depth deals with the number of variants of each product within a product line (Hart and Rafiq 2006). These concepts have managerial implications for various participants in the marketing system, in particular that of the retailing store (e.g., Boatwright and Nunes 2001; Broniarczyk et al. 1998) and manufacturers facing retailer-related product line decisions (Cadeaux 1997).

Similar levels can also be found in the tourism marketing system. Parallel to the depth level in the retailing context, in the tourism context, the stopover region level, or the destination level, has been used in most of the analyses conducted in this study. In this section, another level, namely the state level, is examined.

8.4.1 Variety Distribution at State Level

In Section 8.2.1, the frequency distribution of variety is found to be like the power-law distribution. Power-law distribution is a scale-free distribution (Newman 2005). Due to this scalability characteristic, it is highly possible that the distribution of state level variety also follows a power-law-like distribution. This is supported by the shape of the state level frequency distribution of variety as shown in Figure 8-11.

Figure 8-11: Frequency Distribution of Variety at State Level



8.4.2 Multi-level Diversification Effect

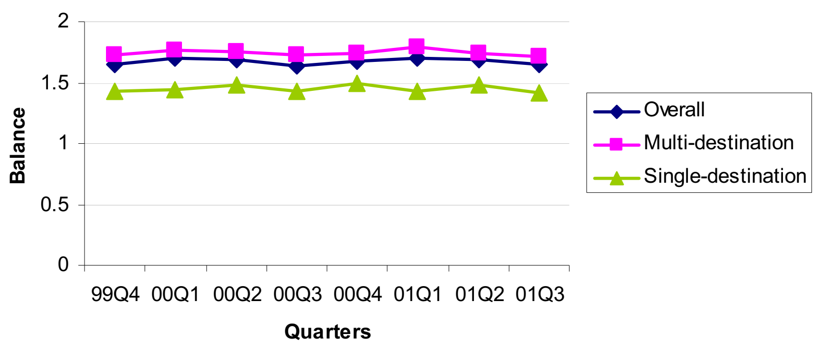
As a main system level property indicator, balance reflects the change of assortment according to internal and external stimuli. In Chapter Seven, the usefulness of balance measure to detect the influence of the Olympics is shown at the destination level. Though the measure is not strongly sensitive to rare species when applied to ecological studies (Fager 1972), a major change in the number of categories would have an impact on the sensitivity of the measure. In particular, the system balance would look more stable than that at the destination level as some destinations might have compensating effects over each other. The state level balance in each quarter is presented in Table 8-7 and depicted in Figure 8-12. As expected, Olympics effect can be found at state level, but to a much lesser extent compared to the destination level figures.

Table 8-7: State Level Balance, by Quarter

	Overall	*Multi-destination*	*Single-destination*
99Q4	1.655	1.729	1.430
00Q1	1.696	1.765	1.437
00Q2	1.685	1.758	1.476
00Q3	1.638	1.721	1.433
00Q4	1.677	1.744	1.488
01Q1	1.704	1.789	1.423
01Q2	1.682	1.743	1.476
01Q3	1.655	1.717	1.420

Similar to the destination level figures, single-destination trips seemed to be free from the influence of the Olympics as measured by balance at state level. A difference to the pattern shown at destination level is that the effect of Olympics is not so obvious in balance at the state level for multi-destination trips either. Hence caution should be taken applying the balance measure to highly aggregated categories, especially if the number of categories is small.

Figure 8-12: Balance at State Level

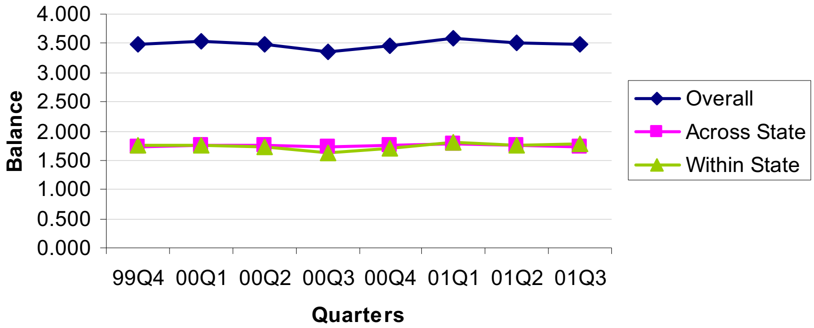


Using entropy as the operationalized measure for balance also implies that it can be interpreted as the level of diversification (Jacquemin and Berry 1979). The higher the balance, the more diversified the whole system is. At the same time, the overall destination level diversification (balance) can be divided into two parts: the cross-state diversification, which is measured by the state-level balance, and the within-state diversification. A comparison of cross-state diversification and within-state diversification during different periods is illustrated in Table 8-8 and Figure 8-13. Since a multiple destination choice is assumed for the diversification analysis, only multi-destination trips are included for this part of analysis. Results of the analysis suggest that the Olympics had a stronger impact for within-state diversification than for cross-state diversification. The traveling activities within the states were less extensive during the Olympics seasons than in other quarters.

Table 8-8: Comparison of Cross-state and Within-state Diversifications

	99Q4	00Q1	00Q2	00Q3	00Q4	01Q1	01Q2	01Q3
Overall Balance	3.486	3.523	3.482	3.354	3.451	3.584	3.505	3.490
Cross-State	1.729	1.765	1.758	1.721	1.744	1.789	1.743	1.717
Within-State	1.757	1.758	1.724	1.633	1.707	1.796	1.762	1.773

Figure 8-13: Cross-state vs. Within-state Diversification
Multi-destination Trips



8.4.3 States As Cues for Information Processing

Categorization scheme has also a cognitive aspect (Rosa et al. 1999). Hence the level of aggregation in the categorization scheme may have implications in the customer's information processing when making the purchase decision. In other words, although the focal choice is made among items/categories (e.g., stopover regions) at a certain level, customers may use higher level categorization (e.g., states) to facilitate information processing.

For the purpose of information processing, there are many other possible higher level categories than the states. For example, travelers may mentally group destinations based on same perceived similarity or difference in destination images. As suggested by Stewart and Vogt (1996), some general questions can be asked with the higher level categorization by customers, such as: Do state boundaries represent discontinuities of mental maps? How would such discontinuities affect destination clustering?

Interestingly, the results on the state affiliation disparity variable seem to support the intuition that destinations in the same state are more likely to be linked, as shown in the QAP correlations between state affiliation disparity and transition probability (Pearson correlation coefficient = .352, $p < .001$), sequence matrix (Pearson correlation coefficient = .165, $p < .001$), and association matrix (Pearson correlation coefficient = .104, $p < .001$). This result is consistent with that shown in the descriptive analysis in Chapter Five, which suggests that high transition probability normally happens between destinations in the same state. Besides that travelers are concerned with cost and convenience when selecting the destinations in their trips and the transportation route, the pattern could also be the result of using states in some circumstances as cues for information processing.

8.5 Summary

In this chapter, empirical relationships between all five assortment measures as well as each measure's own empirical properties are examined. From the results, it is concluded that the proposed measures do reflect the internal consistency of the assortment. Furthermore, tentative tests of hypotheses are conducted and implications for further theory building are discussed.

CHAPTER 9: CONCLUSION

9.1 Introduction

Assortment is probably one of the most frequently encountered phenomena in the marketplace and in everyday life. Suppliers provide assortments based on their anticipation of customers' needs. Customers, in return, acquire and build up their assortments of goods in response to the offering. This type of interaction becomes the very basic general mechanism that guides the functioning and the evolution of a marketing system. Motivated by the importance of accumulating a quantitative understanding of assortments embedded in marketing systems, this thesis has sought to investigate possible measures of acquired assortments some or all of which might be usable in the wider contexts of the offered, accessible, acquired and accumulated assortments found within a marketing system.

This chapter summarizes the key research contributions of the research program, discusses some implications and limitations, and outlines some important future research directions.

9.2 Summary of the Research Program

With a brief introduction to the research program in Chapter 1, the thesis unfolds the program into seven consecutive chapters. Among these seven main chapters, the first two chapters deal with the conceptual framework of assortment and its measures in general, while the rest present an exploratory application that aims at finding potential empirical regularities to further extend and enhance the framework.

More specifically, having reviewed the theoretical background of the assortment concept in Chapter 2, discussed aspects of assortments in marketing systems and suggested a holistic analytical framework to consider acquired assortments in Chapter 3, the applicability and nature of the proposed measures of acquired assortments are explored in an empirical study of tourism destinations in Australia, covered by Chapters 4, 5, 6, 7 and 8. Chapter 4 introduces the research methodology adopted in the thesis, a methodology that utilizes a comprehensive data base comprising 32,000 interviews of departing international visitors. Chapter 5 introduces the case study of destination choices made by international visitors to Australia as an example of the construction of acquired assortments, one that parallels the construction of shopping baskets in a supermarket visit or of choices made from the shops in a shopping centre. Chapter 6 is concerned with cross segment comparisons of acquired assortments of tourism destinations and their associated measures; Chapter 7 looks at these measures over time in the short term evolution of a marketing system and pays particular attention to the Olympic Games held in Sydney, one of the destinations included in the set of Australian destinations, using it as an example of the effects of a major promotion of part of an assortment. Chapter 8 then compares and integrates the five suggested measures of assortment.

The following sections list the most important results of the research program.

9.2.1 The Conceptualization of Assortment in the Marketing System

Trying to identify the assortment's role in marketing systems, the thesis concludes through literature review that assortment is an accessible concept for suppliers, customers, system researchers and administrators as well. In particular, the conceptualization of assortment emphasizes the following points:

- It is a collection of things; single product (brand, firm, etc) is a special case of it;
- It can be observed at different stages of the marketing process;
- Its size and composition are relevant to its value; and
- It contains a multi-level property while its definition is sensitive to the boundary

of categories and the marketing system in which it embedded.

9.2.2 Measures Proposed to Operationalize Acquired Assortments

Two key groups of assortment properties are identified and discussed for acquired assortments. The first group involves diversity properties and includes measures of variety, balance, and disparity. The second group contains the relational properties of assortment, that is, association and sequence. Association measures focus on the relationships between items in an assortment and assess the frequency with which items are found together. Sequence measures focus on the sequence of choices made in the construction of an acquired assortment. Both sets of measures are closely linked with the depiction of an assortment in terms of a network graph.

All the five measures are based on information on individual level assortments, which can be considered as the generalized "shopping baskets". Patterns found in a study of the five properties at the aggregated level have implications for system stability and growth or evolution. From this point of view, the proposed assortment measures provide a platform that bridges micro and macro research streams in marketing.

9.2.3 Application of Proposed Measures on Destination Assortments

As with any other marketing system, the tourism marketing system in Australia is a complex system. Based on carefully and clearly calibrated constituent categories of assortments in the context, the application of assortment measures leads to the following findings that are relevant to players in the Australian tourism industry.

9.2.3.1 Influential Factors in Differentiating Destination Assortments

Destination familiarity, country-of-origin, Internet usage were found to be more influential factors on assortment patterns than were other traveler characteristics such as gender. In a sense each of these characteristics points to information search and utilization as being critical to an understanding of tourism choices. This was particularly apparent in an exploration of balance where it appeared that certain better informed customer groups are more diversified in their overall usage of the system and could be more beneficial to the sustainment and growth of the system.

Highly connected cliques of destinations are found. These structurally dense groups tend to vary across different segments of travelers or according to certain visitor characteristics. Here targeted product bundling and differentiated services can be suggested. Perhaps most important the network graph modeling of assortment points strongly to item dependencies within acquired assortments. This in itself is an important reason for considering assortments as well as single products in the analysis of marketing systems.

For policy makers, the system level structure of visitations constitutes a tool for tracing the market response to tourism developments.

9.2.3.2 Promotion and Seasonal Effects Captured by the Assortment Measures

An important influencing factor on changing patterns of tourism assortment that has been explored in this research is the 2000 Sydney Olympics. From the marketing function perspective, as the event promoted the specific destination – Sydney – that hosted it, in a broader context, it can be considered as a typical promotion effort that focuses on a specific item but may have impacts on other items in offer. The Olympic Games is a major event to any host country, especially to the country’s tourism industry. Hence, from the marketing systems point of view, it also served as a major overarching influence on the whole system. Similar to that of an ecosystem, where a particular change in environmental conditions may increase the diversity of one subset of organisms within a community while decreasing the diversity of a different group of organisms, diversity in some assortments may rise while that in other assortments may drop. Huston argues "it is virtually impossible to understand variation in the total number of species in a community unless changes in the major functional groups of species can be understood" (1994, p. 8). The same idea can be applied in analysis of marketing systems, that is, to understand how assortments interact with the whole system, it is necessary to explore its role and changes in sub-systems.

The Australian tourism marketing system is responsive to seasonal effects and other imposed influences such as the 2000 Sydney Olympics. On the other hand, the system is resilient in that the impact as reflected by the assortment measures appears to be minor (although as noted this does depend on similar studies of assortment measures being undertaken) and assortment balance adjusted back towards its original level after the event. Though the overall system seemed to be resilient, individual destinations were affected differently by the 2000 Olympics. Also, the higher the level of aggregation in the categorization scheme, the more resilient it appeared to be. At the state level, the balance seemed to be more stable overall and less affected by the Olympics in particular.

Results in this study show to some extent the resilience of a marketing system, which refers to its ability to absorb major changes. An underlying question however concerns the extent to which system complexity might contribute as it is not uncommon to find complex systems that are balanced on a "tipping point" where slight changes can provoke major responses. Is it possible that the evolutionary dynamics of a marketing system might predispose such as system to resilience?

9.3 Managerial Implications of Assortment Measures: A General Discussion

9.3.1 Implication of Variety for Performance of Marketing Systems

There is considerable literature discussing the implications of diversity in the "more" or "less" decision setting, in particular for the performance of marketing systems. Some argue more is better (e.g. Ratchford 1990; Opperwal and Koelemeijer 2005), but many suggest it could be the opposite (Chernev 2003; Gourville and Soman 2005; Boatwright and Nunes 2001; Borle, Boatwright, Kadan, Nunes, and Shmueli 2005). However, the implication of diversity in the marketing system is much sophisticated than it appears to be.

Reducing the size (i.e., variety) of the assortment may not improve system efficiency. However, it should be noted that some diversification or differentiation is not effective in serving customer needs, so sometimes there is unnecessary variety in the system.

Some authors have argued "the 80/20 Principle" is the answer to the unnecessary variety in the system, in particular when the sales of different products follow a power-law or similar distribution. The suggestion is to focus on only a few items while getting rid of the rest can be detrimental. From a marketing system perspective, there are at least three reasons that are against such a suggestion. First of all, at an important though early stage of customer behavior, there is the choice of overall system (e.g., a store) that depends on the variety provided by the system. Perceived variety of the assortment offered by the system constitutes an important part of customers' solution to uncertainty. If a marketing system doesn't offer enough variety, then customers would probably turn to a competing system, even if there are barriers to switching such as search costs or transportation costs. Second, relations exist between the less popular items and the most popular items. The system is complex since not all choices of items are independent and not all relations are linear. Thirdly, depending on where variety modification such as the 80/20 principle is applied, whether to profit, sales or customers/segments, the results could be very different. A related factor is concerned with the differing levels of aggregation that may be involved. A typical marketing system could be considered at many different levels of aggregation (in tourism, perhaps state, city and destinations within cities might need to be considered). Variety modification which fails to consider the whole network runs the risk of lowering systems performance perhaps permanently.

The focus should still be on customer benefit, and ultimately, the quality of life. Whether to increase or reduce variety, a marketing system can go either way, but eventually it has to come back to the very basic criterion: Have the needs of the customer been met? In other words, the 80/20 principle cannot be implemented by ignoring customer needs. Although in most times efficiency can be improved through simplification, simplification is not the panacea for efficiency problems in the marketing system.

Variety does not necessarily mean complexity, in particular complexity in management or extra costs. Modern technologies have enabled firms to handle larger and larger assortments without dramatically increasing costs. An example is the growth of Amazon in book-selling, or of networks such as WebJet or Trip Advisor in tourism. Actually, the variable costs of holding an item have dropped so heavily that it is desirable for online retail stores to keep more items than less.

9.3.2 Relational Measures

As mentioned in Section 9.3.1, relational properties of the assortment might indicate different implications of diversity on the marketing system. Hence, one of the managerial applications of relational measures is to differentiate situations where diversity properties have positive or negative effects on the performance of the marketing system.

Relational rules can be used with caution on the bundling of products or shelf arrangement. For example, Borges (2003) proposes a new grocery store layout based on the association among product categories: he argues that the present day grocery store layouts based on "sectors" such as fruits, vegetables, magazines, and CDs were adopted mainly due to historical reasons, therefore such a layout is company-oriented and it fails to respond to the needs of the time-pressured consumer. On the other hand, by developing new formats, leading retailers can align assortments to specific consumer behaviors and segments, optimizing space profitability and creating a better destination for customers (Harper et al. 2010). The layout proposed by Borges (2003) suggests that spatially close items may belong to totally different categories. The viability of this type of layout, however, should depend on the stability of the association patterns of acquired assortments over time. To this extent, quantifiable measures of assortment are useful and desirable tools from the managerial perspective.

9.4 Theoretical Contributions: On Assortment and the Marketing System

Compared to the most widely found research focus on single items (product, brand, etc) in marketing, research on assortment adds reality as well as complexity to the marketing knowledge, and the potential intellectual implication could be enormous. Though the concept of assortment has been adapted into marketing for many years, the understanding of it is still naïve and one-sided (i.e., most researches focus on the supplier’s assortment). This research shows how acquired assortment can add to the existing knowledge of assortment and extend our understanding of both assortment and the marketing systems.

As probably the most influential contributor to the concept of assortment, Alderson (1957) sees the goal of marketing as the matching of segments of supply and demand (p.199). To achieve this goal, there is an essential mechanism of marketing that consists of four aspects of sorting: sorting out, accumulation, allocation, and assorting. The empirical results presented in this thesis focus on the last part of the four stages:

assorting. Thus, instead of looking at the process through a perspective that assumes it is initiated by suppliers, a bottom-up approach is taken. The assumption underlying this customer-focused approach is that customers have an influential role in shaping the marketing system through the construction of their assortments. At the same time, as a type of complex system, the marketing system could share some of the key characteristics of complex systems, such as scalability, resilience, and emergence of macro patterns from micro-level interactions.

One of the extensions made by this research program to Alderson's theories is related to the discrepancy of assortments. Alderson (1957) proposes the concept to account for the unfulfilled goal of marketing. It is generally believed that the discrepancy of assortments is a driving force for the evolution of marketing systems. However, not only were there rarely any proper measures of discrepancy of assortments, the managerial applications were limited as well. The postponement strategy can be considered as a solution to the discrepancy of assortments, and it briefly touches the efficiency and effectiveness of the marketing system, but besides that, there have been few further developments over the years. The problem, again, may lie in that previous theorization of the assortment assumes its formation depends mostly on the suppliers' side. To this extend, this thesis contributes to the theory by showing comparable features of assortments constructed by customers to the assortments that offered. And because of the property of emergent patterns at the aggregate level, the research discloses mechanisms and patterns of assortments that have been ignored or gone unnoticed in the past.

At the same time, the research extends Layton's (2007, 2008) marketing system theories by providing empirical evidences on the assortment, which is one of the main marketing system components. The assortment measures and the mechanisms lead to the assortment patterns suggest viable indications of evaluating efficiency and effectiveness of the marketing system, important factors that influence the quality of life (QOL).

Furthermore, a third criterion of marketing system performance, the resilience of the system, has been put forward by the research and could enhance the richness and thoroughness of the marketing system theory.

9.5 Research Limitations

The analysis is based on an existing survey – the International Visitor Survey. As a result, the unit of analysis for this study is restricted to the Bureau's broad definitions of a 'tourism region' or 'stopover region'. This does, however, pose some limitations for the purpose of the current study as the analyses presented cannot distinguish between the two types of role that a tourist 'destination' may hold in the visitors' itinerary. The reader is reminded, therefore, to keep this somewhat generic definition of a tourism region or destination in mind when interpreting the results presented in this thesis.

9.5.1 Limitations Related to Exploratory Research

The current study is to a large extent an exploratory research. That is to say, the conceptualization and measurement of assortment and its properties are still at a "testing" stage. In this sense, measures and influencing factors can both be expanded, and other mechanisms that may lead to assortment patterns should be explored in the future as well.

9.5.2 Taxonomy and Category Definition Issue

As indicated in previous chapters, definition of category has always been an issue for accurate interpretation because of the level of arbitrary judgment involved. This issue can be generally described as the taxonomy issue.

The research accepts the boundaries to assortment set by the ATC at some 112 destinations (or stopover regions so-called by Tourism Research Australia). This limits the lowest level of aggregation for assortment. If for example Sydney is a destination (coded as "104" in the dataset) then within Sydney there are many levels of specification that would be relevant to tourism choice. The extent of these options and tourism awareness of their existence may be important factors in the overall choice of destination. These possibilities await further enriched data sets.

9.5.3 Sampling Biases

The method of quota sampling according to visitors' country-of-origin could bring biases in the results or interpretations of Australia's tourism marketing system. Though this challenges the representativeness of the sample to the overall assortment of the whole system, it does account for one of the most important dimensions of heterogeneity in the tourism marketing system—the origin-destination distance (Fleming and Hayuth 1994; Stewart and Vogt 1996).

By focusing on overnight visits, the same-day visits (of excursionists) are excluded from the study. The observed assortment patterns might have been influenced by this decision.

A related issue is the definition of "tourism marketing system in Australia", which is slightly different from the commonly used "tourism system" or "total system". While the former is derived from the concept of marketing system, the latter refers to a broader inclusion of geographic locations: tourist generating region – the origin of tourists; transit routes – the routes traveled by tourists to arrive at their chosen destination(s); and destinations – the places visited by the tourist.

9.5.4 Limitations Imposed by Data Availability

Data availability that limits other studies also affects this research. As a result, not all important factors influencing multi-destination trips identified in the literature can be explored. This is particular true with empirical studies. For example, due to data availability constraints, Tideswell and Faulkner (1999) were not able to include economic rationalism, which requires information on income of the visitor, and type of travel arrangements (i.e., whether the trip is a packaged tour or free-independent travel) in their empirical investigation on multi-destination tourism with QVS (an Australian database on international visitor travel patterns in Queensland, which is very similar to the IVS.)

The data used here does not provide explicit information as to the preferences of tourists, while knowledge of the choice process suggests that both cognitive and affective aspects of decision, such as image of a destination, are involved in the process (Lin et al. 2007). This largely restrains the depth and completeness of interpretations of the assortment patterns and their influencing factors. A possible direction for future research would be to integrate preferences into the survey data, since such integration with even preference data that are collected infrequently and for only a subsample of consumers would address more accurately the influence of different factors (Horsky et al. 2006).

