Retail Agglomeration Formats and Outshopping in Thai Grocery Market

Sutthipong Meeyai

Submitted in fulfilment of the requirements for the Degree of PhD

Adam Smith Business School
College of Social Sciences

University of Glasgow

September 2018

Abstract

Thailand has been one of the emerging markets in Asia in recent decades. The pattern of consumers has dramatically changed due to the arrival of various modern retail trade formats. Thai consumers have been shifting from traditional retail formats to modern retail formats and frequently do 'outshopping', particularly from rural areas to town centres. This has led to the decline of rural retailers. To improve this situation, the concept of developing retailers in market towns has been adopted. However, it is unclear **what form** (i.e. store format) this takes and on **which factors** (store image attributes and customer characteristics) the role depends.

This thesis examines the effect of store image attributes and customer characteristics on retail agglomeration format choice for a regular grocery outshopping trip. The conceptual framework is constructed following the stimulus-organism-response (S-O-R) model. The concept of store image is applied as the stimulus, and the customer characteristics are proxy variables representing the organism, which lead to the choice decision as the response. The discrete choice model is applied using the mixed logit modelling approach. The choice set includes (1) a traditional agglomeration retail format (TAF), (2) a modern agglomeration retail format (MAF) and (3) a non-agglomeration retail format (NAF).

The unit of analysis is a household in a regional city that does grocery shopping regularly. The stratified random sampling divided the population into an urban area and a rural area. Then, a random sample was drawn within each stratum by a simple random sampling – a store format. A systematic random sampling was applied by intercepting each household representative in order to maintain randomness. The chosen area is Nakhon Ratchasima province which is one of the regional cities in north-eastern Thailand. It consists of 2,600,000 people (around 830,000 households) and about 75% of the total population live in a rural area. The total sample consists of 1,521 households. The choice experiment is adopted by a computer-assisted personal interviewing (CAPI) survey. The parameters are estimated using the simulated maximum likelihood approach. The models are built, and then marginal effects are used to examine the effects of store image attributes and customer characteristics to the retail agglomeration format choice. Reliability and validity are tested.

The results from the chosen model reveal that increases in seven store image attributes: product quality, customer service, price, travel time, atmosphere, accessibility, and range of products, affect the probability to shop at TAF and MAF with the same degree, while in store attributes have less effect on the probability to shop at NAF. The product quality, customer service level, and price are the most important attributes affecting the

retail agglomeration format choice, following by atmosphere, accessibility, and range of products, respectively. The results indicate that consumers in rural areas are likely to shop at TAF and NAF than consumers in urban areas. Older rather than younger customers tend to shop at NAF. Finally, the higher income households have more opportunity to shop at MAF than the lower income households.

This study employs the theory of cumulative attraction as theoretical lens of the study. However, this study contributes to the theory by examining further dimensions. The first contribution is to the **theory of cumulative attraction** by considering a location dimension. It investigates the role of retail agglomeration formats in market towns. The second dimension contributes to **retail management** by focusing on retail management style as traditional and modern retail formats. Another contribution of this study is the **taxonomy of retail agglomeration formats**. It indicates how retailers are planned and constructed, to what extent they are managed and marketed, and what their management styles are. This classification system can categorise existing retail formats, e.g. weekend markets, periodic markets, night markets, tourist attraction retail sites, and exhibition retail outlets which cannot be classified by the previous studies. The application of this taxonomy is applied as retail agglomeration formats in this study.

Keywords:

Retail agglomeration, outshopping, store format choice, grocery market, Thailand

Acknowledgements

I would like to express my profound gratitude to my supervisors, Dr. Kalliopi Chatzipanagiotou and Dr. James Wilson who motivated me with their enthusiasm, guided me with valuable suggestions, and supported me throughout the research project.

I would also like to thank Prof. Luiz Montinho for his continuous support, and my colleagues at the University of Glasgow.

I am thoroughly indebted to Suranaree University of Technology and the Royal Thai Government, who sponsored me financially and allowed me valuable time.

Also special thanks are to my Thai friends in the Cranfield University community; they have been supportive throughout my time in the United Kingdom.

I will always be grateful to my parents and family for all their support.

A final word is for my wife, Janya Meeyai, for her love and encouragement; I would not have been able to complete this thesis without her.

Table of contents

List of figures

List of tables

List of equations

Author's declaration

"I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution."

Printed Name: Sutthipong Meeyai

Signature: 

Chapter 1 Introduction

In this introductory chapter, an overview of this thesis is presented. First, the background of this study and research gaps are described. Next, the research questions and justification for the study are presented. Then, the theoretical contributions are introduced. The final section outlines the structure of the thesis.