9.5.5 Generalizability

There are some limitations for the generalizability of this study. Some of the tourism-specific results may not be generalizable to other contexts. For example, the stock-out issue, which is less of a problem in the tourism context, is not considered in the study. However, with a shopping basket in the retailing context, the possibility of switching because of not finding the desired item exists. In other words, what happened in other types of shopping basket could be far more complex than that studied here.

9.6 Future Research

There are four major directions where the current research can be extended and enhanced in the future. The first direction is to investigate mechanisms that lead to assortment patterns. It is also possible to test hypotheses that would contribute to the tourism theories. Third, due to the exploratory nature of this study, and because of the generalizability concern, in the future the proposed assortment measures and analytical framework can be further tested in other contexts. Finally, there is a wide range of possibilities in extending the assortment research related to the marketing system research. Thus, both theoretical and methodological developments could be extended and strengthened.

9.6.1 Mechanisms Leading to Assortment Patterns

Researchers have long been exploring mechanisms that lead to different types of assortment patterns in various complex systems. For example, in ecology, it is suggested that biological diversity represents a balance between immigration, extinction, and/or speciation. Similarly, variety changes in a marketing system are influenced by industry dynamics such as innovation and competition, which ultimately are driven by the discrepancy of assortment, knowledge development (e.g. technology enhancement), and heterogeneity of customers.

Identifying the influential factors is a constructive move to better understand assortment. For a next step, it is natural to think of the mechanisms embedded in the process of influences. Based on the literature, some viable directions for exploring these mechanisms are listed below.

As mentioned in previous chapters, assortment patterns include measures of assortment and changes or variations of the measures in relation to the aforementioned segmentation and external factors. A number of stochastic models can be used to explore the "why such patterns exist?" question. These include the two existing models in the literature: Dirichlet model and Hendry system, as well as speculations of some new models given the observation of certain assortment patterns. The discussions are based on general guidelines instead of specific marketing systems for application in a wider context of assortment research.

9.6.1.1 Dirichlet Model

The NBD-Dirichlet model (or "Dirichlet" for short), which is well-established and very popular in large-scale empirical studies of brand purchase (e.g., Ehrenberg et al. 2004) or store patronage (e.g., Uncles and Hammond 1995), specifies the number of purchases/visits each household (or individual consumer) makes of each of the available (or specified) brands (or stores) in a chosen period of length. The model involves five distributional assumptions (Ehrenberg et al. 2004; Uncles and Hammond 1995):

(i) Poisson distributions for individual purchases/visits. Incidences of purchases/visits by a given consumer in successive equal time-periods are independent (i.e., a "zero-order" process) and follow a Poisson distribution with constant mean.

(ii) A Gamma distribution for means of the Poissons across consumers. Consumer heterogeneity in these individual means is assumed to follow a smooth "Gamma" type of distribution.

(iii) Multinomial distributions for specific purchases/visits. Each consumer's probability of purchasing a given brand (or visiting a given store) is constant over time and follows a multinomial distribution. This is also a "zero-order" assumption.

(iv) Heterogeneity in consumers' choice probabilities is assumed to follow a smooth Beta distribution of a multivariate "Dirichlet" type.

(v) The above statistical distributions are independent of each other.

The Dirichlet model can be applied to both store and brand levels; its applicability to different aggregate levels in the marketing system is a desirable feature for assortment studies.

Assessment of stochastic mechanisms can be conducted through comparing empirical data of the current study with model predictions. The NBD-Dirichlet Model could be implemented at the state level, or in other words, the model can be used to predict the number of visits to destinations in a given state and the choice of state in a fixed length of time-period—a season. To do this, three parameters need to be estimated: the mean number of stops in a trip, the exponent of the NBD (Negative Binominal Distribution), and the sums of the values of the "α"s in the Dirichlet Model. Parallel to what suggested by Uncles and Hammond (1995) on store choices, the last parameter reflects how diverse the visitors are in their state choices. It can be estimated from just two measures: the penetration and average visit frequency, where

$$\text{Penetration (\%)} = \frac{\text{The number visiting at least one destination in the state}}{\text{The total number of sampled visitors in the season}}$$

9.6.1.2 Hendry System

This is a model using "pairs of purchases" to estimate the market structure. It has a strong strategy-oriented tradition and has been focused on the brand-switching issues. The Hendry system also assumes constant probability of individual brand choice (i.e., a "zero-order effect"), which constitutes a heterogeneous multinomial probability model (Kalwani and Morrison 1977) and can be stated as follows: each consumer j has a probability p_{ij} of buying Brand i; on each purchase occasion, an individual consumer chooses among g brands on the basis of a constant probability vector ($p_{1j}, p_{2j}, \ldots, p_{gj}$); moreover, each consumer is not assumed to have the same purchase probability p_{ij} of buying Brand *i*.

Ehrenberg et al. (2004) suggest that the assumptions for Dirichlet model and Hendry system are very different. This argument can be understood in a way that Hendry system is a special case of Dirichlet model—while Dirichlet model assumes an unsegmented market (Uncles and Hammond 1995), Hendry system is trying to find subsets of brands (or stores in the case of store patronage being the unit of research) that are "directly competing with each other" through observed switching from one brand to another. The subsets are called "partitions". Using market share of the switch-to brand as the benchmark, the Hendry system defines partitions according to the criterion that "switching is much higher among alternatives within the same partition, relative to share" (Rubinson et al. 1980, p.217).

Using "pairs of purchases" as the unit of analysis is consistent with the proposed relational measures for assortment. Hendry system is a parsimonious model as normally there is only one parameter to be estimated in the model—the switching constant. The key in the Hendry system is the definition of the types of market structure.

Both Dirichlet model and Hendry system are methods that can relate the stochastic mechanisms with market structure. The implementation of Hendry System will be similar to the polythetic-divisive method used in Uncles (1996), and can be fulfilled through the hierarchical clustering approach in network analysis. The major difference between Dirichlet model and Hendry system in the context of this research and beyond is that the latter can take acquired assortment as the unit of research at the individual level while the former still has a single-product focus.

9.6.1.3 First-Order Stochastic Mechanisms

Both the Dirichlet model and Hendry system are zero-order models. However, in a context where the sequence of acquisition matters, it is necessary to incorporate path-dependence into the model, thus an alternative choice is a first-order stochastic mechanism to compare with the two zero-order models.

Assortments may not always be composed of contemporaneous choices, that is, an acquired assortment can also be formed over a period of time. Although the boundary of such an assortment is again arbitrary, it provides an additional relevant dimension of which assortment should be examined. It is under this context—that is, with sequence in choices—that the first-order stochastic mechanisms may apply. One of the potential first-order models that can be adapted for the assortment context is the Hidden Markov Model, which has been discussed in Section 3.3.3.

The major difference between zero-order and first-order mechanisms is that the latter suggests a probability conditional on instead of independent of the last purchase the consumer made before a particular occasion. Therefore selection of first-order mechanisms is aimed at finding a proper construction of conditional probabilities for the assortments.

The Preferential Attachment (PA) mechanism, which has been suggested as one of the driving mechanisms for a power-law distribution (D'Souza et al. 2007; Yamasaki et al. 2006), can be used as the foundation of the conditional probability.

Though the application of Preferential Attachment (PA) mechanism to assortment data is confined by the fixed size of the focal system (Hwang et al. 2007), it is still worth trying with the understanding of assortment properties advanced by this thesis. An alternative to the actual "growth" of the overall network is to consider sub-networks with cores and explain the core-periphery structure with PA.

Besides PA, an alternative hypothesis could involve other non-random structure models, such as those applied by Istock and Scheiner (1987) on ecological diversity. In particular, statistical significance test can be carried out on: (1) deviation of a dataset from its null (random) expectation, (2) deviation of any single item (sample) from the mode, (3) significant similarity between any pair of items/categories, and (4) significant association between any pair of items/categories.

9.6.2 Test of Tourism Related Hypotheses

As discussed in Pearce's (1987) review of origin-linkage-destination models, distance, together with factors that modify the effect of distance such as low cost of living, favorable climate, historic links, political drawbacks, as well as capital city tourism, major transport links and tourism price levels, are all contributors to the resulting international tourist space on scale of visitation. According to these early models, the pattern shown in international tourist space can be best described as concentric zones, where intensity of visitation diminishes gradually from the core to the periphery.

Studies of individual consumers confirm the role of geographical distance in determining assortment pattern. Brooks et al. (2004) found reference-dependent theory (or prospect theory) to have substantial explanatory power in studying destination clustering in shopping trips. Given a fixed combination of needs, the choice between destination assortments could be determined by the spatial relationships within those destinations. Reference-dependent theory suggests the shape of the value function of choices is based on three assumptions, namely reference-point dependence, loss aversion, and diminishing sensitivity. Using home as the reference point, distance as the measure of cost (loss), Brooks et al. (2004) examined both reference-point dependence and diminishing sensitivity assumptions through experiments. According to the idea of reference-point dependence, it is assumed that people frame gains and losses relative to some neutral reference point. For diminishing sensitivity, it is assumed that people are less sensitive to marginal losses/gains further away from the reference point. Their results show both assumptions are useful in predicting the choice between alternative equidistant trip chains.

With the measures proposed in this study, the precise geographical information can be replaced by scale-free networks, which allow for more generalizable analysis and results. As a result, important theoretical hypotheses can be tested with a simplified data frame by introducing theoretically defined roles of destinations. In the case of reference-dependent theory, given that initial origins and ultimate destinations are important and should be identified in analysis related to relational properties of a place (Fleming and Hayuth 1994), two levels of reference points can be used in the current study. The first level involves the entry and exit airports – they can be used as the reference point for the trip chains within Australia. The tourist's country of origin presents a second level of reference point, so that in a sense not only geographical distances but also cultural and technological distances can all be taken into account.

Concerning destination assortment patterns, another stream of literature comes from trip distribution analysis, within which the gravity model is probably one of most frequently used models (Levinson and Kumar 1994). The socioeconomic variable based gravity model has a potential to be applied in the analysis of destination assortments by looking at influences of destination characteristics such as population, area size, or even number of attractions in the stopover regions, on the probability of connecting trip made between a pair of destinations.

9.6.3 Extending the Application of Assortment-Measure-Based Analytical Framework

The measures of assortment proposed here suggest alternative ways of exploring both customer segmentation and the short and long term evolution of a marketing system evolution. At this early stage in the development of assortment measures it seems likely that detailed studies of assortments within and between marketing systems at differing levels of aggregation may uncover useful patterns in the growth, adaptation and evolution of marketing systems. The five component measures provide a possible analytical framework within which these issues can be addressed. Questions such as how does diversity influence system efficiency and effectiveness, or growth pathways; or how might association measures derived from network graphs (such as centralization, or density) impact power and influence within a marketing system, or perhaps the extent of anti-competitive behavior; or sequence measures derived from networks and transition matrices link with customer behavior over time perhaps on shopping trips. All of these possibilities depend on the gradual publication of these or similar measures for a wide range of marketing system contexts.

Looking at the measures more closely, the three-component diversity measures of assortment are natural extensions to the traditional “width” and “depth” considerations, which have been used as a common managerial decision variable in retailing and the vertical coordination issue in various industries. The focus of the “width” and “depth” consideration is variety, which is only part of diversity. With the two additional measures, balance and sometimes disparity, diversity related research questions can go beyond the variety issue to include content scope and diversification. These measures are often available in offered assortments where sales or similar performance outcomes are possible. This raises the possibility of studying the vertical and horizontal assortments found in a typical marketing system.

Analysis of relational properties provides an approach that combines qualitative and quantitative methods, which are especially useful in identifying topological structures in the assortments. In particular, featuring structure such as islands in the sequence matrix helps in an understanding of customer behavior and presents a viable validation tool for cluster analysis and related methodologies that involve sequence. Descriptive numerical measures, on the other hand, are suitable for analyzing effects of marketing activities and other internal or external forces that drive change in a marketing system. Because of their implications for the performance of a marketing system, in the future, they can possibly be linked to or even used directly for measures of system performance.

Using pairwise relationships between items in the assortment, the proposed operationalization of the relational properties brings forward hidden relationships between supplier and buyer networks that have been largely neglected in the past, and points out how those relationships can be investigated through observations on items (i.e., products, services, experiences, and ideas, etc) offered and acquired by the actors; at the same time, it addresses the prevalence of networks in different marketing systems, and is adaptable and applicable to most industries.

The procedure is useful in that, where patterns can be found in acquired assortments, the possibility of these patterns being associated with particular events, customer groups, or factors such as information sources, can be explored. As illustrated in Chapter 6 and 7, implications/consequences of structural properties of assortments can be investigated together with segmentation factors and external factors. Such an analytical framework is applicable to both customer side research and firm side strategy. At the same time, it also provides a validation tool for cluster-based segmentation.

9.6.4 On the Marketing System

Compared to the measurement issue of assortment properties, knowledge development on marketing systems is even more lagged behind its importance. Although not all marketing problems can be transformed into assortment questions, it is worthwhile to identify and explore the assortment dimensions of the underlying marketing system embedded in those problems. For example, with a distributive justice concern, the researcher may want to ask: what would the assortment pattern look like in a marketing system that has distributive injustice? In the future, this type of explorations can add value to both assortment theories and the specific area that applies the assortment measures and the analytical framework.

This research has successfully linked acquired assortments to the performance of the marketing system through preliminary evaluation of its efficiency, effectiveness, and resilience. However, the relationships are still not fully explored; the reason lies in that few suitable empirical measures for the performance of marketing system are available at the moment. Further research can probably build more robust knowledge on the relationship between assortments and the various aspects of marketing systems through combining knowledge of assortments and indicators of marketing system performance.

Appendix A: 1999 International Visitor Survey

ACNielsen

NG2577 - Draft 6

1999: INTERNATIONAL VISITOR SURVEY

NOTE: ALL QUESTIONS WITH 'H' PREFIXES ARE FOR HARDCOPY QUESTIONNAIRES ONLY, AND ALL 'C' PREFIXES ARE FOR CAPI ONLY.

S.2 RECORD CAPI IDENT (OR LIKELY RANGE IF UNSURE)

☐☐☐☐☐ to ☐☐☐☐☐

S.3 RECORD LANGUAGE OF INTERVIEW:

English 1
German 2
Indonesian/Malay 3
Japanese 4
Korean 5
Mandarin 6
Other (SPECIFY) 8

S.4 RECORD FLIGHT NUMBER FROM CONTACT SHEET: ☐☐☐☐☐

RECORD FLIGHT GROUP: ☐☐

SECTION I: INTERNATIONAL TRAVEL PATTERNS

Q.1 RECORD CITY OF INTERVIEW

Sydney 1
Melbourne 2
Brisbane 3
Perth 4
Adelaide 5
Darwin 6
Cairns 7

Q.2 RECORD COUNTRY OF RESIDENCE FROM SCREENING SHEET

Canada 005
China 502
England 102
Germany 210
Hong Kong 302
Indonesia 306
Ireland (Eire) 106
Japan 500
Korea 501
Malaysia 304
New Zealand 801
Northern Ireland 105
Scotland 104
Singapore 303
Taiwan 503
Thailand 307
USA 001
Wales 103
Other (SPECIFY) .... ☐☐☐

HQ.3 How many nights have you spent in Australia for this visit?

Nights .... ☐☐☐ → GO TO Q.4

CQ.3a I'm now going to ask you how many nights you spent in Australia for this visit. Would it be easier for you to give me the date of your arrival or the total number of nights spent in Australia?

Date of arrival .... 1 → Q.3b
Total nights .... 2 → Q.3c

CQ.3b On what date did you arrive in Australia for this visit?

Date: ..../....../......

CQ.3c How many nights have you spent in Australia on this visit?

Nights .... ☐☐☐

CQ.3d So you have spent a total of <*insert number of nights*> in Australia. Is this correct?

Yes 1
No (amend date) .... 2 → Q.3b
No (amend total nights) .... 3 → Q.3c

Q.4 On this trip to Australia, did you stay or will you stay for one or more nights in any other country, including your own? Please include stays both on the journey here and on the way home.

Yes 1
No .... 2 → Q.7

Q.5 How many **nights** altogether will you spend outside Australia on these stays/stopovers.

Nights .... ☐☐☐

Q.6 Will any of those <*insert Q.5*> nights have been spent or will be spent in any of the following countries?

MULTIPLE CHOICE

READ OUT

Hawaii 01
Hong Kong 02
Indonesia 03
Malaysia 04
New Zealand 05
Singapore 06
Thailand 07
United States (not Hawaii) 08
Japan 09
Korea 10
Taiwan 11
None of these 97

Q.7 **Thinking about the whole trip: by the time you get back home, how many nights in total will you have been away?** Please include any nights spent travelling.

PROMPT: Include nights spent travelling (e.g. on a plane or ship).

Nights .... [ ][ ][ ]

Q.8 Is this your first visit to Australia?
(IF ANSWER IS "BORN IN AUSTRALIA" ASK:
Is this your first return visit to Australia?)

Yes 1
No 2

SECTION II: TRAVEL GROUPS

➔ **SHOWCARD 1**

Q.9 Looking at Card 1 (PAUSE), did you travel to Australia on a **group tour**? That is, did you come with a group of people who were associated in some way and travelled together?

Card 1 shows some examples of what I mean by "group tour".

Yes 1
No .... 2 ➔**Q.11**

Q.10 **Is that....**

A sporting or special interest group tour? 1
An ordinary group holiday tour? 2
A business or convention group tour? 3
Other (SPECIFY)
.... 8

Q.11 Is your trip part of a job bonus, reward or other incentive (e.g. for high level of sales)?

Yes 1
No 2

➔ **SHOWCARD 2**

Q.12 Looking at Card 2 (PAUSE), which one of these statements best describes your immediate travel party?

Unaccompanied traveller 01
Adult couple 02
Family group - parent(s) & children 03
Friends &/or relatives travelling together 04
Business associates travelling together with or without spouse 05

SECTION III: REASONS FOR VISIT

➔ **SHOWCARD 3**

Q.13 Looking at Card 3 (PAUSE), when you arrived in Australia and completed your INCOMING PASSENGER CARD, which one of these did you mark as your **main** reason for coming to Australia?

Holiday 01
Visiting friends and relatives 02
Convention/Conference 03
Business 04
Employment 05
Education 06
Exhibition 07

Other reasons (SPECIFY - OR CODE BELOW)

.... 08
In transit 09
Immigration 10
Incoming Card not completed 11

➔ **SHOWCARD 4**

Q.14 Looking at Card 4 (PAUSE), what **other** reasons, if any, did you have for this visit to Australia?

PROBE: Any others?

MULTIPLE RESPONSE

In transit 01
Attend convention/conference/seminar, trade fair/exhibition 02
Accompanying convention, conference/seminar, trade fair/exhibition visitor 03
Business 04
Accompanying business visitor 05
Visiting relatives 06
Holiday/pleasure 07
Employment 08
Education 09
Visiting friends 10
Visiting an international student relative or friend studying in Australia 11
Working holiday 12
Medical reasons 13
On honeymoon 14
Other reasons (specify)
.... 98
NO OTHER REASONS 97

Q.15 In Australia, did you attend a convention/ conference/seminar, trade fair/exhibition or accompany someone who did?

Yes 1
No.. 2 →Q17

→ **SHOWCARD 5**

Q.16 And which of the following did you or the person you accompanied attend while you were in Australia?

Convention/Conference/Seminar 1
Trade fair/Exhibition.................................. 2

→ **SHOWCARD 6**

Q.17 Before you came to Australia, did any of the following influence your decision to come? (Show CARD 6)

MULTIPLE RESPONSE

Sydney 2000 and Paralympic Games 01
To experience Australia's nature, landscapes and wildlife...................................... 02
To experience Australia's coastline and beaches.. 03
To visit rural areas or the outback 04
To experience a nature based outdoor activity (e.g bushwalking, camping etc) 05
To experience Australia's cultural life (e.g theatre, music, arts etc)....................................... 06
To experience Australia's food, wines and wineries 07
To participate or watch an organised sporting event.. 08
To attend a festival or carnival.............................. 09
To experience Aboriginal culture.......................... 10
To experience Australia's shopping....................... 11
To visit Australia's casinos 12
NO PARTICULAR INFLUENCES.......................... 97

SECTION IV: DURATION OF STAY AND PLACES VISITED IN AUSTRALIA

Q.18 When you arrived in Australia on this visit, in which city did you come through Customs and Immigration?

Sydney 01
Melbourne 02
Brisbane 03
Perth.. 04
Adelaide 05
Darwin 06
Townsville.. 07
Cairns 08
Hobart.. 09
Broome.. 10
Coolangatta 11
Other (SPECIFY)
.... 98

Q.19 **CHECK Q.3**
Did respondent stay for one or more nights in Australia?
Yes... **1**
No .... **2→Q.28**

COMPLETE TRAVEL GRID ON FOLLOWING PAGE FOR ALL STOPOVERS.

USE CONTINUATION SHEETS IF NECESSARY AND STAPLE TO BACK OF TRAVEL GRID

TRAVEL & ACCOMMODATION GRID

CODING: NO STOPOVER ☐☐☐

Q.20 What was the (........) city or town you stayed in for one or more nights on this trip to Australia?

(IF NECESSARY, SHOW MAP - RECORD LOCALITY NAME/STATE. PROBE FOR STATE/TERRITORY WHERE TWO OR MORE LOCALITIES SHARE NAME)

Q.21 How many nights did you stay in *(say place / location)*?

→ **SHOWCARD 7**

Q.22 Looking at Card 7 (PAUSE), what was your reason for visiting *(say place / location)*?

SELECT ONLY ONE PURPOSE OF VISIT PER STOP

→ **SHOWCARD 8**

Q.23 Looking at Card 8 (PAUSE), which of these types of accommodation did you use in *(say place / location)*?

(ENTER CODE(S) OR RECORD DETAILS FOR OTHER)

NOTE: IF MORE THAN ONE TYPE OF ACCOMMODATION, USE TWO COLUMNS.

→ **SHOWCARD 9**

Q.24 Looking at Card 9 (PAUSE), which of these forms of transport did you use to get from (*arrival point or previous stop*) to (*this stopover*)?

RECORD MAIN FORM OF TRANSPORT ONLY

PROBE: Was this your last stopover?

IF "YES" → Q25

OTHERWISE RETURN TO Q20

Q.20 NAME OF STOPOVER

1st STOPOVER	2nd STOPOVER	3rd STOPOVER	4th STOPOVER	5th STOPOVER
....	....	....	....	....
Q.21 NO. OF NIGHTS				
.... ☐☐☐	.... ☐☐☐	.... ☐☐☐	.... ☐☐☐	.... ☐☐☐
Q.22 REASON FOR VISIT				
.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐
Q.23 TYPE OF ACCOMMODATION				
.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐
Q.24 TYPE OF TRANSPORT				
.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐	.... ☐☐

Q.25 How did you travel from (*last stopover*) to the airport today?.. ☐☐

Q.26 How many **nights** did you spend **travelling** in Australia - in trains, planes, buses and so on? **WRITE IN:** ☐☐☐

NOW CHECK TOTALS:

Total stopover nights (this page)	....
Stopover nights from continuation sheets	....
Nights spent travelling	....
TOTAL	

IS THIS THE SAME AS ANSWER IN Q.3? IF NOT -

CHECK GRID

Q.27 CHECK TRAVEL GRID
Circle states/territories visited from Travel Grid and Q18 in Q.28 below

→ **SHOWCARD 10**

Q.28 Looking at Card 10 (PAUSE), did you do any day-trips into any of these states (that is, you visited them but did not spend any nights there)? **CIRCLE STATES/TERRITORIES MENTIONED IN Q.28 BELOW.**

STATES VISITED

New South Wales	1
ACT (Canberra)	2
Victoria	3
Queensland	4
South Australia	5
Western Australia	6
Northern Territory	7
Tasmania	8

IF NSW VISITED - ASK Q.29
OTHERWISE → Q.30

→ **SHOWCARD 11**

Q.29 Looking at Card 11 (PAUSE), which of these places in New South Wales did you visit?

MULTIPLE RESPONSE

Sydney Shopping	01
Sydney Opera House	02
Darling Harbour	03
Bondi Beach	04
Sydney Tower (Centrepoint)	05
Sydney Harbour Cruise	06
The Rocks	07
Star City (Sydney) Casino	08
Sydney Olympic Site	09
Blue Mountains	10
NONE OF THESE	97

IF ACT VISITED - ASK Q.30
OTHERWISE → Q.31

→ **SHOWCARD 12**

Q.30 Looking at Card 12 (PAUSE), which of these places in the ACT did you visit?

MULTIPLE RESPONSE

Australian War Memorial	01
Parliament House	02
Old Parliament House	03
National parks/Natural bushlands	04
Telstra Tower	05
National Science and Technology Centre	06
National Gallery of Australia	07
Australian Institute of Sport	08
Wineries	09
Festivals/events	10
NONE OF THESE	97

IF VICTORIA VISITED - ASK Q.31
OTHERWISE → Q.32

→ **SHOWCARD 13**

Q.31 Looking at Card 13 (PAUSE), which of these places in Victoria did you visit?

MULTIPLE RESPONSE

Phillip Island, Penguin Parade	01
Sovereign Hill, Ballarat, Goldfields	02
Dandenong Ranges, Puffing Billy, Healesville Sanctuary	03
Great Ocean Road, Twelve Apostles	04
Grampians National Park	05
Mornington Peninsula	06
Wilsons Promontory	07
Daylesford, Macedon, Hepburn, Spa Country	08
Yarra Valley Wineries	09
High Country, Snowfields	10
NONE OF THESE	97

IF QUEENSLAND VISITED - ASK Q.32
OTHERWISE → Q.33

→ **SHOWCARD 14**

Q.32 Looking at Card 14 (PAUSE), which of these places in Queensland did you visit?

MULTIPLE RESPONSE

Theme Parks on the Gold Coast	01
Gold Coast Rainforests/Mountains/ Hinterland	02
Southbank Parklands in Brisbane	03
Noosa	04
Great Barrier Reef and Islands	05
Fraser Islands	06
Wineries in Southern Queensland	07
Hamilton Island	08
Tjabukai Aboriginal Centre	09
Kuranda (near Cairns)	10
NONE OF THESE	97

IF SOUTH AUSTRALIA VISITED - ASK Q.33
OTHERWISE → Q.34

→ **SHOWCARD 15**

Q.33 Looking at Card 15 (PAUSE), which of these places in South Australia did you visit?

MULTIPLE RESPONSE

Barossa Valley	01
Adelaide Hills, Mt Lofty Summit, Hahndorf	02
Coober Pedy Opal Fields	03
Kangaroo Island	04
Flinders Ranges, Wilpena Pound, Arkaroola	05
Naracoorte Caves, Penola, Coonawarra	06
River Murray	07
Festivals/events	08
Wineries	09
Museums or art galleries	10
NONE OF THESE	97

IF WESTERN AUSTRALIA VISITED - ASK Q.34
OTHERWISE → Q.35

→ **SHOWCARD 16**

Q.34 Looking at Card 16 (PAUSE), which of these places in Western Australia did you visit?

MULTIPLE RESPONSE

Fremantle 01
Rottnest Island 02
Northbridge: restaurants, nightclubs, museum, art gallery 03
Burswood Casino 04
Shopping Centres (eg Galleria/ Garden City) 05
The Pinnacles 06
Broome/Kimberley region 07
Monkey Mia/Shark Bay 08
Swan Valley Wineries 09
Margaret River Wineries 10

NONE OF THESE 97

IF TASMANIA VISITED - ASK Q.35
OTHERWISE → Q.36

→ **SHOWCARD 17**

Q.35 Looking at Card 17 (PAUSE), which of these places in Tasmania did you visit?

MULTIPLE RESPONSE

Hobart 01
Launceston 02
Huon Valley 03
Strahan 04
Stanley 05
St Helens 06
Freycinet National Park 07
Port Arthur 08
Ross 09
Cradle Mountain National Park 10

NONE OF THESE 97

IF NORTHERN TERRITORY VISITED - ASK Q.36
OTHERWISE → Q.37

→ **SHOWCARD 18**

Q.36 Looking at Card 18 (PAUSE), which of these places in the Northern Territory did you visit?

MULTIPLE RESPONSE

Darwin 01
Katherine 02
Tennant Creek 03
Alice Springs 04
Uluru (Ayers Rock) 05
Kakadu National Park 06
Litchfield National Park 07
Kings Canyon 08
West MacDonnel Ranges 09
Arnhem Land 10

NONE OF THESE 97

→ **SHOWCARD 19**

Q.37 Looking at Card 19 (PAUSE), what (leisure activities) did you do during this trip?

MULTIPLE RESPONSE

Outdoor/Ecotourism

Go to the beach (incl. swimming, surfing, diving etc) 01
Visit national parks, bushwalking, rainforest walks 02
Visit botanical gardens or other public gardens 03
Go whale/dolphin watching in the ocean 04
Visit the outback 05
Visit farms 06

Active Outdoors/Sports

Go fishing 07
Play golf 08
Play other sports 09
Other outdoor activities (e.g. horse riding, rock climbing, white water rafting, bungee jumping etc) 10

Arts/Heritage

Attend theatre, concerts or other performing arts 11
Visit museums or art galleries 12
Visit art/craft workshops/studios 13
Attend festivals/fairs or cultural events 14
Experience Aboriginal art/craft and cultural displays 15
Visit an Aboriginal site/community 16
Visit history/heritage buildings, sites or monuments 17

Local Attractions/Tourist Activities

Visit amusement/theme parks 18
Visit wildlife parks/zoos 19
Go on guided tours or excursions 20
Tourist trains 21
Visit industrial tourism attractions (e.g. breweries, mines) 22
Visit wineries 23

Social/Other

Visit friends/relatives 24
Visit pubs, clubs and discos 25
Visit casinos 26
Attend an organised sporting event 27
Go shopping (for pleasure) 28
Other (specify) 98
NONE OF THESE 97

SECTION V: TRAVEL EXPENDITURE

→ SHOWCARD 20

Q.38 Did you arrive in Australia on a travel package? Card 20 explains what I mean by a travel package

Yes .... 1 → Q.39
No............................... 2 → Q.42

→ SHOWCARD 21

Q.39 Looking at Card 21 (PAUSE), which of these travel arrangements were included in your travel package?

MULTIPLE RESPONSE

PROMPT: Does this include international air/sea fares?

International (air/sea) fare 01
Airfares within Australia....................................... 02
Organised tours in Australia 03
Most accommodation in Australia 04
Some accommodation in Australia..................... 05
Most ground transport within Australia 06
Some ground transport within Australia.............. 07
Most meals in Australia 08
Some meals in Australia...................................... 09
Entertainment and/or recreation activities in Australia 10
Sightseeing tours... 11
Convention fees 12
Other items (SPECIFY MOST EXPENSIVE ONE) 98

None/No Arrangements...................................... 97

Q.40 CHECK Q.39
Did the travel package include accommodation (codes 04 or 05)?

Yes 1
No.. 2 → Q.42

Q.41 How many nights in paid accommodation were covered by that travel package?

Nights ....

→ SHOWCARD 22

Q.42 I'd like to ask you about the cost of your trip and how much money you have spent in Australia.
Card 22 (PAUSE), shows what information to include. Is it easier for you to report on your own personal spending or for your travel party?

Personal only....................... 1 → Q.43
Immediate Travel party........ 2 → Q.45

No expenditure .... 3 → Q.63 ONLY WHEN CONVINCED

Q.43 I am now going to ask you some questions about your own personal expenditure. This includes what you *personally* have spent and any costs paid for by a company or organisation overseas on your behalf. Can you confirm again that you are only answering for yourself? That is, you are not reporting on behalf of your family or anyone else.

Yes .... 1 → Q.46
No.. 2 → Q.44

Q.44 You mentioned before that you were reporting your *personal* expenditure only. How many people, including yourself, are you in fact answering for?

Number of persons .... → Q.46

Q.45 I am now going to ask you some questions about the expenditure for you and your travel party. This includes what you have spent for you and your travel party, and any costs paid for by a company or organisation overseas on your behalf. How many people are you answering on behalf of?

Number of persons.......................

Q.46 CHECK Q.38:
Did respondent arrive on a travel package (Code 1 in Q.38)?

Yes.. 1→Q.47
No.. 2→Q.49

Q.47 Before arriving in Australia how much did (you/your party, or any other person or company on your behalf) pay for your travel package?

AMOUNT:..

Q.48 ASK OR RECORD
In which currency have you answered?

....

CONVERSION TO A$

$

→ NOW SKIP TO Q.52

Q.49 Before arriving in Australia, how much was paid for (your/your party's) international (air/sea) fares? Do not include any international fares paid for in Australia. Please include any payment you contributed for any persons travelling with you.

AMOUNT:..

Q.50 ASK OR RECORD
In which currency have you answered?

....

CONVERSION TO A$

$

Q.51 Did any of that expenditure cover the cost of airfares within Australia?

Yes 1
No 2

➔ **SHOWCARD 23**

Q.52 Now I'm going to ask you about your expenditure in Australia. Card 23 lists the categories I will be asking about. When you are thinking about your expenditure, please include money spent in Australia, amounts to be paid after you leave, and amounts paid before arriving in Australia (apart from your international air fare or travel package).

ON THE FOLLOWING PAGE ASK Q.53, Q.54, Q.55 AND Q.56 FOR EACH ITEM IN TURN

Q.53	Did you spend anything on (item 1)...?	Q.53		Q.54	Q.55	Q.56
Q.54	**IF ANYTHING SPENT ON** (item 1)... Was any of your expenditure on *(say item)* pre-paid, apart from amounts already covered by your travel package?					
Q.55	**IF ANY PREPAID EXPENDITURE (code 1 in Q.55):** How much was prepaid on *(say item)*?	**Any expenditure on items**		**Any pre-paid**	**Pre-paid expenditure amount**	**Australian expenditure amount**
Q.56	How much did (you/your party) spend on *(say item)* whilst in Australia? Include any amounts still to be paid.	**Yes**	**No**	**Pre-paid?**	**A$**	**A$**
1.	Organised tours. Include tours which combine coach, train or plane travel	1	2	1		
2.	Airline fares for travel within Australia	1	2	1		
3.	a) International airfares bought in Australia	1	2	1		
Ivwr only	**b) CALCULATE TOTAL FOR Q.55 AND Q.56 - items 2 & 3**				**TOTAL $A**	
4.	Rental and leasing fees for self-drive cars, rent-a-cars, camper vans. Please exclude petrol and oil costs	1	2	1		
5.	Petrol and oil costs for self-drive cars or other vehicles driven	1	2	1		
6.	Other transport fares. Include fares for trains, coaches, ferries, taxis, limousines, public transport	1	2	1		
7.	Food, drink and accommodation. Include alcohol, restaurant and bar expenditure					
	a) food, drink and accommodation inclusive	1	2	1		
	b) accommodation	1	2	1		
	c) food and drink	1	2	1		
Ivwr only	**d) Q55 & Q56 TOTAL FDA (items 7a, b, & c)**				**TOTAL $A**	
8.	Shopping (includes goods you may just have bought or intend to buy before departing)					
	a) items for use in Australia (eg film, cigarettes, toiletries, books, computers)	1	2	1		
	b) items to take home (eg gifts, souvenirs, clothing, books, jewellery and duty free goods)	1	2	1		
9.	Horse racing and gambling. Include casinos, horse racing, trotting, lotto etc	1	2	1		
10.	Entertainment such as theatres, movies, zoos, museums, nightclub, recreation, entry fees (Do not include alcohol)	1	2	1		
11.	Purchase of a motor vehicle.	1	2	1		
12.	a) Other major purchases (eg land, real estate, major business equipment, shares). **(SPECIFY)**	1	2	1		
Ivwr only	**b) CALCULATE TOTAL FOR Q.55 AND Q.56 - items 11 & 12**				**TOTAL $A**	
13.	Education fees (ask only if this is visit's purpose)	1	2	1		
14.	Education fees (if visit's purpose **is not education**)	1	2	1		
15.	Phone, Internet, fax &/or postage	1	2	1		
16.	Any other expenditure? Please include Convention registration fees, medical expenses, utilities, laundry, dry cleaning, hairdressing, insurance, registration, and any other expenses. **(Probe for convention fee expenditure if purpose of visit to Australia and/or any location is convention/conference)** (SPECIFY)............	1	2	1		
	CALCULATE TOTAL FOR Q.55 **AND** Q.56					
Q.57	a) **CONFIRM TOTALS:** So that means a total of *(Q.55 & Q.56)* was spent on this trip to Australia	**RECORD TOTAL AUSTRALIAN AND PRE PAID EXPENDITURE**			**$A**	
Ivwr only	b) **CALCULATE TOTAL EXPENDITURE MINUS TOTAL AIRFARES (ITEM 3b) AND MOTOR VEHICLES AND MAJOR GOODS (ITEM 12b)**	**TOTAL (item 57a) - (Item 3b + item 12b)**			**$A**	

Q.58a Has the respondent reported more than 1 stopover in the travel grid?

More than one stop .... 1 GO TO Q58

One stop only......................... 2 GO TO Q63

CQ.58 SELECTION OF RANDOM LOCATION

CAPI to select location .... 1 GO TO Q60

Entering hardcopy interview with random selection .... 2 GO TO Q59

CQ.59 RANDOM STOPOVER NUMBER

Enter random stopover number ☐☐

CONTINUE

CQ60 PLEASE VERIFY THE FOLLOWING RANDOM LOCATION:

Random Stop No.: ☐☐

Location ....

Yes, it is correct .... 1 GO TO Q61

No, it is not incorrect .... 2 Amend Q59

RECORD TOTAL EXPENDITURE FROM Q.57b

TOTAL A$ ☐☐☐☐☐☐

Q.61 While you were staying in *(randomly selected location)*, how much of your total expenditure of *(Q.57b total)* was spent in *(randomly selected location)*?
(**IF NECESSARY:** This is excluding expenditure on airfares, motor vehicles and major purchases)

A$ ☐☐☐☐☐☐

RECORD TOTAL FDA EXPENDITURE (item 7d)

FDA A$ ☐☐☐☐☐☐

Q62 Again, thinking about *(randomly selected location)*, how much of your Australian and pre-paid food, drink and accommodation expenditure of *(item 7d)* was spent in *(randomly selected location)*?

A$ ☐☐☐☐☐☐

WRITE IN TOTAL FROM Q56 AUSTRALIAN EXPENDITURE ONLY

A$ ☐☐☐☐☐☐

→ **SHOWCARD 24**

Q.63 Looking at Card 24 (PAUSE), which, if any, of the following did you or any of your travel party receive income from in Australia during this visit?

MULITPLE RESPONSE

Sale of Capital Goods.......................... 1
Gambling winnings 2
Other income (e.g. work) 3
No income received .... 4 → **Q.65**

Q.64 About how much income was received? Please separate gambling income, sale of capital goods, and other income.

Sale of capital goods, such as real estate, car, boat, business equipment, etc **A$** ☐☐☐☐☐☐

Gambling income A$ ☐☐☐☐☐☐

Other Income A$ ☐☐☐☐☐☐

SECTION VI: IMPRESSIONS OF AUSTRALIA

→ **SHOWCARD 25**

Q.65 Looking at Card 25 (PAUSE), please tell me how satisfied you were with certain aspects of your stay in Australia. How satisfied were you with…?

READ OUT EACH ITEM.
IF 'DON'T KNOW' RECORD '9' IN THE BOX.
IF 'NOT APPLICABLE' RECORD '7' IN THE BOX.

(1) The amount of tourist information available in Australia.................................... ☐
(2) The cost of domestic airfares....................... ☐
(3) The cost of other forms of transport............. ☐
(4) The availability of disabled/handicapped facilities.. ☐
(5) Shop trading hours .... ☐
(6) The cost of goods in shops.......................... ☐
(7) The cost of accommodation......................... ☐
(8) Airport facilities .... ☐
(9) Immigration/customs .... ☐

(10) Visa requirements for Australia.................. ☐

Q.66 Before you left <*country of residence*> did you get any information about Australia for this visit?

Yes..1 ➔ **Q67**
No ....2 ➔ **Q68**

Q.67 Did you use the internet to obtain information about Australia for this visit?

Yes...01
No 02

Q.68 Was the length of your stay in Australia... READ OUT

Longer than planned.............................1
Shorter than planned 2
Same as planned..................................3

Q.69 How much of your trip itinerary was planned before you arrived in Australia?

All planned ....1 ➔ **Q71**
Mostly planned......................................2
Some planned.......................................3
None planned 4

Q.70 Did you use tourism information obtained in Australia to help decide destinations that were not planned?

Yes...1
No 2

SECTION VII: DEMOGRAPHICS

Q.71 **RECORD SEX:**

Male 1
Female...2

➔ **SHOWCARD 26**

Q.72 Looking at Card 26 (PAUSE), which of these age groups do you fall within?

15 to 19...01
20 to 24...02
25 to 29...03
30 to 34...04
35 to 39...05
40 to 44...06
45 to 49...07
50 to 54...08
55 to 59...09
60 to 64...10
65 to 69...11
70 and over...12

Q.73 What is your first language, the language you speak most at home?

English	00
Cantonese	71
Danish	12
Dutch	13
Filipino languages	16
French	18
German	20
Indonesian/Malay	24
Italian	25
Japanese	26
Korean	28
Mandarin	70
Spanish	46
Swedish	47
Thai	50
Other (please specify)...........................	98

Q.74 Thank you very much for your cooperation. We would like you to accept this item as a token of our appreciation.
(HAND OVER PIN)

Q.75 **FOR INTERVIEWERS ONLY**
Thinking about when the respondent was completing the **expenditure grid**, select one of the following four (4) categories that you think best describes the respondent's answers.

Very accurate (referred to receipts/diary/log book/budget)....................1

Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought)...........2

Quite rough (no reference to any document; very quick, top-of-head response)..3

Very rough (just guessing) 4

Q.76 **FOR INTERVIEWERS ONLY**
Thinking about when the respondent was answering the **random location** questions, select one of the four (4) categories that you think best describes the respondents answers.

Very accurate (referred to receipts/diary/log book/budget.....................1

Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought)...........2

Quite rough (no reference to any document; very quick, top-of-head response..3

Very rough (just guessing) 4

S.1 **Record Interview Type**
Normal CAPI......................1
Interrupted CAPI................2
All Hardcopy.......................3 → S.2

S.2 **Hardcopy Interviews Only**

(a) Please record the date this hardcopy interview was done on:

__ __ / __ __ / __ __ __ __

(b) And record the reason why this interview was done on hardcopy:

____
____
____
____
____
____

INTERVIEWER DECLARATION:

I have conducted this interview. It is a full and to the best of my knowledge, accurate recording and has been completed in accordance with my interviewing and ICC/ESOMAR guidelines.

INTERVIEWER: ....

RECORD DATE: (DD/MM/YY)					9	9

SIGNED:...

INTERVIEWER NUMBER:						

IF HARDCOPY:
MAKE SURE THAT THIS QUESTIONNAIRE AND ANY TRAVEL GRID CONTINUATION SHEETS ARE STAPLED TOGETHER AND THAT THE QUESTIONNAIRE NUMBER IS WRITTEN ON THE FRONT OF THIS QUESTIONNAIRE AND ON ALL CONTINUATION SHEETS.

STAPLE SHEETS IN THE FOLLOWING ORDER:

- **MAIN QUESTIONNAIRE**
- **GREEN CONTINUATION SHEET(S) (if used)**

Appendix B: 2000 International Visitor Survey

ACNielsen

2000: INTERNATIONAL VISITOR SURVEY

NOTE: ALL QUESTIONS WITH 'H' PREFIXES ARE FOR HARDCOPY QUESTIONNAIRES ONLY, AND ALL 'C' PREFIXES ARE FOR CAPI ONLY.

S.2 RECORD CAPI IDENT (OR LIKELY RANGE IF UNSURE)

☐☐☐☐☐ to ☐☐☐☐☐

S.3 RECORD LANGUAGE OF INTERVIEW:

English..1
German..2
Indonesian/Malay..3
Japanese...4
Korean..5
Mandarin...6
Other (SPECIFY)..8

S.4 RECORD FLIGHT NUMBER FROM CONTACT SHEET:

☐☐☐☐☐

RECORD FLIGHT GROUP: ☐☐

SECTION I: INTERNATIONAL TRAVEL PATTERNS

Q.1 RECORD CITY OF INTERVIEW

Sydney 1
Melbourne 2
Brisbane 3
Perth... 4
Adelaide 5
Darwin 6
Cairns 7

Q.2 RECORD COUNTRY OF RESIDENCE FROM SCREENING SHEET

Canada.. 005
China.. 502
England 102
Germany... 210
Hong Kong 302
Indonesia.. 306
Ireland (Eire)... 106
Japan.. 500
Korea.. 501
Malaysia 304
New Zealand 801
Northern Ireland 105

Scotland 104
Singapore 303
Taiwan 503
Thailand 307
USA 001
Wales 103
Other (SPECIFY)
.... [| |]

HQ.3 How many nights have you spent in Australia for this visit?

Nights .... [| |] → **GO TO Q.4**

CQ.3a I'm now going to ask you how many nights you spent in Australia for this visit. Would it be easier for you to give me the date of your arrival or the total number of nights spent in Australia?

Date of arrival .... 1→**Q.3b**
Total nights .... 2→**Q.3c**

CQ.3b On what date did you arrive in Australia for this visit?

Date: ..../......../........

CQ.3c How many nights have you spent in Australia on this visit?

Nights .... [| |]

CQ.3d So you have spent a total of <*insert number of nights* > in Australia. Is this correct?