1.1 Background and research gaps

Thailand has been one of the emerging markets in Asia in recent decades. This has led to rapid growth in household consumption. USDA (2016) states that retailing is an important sector in Thailand, with a value of $84.31 billion, accounting for approximately 25% of GDP in 2015. After the Asian financial crisis in 1997, the pattern of consumers has dramatically changed due to the arrival of various modern trade companies, e.g. Tesco (UK-based retailer), Macro (The Netherlands-based retailer), and 7-Eleven. Modern retailing accounts for approximately 70% of total retail sales as the result of the diversion of shopping trips from traditional stores to hypermarkets and supermarkets (USDA, 2016). This shift has been observed by all the major international retail companies, who are focusing their targets on '*emerging*' and '*developing*' countries in Asia, Latin America, Eastern Europe, Africa, and the Middle East (Hino, 2010, Belwal and Belwal, 2017, Gido et al., 2016, Maruyama et al., 2016).

In Thailand, most of the major developments have taken place in Bangkok, the capital city of Thailand, which accounts for approximately 50% of GDP. This development leads to disparity in wealth between the capital and other regions. After several years of fierce competition, retailing sectors in Bangkok reached saturation (Feeny et al., 1996). Subsequently, modern retailing has been spreading to the other provinces where more than 80% of the population live. In major cities there are new retail development being constructed ranging from small store formats to medium and large retail formats. The modern retail formats encompass hypermarkets, supermarkets, cash and carry, and convenience stores (USDA, 2016). The hypermarkets, such as Tesco Lotus, and Big C Supercenter, have been opening their branches in every province. Tesco Lotus seems to be the most aggressive in terms of market expansion, with both full sized hypermarkets and discount convenience stores (Shannon, 2009). The convenience stores such as 7-Eleven, and Tesco Express have been growing in almost every district so far. Consequently, this impacts on consumer shopping behaviour, not only that of people in urban areas but also in rural areas. In terms of convenience stores, Feeny et al. (1996) reported that the impact of 7-Eleven on Thai retailing and Thai life had been enormous.

Shannon (2009) also noted that the new formats no longer marketed themselves to high-income consumers but instead aimed to apply low prices and a range of products to attract middle- and low-income consumers.

Agriculture and Agri-Food Canada (Canada, 2012) reported that traditional grocery retailers, e.g. fresh markets, food stalls, share 62% of grocery sales; however, consumers have continuously been shifting their shopping destination to modern and larger formats, e.g. hypermarkets, instead of small, independently owned grocers. The shifting of customers from traditional to modern retailers has led to the decline of traditional grocery stores in several countries (Artz and Stone, 2006, Basker, 2005). In Thailand, traditional grocery retailers mainly consisted of fresh/wet markets and mom-and-pop stores that catered to the 'price sensitive' and 'traditional diet' consumers (Banwell et al., 2012). According to Ho (2005), the traditional grocery stores were the first victims after the popularity of the supermarkets in Hong Kong. In Thailand, Gorton et al. (2011) found that the market share of fresh markets has eroded sharply due to the entry of modern larger retail formats. By the early 1990s, in Bangkok there were fewer than 50 supermarkets and over 200,000 traditional local outlets (Smith and Mandhachitara, 2000). Between 2000 and 2001, approximately half the small local supermarkets in Thailand closed as they lost customers to modern retailers (May, 2006).

The spread of modern retail formats into low- and middle-income developing countries has been observed by Reardon and Berdegué (2008), who called it the supermarket diffusion theory. The diffusion process can be described as having three dimensions: socio-economic diffusion, geographic diffusion, and product category diffusion. First, modern retailers begin by focusing on high- and middle-income consumers, later they diversify their product by providing low cost mass-produced packaged and processed products. Second, they set up in high-income urban districts, and then diffuse into regional centres and rural areas. Finally, the most challenging part: the modern retailers initially offer packaged foods, and then fresh produce which is a difficult area for modern retailers to compete in with traditional markets (Maruyama and Wu, 2014, Goldman and Hino, 2005, Huang et al., 2015).

Fresh markets are one of the most prevalent retail formats for many Asian households when they buy daily food supplies and essential household products (Huang et al., 2015). Many Asian consumers still visit these to buy their fresh food products as they perceive that products sold at these markets are fresh, and cheaper (USDA, 2004, Chamhuri and Batt, 2013, Goldman et al., 1999). USDA (2004) reports that Thai consumers frequently visit fresh markets with an average of 18 visits per month, convenience stores at least six times a month, and four times a month for supermarket and hypermarket commitments.