Yes 1
No (amend date) .... 2 →**Q.3b**
No (amend total nights) .... 3 →**Q.3c**

Q.4 On this trip to Australia, did you stay or will you stay for one or more nights in any other country, including your own? Please include stays both on the journey here and on the way home.

Yes 1
No .... 2 → **Q.7**

Q.5 How many **nights** altogether will you spend outside Australia on these stays/stopovers.

Nights .... [| |]

Q.6 Will any of those <*insert Q.5*> nights have been spent or will be spent in any of the following countries?

MULTIPLE CHOICE
READ OUT

Hawaii 01
Hong Kong 02
Indonesia 03
Malaysia 04

New Zealand 05
Singapore 06
Thailand...07
United States (not Hawaii).................08
Japan...09
Korea...10
Taiwan 11
None of these 97

Q.7 **Thinking about the whole trip:**
by the time you get back home, how many nights **in total will you have been away?** Please include any nights spent travelling.

PROMPT: Include nights spent travelling (e.g. on a plane or ship).

Nights ....

Q.8 Is this your first visit to Australia?
(IF ANSWER IS "BORN IN AUSTRALIA" ASK:
Is this your first return visit to Australia?)

Yes 1
No..2

SECTION II: TRAVEL GROUPS

→ SHOWCARD 1

Q.9 Looking at Card 1 (PAUSE), did you travel to Australia on a **group tour**? That is, did you come with a group of people who were associated in some way and travelled together?

Card 1 shows some examples of what I mean by "group tour".

Yes 1
No... 2 **→Q.11**

Q.10 **Is that.....**

A sporting or special interest group tour?..... 1
An ordinary group holiday tour? 2
A business or convention group tour?.......... 3
Other (SPECIFY)
.... 8

Q.11 Is your trip part of a job bonus, reward or other incentive (e.g. for high level of sales)?

Yes 1
No... 2

→SHOWCARD 2

Q.12 Looking at Card 2 (PAUSE), which one of these statements best describes your immediate travel party?

Unaccompanied traveller.......................... 01
Adult couple... 02
Family group - parent(s) & children........... 03
Friends &/or relatives travelling together... 04
Business associates travelling together with or without spouse 05

SECTION III: REASONS FOR VISIT

➔ **SHOWCARD 3**

Q.13 Looking at Card 3 (PAUSE), when you arrived in Australia and completed your INCOMING PASSENGER CARD, which one of these did you mark as your **main** reason for coming to Australia?

Holiday 01
Visiting friends and relatives........................ 02
Convention/Conference.............................. 03
Business.. 04
Employment 05
Education 06
Exhibition... 07

Other reasons (SPECIFY - OR CODE BELOW)
.... 08
In transit... 09
Immigration.. 10
Incoming Card not completed 11

➔ **SHOWCARD 4**

Q.14 Looking at Card 4 (PAUSE), what **other** reasons, if any, did you have for this visit to Australia?

PROBE: Any others?
MULTIPLE RESPONSE

In transit.. 01
Attend convention/conference/seminar, trade fair/exhibition 02
Accompanying convention, conference/seminar, trade fair/exhibition visitor
.... 03
Business.. 04
Accompanying business visitor 05
Visiting relatives 06
Holiday/pleasure.. 07
Employment 08
Education 09
Visiting friends... 10
Visiting an international student relative or friend studying in Australia 11
Working holiday... 12
Medical reasons 13
On honeymoon.. 14
Other reasons (specify)
.... 98
NO OTHER REASONS 97

Q.15 In Australia, did you attend a convention/ conference/seminar, trade fair/exhibition or accompany someone who did?

Yes 1
No... 2 **➔Q.17**

➔ **SHOWCARD 5**

Q.16 And which of the following did you or the person you accompanied attend while you were in Australia?
MULTIPLE RESPONSE

Convention/Conference/Seminar.................. 1
Trade fair/Exhibition...................................... 2
➔ **SHOWCARD 6**

Q.17 Before you came to Australia, did any of the following influence your decision to come?

MULTIPLE RESPONSE

Sydney 2000 Olympic and Paralympic Games 01
To visit Australia's casinos 02
To experience Aboriginal culture 03
To experience Australia's nature, landscapes and wildlife 04
To experience Australia's coastline and beaches 05
To experience a nature based outdoor activity (e.g bushwalking, camping etc) 06
To attend a festival or carnival 07
To experience Australia's food, wines and wineries 08
To experience Australia's shopping 09
To visit rural areas or the outback 10
To experience Australia's cultural life (e.g theatre, music, arts etc) 11
To participate or watch an organised sporting event 12

NO PARTICULAR INFLUENCES.......................... 97
OTHER (SPECIFY)
.... 98

SECTION IV: DURATION OF STAY AND PLACES VISITED IN AUSTRALIA

Q.18 When you arrived in Australia on this visit, in which city did you come through Customs and Immigration?

Sydney 01
Melbourne 02
Brisbane 03
Perth.. 04
Adelaide 05
Darwin 06
Townsville.. 07
Cairns 08
Hobart.. 09
Broome.. 10
Coolangatta... 11
Other (SPECIFY).. 98

Q.19 **CHECK Q.3**

Did respondent stay for one or more nights in Australia?

Yes..1
No ....2→Q.28

COMPLETE TRAVEL GRID ON FOLLOWING PAGE FOR ALL STOPOVERS.

USE CONTINUATION SHEETS IF NECESSARY AND STAPLE TO BACK OF TRAVEL GRID

TRAVEL & ACCOMMODATION GRID **CODING:** NO STOPOVER

Q.20 What was the (........) city or town you stayed in for one or more nights on this trip to Australia?

(IF NECESSARY, SHOW MAP - RECORD LOCALITY NAME/STATE. PROBE FOR STATE/TERRITORY WHERE TWO OR MORE LOCALITIES SHARE NAME)

Q.21 How many nights did you stay in *(say place / location)*?

➔ **SHOWCARD 7**

Q.22 Looking at Card 7 (PAUSE), what was your reason for visiting *(say place / location)*?

SELECT ONLY ONE PURPOSE OF VISIT PER STOP

➔ **SHOWCARD 8**

Q.23 Looking at Card 8 (PAUSE), which of these types of accommodation did you use in *(say place / location)*?

(ENTER CODE(S) OR RECORD DETAILS FOR OTHER)

NOTE: IF MORE THAN ONE TYPE OF ACCOMMODATION, USE TWO COLUMNS.

➔ **SHOWCARD 9**

Q.24 Looking at Card 9 (PAUSE), which of these forms of transport did you use to get from (*arrival point or previous stop*) to (*this stopover*)?

RECORD MAIN FORM OF TRANSPORT ONLY

PROBE: Was this your last stopover?

IF "YES" ➔ Q.25

OTHERWISE RETURN TO Q.20

Q.20 NAME OF STOPOVER				
1st STOPOVER	**2nd STOPOVER**	**3rd STOPOVER**	**4th STOPOVER**	**5th STOPOVER**
....	....	....	....	....
Q.21 NO. OF NIGHTS				
☐☐☐	☐☐☐	☐☐☐	☐☐☐	
Q.22 REASON FOR VISIT				
☐☐	☐☐	☐☐	☐☐	
Q.23 TYPE OF ACCOMMODATION				
☐☐	☐☐	☐☐	☐☐	
Q.24 TYPE OF TRANSPORT				
☐☐	☐☐	☐☐	☐☐	

Q.25 How did you travel from (*last stopover*) to the airport today? ....

Q.26 How many **nights** did you spend **travelling** in Australia - in trains, planes, buses and so on?
WRITE IN:

NOW CHECK TOTALS:	Total stopover nights (this page)	....	
	Stopover nights from continuation sheets	....	
	Nights spent travelling	....	
	TOTAL		**IS THIS THE SAME AS ANSWER IN Q.3? IF NOT - CHECK GRID**

Q.27 CHECK TRAVEL GRID
Circle states/territories visited from Travel Grid and Q.18 in Q.28 below

→ **SHOWCARD 10**

Q.28 Looking at Card 10 (PAUSE), did you do any day-trips into any of these states (that is, you visited them but did not spend any nights there)? **CIRCLE STATES/TERRITORIES MENTIONED IN Q.28 BELOW.**

STATES VISITED

New South Wales....................................... 1
ACT (Canberra).. 2
Victoria 3
Queensland 4
South Australia... 5
Western Australia....................................... 6
Northern Territory 7
Tasmania.. 8

IF NSW VISITED - ASK Q.29
OTHERWISE → Q.30

→ **SHOWCARD 11**

Q.29 Looking at Card 11 (PAUSE), which of these places in New South Wales did you visit?

MULTIPLE RESPONSE

Fox Studios Australia 01
Sydney Opera House 02
Darling Harbour.. 03
Bondi Beach... 04
Kings Cross.. 05
Special Event / Festival............................. 06
The Rocks 07
Star City (Sydney) Casino 08
Sydney Olympic Site 09
Blue Mountains.. 10
NONE OF THESE 97

IF ACT VISITED - ASK Q.30
OTHERWISE → Q.31

→ **SHOWCARD 12**

Q.30 Looking at Card 12 (PAUSE), which of these places in the ACT did you visit?

MULTIPLE RESPONSE

Australian War Memorial........................... 01
Parliament House....................................... 02
Old Parliament House 03
National parks/Natural bushlands 04
Telstra Tower... 05
National Science and Technology Centre . 06
National Gallery of Australia...................... 07

Australian Institute of Sport 08
Wineries 09
Festivals/events.. 10
NONE OF THESE 97

IF VICTORIA VISITED - ASK Q.31
OTHERWISE → Q.32

→ **SHOWCARD 13**

Q.31 Looking at Card 13 (PAUSE), which of these places in Victoria did you visit?

MULTIPLE RESPONSE

Phillip Island, Penguin Parade 01
Sovereign Hill, Ballarat, Goldfields 02
Dandenong Ranges, Puffing Billy,
Healesville Sanctuary 03
Great Ocean Road,
Twelve Apostles 04
Grampians National Park 05
Mornington Peninsula................................. 06
Wilsons Promontory.................................... 07
Daylesford, Macedon, Hepburn,
Spa Country.. 08
Yarra Valley Wineries................................. 09
High Country, Snowfields 10
NONE OF THESE 97

IF QUEENSLAND VISITED - ASK Q.32
OTHERWISE → Q.33

→ **SHOWCARD 14**

Q.32 Looking at Card 14 (PAUSE), which of these places in Queensland did you visit?

MULTIPLE RESPONSE

Theme Parks on the Gold Coast 01
Gold Coast Hinterland / Surrounding Hills / Mountains 02
Southbank Parklands in Brisbane 03
Fraser Island / Hervey Bay
Whale Watching 04
The Great Barrier Reef............................... 05
Daintree/Cape Tribulation 06
Arts and crafts markets 07
Noosa on the Sunshine Coast.................... 08
National Parks / State Forest (excluding the Great Barrier Reef) 09
Festival/Sporting Event 10
NONE OF THESE 97

IF SOUTH AUSTRALIA VISITED - ASK Q.33
OTHERWISE → Q.34

→ **SHOWCARD 15**

Q.33 Looking at Card 15 (PAUSE), which of these places in South Australia did you visit?

MULTIPLE RESPONSE

Barossa Valley 01
Adelaide Hills, Mt Lofty Summit, Hahndorf 02
Coober Pedy Opal Fields 03
Kangaroo Island 04
Flinders Ranges, Wilpena Pound, Arkaroola 05
Naracoorte Caves, Penola, Coonawarra.... 06
River Murray... 07
Festivals/events.. 08

Wineries 09
Museums or art galleries 10
NONE OF THESE 97

IF WESTERN AUSTRALIA VISITED - ASK Q.34
OTHERWISE → Q.35

→ **SHOWCARD 16**

Q.34 Looking at Card 16 (PAUSE), which of these places in Western Australia did you visit?

MULTIPLE RESPONSE

Fremantle 01
Swan Valley 02
York/Toodyay/ Avon Valley 03
Margaret River/ Southern Forest Areas 04
Albany / South Coastal and Range Areas 05
Kalgoorlie-Boulder/ Goldfields Area 06
Geraldton/ Kalbarri 07
Monkey Mia/ Shark Bay/ Exmouth 08
Karijini National Park/ Gorges 09
Broome / Kununurra 10
NONE OF THESE 97

IF TASMANIA VISITED - ASK Q.35
OTHERWISE → Q.36

→ **SHOWCARD 17**

Q.35 Looking at Card 17 (PAUSE), which of these places in Tasmania did you visit?

MULTIPLE RESPONSE

Hobart 01
Launceston 02
Huon Valley 03
Strahan 04
Stanley 05
St Helens 06
Freycinet National Park 07
Port Arthur 08
Ross 09
Cradle Mountain National Park 10
NONE OF THESE 97

IF NORTHERN TERRITORY VISITED - ASK Q.36
OTHERWISE → Q.37

→ **SHOWCARD 18**

Q.36 Looking at Card 18 (PAUSE), which of these places in the Northern Territory did you visit?

MULTIPLE RESPONSE

Darwin 01
Katherine 02
Tennant Creek 03
Alice Springs 04
Uluru (Ayers Rock) 05
Kakadu National Park 06
Litchfield National Park 07
Kings Canyon 08
West MacDonnell Ranges 09
Arnhem Land 10
NONE OF THESE 97

→ **SHOWCARD 19**

Q.37 Looking at Card 19 (PAUSE), what (leisure activities) did you do during this trip?

MULTIPLE RESPONSE

Outdoor/Ecotourism

Go to the beach (incl. swimming, surfing, taking a picnic etc)	01
Visit national parks, bushwalking, rainforest walks	02
Visit botanical gardens or other public gardens . ..	03
Go whale/dolphin watching in the ocean............ ..	04
Visit the outback.. ..	05
Visit farms	06

Active Outdoors/Sports

Go fishing.. ..	07
Play golf	08
Play other sports	09
Other outdoor activities (e.g. horse riding, rock climbing, white water rafting, bungee jumping, scuba diving etc).................................. ..	10

Arts/Heritage

Attend theatre, concerts or other performing arts .	11
Visit museums or art galleries............................ ..	12
Visit art/craft workshops/studios......................... ..	13
Attend festivals/fairs or cultural events............... ..	14
Experience Aboriginal art/craft and cultural displays	15
Visit an Aboriginal site/community	16
Visit history/heritage buildings, sites or monuments	17

Local Attractions/Tourist Activities

Visit amusement/theme parks............................ ..	18
Visit wildlife parks/zoos/aquariums	19
Go on guided tours or excursions	20
Go to markets (eg. street, arts & crafts)............. ..	21
Tourist trains	22
Visit industrial tourism attractions (e.g. breweries, mines)	23
Visit wineries	24

Social/Other

Visit friends/relatives	25
Visit pubs, clubs and discos	26
Visit casinos	27
Attend an organised sporting event	28
Go shopping (for pleasure)	29
Other (specify).. ..	98
NONE OF THESE	97

SECTION V: OLYMPICS
ONLY ASK Q.38 TO Q.40 DURING AND AFTER THE 2000 OLYMPIC GAMES

Q.38 During your visit to Australia, did you attend ....

a) any Olympic Games event

Yes 1
No...2

b) any Paralympic event

Yes ....1 → Q.39
No...2 → Q.41

→ SHOWCARD A

Q.39 Looking at Card A (PAUSE), what event/s did you attend?

Opening / Closing Ceremony..........1 → Q.41
Athletics (Track events)...................2 → Q.41
Swimming..3 → Q.41
Football (soccer) ....4 → → → Q.40
Rowing ....5 → Q.41
Basketball ....6 → Q.41
Gymnastics ....7 → Q.41
Cycling (Track) ....8 → Q.41
Triathlon ....9 → Q.41
Hockey ....10 → Q.41
Other (Please Specify)
....98 → Q.41

→ SHOWCARD B

Q.40 Looking at Card B (PAUSE), in what City/Cities did you attend Olympic football (soccer) matches?

Sydney 1
Melbourne 2
Canberra 3
Adelaide 4
Brisbane 5
Don't Know...9

SECTION VI: TRAVEL EXPENDITURE

→ SHOWCARD 20

Q.41 Did you arrive in Australia on a travel package? Card 20 explains what I mean by a travel package.

Yes .... 1 → Q.42
No............................ 2 → Q.45

→ **SHOWCARD 21**

Q.42 Looking at Card 21 (PAUSE), which of these travel arrangements were included in your travel package?

MULTIPLE RESPONSE

PROMPT: Does this include international air/sea fares?

International (air/sea) fare	01
Airfares within Australia.......................................	02
Organised tours in Australia	03
Most accommodation in Australia	04
Some accommodation in Australia.....................	05
Most ground transport within Australia	06
Some ground transport within Australia	07
Most meals in Australia	08
Some meals in Australia......................................	09
Entertainment and/or recreation activities in Australia	10
Sightseeing tours..	11
Convention fees	12
Other items (SPECIFY MOST EXPENSIVE ONE)	98
None/No Arrangements......................................	97

Q.43 **CHECK Q.42**

Did the travel package include accommodation (codes 04 or 05)?

Yes 1
No..2 → Q.45

Q.44 How many nights in paid accommodation were covered by that travel package?

Nights ....

→ **SHOWCARD 22**

Q.45 I'd like to ask you about the cost of your trip and how much money you have spent in Australia.

Card 22 (PAUSE), shows what information to include. Is it easier for you to report on your own personal spending or for your travel party?

Personal only.......................1 → Q.46
Immediate Travel party........2 → Q.48

No expenditure ....3 → Q.66 ONLY WHEN CONVINCED

Q.46 I am now going to ask you some questions about your own personal expenditure. This includes what you *personally* have spent and any costs paid for by a company or organisation overseas on your behalf. Can you confirm again that you are only answering for yourself? That is, you are not reporting on behalf of your family or anyone else.

Yes .... 1 → Q.49
No.. 2 → Q.47

Q.47 You mentioned before that you were reporting your *personal* expenditure only. How many people, including yourself, are you in fact answering for?

Number of persons...................... → Q.49

Q.48 I am now going to ask you some questions about the expenditure for you and your travel party. This includes what you have spent for you and your travel party, and any costs paid for by a company or organisation overseas on your behalf. How many people are you answering on behalf of?

Number of persons.........................

Q.49 **CHECK Q.41:**
Did respondent arrive on a travel package (Code 1 in Q.41)?

Yes .... **1→Q.50**
No... **2→Q.52**

Q.50 Before arriving in Australia how much did (you/your party, or any other person or company on your behalf) pay for your travel package?

AMOUNT:..

Q.51 **ASK OR RECORD**
In which currency have you answered?

CONVERSION TO A$ | | | | | | | |

NOW SKIP TO Q.55

Q.52 Before arriving in Australia, how much was paid for (your/your party's) international (air/sea) fares? Do not include any international fares paid for in Australia. Please include any payment you contributed for any persons travelling with you.

AMOUNT:..

Q.53 **ASK OR RECORD**
In which currency have you answered?

....

CONVERSION TO A$

$ | | | | | | | |

Q.54 Did any of that expenditure cover the cost of airfares within Australia?

Yes 1
No.. 2

→ **SHOWCARD 23**

Q.55 Now I'm going to ask you about your expenditure in Australia. Card 23 lists the categories I will be asking about. When you are thinking about your expenditure, please include money spent in Australia, amounts to be paid after you leave, and amounts paid before arriving in Australia (apart from your international air fare or travel package).

ON THE FOLLOWING PAGE ASK Q.56, Q.57, Q.58 AND Q.59 FOR EACH ITEM IN TURN

Q.56	Did you spend anything on (item 1)...?	Q.56		Q.57	Q.58	Q.59
Q.57	**IF ANYTHING SPENT ON** (item 1)... Was any of your expenditure on *(say item)* pre-paid, apart from amounts already covered by your travel package?					
Q.58	**IF ANY PREPAID EXPENDITURE (code 1 in Q.57):** How much was prepaid on *(say item)*?	**Any expenditure on items**		**Any pre-paid**	**Pre-paid expenditure amount**	**Australian expenditure amount**
Q.59	How much did (you/your party) spend on *(say item)* whilst in Australia? Include any amounts still to be paid.	**Yes**	**No**	**Pre-paid ?**	**A$**	**A$**
1.	Organised tours. Include tours which combine coach, train or plane travel	1	2	1		
2.	Airline fares for travel within Australia	1	2	1		
3.	a) International airfares bought in Australia	1	2	1		
	b) CALCULATE TOTAL FOR Q.58 AND Q.59 - items 2 & 3				**TOTAL $A**	
4.	Rental and leasing fees for self-drive cars, rent-a-cars, camper vans. Please exclude petrol and oil costs	1	2	1		
5.	Petrol and oil costs for self-drive cars or other vehicles driven	1	2	1		
6.	Other transport fares. Include fares for trains, coaches, ferries, taxis, limousines, public transport	1	2	1		
7.	Food, drink and accommodation. Include alcohol, restaurant and bar expenditure a) food, drink and accommodation inclusive b) accommodation c) food and drink	1 1 1	2 2 2	1 1 1		
	d) Q.58 & Q.59 TOTAL FDA (items 7a, b, & c)				**TOTAL $A**	
8.	Shopping (includes goods you may just have bought or intend to buy before departing) a) items for use in Australia (eg film, cigarettes, toiletries, books, computers) b) items to take home (eg gifts, souvenirs, clothing, books, jewellery and duty free goods)	1 1	2 2	1 1		
9.	Gambling. Include casinos, horse racing, trotting, lotto etc	1	2	1		
10.	Entertainment such as theatres, movies, zoos, museums, nightclub, recreation, entry fees (Do not include alcohol)	1	2	1		
11.	Purchase of a motor vehicle.	1	2	1		
12.	a) Other major purchases (eg land, real estate, major business equipment, shares). (SPECIFY)	1	2	1		
	b) CALCULATE TOTAL FOR Q.58 AND Q.59 - items 11 & 12				**TOTAL $A**	
13.	Education fees (ask only if this is visit's purpose)	1	2	1		
14.	Education fees (if visit's purpose **is not education**)	1	2	1		
15.	Phone, Internet, fax &/or postage	1	2	1		
16.	Any other expenditure? Please include Convention registration fees, medical expenses,					

	electricity, water and gas, laundry, dry cleaning, hairdressing, registration, insurance, car repairs, and any other expenses. **(Probe for convention fee expenditure if purpose of visit to Australia and/or any location is convention/conference)** (SPECIFY)	1 2	1			
	CALCULATE TOTAL FOR Q.58 **AND** Q.59					
Q.60	**a) CONFIRM TOTALS:** So that means a total of *(Q.58 & Q.59)* was spent on this trip to Australia	**RECORD TOTAL AUSTRALIAN AND PRE PAID EXPENDITURE**			**$A**	
	b) CALCULATE TOTAL EXPENDITURE MINUS TOTAL AIRFARES (ITEM 3b) AND MOTOR VEHICLES AND MAJOR GOODS (ITEM 12b)	**TOTAL (item 60a) - (item 3b + item 12b)**			**$A**	

Q.61a Has the respondent reported more than 1 stopover in the travel grid?

More than one stop...............1 GO TO Q.61

One stop only........................2 GO TO Q.66

CQ.61 SELECTION OF RANDOM LOCATION

CAPI to select location .... 1 GO TO Q.63

Entering hardcopy interview with random selection .... 2 GO TO Q.62

CQ.62 RANDOM STOPOVER NUMBER

Enter random stopover number ☐☐

CONTINUE

CQ.63 PLEASE VERIFY THE FOLLOWING RANDOM LOCATION:

Random Stop No.: ☐☐

Location ....

Yes, it is correct..................1 GO TO Q.64

No. it is not incorrect ....2 Amend Q.62

RECORD TOTAL EXPENDITURE FROM Q.60b

TOTAL A$ ☐☐☐☐☐☐

Q.64 While you were staying in *(randomly selected location)*, how much of your total expenditure of *(Q.60b total)* was spent in *(randomly selected location)*?

(IF NECESSARY: This is excluding expenditure on airfares, motor vehicles and major purchases)

A$ ☐☐☐☐☐☐

RECORD TOTAL FDA EXPENDITURE (item 7d)

FDA A$ [| | | | | |]

Q.65 Again, thinking about *(randomly selected location)*, how much of your Australian and pre-paid food, drink and accommodation expenditure of *(item 7d)* was spent in *(randomly selected location)*?

A$ [| | | | | |]

→ SHOWCARD 24

Q.66 Looking at Card 24 (PAUSE), which, if any, of the following did you or any of your travel party receive income from in Australia during this visit?

MULITPLE RESPONSE

Sale of Capital Goods 1
Gambling winnings.................................... 2
Other income (e.g. work)........................... 3
No income received................................... 4 **→ Q.68**

Q.67 About how much income was received? Please separate gambling income, sale of capital goods, and other income.

Sale of capital goods, such as real estate, car, boat, business equipment, etc A$ [| | | | | |]

Gambling income A$ [| | | | | |]

Other Income A$ [| | | | | |]

SECTION VII: IMPRESSIONS OF AUSTRALIA

→ SHOWCARD 25

Q.68 Looking at Card 25 (PAUSE), please tell me how satisfied you were with certain aspects of your stay in Australia. How satisfied were you with…?

READ OUT EACH ITEM.
IF 'DON'T KNOW' RECORD '9' IN THE BOX.
IF 'NOT APPLICABLE' RECORD '7' IN THE BOX.

(1) The amount of tourist information available in Australia [ ]
(2) The cost of domestic airfares .... [ ]
(3) The cost of other forms of transport .... [ ]
(4) The availability of disabled/handicapped facilities [ ]
(5) Shop trading hours .... [ ]

(6) The cost of goods in shops.............................. ☐

(7) The cost of accommodation .... ☐

(8) Airport facilities in this airport .... ☐

(9) Immigration/customs .... ☐

(10) Visa requirements for Australia...................... ☐

SECTION VIII: INFORMATION SOURCES

Q.69 Before you left <*country of residence*> did you get any information about Australia for this visit?

Yes 1
No..2 → **Q.71**

→ **SHOWCARD 26**

Q.70 Looking at Card 26 (PAUSE), where did you get that information?
MULTIPLE RESPONSE

Travel Agent	01
Internet	02
Airline	03
Tour Operator...	04
Travel book or guide..................................	05
Advertising in Newspaper, Magazine or on TV, radio	06
Travel article in Newspaper or Magazine ..	07
Films or TV/Radio program	08
Friend or relative living in Australia	09
Friend or relative who has visited Australia	10
Previous Visit(s)	11
Somewhere else (Specify)	98

Q.71 Before you left <*country of residence*>, did you make any bookings for this visit on the Internet?

Yes 1
No..2 → **Q.73**
Don't Know................................3 → **Q.73**

→ **SHOWCARD 27**

Q.72 Looking at Card 27 (PAUSE), which of the following did you book on the Internet?
MULTIPLE RESPONSE

International air Travel................................ 1
Air Travel within Australia........................... 2
Organised tours in Australia....................... 3
Rental or leasing of self drive cars, rent-a-cars and campervans in Australia
.... 4
Accommodation in Australia....................... 5
Other (Please Specify) 98

Q.73 Was the length of your stay in Australia….

READ OUT

Longer than planned 1
Shorter than planned.................................. 2
Same as planned 3

Q.74 How much of your trip itinerary for this visit was planned before you arrived in Australia?

All planned ....1 → Q.76
Mostly planned 2
Some planned 3
None planned...4

Q.75 Did you use tourism information obtained in Australia to help decide destinations to visit that were not planned?

Yes 1
No..2

SECTION IX: DEMOGRAPHICS

Q.76 **RECORD SEX:**

Male...1
Female 2

→ **SHOWCARD 28**

Q.77 Looking at Card 28 (PAUSE), which of these age groups do you fall within?

15 to 19	01	→ Q.78
20 to 24	02	→ Q.78
25 to 29	03	→ Q.79
30 to 34	04	→ Q.79
35 to 39	05	→ Q.79
40 to 44	06	→ Q.79
45 to 49	07	→ Q.79
50 to 54	08	→ Q.79
55 to 59	09	→ Q.79
60 to 64	10	→ Q.79
65 to 69	11	→ Q.79
70 and over	12	→ Q.79

Q.78 Do you live with your parent or guardian (in your country of residence)?

Yes 1
No..2
No answer 3

→ **SHOWCARD 29**

Q.79 Looking at Card 29 (PAUSE), what is your marital status?

Single (never married, divorced, separated, widowed)..1
Part of a couple (married, De facto, living together) 2
No answer 3

Q.80 Are you the parent or guardian of any children living with you?

Yes 1
No .... 2 → Q.82
No answer .... 3 → Q.82

Q.81 What age groups are these children?
MULTIPLE RESPONSE

0-5 1
6-14 2
15-24 3
25 and over 4
No answer 5

Q.82 Thank you very much for your cooperation. We would like you to accept this item as a token of our appreciation.
(HAND OVER PIN)

Q.83 **FOR INTERVIEWERS ONLY**
Thinking about when the respondent was completing the **expenditure grid**, select one of the following four (4) categories that you think best describes the respondent's answers.

Very accurate (referred to receipts/diary/log book/budget) 1

Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought) 2

Quite rough (no reference to any document; very quick, top-of-head response) 3

Very rough (just guessing) 4

Q.84 **FOR INTERVIEWERS ONLY**

Thinking about when the respondent was answering the random location questions, select one of the four (4) categories that you think best describes the respondents answers.
Very accurate (referred to receipts/diary/log book/budget 1
Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought) 2
Quite rough (no reference to any document; very quick, top-of-head response 3
Very rough (just guessing) 4

S.1 **Record Interview Type**
Normal CAPI 1
Interrupted CAPI 2
All Hardcopy .... 3 → S.2

S.2 **Hardcopy Interviews Only**
(a) Please record the date this hardcopy interview was done on:

__ __ / __ __ / __ __ __ __
(b) And record the reason why this interview was done on hardcopy:

INTERVIEWER DECLARATION:

I have conducted this interview. It is a full and to the best of my knowledge, accurate recording and has been completed in accordance with my interviewing and ICC/ESOMAR guidelines.

INTERVIEWER: ....

RECORD DATE: (DD/MM/YY) | | | | | 0 | 0 |

SIGNED:...

INTERVIEWER NUMBER: | | | | | | |

IF HARDCOPY:
MAKE SURE THAT THIS QUESTIONNAIRE AND ANY TRAVEL GRID CONTINUATION SHEETS ARE STAPLED TOGETHER AND THAT THE QUESTIONNAIRE NUMBER IS WRITTEN ON THE FRONT OF THIS QUESTIONNAIRE AND ON ALL CONTINUATION SHEETS.

STAPLE SHEETS IN THE FOLLOWING ORDER:

- **MAIN QUESTIONNAIRE**
- **GREEN CONTINUATION SHEET(S)**
  (if used)

Appendix C: 2001 International Visitor Survey

ACNielsen

NG6192
Version 1

2001: INTERNATIONAL VISITOR SURVEY

NOTE: ALL QUESTIONS WITH 'H' PREFIXES ARE FOR HARDCOPY QUESTIONNAIRES ONLY, AND ALL 'C' PREFIXES ARE FOR CAPI ONLY.

S.2 RECORD CAPI IDENT (OR LIKELY RANGE IF UNSURE)

☐☐☐☐☐ to ☐☐☐☐☐

S.3 RECORD LANGUAGE OF INTERVIEW:

English 1
German 2
Indonesian/Malay 3
Japanese 4
Korean 5
Mandarin 6
Other (SPECIFY) 8

S.4 RECORD FLIGHT NUMBER FROM CONTACT SHEET: ☐☐☐☐☐

RECORD FLIGHT GROUP: ☐☐

SECTION I: INTERNATIONAL TRAVEL PATTERNS

Q.1 RECORD CITY OF INTERVIEW

Sydney 1
Melbourne 2
Brisbane 3
Perth 4
Adelaide 5
Darwin 6
Cairns 7

Q.2 RECORD COUNTRY OF RESIDENCE FROM SCREENING SHEET

Canada 005
China 502
England 102
Germany 210
Hong Kong 302
Indonesia 306
Ireland (Eire) 106
Japan 500
Korea 501
Malaysia 304
New Zealand 801
Northern Ireland 105
Scotland 104
Singapore 303
Taiwan 503
Thailand 307
USA 001
Wales 103
Other (SPECIFY) .... ☐☐☐

HQ.3 How many nights have you spent in Australia for this visit?

Nights .... ☐☐☐ → GO TO Q.4

CQ.3a I'm now going to ask you how many nights you spent in Australia for this visit. Would it be easier for you to give me the date of your arrival or the total number of nights spent in Australia?

Date of arrival .... 1 → Q.3b
Total nights .... 2 → Q.3c

CQ.3b On what date did you arrive in Australia for this visit?

Date: ..../......./.........

CQ.3c How many nights have you spent in Australia on this visit?

Nights .... ☐☐☐

CQ.3d So you have spent a total of <*insert number of nights* > in Australia. Is this correct?

Yes 1
No (amend date) .... 2 → Q.3b
No (amend total nights) .... 3 → Q.3c

Q.4 On this trip to Australia, did you stay or will you stay for one or more nights in any other country, including your own? Please include stays both on the journey here and on the way home.

Yes 1
No .... 2 → Q.7

Q.5 How many **nights** altogether will you spend outside Australia on these stays/stopovers.

Nights .... ☐☐☐

Q.6 Will any of those <*insert Q.5*> nights have been spent or will be spent in any of the following countries?

MULTIPLE CHOICE
READ OUT

Hawaii 01
Hong Kong 02
Indonesia 03
Malaysia 04
New Zealand 05
Singapore 06
Thailand 07
United States (not Hawaii) 08
Japan 09
Korea 10
Taiwan 11
None of these 97

Q.7 Thinking about the whole trip: by the time you get back home, how many nights in total will you have been away? Please include any nights spent travelling.

PROMPT: Include nights spent travelling (e.g. on a plane or ship).

Nights .... ☐☐☐

Q.8 Is this your first visit to Australia?
(IF ANSWER IS "BORN IN AUSTRALIA" ASK: Is this your first return visit to Australia?)

Yes 1
No... 2

SECTION II: TRAVEL GROUPS

→ SHOWCARD 1

Q.9 Looking at Card 1 (PAUSE), did you travel to Australia on a **group tour**? That is, did you come with a group of people who were associated in some way and travelled together?

Card 1 shows some examples of what I mean by "group tour".

Yes 1
No.. 2 **→Q.15**

Q.10 Is that.....

A sporting group tour? .... 1 **→Q.15**
Special interest group tour other than a sporting tour? .... 2 **→Q.15**
A guided group holiday tour? .... 3 **→ Q.11**
A business or convention group tour? .... 4 **→Q.15**
Other (SPECIFY) .... 8 **→Q.15**

IF Q.10 = 3 – ASK Q.11
OTHERWISE →Q.15

→ SHOWCARD 2

Q.11 Looking at Card 2, compared to how the tour was promoted, how satisfied were you with...

READ OUT EACH ITEM.
IF 'DON'T KNOW' RECORD '9' IN THE BOX.
IF 'NOT APPLICABLE' RECORD '7' IN THE BOX.

(A) The tour guide service................................ ☐
(B) The amount of time spent shopping........... ☐
(C) The activities in the tour .... ☐
(D) The quality of accommodation .... ☐
(E) Value for money of the tour......................... ☐
(F) The tour overall .... ☐

IF Q.11(A) = 3 or 4 – ASK Q.12
OTHERWISE → Q.13

Q.12 Were you dissatisfied with the tour guide's...

READ OUT EACH ITEM.
DO NOT READ OUT 'DON'T KNOW'

(A) Language skills
Yes 1
No 2
Don't Know.. 9

(B) Knowledge of Australia
Yes 1
No 2
Don't Know.. 9

(C) Courtesy and helpfulness
Yes 1
No 2
Don't Know.. 9

(D) Anything else
Yes (specify)
.... 1
No 2
Don't Know.. 9

IF Q.11(B) = 3 OR 4 – ASK Q.13
OTHERWISE → Q.14

Q.13 Was the amount of time spent shopping too much or not enough?

Too much... 1
Not enough 2

IF Q.11(C) = 3 OR 4 – ASK Q.14
OTHERWISE →Q.15

Q.14 Thinking about the activities on the tour, were you dissatisfied with....

READ OUT EACH ITEM.
DO NOT READ OUT 'DON'T KNOW'

(A) The variety of activities
Yes 1
No 2
Don't Know.. 9

(B) The quality of activities
Yes 1
No 2
Don't Know.. 9

(C) Anything else
Yes (specify)
.... 1
No 2
Don't Know.. 9

➔ **SHOWCARD 3**

Q.15 Looking at Card 3 (PAUSE), which one of these statements best describes your immediate travel party?

Unaccompanied traveller 01
Adult couple 02
Family group - parent(s) & children 03
Friends &/or relatives travelling together 04
Business associates travelling together with or without spouse 05

SECTION III: REASONS FOR VISIT

➔ **SHOWCARD 4**

Q.16 Looking at Card 4 (PAUSE), when you arrived in Australia and completed your INCOMING PASSENGER CARD, which one of these did you mark as your **main** reason for coming to Australia?

Holiday 01
Visiting friends and relatives 02
Convention/Conference 03
Business 04
Employment 05
Education 06
Exhibition 07

Other reasons (SPECIFY - OR CODE BELOW)
.... 08
In transit 09
Immigration 10
Incoming Card not completed 11

➔ **SHOWCARD 5**

Q.17 Looking at Card 5 (PAUSE), what **other** reasons, if any, did you have for this visit to Australia?

PROBE: Any others?
MULTIPLE RESPONSE

In transit 01
Attend convention/conference/seminar, trade fair/exhibition 02
Accompanying convention, conference/seminar, trade fair/exhibition visitor 03
Business 04
Accompanying business visitor 05
Visiting relatives 06
Holiday/pleasure 07
Employment 08
Education 09
Visiting friends 10
Visiting an international student relative or friend studying in Australia 11
Working holiday 12
Medical reasons 13
On honeymoon 14
Other reasons (specify)
.... 98
NO OTHER REASONS 97

Q.18 In Australia, did you attend a convention/ conference/seminar, trade fair/exhibition or accompany someone who did?

Yes 1
No .... 2 ➔Q.20

➔ **SHOWCARD 6**

Q.19 And which of the following did you or the person you accompanied attend while you were in Australia?
MULTIPLE RESPONSE

Convention/Conference/Seminar 1
Trade fair/Exhibition 2

➔ **SHOWCARD 7**

Q.20 Before you came to Australia, did any of the following influence your decision to come?

MULTIPLE RESPONSE

Sydney's hosting of the 2000 Olympic and Paralympic Games 01
To visit Australia's casinos 02
To experience Aboriginal culture 03
To experience Australia's nature, landscapes and wildlife 04
To experience Australia's coastline and beaches 05
To experience a nature based outdoor activity (e.g bushwalking, camping etc) 06
To attend a festival or carnival 07
To experience Australia's food, wines and wineries 08
To experience Australia's shopping 09
To visit rural areas or the outback 10
To experience Australia's cultural life (e.g theatre, music, arts etc) 11
To participate in an organised sporting event 12
To watch an organised sporting event 13
To meet Australians 14

NO PARTICULAR INFLUENCES 97
OTHER (SPECIFY)
.... 98

SECTION IV: DURATION OF STAY AND PLACES VISITED IN AUSTRALIA

Q.21 When you arrived in Australia on this visit, in which city did you come through Customs and Immigration?

Sydney.. 01
Melbourne.. 02
Brisbane 03
Perth.. 04
Adelaide 05
Darwin 06
Townsville.. 07
Cairns 08
Hobart... 09
Broome 10
Coolangatta 11
Other (SPECIFY)
.... 98

Q.22 **CHECK Q.3**

Did respondent stay for one or more nights in Australia?

Yes...1
No ....2→Q.31

COMPLETE TRAVEL GRID ON FOLLOWING PAGE FOR ALL STOPOVERS.

USE CONTINUATION SHEETS IF NECESSARY AND STAPLE TO BACK OF TRAVEL GRID

TRAVEL & ACCOMMODATION GRID **CODING:** NO STOPOVER

Q.23 What was the (........) city or town you stayed in for one or more nights on this trip to Australia?

(IF NECESSARY, SHOW MAP - RECORD LOCALITY NAME/STATE. PROBE FOR STATE/TERRITORY WHERE TWO OR MORE LOCALITIES SHARE NAME)

Q.24 How many nights did you stay in *(say place / location)*?

➔ **SHOWCARD 8**

Q.25 Looking at Card 8 (PAUSE), what was your reason for visiting *(say place / location)*?

SELECT ONLY ONE PURPOSE OF VISIT PER STOP

➔ **SHOWCARD 9**

Q.26 Looking at Card 9 (PAUSE), which of these types of accommodation did you use in *(say place / location)*?

(ENTER CODE(S) OR RECORD DETAILS FOR OTHER)

NOTE: IF MORE THAN ONE TYPE OF ACCOMMODATION, USE TWO COLUMNS.

➔ **SHOWCARD 10**

Q.27 Looking at Card 10 (PAUSE), which of these forms of transport did you use to get from (*arrival point or previous stop*) to (*this stopover*)?

RECORD MAIN FORM OF TRANSPORT ONLY

PROBE: Was this your last stopover?

IF "YES" ➔ Q.28

OTHERWISE RETURN TO Q.23

Q.23 NAME OF STOPOVER

1st STOPOVER	2nd STOPOVER	3rd STOPOVER	4th STOPOVER	5th STOPOVER
....	....	....	....	....

Q.24 NO. OF NIGHTS

Q.25 REASON FOR VISIT

Q.26 TYPE OF ACCOMMODATION

Q.27 TYPE OF TRANSPORT

Q.28 How did you travel from (*last stopover*) to the airport today?..........

Q.29 How many **nights** did you spend **travelling** in Australia - in trains, planes, buses and so on? **WRITE IN:**

NOW CHECK TOTALS:

Total stopover nights (this page) ....

Stopover nights from continuation sheets ....

Nights spent travelling ....

TOTAL

IS THIS THE SAME AS ANSWER IN Q.3? IF NOT - CHECK GRID

Q.30	CHECK TRAVEL GRID
	Circle states/territories visited from Travel Grid and Q.21 in Q.31 below

➔ **SHOWCARD 11**

Q.31 Looking at Card 11 (PAUSE), did you do any day-trips into any of these states (that is, you visited them but did not spend any nights there)? **CIRCLE STATES/TERRITORIES MENTIONED IN Q.21 BELOW.**

STATES VISITED

New South Wales 1
ACT (Canberra) 2
Victoria 3
Queensland 4
South Australia 5
Western Australia 6
Northern Territory 7
Tasmania 8

IF NSW VISITED - ASK Q.32
OTHERWISE ➔ Q.33

➔ **SHOWCARD 12**

Q.32 Looking at Card 12 (PAUSE), which of these places in New South Wales did you visit?

MULTIPLE RESPONSE

Fox Studios Australia 01
Sydney Opera House 02
Darling Harbour 03
Bondi Beach 04
Kings Cross 05
Special Event / Festival 06
The Rocks 07
Star City (Sydney) Casino 08
Sydney Olympic Site 09
Blue Mountains 10

NONE OF THESE 97

IF ACT VISITED - ASK Q.33
OTHERWISE ➔ Q.34

➔ **SHOWCARD 13**

Q.33 Looking at Card 13 (PAUSE), which of these places in the ACT did you visit?

MULTIPLE RESPONSE

Australian War Memorial 01
Parliament House 02
Old Parliament House 03
National parks/Natural bushlands 04
Telstra Tower 05
National Science and Technology Centre 06
National Gallery of Australia 07
Australian Institute of Sport 08
Wineries 09
Festivals/events 10

NONE OF THESE 97

IF VICTORIA VISITED - ASK Q.34
OTHERWISE ➔ Q.35

➔ **SHOWCARD 14**

Q.34 Looking at Card 14 (PAUSE), which of these places in Victoria did you visit?

MULTIPLE RESPONSE

Phillip Island, Penguin Parade 01
Sovereign Hill, Ballarat, Goldfields 02
Dandenong Ranges, Puffing Billy, Healesville Sanctuary 03
Great Ocean Road, Twelve Apostles 04
Grampians National Park 05
Mornington Peninsula 06
Wilsons Promontory 07
Daylesford, Macedon, Hepburn, Spa Country 08
Yarra Valley Wineries 09
High Country, Snowfields 10

NONE OF THESE 97

IF QUEENSLAND VISITED - ASK Q.35
OTHERWISE ➔ Q.36

➔ **SHOWCARD 15**

Q.35 Looking at Card 15 (PAUSE), which of these places in Queensland did you visit?

MULTIPLE RESPONSE

Theme Parks on the Gold Coast 01
Gold Coast Hinterland / Surrounding Hills / Mountains 02
Southbank Parklands in Brisbane 03
Fraser Island / Hervey Bay Whale Watching 04
The Great Barrier Reef 05
Daintree/Cape Tribulation 06
Arts and crafts markets 07
Noosa on the Sunshine Coast 08
National Parks / State Forest (excluding the Great Barrier Reef) 09
Festival/Sporting Event 10

NONE OF THESE 97

IF SOUTH AUSTRALIA VISITED - ASK Q.36
OTHERWISE ➔ Q.37

➔ **SHOWCARD 16**

Q.36 Looking at Card 16 (PAUSE), which of these places in South Australia did you visit?