Kelly et al. (2015) observed that in Thailand modern retail controls half the food sales, but traditional fresh markets remained essential. They revealed that approximately half of shoppers went to traditional retailers and the rest either supported modern or traditional formats. Even though the market share has fallen, traditional markets remain the largest portion of food retailing. This occurs in many Asian countries, e.g. Taiwan (Huang et al., 2015), Malaysia (Chamhuri and Batt, 2013), Indonesia (Agriculture and Agri-Food Canada, Canada, 2012), Hong Kong (Bougoure and Lee, 2009), China (Mai and Zhao, 2004) and India (Sinha et al., 2002).

In terms of non-store formats, Agriculture and Agri-Food Canada (Canada, 2012) notes that Internet-based retailing in Thailand has taken off, but most are non-food items. However, in recent years, Tesco has operated Internet retail but its service area is within only urban areas in a few major cities in Thailand. The total trade value of non-store formats, including vending, home shopping, Internet shopping, and direct selling, is approximately $4 billion or 4% of total retail sales in 2015 (USDA, 2016). However, Thai people tend to go to the shop, and choose to make a purchase decision only after having seen the products themselves (Kurabayashi et al., 2013).

People in rural areas commonly do outshopping because of poorer services in local communities (Jarratt, 2000). This decline in rural services has been noticed elsewhere (Moseley, 2000). Home (2002) studied rural grocery outshopping in Finland and found that approximately two thirds of their sample exhibit outshopping for groceries. The drawback of rural retailers is geographical isolation, unfavourable cost structures and restricted population catchments (Paddison and Calderwood, 2007); as a result, trading conditions may be inefficient and pressured.

In addition, no study on retail format choice has focused on outshopping behaviour, particularly from rural areas to urban districts. Past studies on store format choice have shown that most researchers have focused on retailers in cities or metropolitan areas (e.g. González-Benito, 2005, Solgaard and Hansen, 2003, Reutterer and Teller, 2009). They often ignore the retailers in rural areas even though a large number of rural people regularly do outshopping (Jarratt, 2000, Home, 2002, Kumar Velayudhan, 2014). Outshopping seems to be prevalent in developing countries, e.g. India (Varshney and Goyal, 2005) and Thailand (Gorton et al., 2011, Ihara, 2013). Far fewer studies on outshopping have been done in rural areas compared to the studies on urban districts (Varshney and Goyal, 2005).

Goodman and Remaud (2015) found that consumer choice for retail stores types identified a segment that may assist in the sustainability of smaller stores if they catered to the

attributes their target consumers seek. Powe and Shaw (2004) suggested a mutual dependence between market town services and hinterland residents and that the continuation of this relationship depended on market towns taking advantage of demographic trends in rural areas. The importance of the role played by market towns has increasingly been recognised in rural England in recent years (Phillips and Swaffin-Smith, 2004). Powe and Shaw (2004) noted that market towns may provide an acceptable compromise for a range of services, where the town catchment may be sufficiently large to allow economies of scale and a degree of specialisation. Their study showed that respondents would be shopping more at the market town if a supermarket was opened within the town. By providing improved supermarket services within market towns, and owing to the frequency of purchase, physical distance is likely to be more of a deterrent for food shopping, suggesting a greater potential to 'claw back' trade from large urban areas, which may increase the patronage of other market town services (Powe and Shaw, 2004). For example, their hinterland survey suggested there was potential for patronage of evening entertainments within market towns.

Although it has been suggested that market towns play an important role in servicing their hinterlands, it is unclear **what form** (e.g. store format) this takes and on **which factors** (store image attributes and customer characteristics) the role depends.

1.2 Research questions and the justification for the study

This study focuses on the development of retailers in rural areas. It attempts to answer the question of **what form of retailers** should be developed in rural areas. An opportunity exists in the rural retailing to develop a retail format that may be able to effectively compete with the large modern retail stores in the city centre. This study employs the idea of developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004); however, it also advances the previous work by explicitly studying the role of store agglomeration.

To examine the role of the store agglomeration, this study attempts to identify store image attributes and customer characteristics that impact on retail agglomeration format choice. It tries to answer the question **which store image attributes and customer characteristics** affect retail agglomeration format choice for a regular grocery outshopping trip. Despite extensive literature on outshopping, little is known regarding how store image attributes and customer characteristics influence retail agglomeration format choice for outshopping.

Thus, the research questions are set up as follows:

RQ1: What form of retailers can reduce regular grocery outshopping trips from rural to urban areas?