MULTIPLE RESPONSE

Barossa Valley 01
Adelaide Hills, Mt Lofty Summit, Hahndorf 02
Coober Pedy Opal Fields 03
Kangaroo Island 04
Flinders Ranges, Wilpena Pound, Arkaroola 05
Naracoorte Caves, Penola, Coonawarra 06
River Murray 07
Festivals/events 08
Wineries 09
Museums or art galleries 10

NONE OF THESE 97

IF WESTERN AUSTRALIA VISITED - ASK Q.37
OTHERWISE → Q.38

→ **SHOWCARD 17**

Q.37 Looking at Card 17 (PAUSE), which of these places in Western Australia did you visit?

MULTIPLE RESPONSE

Fremantle 01
Swan Valley 02
York/Toodyay/ Avon Valley 03
Margaret River/ Southern Forest Areas 04
Albany / South Coastal and Range Areas 05
Kalgoorlie-Boulder/ Goldfields Area 06
Geraldton/ Kalbarri 07
Monkey Mia/ Shark Bay/ Exmouth 08
Karijini National Park/ Gorges 09
Broome / Kununurra 10

NONE OF THESE 97

IF TASMANIA VISITED - ASK Q.38
OTHERWISE → Q.39

→ **SHOWCARD 18**

Q.38 Looking at Card 18 (PAUSE), which of these places in Tasmania did you visit?

MULTIPLE RESPONSE

Hobart 01
Launceston 02
Huon Valley 03
Strahan 04
Stanley 05
St Helens 06
Freycinet National Park 07
Port Arthur 08
Ross 09
Cradle Mountain National Park 10

NONE OF THESE 97

IF NORTHERN TERRITORY VISITED - ASK Q.39
OTHERWISE → Q.40

→ **SHOWCARD 19**

Q.39 Looking at Card 19 (PAUSE), which of these places in the Northern Territory did you visit?

MULTIPLE RESPONSE

Darwin 01
Katherine 02
Tennant Creek 03
Alice Springs 04
Uluru (Ayers Rock) 05
Kakadu National Park 06
Litchfield National Park 07
Kings Canyon 08
West MacDonnell Ranges 09
Arnhem Land 10

NONE OF THESE 97

→ **SHOWCARD 20**

Q.40 Looking at Card 20 (PAUSE), what (leisure activities) did you do during this trip?

MULTIPLE RESPONSE

Outdoor/Ecotourism

Go to the beach (incl. swimming, surfing, taking a picnic etc) 01
Visit national parks, bushwalking, rainforest walks 02
Visit botanical gardens or other public gardens 03
Go whale/dolphin watching in the ocean 04
Visit the outback 05
Visit farms 06

Active Outdoors/Sports

Go fishing 07
Play golf 08
Play other sports 09
Other outdoor activities (e.g. horse riding, rock climbing, white water rafting, bungee jumping, scuba diving, snorkelling, etc) 10

Arts/Heritage

Attend theatre, concerts or other performing arts 11
Visit museums or art galleries 12
Visit art/craft workshops/studios 13
Attend festivals/fairs or cultural events 14
Experience Aboriginal art/craft and cultural displays 15
Visit an Aboriginal site/community 16
Visit history/heritage buildings or monuments 17

Local Attractions/Tourist Activities

Visit amusement/theme parks 18
Visit wildlife parks/zoos/aquariums 19
Go on guided tours or excursions 20
Go to markets (eg. street, arts & crafts) 21
Tourist trains 22
Visit industrial tourism attractions (e.g. breweries, mines) 23
Visit wineries 24

Social/Other

Visit friends/relatives 25
Visit pubs, clubs and discos 26
Visit casinos 27
Attend an organised sporting event 28
Go shopping (for pleasure) 29
Other (specify)
.... 98
NONE OF THESE 97

SECTION V: OLYMPICS

ONLY ASK Q.41 TO Q.43 if respondent arrived in Australia prior to 30 October 2000 (ie prior to the completion of the 2000 Olympic/Paralympic Games)

Q.41 During your visit to Australia, did you attend ....

a) any Olympic Games event

Yes 1
No...2

b) any Paralympic event

Yes 1
No...2

CHECK:
IF Yes (1) to EITHER Q.41 a) OR b) → Q.42
IF No (2) to BOTH Q.41 a) AND b) → Q.44

➔ **SHOWCARD A**

Q.42 Looking at Card A (PAUSE), what event/s did you attend?

Opening / Closing Ceremony ....1 → Q.44
Athletics (Track events)...................2 → Q.44
Swimming..3 → Q.44
Football (soccer) ....4 → → → Q.43
Rowing ....5 → Q.44
Basketball...6 → Q.44
Gymnastics ....7 → Q.44
Cycling (Track).................................8 → Q.44
Triathlon ....9 → Q.44
Hockey ....10 → Q.44
Other (Please Specify)
....98 → Q.44

➔ **SHOWCARD B**

Q.43 Looking at Card B (PAUSE), in what City/Cities did you attend Olympic football (soccer) matches?

Sydney 1
Melbourne 2
Canberra 3
Adelaide 4
Brisbane...5
Don't Know..9

SECTION VI: TRAVEL EXPENDITURE

➔ **SHOWCARD 21**

Q.44 Did you arrive in Australia on a travel package? Card 21 explains what I mean by a travel package.

Yes 1
No................................2 → Q.48

➔ **SHOWCARD 22**

Q.45 Looking at Card 22 (PAUSE), which of these travel arrangements were included in your travel package?

MULTIPLE RESPONSE

PROMPT: Does this include international air/sea fares?

International (air/sea) fare 01
Airfares within Australia 02
Organised tours in Australia 03
Most accommodation in Australia........................ 04
Some accommodation in Australia...................... 05
Most ground transport within Australia 06
Some ground transport within Australia............. 07
Most meals in Australia 08
Some meals in Australia..................................... 09
Entertainment and/or recreation
activities in Australia 10
Sightseeing tours.. 11
Convention fees.. 12
Other items (SPECIFY MOST
EXPENSIVE ONE)
.... 98
None/No Arrangements...................................... 97

Q.46 CHECK Q.45

Did the travel package include accommodation (codes 04 or 05)?

Yes 1
No...2 → Q.48

Q.47 How many nights in paid accommodation were covered by that travel package?

Nights.. [ ][ ][ ]

➔ **SHOWCARD 23**

Q.48 I'd like to ask you about the cost of your trip and how much money you have spent in Australia.

Card 23 (PAUSE), shows what information to include. Is it easier for you to report on your own personal spending or for your travel party?

Personal only........................1 → Q.49
Immediate Travel party........2 → Q.51

No expenditure ....3 → Q.69 ONLY WHEN CONVINCED

Q.49 I am now going to ask you some questions about your own personal expenditure. This includes what you *personally* have spent and any costs paid for by a company or organisation overseas on your behalf. Can you confirm again that you are only answering for yourself? That is, you are not reporting on behalf of your family or anyone else.

Yes .... 1 → Q.52
No .... 2 → Q.50

Q.50 You mentioned before that you were reporting your *personal* expenditure only. How many people, including yourself, are you in fact answering for?

Number of persons .... [ ][ ] → Q.52

Q.51 I am now going to ask you some questions about the expenditure for you and your travel party. This includes what you have spent for you and your travel party, and any costs paid for by a company or organisation overseas on your behalf. How many people are you answering on behalf of?

Number of persons .... [ ][ ]

Q.52 **CHECK Q.44:**
Did respondent arrive on a travel package (Code 1 in Q.40)?

Yes .... **1→Q.53**
No .... **2→Q.55**

Q.53 Before arriving in Australia how much did (you/your party, or any other person or company on your behalf) pay for your travel package?

AMOUNT:..

Q.54 **ASK OR RECORD**
In which currency have you answered?

....

CONVERSION TO A$

$ [ ][ ][ ][ ][ ][ ][ ]

→ **NOW SKIP TO Q.58**

Q.55 Before arriving in Australia, how much was paid for (your/your party's) international (air/sea) fares? Do not include any international fares paid for in Australia. Please include any payment you contributed for any persons travelling with you.

AMOUNT:..

Q.56 **ASK OR RECORD**
In which currency have you answered?

....

CONVERSION TO A$

$ [ ][ ][ ][ ][ ][ ][ ]

Q.57 Did any of that expenditure cover the cost of airfares within Australia?

Yes 1
No 2

→ **SHOWCARD 24**

Q.58 Now I'm going to ask you about your expenditure in Australia. Card 24 lists the categories I will be asking about. When you are thinking about your expenditure, please include money spent in Australia, amounts to be paid after you leave, and amounts paid before arriving in Australia (apart from your international air fare or travel package).

ON THE FOLLOWING PAGE ASK Q.59, Q.60, Q.61 AND Q.62 FOR EACH ITEM IN TURN

		Q.59		Q.60	Q.61	Q.62
Q.59	Did you spend anything on (item 1)...?					
Q.60	**IF ANYTHING SPENT ON** (item 1)... Was any of your expenditure on *(say item)* pre-paid, apart from amounts already covered by your travel package?					
Q.61	**IF ANY PREPAID EXPENDITURE (code 1 in Q.60):** How much was prepaid on *(say item)*?	Any expenditure on items		Any pre-paid	Pre-paid expenditure amount	Australian expenditure amount
Q.62	How much did (you/your party) spend on *(say item)* whilst in Australia? Include any amounts still to be paid.	Yes	No	Pre-paid?	A$	A$
1.	Organised tours. Include tours which combine coach, train or plane travel	1	2	1		
2.	Airline fares for travel within Australia	1	2	1		
3.	a) International airfares bought in Australia	1	2	1		
Ivwr only	b) CALCULATE TOTAL FOR Q.61 AND Q.62 - items 2 & 3				TOTAL $A	
4.	Rental and leasing fees for self-drive cars, rent-a-cars, camper vans. Please exclude petrol and oil costs	1	2	1		
5.	Petrol and oil costs for self-drive cars or other vehicles driven	1	2	1		
6.	Other transport fares. Include fares for trains, coaches, ferries, taxis, limousines, public transport	1	2	1		
7.	Food, drink and accommodation. Include alcohol, restaurant and bar expenditure					
	a) food, drink and accommodation inclusive	1	2	1		
	b) accommodation	1	2	1		
	c) food and drink	1	2	1		
Ivwr only	d) Q.61 & Q.62 TOTAL FDA (items 7a, b, & c)				TOTAL $A	
8.	Shopping (includes goods you may just have bought or intend to buy before departing)					
	a) items for use in Australia (eg film, cigarettes, toiletries, books, computers)	1	2	1		
	b) items to take home (eg gifts, souvenirs, clothing, books, jewellery and duty free goods)	1	2	1		
9.	Gambling. Include casinos, horse racing, trotting, lotto etc	1	2	1		
10.	Entertainment such as theatres, movies, zoos, museums, nightclub, recreation, entry fees (Do not include alcohol)	1	2	1		
11.	Purchase of a motor vehicle.	1	2	1		
12.	a) Other major purchases (eg land, real estate, major business equipment, shares). **(SPECIFY)**	1	2	1		
Ivwr only	b) CALCULATE TOTAL FOR Q.61 AND Q.62 - items 11 & 12				TOTAL $A	
13.	Education fees (ask only if this is visit's purpose)	1	2	1		
14.	Education fees (if visit's purpose **is not education**)	1	2	1		
15.	Phone, Internet, fax &/or postage	1	2	1		
16.	Any other expenditure? Please include Convention registration fees, medical expenses, electricity, water and gas, laundry, dry cleaning, hairdressing, registration, insurance, car repairs, and any other expenses. **(Probe for convention fee expenditure if purpose of visit to Australia and/or any location is convention/conference)** (SPECIFY)	1	2	1		
	CALCULATE TOTAL FOR Q.61 **AND** Q.62					
Q.63	a) **CONFIRM TOTALS:** So that means a total of *(Q.61 & Q.62)* was spent on this trip to Australia	**RECORD TOTAL AUSTRALIAN AND PRE PAID EXPENDITURE**			$A	
Ivwr only	b) **CALCULATE TOTAL EXPENDITURE <u>MINUS</u> TOTAL AIRFARES (ITEM 3b) AND MOTOR VEHICLES AND MAJOR GOODS (ITEM 12b)**	**TOTAL (item 63a) - (item 3b + item 12b)**			$A	

Q.64a Has the respondent reported more than 1 stopover in the travel grid?

More than one stop .... 1 GO TO Q.64
One stop only........................ 2 GO TO Q.69

CQ.64 SELECTION OF RANDOM LOCATION

CAPI to select location .... 1 GO TO Q.66

Entering hardcopy interview with random selection............... 2 GO TO Q.65

CQ.65 RANDOM STOPOVER NUMBER

Enter random stopover number ☐☐

CONTINUE

CQ.66 PLEASE VERIFY THE FOLLOWING RANDOM LOCATION:

Random Stop No.: ☐☐

Location ....

Yes, it is correct .... 1 GO TO Q.67
No. it is not incorrect......... 2 Amend Q.65

RECORD TOTAL EXPENDITURE FROM Q.63b

TOTAL A$ ☐☐☐☐☐☐

Q.67 While you were staying in *(randomly selected location)*, how much of your total expenditure of *(Q.63b total)* was spent in *(randomly selected location)*?

(**IF NECESSARY**: This is excluding expenditure on airfares, motor vehicles and major purchases)

A$ ☐☐☐☐☐☐

RECORD TOTAL FDA EXPENDITURE (item 7d)

FDA A$ ☐☐☐☐☐☐

Q.68 Again, thinking about *(randomly selected location)*, how much of your Australian and pre-paid food, drink and accommodation expenditure of *(item 7d)* was spent in *(randomly selected location)*?

A$ ☐☐☐☐☐☐

WRITE IN TOTAL FROM Q.62 AUSTRALIAN EXPENDITURE ONLY

A$ ☐☐☐☐☐☐

→ **SHOWCARD 25**

Q.69 Looking at Card 25 (PAUSE), which, if any, of the following did you or any of your travel party receive income from in Australia during this visit?

MULITPLE RESPONSE

Sale of Capital Goods................................ 1
Gambling winnings 2
Other income (e.g. work) 3
No income received..................................... 4 → Q.71

Q.70 About how much income was received? Please separate gambling income, sale of capital goods, and other income.

Sale of capital goods, such as real estate, car, boat, business equipment, etc A$ ☐☐☐☐☐☐

Gambling income A$ ☐☐☐☐☐☐

Other Income A$ ☐☐☐☐☐☐

SECTION VII: IMPRESSIONS OF AUSTRALIA

→ **SHOWCARD 26**

Q.71 Looking at Card 26 (PAUSE), please tell me how satisfied you were with certain aspects of your stay in Australia. How satisfied were you with...?

READ OUT EACH ITEM.
IF 'DON'T KNOW' RECORD '9' IN THE BOX.
IF 'NOT APPLICABLE' RECORD '7' IN THE BOX.

(1) The amount of tourist information available in Australia................................. ☐
(2) The cost of domestic airfares.................... ☐
(3) The cost of other forms of transport.......... ☐
(4) The availability of facilities for the disabled/handicapped................................ ☐
(5) Shop trading hours .... ☐
(6) The cost of goods in shops........................ ☐
(7) The cost of accommodation....................... ☐
(8) Airport facilities in this airport.................... ☐
(9) Clearance through customs on arrival in Australia.. ☐
(10) Visa requirements for Australia.................. ☐

Q.72 Would you return to Australia for a holiday?

Yes 1
No... 2

Q.73 Would you recommend Australia as a holiday destination to your friends and relatives in <*country of residence*>?

Yes 1
No 2
Don't know/Not applicable 9

SECTION VIII: INTERNET USAGE

Q.74 Before you left <*country of residence*>, did you use the internet to get information about Australia for this visit?

Yes 1
No .... 2 → **Q.76**

→ **SHOWCARD 27**

Q.75 Looking at Card 27 (PAUSE), for which of the following reasons did you use the internet?
MULTIPLE RESPONSE

To help decide whether or not to visit Australia 1
To find out more about Australia after you decided to visit 2
To help plan your Australian trip itinerary 3
To find a travel agent for Australia 4
To find out about events or activities within Australia 5
To participate in travel-related chat rooms about Australia 6
To look for airfares or air schedules:
- for travel to Australia 7
- for travel within Australia 8

To help plan other transport options within Australia (e.g., car rental, public transport, etc.) 9
To find out about accommodation in Australia 10
To be involved in an online travel auction about Australia 11
Other reason (specify)
.... 98

Q.76 Before you left <*country of residence*>, did you make any bookings for this visit to Australia on the Internet?

Yes 1
No .... 2 → **Q.84**
Don't Know .... 3 → **Q.84**

Q.77 Were any of these bookings made through online travel auctions?

Yes 1
No .... 2 → **Q.81**
Don't know .... 3 → **Q.81**

→ **SHOWCARD 28**

Q.78 Looking at Card 28 (PAUSE), what did you book through the online travel auction?
MULTIPLE RESPONSE

International air travel to Australia 1
Air travel within Australia 2
Organised tours in Australia 3
Rental or leasing of cars or campervans in Australia 4
Accommodation in Australia 5
Other (specify)
.... 98

Q.79 Did you pay for this/these booking(s) over the internet?

Yes 1
No .... 2 → **Q.81**
Don't know .... 9 → **Q.81**

Q.80 And how much did you spend on each of the following items through the online travel auction?
READ OUT ITEMS CIRCLED IN Q.78 ONLY

a) International airline tickets to Australia	A$						
b) Airline tickets for travel within Australia	A$						
c) Organised tours in Australia	A$						
d) Rental or leasing of cars or campervans in Australia	A$						
e) Accommodation reservations for Australia	A$						
f) Other	A$						

→ **SHOWCARD 28**

Q.81 Looking (again) at Card 28, what did you book on the internet, (other than the bookings you made through the travel auction)?
MULTIPLE RESPONSE

All bookings made through travel auction .... 97 → **Q.84**

International air travel to Australia 1
Air travel within Australia 2
Organised tours in Australia 3
Rental or leasing of cars or campervans in Australia 4
Accommodation in Australia 5
Other (specify)
.... 98

Q.82 Did you pay for this/these booking(s) over the internet?

Yes 1
No .... 2 → **Q.84**

Q.83 And how much did you spend on each of the following items online (not including amounts spent through the travel auction)?
READ OUT ITEMS CIRCLED IN Q.81 ONLY

a) International airline tickets to Australia A$ ☐☐☐☐☐☐

b) Airline tickets for travel within Australia A$ ☐☐☐☐☐☐

c) Organised tours in Australia A$ ☐☐☐☐☐☐

d) Rental or leasing of cars or campervans in Australia A$ ☐☐☐☐☐☐

e) Accommodation reservations for Australia A$ ☐☐☐☐☐☐

f) Other A$ ☐☐☐☐☐☐

SECTION IX: DEMOGRAPHICS

Q.84 **RECORD SEX:**

Male.. 1
Female 2

→ **SHOWCARD 29**

Q.85 Looking at Card 29 (PAUSE), which of these age groups do you fall within?

15 to 19 ....01 } → Q.86
20 to 24 ....02 }
25 to 29 ....03 }
30 to 34 ....04 }
35 to 39 ....05 }
40 to 44 ....06 }
45 to 49 ....07 } → Q.87
50 to 54 ....08 }
55 to 59 ....09 }
60 to 64 ....10 }
65 to 69 ....11 }
70 and over ....12 }

Q.86 Do you live with your parent or guardian (in your country of residence)?

Yes 1
No.. 2
No answer 3

→ **SHOWCARD 30**

Q.87 Looking at Card 30 (PAUSE), what is your marital status?

Single (never married, divorced, separated, widowed).. 1
Part of a couple (married, De facto, living together) 2
No answer 3

Q.88 Are you the parent or guardian of any children living with you?

Yes 1
No...2 → **Q.90**
No answer ....3 → **Q.90**

Q.89 What age groups are these children?
MULTIPLE RESPONSE

0-5 1
6-14 2
15-24 3
25 and over 4
No answer 5

Q.90 Thank you very much for your cooperation. We would like you to accept this item as a token of our appreciation.
(HAND OVER PIN)

Q.91 **FOR INTERVIEWERS ONLY**

Thinking about when the respondent was completing the **expenditure grid**, select one of the following four (4) categories that you think best describes the respondent's answers.

Very accurate (referred to receipts/diary/log book/budget) 1

Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought) 2

Quite rough (no reference to any document; very quick, top-of-head response) 3

Very rough (just guessing) 4

Q.92 **FOR INTERVIEWERS ONLY**

Thinking about when the respondent was answering the random location questions, select one of the four (4) categories that you think best describes the respondents answers.

Very accurate (referred to receipts/diary/log book/budget 1

Quite accurate (occasional reference to receipt/budget, or answered confidently with appropriate thought) 2

Quite rough (no reference to any document; very quick, top-of-head response 3

Very rough (just guessing) 4

S.1 **Record Interview Type**

Normal CAPI 1
Interrupted CAPI 2
All Hardcopy .... 3 → S.2

S.2 **Hardcopy Interviews Only**

(a) Please record the date this hardcopy interview was done on:

__ __ / __ __ / __ __ __ __

(b) And record the reason why this interview was done on hardcopy:

____
____
____
____
____
____
____

INTERVIEWER DECLARATION:

I have conducted this interview. It is a full and to the best of my knowledge, accurate recording and has been completed in accordance with my interviewing and ICC/ESOMAR guidelines.

INTERVIEWER:...

RECORD DATE: (DD/MM/YY) | | | | | 0 | 1 |

SIGNED:..

INTERVIEWER NUMBER: | | | | | | |

IF HARDCOPY:
MAKE SURE THAT THIS QUESTIONNAIRE AND ANY TRAVEL GRID CONTINUATION SHEETS ARE STAPLED TOGETHER AND THAT THE QUESTIONNAIRE NUMBER IS WRITTEN ON THE FRONT OF THIS QUESTIONNAIRE AND ON ALL CONTINUATION SHEETS.

STAPLE SHEETS IN THE FOLLOWING ORDER:
- **MAIN QUESTIONNAIRE**
- **GREEN CONTINUATION SHEET(S) (if used)**

Appendix D: Common Itineraries, 2000

Cluster	Description	Regional Destinations	Cluster Center	N (n= 6,132)
1	Tropical North Queensland Focused	Tropical North QLD	.45	949 (15.5%)
		Sydney, NSW	.23	
		Gold Coast, QLD	.08	
		Petermann, NT	.04	
		Melbourne, VIC	.03	
2	Gold Coast/ Sydney	Gold Coast, QLD	.54	985 (16.1%)
		Sydney, NSW	.31	
		Brisbane, QLD	.04	
		Melbourne, VIC	.03	
3	Around Australia	Sydney, NSW	.13	1341 (21.9%)
		Melbourne, VIC	.07	
		Brisbane, QLD	.05	
		Canberra, ACT	.04	
		Tropical North QLD	.04	
		Darwin, NT	.04	
		Northern Rivers, NSW	.03	
		Perth, WA	.03	
		Whitsundays, QLD	.03	
4	Sydney Focused	Sydney, NSW	.67	1033 (16.8%)
		Melbourne, VIC	.08	
		Brisbane, QLD	.04	
		Tropical North QLD	.03	
5	Perth Focused	Perth, WA	.64	434 (7.1%)
		Sydney, NSW	.08	
		South West, WA	.06	
		Melbourne, VIC	.04	
		Great Southern, WA	.03	
6	Brisbane Focused	Brisbane, QLD	.63	410 (6.7%)
		Sydney, NSW	.11	
		Gold Coast, QLD	.06	
		Tropical North QLD	.03	
		Melbourne, VIC	.03	
7	SE QLD Focused	Sunshine Coast, QLD	.64	107 (1.7%)
		Brisbane, QLD	.10	
		Gold Coast, QLD	.09	
8	Melbourne/	Melbourne, VIC	.64	624 (10.2%)

	Sydney	Sydney, NSW	.16	
9	Adelaide Focused	Adelaide, SA	.65	249 (4.1%)
		Sydney, NSW	.09	
		Melbourne, VIC	.07	

Appendix E: Final Cluster Centers (All Multi-destination Trips, N = 15,002)

		Mean Trip Index Scores by Cluster								
State	Region	1	2	3	4	5	6	7	8	9
NSW	South Coast	.00	.00	.01	.01	.00	.00	.00	.00	.00
NSW	Illawarra	.00	.00	.01	.01	.00	.00	.00	.00	.00
NSW	Sydney	.22	.29	.12	.68	.06	.10	.03	.15	.08
NSW	Snowy Mountains	.00	.00	.00	.00	.00	.00	.00	.00	.00
NSW	Capital Country	.00	.00	.00	.00	.00	.00	.00	.00	.00
NSW	Murray	.00	.00	.01	.00	.00	.00	.00	.00	.00
NSW	Riverina	.00	.00	.00	.00	.00	.00	.00	.00	.00
NSW	Explorer country	.00	.00	.01	.00	.00	.00	.00	.00	.00
NSW	Hunter	.00	.00	.02	.01	.00	.00	.00	.00	.00
NSW	North Coast	.00	.00	.02	.01	.00	.00	.00	.00	.00
NSW	Northern Rivers	.01	.00	.03	.01	.00	.01	.01	.00	.00
NSW	New England North West	.00	.00	.01	.00	.00	.00	.00	.00	.00
NSW	Outback	.00	.00	.00	.00	.00	.00	.00	.00	.00
ACT	Canberra	.00	.01	.04	.02	.00	.01	.00	.01	.00
NSW	Central Coast	.00	.00	.01	.00	.00	.00	.00	.00	.00
NSW	Blue Mountains	.00	.00	.01	.01	.00	.00	.00	.00	.00
NSW	Lord Howe	.00	.00	.00	.00	.00	.00	.00	.00	.00
NSW	Transit/Other NSW	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Melbourne	.04	.03	.06	.07	.04	.03	.01	.67	.06
VIC	Wimmera	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Mallee	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Western	.00	.00	.01	.00	.00	.00	.00	.01	.01
VIC	Western Grampians	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Bendigo Loddon	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Peninsula	.00	.00	.01	.00	.00	.00	.00	.01	.00
VIC	Central Murray	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Goulburn	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	High Country	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Lakes	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Gippsland	.00	.00	.01	.00	.00	.00	.00	.00	.00
VIC	Melbourne East	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Geelong	.00	.00	.01	.00	.00	.00	.00	.00	.00
VIC	Macedon	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Spa Country	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Ballarat	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Central Highlands	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Upper Yarra	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Murray East	.00	.00	.00	.00	.00	.00	.00	.00	.00
VIC	Philip Island	.00	.00	.00	.00	.00	.00	.00	.00	.00

State	Region	Mean Trip Index Scores by Cluster								
		1	2	3	4	5	6	7	8	9
VIC	Transit/Other Vic	.00	.00	.00	.00	.00	.00	.00	.00	.00
QLD	Gold Coast	.07	.55	.02	.02	.00	.06	.11	.02	.01
QLD	Brisbane	.03	.04	.04	.03	.01	.65	.11	.02	.01
QLD	Sunshine Coast	.01	.01	.01	.01	.00	.02	.62	.00	.00
QLD	Hervey Bay Maryborough	.01	.00	.03	.01	.00	.02	.02	.00	.00
QLD	Darling Downs	.00	.00	.01	.00	.00	.01	.00	.00	.00
QLD	Bundaberg	.00	.00	.01	.00	.00	.00	.00	.00	.00
QLD	Fitzroy	.00	.00	.02	.00	.00	.01	.00	.00	.00
QLD	Mackay	.00	.00	.01	.00	.00	.00	.00	.00	.00
QLD	Whitsundays	.02	.02	.03	.01	.00	.01	.01	.00	.00
QLD	Northern	.01	.00	.03	.00	.00	.01	.01	.00	.00
QLD	Tropical North Queensland	.45	.02	.05	.03	.01	.03	.02	.01	.01
QLD	Outback Qld	.00	.00	.01	.00	.00	.00	.00	.00	.00
QLD	Transit/Other Qld	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Limestone Coast	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Murraylands	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Fleurieu Peninsula	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Adelaide	.01	.00	.03	.01	.02	.01	.00	.01	.70
SA	Barossa	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Riverland	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Clare Valley	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Adelaide Hills	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Flinders Ranges	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Outback SA	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Eyre Peninsula	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Yorke Peninsula	.00	.00	.00	.00	.00	.00	.00	.00	.00
SA	Kangaroo Island	.00	.00	.00	.00	.00	.00	.00	.00	.01
SA	Other SA	.00	.00	.00	.00	.00	.00	.00	.00	.00
WA	South East	.00	.00	.00	.00	.00	.00	.00	.00	.00
WA	Goldfields	.00	.00	.00	.00	.01	.00	.00	.00	.00
WA	Midwest	.00	.00	.00	.00	.01	.00	.00	.00	.00
WA	Gascoyne	.00	.00	.01	.00	.02	.00	.00	.00	.00
WA	Pilbara	.00	.00	.01	.00	.01	.00	.00	.00	.00
WA	Kimberley	.00	.00	.01	.00	.01	.00	.00	.00	.00
WA	Perth	.01	.00	.03	.01	.66	.01	.00	.01	.01
WA	Peel	.00	.00	.00	.00	.01	.00	.00	.00	.00
WA	South West	.00	.00	.01	.00	.06	.00	.00	.00	.00
WA	Great Southern	.00	.00	.00	.00	.02	.00	.00	.00	.00
WA	Wheatbelt	.00	.00	.00	.00	.01	.00	.00	.00	.00
WA	Other WA	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAS	Greater Hobart	.00	.00	.02	.00	.00	.00	.00	.01	.00

State	Region	Mean Trip Index Scores by Cluster								
		1	2	3	4	5	6	7	8	9
TAS	Southern	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAS	East Coast	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAS	Northern	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAS	Greater Launceston	.00	.00	.01	.00	.00	.00	.00	.00	.00
TAS	North West	.00	.00	.01	.00	.00	.00	.00	.00	.00
TAS	West Coast	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAS	Transit/Other Tas	.00	.00	.00	.00	.00	.00	.00	.00	.00
NT	Darwin	.01	.00	.04	.01	.01	.00	.00	.00	.00
NT	Kakadu	.01	.00	.01	.00	.00	.00	.00	.00	.00
NT	Arnhem	.00	.00	.00	.00	.00	.00	.00	.00	.00
NT	Katherine	.00	.00	.01	.00	.00	.00	.00	.00	.00
NT	Tablelands	.00	.00	.00	.00	.00	.00	.00	.00	.00
NT	Petermann	.04	.01	.02	.01	.01	.00	.00	.00	.00
NT	Alice Springs	.01	.00	.02	.00	.00	.00	.00	.00	.01
NT	Macdonnell	.00	.00	.00	.00	.00	.00	.00	.00	.00
NT	Daly	.00	.00	.00	.00	.00	.00	.00	.00	.00
NT	Other NT	.00	.00	.00	.00	.00	.00	.00	.00	.00
Other	External Regions/Other DK	.00	.00	.00	.00	.00	.00	.00	.00	.00

Appendix F: Common Itineraries, 1997

Cluster	Description	Regional Destinations	Cluster Center	N (n= 6,662)
1	Tropical North Queensland Focused	Tropical North QLD	.50	1090 (16.4%)
		Sydney, NSW	.22	
		Gold Coast, QLD	.12	
		Petermann, NT	.04	
2	Gold Coast/ Sydney	Gold Coast, QLD	.53	1375 (20.6%)
		Sydney, NSW	.33	
		Brisbane, QLD	.03	
		Whitsundays, QLD	.03	
3	Around Australia	Sydney, NSW	.12	1170 (17.6%)
		Sunshine Coast, QLD	.05	
		Tropical North Queensland, QLD	.05	
		Whitsundays, QLD	.05	
		Canberra, ACT	.04	
		Melbourne, VIC	.04	
		Brisbane, QLD	.04	
		Upper North Coast, NSW	.03	
		Gold Coast, QLD	.03	
4	Sydney Focused	Sydney, NSW	.70	969 (14.5%)
		Gold Coast, QLD	.04	
		Brisbane, QLD	.04	
		Tropical North QLD	.04	
		Melbourne, VIC	.03	
5	Perth Focused	Perth, WA	.69	357 (5.4%)
		Sydney, NSW	.05	
		Lower South West, WA	.05	
		Melbourne, VIC	.03	
		Central South, WA	.03	
6	Brisbane Focused	Brisbane, QLD	.63	441 (6.6%)
		Sydney, NSW	.12	
		Gold Coast, QLD	.09	
		Tropical North QLD	.03	
7	Three-State Tourers	Melbourne, VIC	.35	650 (9.8%)
		Sydney, NSW	.34	
		Gold Coast, QLD	.08	
		Tropical North Queensland, QLD	.06	
		Brisbane, QLD	.04	

		Canberra, ACT	.03	
8	Melbourne/ Sydney	Melbourne, VIC	.74	444 (6.7%)
		Sydney, NSW	.07	
9	Adelaide Focused	Adelaide, SA	.70	166 (2.5%)
		Sydney, NSW	.08	
		Melbourne, VIC	.06	

Note: (1) The names of the common itineraries are changed to those used by Collins (2006).
(2) Stopover region “Far North Queensland” in the 1997 IVS was renamed to “Tropical North Queensland”

Source: Adapted from Tideswell (2004, p.32).

Appendix G: Common Itineraries, 1999

Cluster	Description	Regional Destinations	Cluster Center	Proportion*
1	Tropical North Queensland Focused	Tropical North QLD	.50	16%
		Sydney, NSW	.23	
		Gold Coast, QLD	.07	
		Petermann, NT	.04	
		Melbourne, VIC	.03	
2	Gold Coast/ Sydney	Gold Coast, QLD	.56	20%
		Sydney, NSW	.30	
		Brisbane, QLD	.04	
		Melbourne, VIC	.03	
3	Around Australia	Sydney, NSW	.12	20%
		Melbourne, VIC	.07	
		Sunshine Coast, QLD	.06	
		Brisbane, QLD	.06	
		Tropical North QLD	.04	
		Gold Coast, QLD	.03	
		Canberra, ACT	.03	
		Perth, WA	.03	
		Hunter, NSW	.03	
		Alice Springs, NT	.03	
		Northern Rivers, NSW	.03	
4	Sydney Focused	Sydney, NSW	.69	15%
		Melbourne, VIC	.06	
		Tropical North Queensland, QLD	.04	
		Brisbane, QLD	.03	
5	Perth Focused	Perth, WA	.70	7%
		South West, WA	.10	
		Sydney, NSW	.04	
		Coral Coast, WA	.03	
		North West, WA	.03	
6	Brisbane Focused	Brisbane, QLD	.67	7%
		Sydney, NSW	.09	
		Gold Coast, QLD	.07	
		Tropical North QLD	.03	
		Sunshine Coast, QLD	.03	
7	Melbourne/ Sydney	Melbourne, VIC	.63	11%
		Sydney, NSW	.18	

8	Adelaide Focused	Adelaide, SA	.65	3%
		Sydney, NSW	.08	
		Melbourne, VIC	.07	

Note: *The proportion of all visitors to Australia during 1999.

Source: Adapted from Collins (2006, p.7).

Appendix H: Common Itineraries, 2004

Cluster	Description	Regional Destinations	Cluster Center	Proportion*
1	Tropical North Queensland Focused	Tropical North QLD	.55	16%
		Sydney, NSW	.21	
		Gold Coast, QLD	.07	
		Petermann, NT	.04	
		Melbourne, VIC	.03	
2	Gold Coast/ Sydney	Gold Coast, QLD	.58	14%
		Sydney, NSW	.27	
		Brisbane, QLD	.04	
		Melbourne, VIC	.03	
3	Around Australia	Sydney, NSW	.11	21%
		Adelaide, SA	.10	
		Melbourne, VIC	.07	
		Tropical North QLD	.04	
		Whitsundays, QLD	.04	
		Hobart, TAS	.04	
		Perth, WA	.03	
		Brisbane, QLD	.03	
		Northern Rivers, NSW	.03	
		Darwin, NT	.03	
4	Sydney Focused	Sydney, NSW	.66	18%
		Melbourne, VIC	.07	
		Gold Coast, QLD	.05	
		Brisbane, QLD	.04	
		Tropical North QLD	.03	
5	Perth Focused	Perth, WA	.72	7%
		South West, WA	.08	
		Sydney, NSW	.06	
		Melbourne, VIC	.03	
6	Brisbane Focused	Brisbane, QLD	.66	7%
		Sydney, NSW	.11	
		Gold Coast, QLD	.06	
		Tropical North QLD	.03	
		Sunshine Coast, QLD	.03	
7	SE QLD Focused	Sunshine Coast, QLD	.62	3%
		Brisbane, QLD	.13	
		Gold Coast, QLD	.11	

		Sydney, NSW	.04	
8	Melbourne/ Sydney	Melbourne, VIC	.63	13%
		Sydney, NSW	.17	
9	Hunter Focused	Hunter, NSW	.57	1%
		Sydney, NSW	.21	
		North Coast, NSW	.04	
		Gold Coast, QLD	.04	
10	Illawarra Focused	Illawarra, NSW	.63	0.4%
		Sydney, NSW	.11	
		Gold Coast, QLD	.06	
		Sunshine Coast, QLD	.05	
		Riverina	.04	

Note: *The proportion of all visitors to Australia during 2004.

Source: Adapted from Collins (2006, p.5).

Appendix I: Relationship between the lift measure in data mining and the (O-E)/E Index

In brief, an association rule is an expression $A \Rightarrow B$, where A and B are sets of items. The meaning of such rules is quite intuitive: Given a database D of transactions, where each transaction $T \in D$ is a set of items, $A \Rightarrow B$ expresses that whenever a transaction T contains A then it probably contains B too.

The probability or rule confidence is defined as the percentage of transactions containing B in addition to A with regard to the overall number of transactions containing A. That is, the rule confidence can be understood as the conditional probability $p(B \subseteq T \mid A \subseteq T)$.

But it is the lift of the rule that has been used as the general screening criterion since a lot of spurious rules may emerge in mining a large database. Using the probability terms, lift can be defined as

$$lift = \frac{P(B \mid A)}{P(B)} = \frac{P(A \cap B)}{P(A) \cdot P(B)} = \frac{P(A \mid B)}{P(A)}$$

In a database with a total of N transactions, it can be calculated that

$P(B \mid A) = \frac{O_{AB}}{N_A}$, and $P(B) = \frac{N_B}{N}$

where O_{AB} stands for the observed frequency of A and B appear together in transactions, N_A represents the number of transactions that contain A, and N_B represents the number of transactions that contain B.

Therefore the lift of rule $A \Leftrightarrow B$ (lift is a symmetric measure) can also be expressed as

$$lift = \frac{P(B \mid A)}{P(B)} = \frac{O_{AB} / N_A}{N_B / N} = \frac{O_{AB} \cdot N}{N_A \cdot N_B}$$

At the same time, the expected frequency of A and B appear together in transactions E_{AB} can be calculated under the independence assumption:

$$E_{AB} = P(A) \cdot P(B) \cdot N = \frac{N_A \cdot N_B}{N}$$

Hence, the relationship between the (O-E)/E Index and the lift measure is:

$$\frac{O_{AB} - E_{AB}}{E_{AB}} = \frac{O_{AB}}{E_{AB}} - 1 = \frac{O_{AB}}{N_A \cdot N_B / N} - 1 = lift - 1$$

Appendix J: Comparison of Average Variety-in-trip between Customer Groups

1. Variety-in-trip vs. Gender

Among the eight quarters in our sample, except for quarters 00Q4 and 01Q2, on average there is no significant difference between male and female travelers in their number of distinct places visited (variety). The two groups also have similar within-group variances in each quarter. The means of both groups are summarized in the table below.

Table 1: Comparison between Male and Female Travelers on Average Variety-in-trip

	Mean		Levene's Test of Equal Variance	t-value	p-value
	Male	Female			
99Q4	2.53	2.55	F = 1.084, p = .772	-.235	.814
00Q1	2.65	2.74	F = 1.041, p = .308	-.899	.369
00Q2	2.33	2.41	F = 2.452, p = .117	-.848	.396
00Q3	2.15	2.18	F = 1.343, p = .247	-.375	.708
00Q4	2.28	2.46	F = 5.977, p = .015	-2.167	.030
01Q1	2.55	2.76	F = 4.633, p = .031	-1.949	.051
01Q2	2.45	2.70	F = 15.432, p < .001	-2.377	.017
01Q3	2.70	2.77	F = .132, p = .716	-.667	.505

The frequency distributions show a mode at 1 and are highly skewed to the right.

2. Variety-in-trip vs. Internet Usage

The reason why travelers used Internet for information might behave differently in the assortments they selected compared to those who didn't use Internet. Information search behavior is a viable factor to segment tourism market (Fodness & Murray, 1997, 1998). In the tourism marketing system, information is part of the differentiating product package firms in the distribution channels sell (Pearce & Schott, 2005).

Table 2: Comparison between Internet Users and Non-users on Average Variety-in-trip

	Mean		Levene's Test of Equal Variance	t-value	p-value
	User	Non-user			
99Q4	3.78	2.25	F = 253.515, p < .001	-10.113	< .001
00Q1	4.18	2.46	F = 221.433, p < .001	-8.673	< .001
00Q2	3.69	2.13	F = 213.381, p < .001	-9.259	< .001
00Q3	3.37	1.97	F = 219.258, p < .001	-8.005	< .001
00Q4	3.60	2.12	F = 232.812, p < .001	-9.922	< .001
01Q1	3.51	2.23	F = 176.177, p < .001	-10.475	< .001
01Q2	3.33	2.18	F = 147.946, p < .001	-9.436	< .001
01Q3	3.31	2.47	F = 58.720, p < .001	-7.011	< .001

3. Variety-in-trip vs. Group or Alone Travelers

Table 3: Comparison between Group and Alone Travelers on Average Variety-in-trip

	Mean		Levene's Test of Equal Variance	t-value	p-value
	Group	Alone			
99Q4	2.59	2.53	F = 26.710, p < .001	.563	.574
00Q1	2.37	2.73	F = 56.020, p < .001	-3.798	< .001
00Q2	2.28	2.38	F = 27.112, p < .001	-1.011	.312
00Q3	2.33	2.14	F = 8.323, p = .004	1.768	.078
00Q4	2.45	2.35	F = 21.006, p < .001	1.022	.307
01Q1	2.55	2.66	F = 18.671, p < .001	-.770	.442
01Q2	2.37	2.59	F = 35.323, p < .001	-1.976	.049
01Q3	2.54	2.76	F = 37.008, p < .001	-2.053	.040

4. Variety-in-trip vs. First-time and Return Visitors

Table 4: Comparison between First-time and Return Visitors on Their Variety-in-trip

	Mean		Levene's Test of Equal Variance	t-value	p-value
	First Visit	Return Visit			
99Q4	3.38	1.89	F = 366.699, p < .001	15.365	< .001
00Q1	3.45	2.07	F = 258.776, p < .001	13.689	< .001
00Q2	3.15	1.80	F = 314.885, p < .001	13.515	< .001
00Q3	2.90	1.66	F = 338.597, p < .001	13.345	< .001
00Q4	3.12	1.83	F = 285.544, p < .001	14.371	< .001
01Q1	3.61	2.01	F = 381.644, p < .001	14.114	< .001
01Q2	3.60	1.83	F = 462.798, p < .001	15.440	< .001
01Q3	3.65	2.00	F = 356.216, p < .001	15.448	< .001

5. Variety-in-trip vs. Age

Table 5: Comparison between Age Groups on Average Variety-in-trip

	Mean of Age Group												F (ANOVA)
	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70+	
99Q4	1.75	3.1	2.96	2.58	2.27	1.96	2.01	2.32	2.34	2.53	2.91	2.88	7.654**
00Q1	2.09	3.52	3.05	2.78	2.26	1.94	2.04	2.48	2.4	2.87	2.65	2.37	9.636**
00Q2	2.78	2.96	2.64	2.39	1.93	1.82	1.99	2.18	1.87	2.23	2.41	2.27	6.216**
00Q3	1.66	3.1	2.61	1.82	1.67	1.73	1.8	2.03	1.85	2.01	2.76	1.68	14.898**
00Q4	1.67	2.63	2.81	2.47	2.07	1.83	1.84	2.16	2.27	2.91	3.07	2.34	8.360**
01Q1	1.74	3.3	2.74	2.97	2.44	1.98	2.35	2.36	2.87	2.13	2.6	2.57	6.245**
01Q2	3.17	3.42	3.05	2.44	2.03	1.83	1.89	2.15	2.3	2.3	2.26	2.24	10.321**
01Q3	2.64	3.46	3.46	2.53	1.94	2.1	2.21	2.22	2.56	2.95	2.54	2.1	11.778**

** p < .001

6. Variety-in-trip vs. Package or Independent Travelers

Table 6: Comparison between Package and Independent Travelers on Average Variety-in-trip

	Mean		Levene's Test of Equal Variance	t-value	p-value
	Package	F.I.T.			
99Q4	3.19	2.27	F = 36.940, p < .001	8.626	< .001
00Q1	2.95	2.60	F = .714, p = .398	3.163	.002
00Q2	2.56	2.29	F = 1.439, p = .230	2.614	.009
00Q3	2.37	2.09	F = .085, p = .771	2.962	.003
00Q4	2.78	2.19	F = 8.763, p = .003	6.411	< .001
01Q1	3.11	2.50	F = 8.847, p = .003	4.824	< .001
01Q2	2.52	2.58	F = 36.300, p < .001	-.582	.561
01Q3	2.85	2.69	F = 12.308, p < .001	1.575	.115

Appendix K: Stopover Region Coding Theme for IVS 1999-2001
(Source: Tourism Research Australia, Tourism Australia)

Stopover Regions (IVS 1999)	*Stopover Regions (IVS 2000)*	*Stopover Regions (IVS 2001)*
101 South Coast	101 South Coast	101 South Coast
102 Illawarra	102 Illawarra	102 Illawarra
104 Sydney	104 Sydney	104 Sydney
105 Snowy Mountains	105 Snowy Mountains	105 Snowy Mountains
106 Capital Country	106 Capital Country	106 Capital Country
107 The Murray	107 Murray	107 The Murray
108 Riverina	108 Riverina	108 Riverina
109 Explorer country	109 Explorer country	109 Explorer Country
110 Hunter	110 Hunter	110 Hunter
111 Mid North Coast	111 Mid North Coast	112 North Coast NSW
112 Holiday Coast	112 Holiday Coast	113 Northern Rivers Tropical NSW
113 Northern River / Tropical NSW	113 Northern River / Tropical NSW	114 Big Sky Country
114 Big sky country	114 New England/ North West	115 The Living Outback
115 Outback NSW	115 Outback	118 Central Coast
118 Central Coast Region	116 Far Western	119 Blue Mountains
119 Blue Mountains	118 Central Coast Region	120 Lord Howe Island
120 Lord Howe Island	119 Blue Mountains	190 Transit NSW
190 Transit NSW	120 Lord Howe Island	198 Other NSW
198 Other NSW	190 Transit NSW	201 Melbourne
201 Melbourne	198 Other NSW	202 Wimmera
202 Wimmera	201 Melbourne	203 Mallee
203 Mallee	202 Wimmera	204 Western
204 Western	203 Mallee	205 Western Grampians
205 Western Grampians	204 Western	206 Bendigo Loddon
206 Bendigo Loddon	205 Western Grampians	207 Peninsula
207 Peninsula	206 Bendigo Loddon	208 Central Murray
208 Central Murray	207 Peninsula	209 Goulburn
209 Goulburn	208 Central Murray	210 High Country
210 High Country	209 Goulburn	211 Lakes
211 Lakes	210 High Country	212 Gippsland
212 Gippsland	211 Lakes	213 Melbourne East
213 Melbourne East	212 Gippsland	214 Geelong
214 Geelong	213 Melbourne East	215 Macedon
215 Macedon	214 Geelong	216 Spa Country
216 Spa Country	215 Macedon	217 Ballarat
217 Ballarat	216 Spa Country	218 Central Highlands
218 Central Highlands	217 Ballarat	219 Upper Yarra
219 Upper Yarra	218 Central Highlands	220 Murray East
220 Murray East	219 Upper Yarra	221 Phillip Island
221 Phillip Island	220 Murray East	290 Transit Vic
290 Transit VIC	221 Phillip Island	298 Other Vic
298 Other VIC	290 Transit VIC	301 Gold Coast
301 Gold Coast	298 Other VIC	302 Brisbane
302 Brisbane	301 Gold Coast	303 Sunshine Coast
303 Sunshine Coast	302 Brisbane	304 Hervey Bay/Maryborough
304 Harvey Bay/ Maryborough	303 Sunshine Coast	306 Darling Downs

Stopover Regions (IVS 1999)	Stopover Regions (IVS 2000)	Stopover Regions (IVS 2001)
306 Darling Downs	304 Harvey Bay/ Maryborough	307 Bundaberg
307 Bundaberg	305 Brisbane Valley and Hinterland	308 Fitzroy
308 Fitzroy	306 Darling Downs	309 Mackay
309 Mackay	307 Bundaberg	310 Whitsundays
310 Whitsundays	308 Fitzroy	311 Northern
311 Northern	309 Mackay	312 Tropical North Queensland
312 Tropical North Queensland	310 Whitsundays	313 Great Barrier Reef
313 GBR	311 Northern	314 Outback
314 Outback Qld	312 Tropical North Queensland	390 Transit Qld
390 Transit QLD	313 GBR (also incl. in mainland region)	398 Other Qld
398 Other QLD	314 Outback	401 Limestone Coast
401 Limestone Coast	390 Transit QLD	402 Murraylands
402 Murraylands	398 Other QLD	403 Fleurieu Peninsula
403 Fleurieu Peninsula	401 Limestone Coast	404 Adelaide
404 Adelaide	402 Murraylands	405 Barossa
405 Bavossa	403 Fleurieu Peninsula	406 Riverland
406 Riverland	404 Adelaide	407 Clare Valley
407 Clare Vally	405 Barossa Valley	408 Adelaide Hills
408 Adelaide Hills	406 Riverland	409 Flinders Ranges
409 Flinders Ranges	407 Clare Valley	410 Outback SA
410 Outback SA	408 Adelaide Hills	411 Eyre Peninsula
411 Eyre Peninsula	409 Flinders Ranges	412 Yorke Peninsula
412 Yorke Peninsula	410 Outback SA	413 Kangaroo Island
413 Kangaroo Island	411 Eyre Peninsula	490 Transit SA
490 Transit SA	412 Yorke Peninsula	498 Other SA
498 Other SA	413 Kangaroo Island	501 South East
501 South East	490 Transit SA	502 Goldfields
502 Goldfields	498 Other SA	503 Midwest
503 Midwest	501 South East	504 Gascoyne
504 Gascoyne	502 Goldfields	505 Pilbara
505 Pilbara	503 Midwest	506 Kimberley
506 Kimberly	504 Gascoyne	507 Perth
507 Perth	505 Pilbara	508 Peel
508 Peel	506 Kimberly	509 South West
509 South West	507 Perth	510 Great Southern
510 Great Southern	508 Peel	511 Wheatbelt
511 Wheatbelt	509 South West	590 Transit WA
590 Transit WA	510 Great Southern	598 Other WA
598 Other WA	511 Wheatbelt	601 Greater Hobart
601 Greater Hobart	512 Midlands	602 Southern
602 Southern	590 Transit WA	603 East Coast
603 East Coast	598 Other WA	604 Northern
604 Northern	601 Greater Hobart	605 Greater Launceston
605 Greater Launceston	602 Southern	606 North West
606 North West	603 East Coast	607 West Coast
607 West Coast	604 Northern	690 Transit TAS
690 Transit TAS	605 Greater Launceston	698 Other TAS

Stopover Regions (IVS 1999)	***Stopover Regions (IVS 2000)***	***Stopover Regions (IVS 2001)***
698 Other TAS	606 North West	801 Darwin
801 Darwin	607 West Coast	802 Kakadu
802 Kakadu	690 Transit TAS	803 Arnhem
803 Arnhem	698 Other TAS	804 Katherine
804 Katherine	801 Darwin	805 Tablelands
805 Tablelands	802 Kakadu	806 Petermann
806 Petermann	803 Arnhem	807 Alice Springs
807 Alice Springs	804 Katherine	808 Macdonnell
808 Macdonnell	805 Tablelands	809 Daly
809 Daly	806 Petermann	890 Transit NT
890 Transit NT	807 Alice Springs	898 Other NT
898 Other NT	808 Macdonnell	117 Canberra
117 Canberra	809 Daly	900 External Regions
900 External Regions	890 Transit NT	999 Don't know where in Australia
998 Other Australia	898 Other NT	
999 Don't know where in Australia	117 Canberra	
	900 External Regions	
	998 Other Australia	
	999 Don't know where in Australia	

Appendix L: Final Standardized List of Stopover Regions

Label	Stopover Region	State
101	South Coast	NSW
102	Illawarra	NSW
104	Sydney	NSW
105	Snowy Mountains	NSW
106	Capital Country	NSW
107	Murray	NSW
108	Riverina	NSW
109	Explorer country	NSW
110	Hunter	NSW
112	North Coast	NSW
113	Northern Rivers	NSW
114	New England North West	NSW
115	Outback	NSW
117	Canberra	ACT
118	Central Coast	NSW
119	Blue Mountains	NSW
120	Lord Howe	NSW
198	Transit/Other NSW	NSW
201	Melbourne	VIC
202	Wimmera	VIC
203	Mallee	VIC
204	Western	VIC
205	Western Grampians	VIC
206	Bendigo Loddon	VIC
207	Peninsula	VIC
208	Central Murray	VIC
209	Goulburn	VIC
210	High Country	VIC
211	Lakes	VIC
212	Gippsland	VIC
213	Melbourne East	VIC
214	Geelong	VIC
215	Macedon	VIC
216	Spa Country	VIC
217	Ballarat	VIC
218	Central Highlands	VIC
219	Upper Yarra	VIC
220	Murray East	VIC
221	Philip Island	VIC
298	Transit/Other Vic	VIC
301	Gold Coast	QLD
302	Brisbane	QLD
303	Sunshine Coast	QLD
304	Hervey Bay Maryborough	QLD
306	Darling Downs	QLD
307	Bundaberg	QLD
308	Fitzroy	QLD
309	Mackay	QLD

310	Whitsundays	QLD
311	Northern	QLD
312	Tropical North Queensland	QLD
314	Outback Qld	QLD
398	Transit/Other Qld	QLD
401	Limestone Coast	SA
402	Murraylands	SA
403	Fleurieu Peninsula	SA
404	Adelaide	SA
405	Barossa	SA
406	Riverland	SA
407	Clare Valley	SA
408	Adelaide Hills	SA
409	Flinders Ranges	SA
410	Outback SA	SA
411	Eyre Peninsula	SA
412	Yorke Peninsula	SA
413	Kangaroo Island	SA
498	Other SA	SA
501	South East	WA
502	Goldfields	WA
503	Midwest	WA
504	Gascoyne	WA
505	Pilbara	WA
506	Kimberley	WA
507	Perth	WA
508	Peel	WA
509	South West	WA
510	Great Southern	WA
511	Wheatbelt	WA
598	Other WA	WA
601	Greater Hobart	TAS
602	Southern	TAS
603	East Coast	TAS
604	Northern	TAS
605	Greater Launceston	TAS
606	North West	TAS
607	West Coast	TAS
698	Transit/Other Tas	TAS
801	Darwin	NT
802	Kakadu	NT
803	Arnhem	NT
804	Katherine	NT
805	Tablelands	NT
806	Petermann	NT
807	Alice Springs	NT
808	Macdonnell	NT
809	Daly	NT
898	Other NT	NT
998	External Regions/Other DK	Other

Appendix M: Trip Index (All Trips, N = 32,320)

State	Stopover Region	Trip Index	S. D.	Skewness	Kurtosis
NSW	South Coast	.0020	.03159	24.141	662.069
NSW	Illawarra	.0038	.05513	16.306	274.413
NSW	Sydney	.3358	.40923	.753	-1.142
NSW	Snowy Mountains	.0005	.01315	50.034	3066.491
NSW	Capital Country	.0004	.01505	48.722	2674.897
NSW	Murray	.0011	.02605	31.253	1059.339
NSW	Riverina	.0009	.02281	35.248	1379.621
NSW	Explorer country	.0016	.03192	25.684	709.981
NSW	Hunter	.0054	.05941	13.960	207.906
NSW	North Coast	.0033	.03215	18.729	441.685
NSW	Northern Rivers	.0071	.05660	12.873	190.924
NSW	New England North West	.0025	.03717	21.263	497.158
NSW	Outback	.0004	.01156	43.233	2184.262
ACT	Canberra	.0109	.08405	9.890	103.785
NSW	Central Coast	.0017	.03340	24.846	662.867
NSW	Blue Mountains	.0017	.02492	28.349	981.169
NSW	Lord Howe	.0000	.00159	170.540	29838.485
NSW	Transit/Other NSW	.0001	.00903	102.275	10795.132
VIC	Melbourne	.1219	.28633	2.372	4.162
VIC	Wimmera	.0001	.00496	124.446	16998.864
VIC	Mallee	.0006	.01855	43.366	2068.298
VIC	Western	.0029	.03260	21.501	563.239
VIC	Western Grampians	.0003	.01035	61.445	4601.015
VIC	Bendigo Loddon	.0009	.02476	33.978	1225.864
VIC	Peninsula	.0023	.04257	20.517	439.328
VIC	Central Murray	.0005	.01630	44.787	2212.073
VIC	Goulburn	.0005	.01811	45.096	2217.628
VIC	High Country	.0006	.01714	40.745	1955.950
VIC	Lakes	.0006	.01147	51.230	3586.845
VIC	Gippsland	.0010	.02530	32.600	1138.969
VIC	Melbourne East	.0011	.02943	29.808	934.022
VIC	Geelong	.0022	.04149	21.760	490.843
VIC	Macedon	.0003	.01545	55.396	3260.174
VIC	Spa Country	.0002	.01100	72.198	5821.750
VIC	Ballarat	.0009	.02505	33.691	1201.139
VIC	Central Highlands	.0005	.00775	26.332	969.290
VIC	Upper Yarra	.0001	.00633	89.726	8818.429
VIC	Murray East	.0004	.01392	51.335	2930.682
VIC	Philip Island	.0007	.01923	43.272	2086.372
VIC	Transit/Other Vic	.0001	.00860	106.728	11918.819

QLD	Gold Coast	.1062	.26781	2.551	5.198
QLD	Brisbane	.0782	.23367	3.243	9.325
QLD	Sunshine Coast	.0157	.10403	8.081	67.954
QLD	Hervey Bay Maryborough	.0054	.03899	15.025	304.210
QLD	Darling Downs	.0022	.03796	21.100	479.992
QLD	Bundaberg	.0015	.02466	28.698	979.330
QLD	Fitzroy	.0044	.04937	16.525	297.332
QLD	Mackay	.0018	.03247	25.575	705.944
QLD	Whitsundays	.0078	.04997	9.809	120.681
QLD	Northern	.0063	.06058	13.510	197.252
QLD	Tropical North Queensland	.0769	.21468	3.240	10.059
QLD	Outback Qld	.0013	.02660	30.334	1021.501
QLD	Transit/Other Qld	.0001	.00637	127.832	19082.543
SA	Limestone Coast	.0008	.01679	38.895	1782.347
SA	Murraylands	.0003	.01182	58.018	3828.672
SA	Fleurieu Peninsula	.0009	.02279	36.670	1476.021
SA	Adelaide	.0368	.16609	5.015	24.494
SA	Barossa	.0007	.01879	41.707	1932.726
SA	Riverland	.0003	.01301	65.320	4690.211
SA	Clare Valley	.0002	.00963	74.099	6215.452
SA	Adelaide Hills	.0002	.01113	76.755	6261.895
SA	Flinders Ranges	.0007	.01269	41.599	2431.509
SA	Outback SA	.0007	.01419	47.130	2662.858
SA	Eyre Peninsula	.0007	.02157	38.638	1606.027
SA	Yorke Peninsula	.0001	.00653	82.447	7760.803
SA	Kangaroo Island	.0007	.01229	44.688	3007.825
SA	Other SA	.0000	.00164	108.667	13652.878
WA	South East	.0003	.00891	51.422	3331.738
WA	Goldfields	.0007	.01940	40.604	1824.991
WA	Midwest	.0012	.01990	32.487	1347.588
WA	Gascoyne	.0018	.02167	21.052	636.838
WA	Pilbara	.0014	.02931	27.534	816.681
WA	Kimberley	.0021	.02820	19.709	489.839
WA	Perth	.0797	.25030	3.126	8.209
WA	Peel	.0012	.02964	29.125	895.801
WA	South West	.0038	.04293	16.538	318.350
WA	Great Southern	.0014	.02273	28.167	971.115
WA	Wheatbelt	.0009	.01949	34.633	1396.446
WA	Other WA	.0001	.00726	117.661	14504.045
TAS	Greater Hobart	.0054	.05968	13.965	208.872
TAS	Southern	.0007	.01623	40.195	2035.300
TAS	East Coast	.0001	.00671	113.348	15719.087
TAS	Northern	.0001	.00730	112.061	13871.385

TAS	Greater Launceston	.0018	.03387	25.343	690.708
TAS	North West	.0013	.02843	30.261	984.139
TAS	West Coast	.0002	.00618	59.678	5238.862
TAS	Transit/Other Tas	.0000	.00194	160.310	27241.705
NT	Darwin	.0118	.08678	9.905	104.092
NT	Kakadu	.0017	.01589	19.064	625.509
NT	Arnhem	.0002	.01190	70.366	5211.360
NT	Katherine	.0011	.01171	22.888	861.352
NT	Tablelands	.0004	.00576	64.942	7385.322
NT	Petermann	.0069	.03656	8.464	110.072
NT	Alice Springs	.0044	.03216	16.424	389.370
NT	Macdonnell	.0002	.00709	87.292	10180.423
NT	Daly	.0002	.00704	107.368	13951.530
NT	Other NT	.0000	.00348	160.836	27498.275
Other	External Regions/Other DK	.0002	.01167	79.136	6351.778

Appendix N: Trip Index (All Multi-destination Trips, N = 15,002)

State	Region	Trip Index	S. D.	Skewness	Kurtosis
NSW	South Coast	.0034	.03579	16.869	340.390
NSW	Illawarra	.0047	.05500	14.346	219.294
NSW	Sydney	.2431	.25352	.903	-.028
NSW	Snowy Mountains	.0010	.01747	33.364	1399.459
NSW	Capital Country	.0008	.01882	33.612	1290.967
NSW	Murray	.0017	.02935	23.350	609.855
NSW	Riverina	.0013	.02282	25.406	762.536
NSW	Explorer country	.0030	.04153	18.538	374.649
NSW	Hunter	.0089	.06920	10.569	122.242
NSW	North Coast	.0066	.04250	12.075	185.968
NSW	Northern Rivers	.0129	.06666	8.783	92.867
NSW	New England North West	.0044	.04587	15.342	265.352
NSW	Outback	.0009	.01695	29.436	1012.028
ACT	Canberra	.0157	.08657	7.800	67.848
NSW	Central Coast	.0023	.03373	19.082	402.968
NSW	Blue Mountains	.0032	.02944	18.674	463.929
NSW	Lord Howe	.0000	.00233	116.189	13849.997
NSW	Transit/Other NSW	.0001	.00650	104.868	11871.865
VIC	Melbourne	.1165	.22149	2.181	4.132
VIC	Wimmera	.0001	.00727	84.782	7889.503
VIC	Mallee	.0009	.01847	31.199	1104.153
VIC	Western	.0054	.03758	13.855	254.670
VIC	Western Grampians	.0006	.01281	38.118	1751.282
VIC	Bendigo Loddon	.0014	.02807	26.175	743.431
VIC	Peninsula	.0029	.04213	17.244	318.880
VIC	Central Murray	.0010	.02248	30.865	1053.264
VIC	Goulburn	.0008	.01931	33.824	1300.452
VIC	High Country	.0011	.01914	25.066	729.708
VIC	Lakes	.0012	.01470	31.353	1433.551
VIC	Gippsland	.0017	.03020	24.352	648.542
VIC	Melbourne East	.0015	.02943	25.061	686.439
VIC	Geelong	.0027	.04057	19.372	403.962
VIC	Macedon	.0004	.01346	44.007	2065.379
VIC	Spa Country	.0003	.01128	51.303	3107.548
VIC	Ballarat	.0015	.02861	25.968	727.172
VIC	Central Highlands	.0011	.01135	17.917	449.003
VIC	Upper Yarra	.0002	.00929	61.122	4091.614
VIC	Murray East	.0007	.01872	35.245	1383.439
VIC	Philip Island	.0011	.01622	30.507	1198.697
VIC	Transit/Other Vic	.0001	.00510	97.511	10593.303

QLD	Gold Coast	.1037	.20737	1.997	2.992
QLD	Brisbane	.0750	.17810	2.965	8.770
QLD	Sunshine Coast	.0186	.09146	6.662	48.942
QLD	Hervey Bay Maryborough	.0109	.04919	9.171	120.321
QLD	Darling Downs	.0038	.04583	15.405	259.856
QLD	Bundaberg	.0030	.03224	19.607	472.427
QLD	Fitzroy	.0071	.05454	12.463	177.106
QLD	Mackay	.0029	.03656	19.516	426.360
QLD	Whitsundays	.0164	.06911	6.237	46.840
QLD	Northern	.0099	.06502	10.289	119.784
QLD	Tropical North Queensland	.0932	.17573	2.032	3.637
QLD	Outback Qld	.0023	.03146	22.355	580.893
QLD	Transit/Other Qld	.0001	.00456	48.687	2696.163
SA	Limestone Coast	.0018	.02322	26.255	816.057
SA	Murraylands	.0006	.01530	38.950	1717.227
SA	Fleurieu Peninsula	.0012	.02127	28.027	948.510
SA	Adelaide	.0393	.14426	4.552	21.261
SA	Barossa	.0011	.02066	29.782	1021.504
SA	Riverland	.0004	.00989	44.612	2394.701
SA	Clare Valley	.0004	.01154	49.421	2737.952
SA	Adelaide Hills	.0002	.01155	61.324	4131.395
SA	Flinders Ranges	.0015	.01671	24.864	884.576
SA	Outback SA	.0015	.02079	32.130	1236.566
SA	Eyre Peninsula	.0011	.02455	29.473	964.566
SA	Yorke Peninsula	.0003	.00958	56.165	3601.008
SA	Kangaroo Island	.0013	.01383	17.116	403.864
SA	Other SA	.0000	.00241	74.029	6336.180
WA	South East	.0007	.01307	35.027	1545.618
WA	Goldfields	.0012	.02184	29.295	984.111
WA	Midwest	.0023	.02417	20.097	552.167
WA	Gascoyne	.0037	.02952	12.587	219.498
WA	Pilbara	.0027	.03892	19.613	418.177
WA	Kimberley	.0044	.03877	12.748	203.296
WA	Perth	.0569	.17484	3.500	11.940
WA	Peel	.0017	.03099	23.636	609.897
WA	South West	.0069	.05183	11.067	147.182
WA	Great Southern	.0028	.03015	18.583	430.386
WA	Wheatbelt	.0019	.02738	23.554	649.118
WA	Other WA	.0002	.01066	80.158	6731.053
TAS	Greater Hobart	.0079	.06329	10.871	132.385
TAS	Southern	.0014	.01915	24.200	776.669
TAS	East Coast	.0002	.00551	42.923	2269.039
TAS	Northern	.0002	.00694	81.668	7876.756

TAS	Greater Launceston	.0024	.03276	20.698	496.891
TAS	North West	.0019	.02843	24.677	700.421
TAS	West Coast	.0005	.00907	40.668	2433.341
TAS	Transit/Other Tas	.0000	.00284	109.218	12644.595
NT	Darwin	.0136	.06786	8.312	85.321
NT	Kakadu	.0036	.02316	12.994	292.118
NT	Arnhem	.0004	.01545	51.283	2787.834
NT	Katherine	.0023	.01711	15.610	401.768
NT	Tablelands	.0008	.00844	44.419	3451.532
NT	Petermann	.0146	.05131	5.172	37.780
NT	Alice Springs	.0091	.04228	10.020	152.554
NT	Macdonnell	.0005	.01041	59.500	4729.242
NT	Daly	.0003	.00634	55.584	4530.676
NT	Other NT	.0001	.00510	109.579	12764.029
Other	External Regions/Other DK	.0003	.01506	59.836	3639.784

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