RQ2: Which store image attributes and customer characteristics affect retail agglomeration format choice for a regular grocery outshopping trip?

The centres of market towns are less suitable for large-scale retail formats (Phillips and Swaffin-Smith, 2004). Although many people in rural areas have their own cars and it is easier for them to outshop further, i.e. to larger cities, not everyone can travel further away for their daily needs. Households with children, disabled persons or the elderly can find it difficult to travel. One approach is to create a traditional retail format in a market town, which can serve its hinterland including remote areas. Market towns can play a major role and act as the focal point for the provision of services for rural areas (Powe and Shaw, 2004). The concept of market town development is not new, and has recently been employed in some rural districts in the UK (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). However, this approach focused on individual local shops. It has never been applied to a traditional agglomeration retail format (TAF), particularly in Asian countries. There are several forms of the TAF such as a weekend market (Bangkok-Attractions, 2017), a periodic market (Kumar Velayudhan, 2014), a night market (Adventure-In-Thailand, 2017), a local shopping strip (Asia-for-Visitors, 2017) that could be applied in the market town, and in turn be possible to reduce the outshopping from rural areas to urban districts.

A large number of people from rural areas regularly outshop to town centres (Jarratt, 2000, Home, 2002, Kumar Velayudhan, 2014, Marjanen, 2000) resulting in the decline and closure of several local and village retail outlets (Findlay and Sparks, 2008). One possible strategy is to create a large attraction of retail outlets in rural areas. However, the modern large retail format is not suitable to be located in a remote area. The modern large retail format, such as a supercentre, needs a large number of customers to achieve economies of scale, but there would typically not be enough customers within a remote catchment area (Paddison and Calderwood, 2007). Thus, instead of creating a modern, large retail format in a rural area, a TAF may be more appropriate.

Evidence from a systematic literature review (Meeyai, 2015) showed that most store formats were often categorised by characteristics of individual store types. It indicated that assortment, size and pricing were the most frequent criteria to categorise retail formats, while promotion policy and service were less adopted. Most research applied was bi- or multi-polar to categorise the retail formats, such as a traditional retail store/fresh market and a supermarket (Bougoure and Lee, 2009, Gorton et al., 2011,

Goldman and Hino, 2005), a speciality store, a supermarket, a supercentre, and a warehouse club (Carpenter and Moore, 2006), a discount store, a hypermarket, and a conventional supermarket (Solgaard and Hansen, 2003). There are a small number of studies using a single criterion, i.e. size (Reutterer and Teller, 2009), and physical development characteristics (Reimers and Clulow, 2004). There are only a few studies focused on the collective of retailers. The dimensions previously used to classify the retail agglomeration formats are (1) a location site and retail development (Gilbert, 2003) as a solitary site, an unplanned shopping area, and a planned shopping district/centre, (2) physical characteristics (Reimers and Clulow, 2004) as a shopping strip and a shopping centre, and (3) planning, marketing and management (Teller, 2008) as both an evolved and a created retail agglomeration format.

The author argues that the prior dimensions cannot categorise a number of retail formats, e.g. a periodic market, a weekend market, and a night market, particularly in Asian countries. The past studies did not focus on the management style of retail agglomeration formats. For instance, fresh markets in several suburban and rural districts are planned and managed centrally. The management style of a typical fresh market is traditionally family-oriented, characteristically providing old-fashioned service, showing outdated displays, and not operating within standardised procedures (Goldman et al., 1999). Retail parks are also planned and managed centrally; however, their management style is more modern with standardised management systems, points of sale, and new technology (USDA, 2016). To examine the idea of retailing development in market towns using a traditional retail agglomeration format, a new classification system of retail agglomeration formats is needed. It needs more understanding of the existence of traditional store formats and whether the development of traditional retail formats (agglomeration or non-agglomeration) in a market town can reduce the outshopping from rural to urban areas.

Since, in recent years, new retail formats have been growing rapidly (USDA, 2016), there remains a need for retailers to understand the changing behaviour of customers who shop across retail formats. Consumers typically have a primary affiliation to a '*main store*' which captures the majority of their purchases (Rhee and Bell, 2002). Being the first-choice store, i.e. the main store, is very important because consumers tend to spend twice as much in the main store as in other stores (Knox and Denison, 2000). Evidence from a number of studies (e.g. Carpenter and Moore, 2006, Solgaard and Hansen, 2003, Fox et al., 2004, González-Benito, 2001, Reutterer and Teller, 2009) shows that to some extent store image attributes affect store choice and store format choice. A change in each store image attribute results in different store format choice. By understanding profoundly the relationship between store image attributes and their store format choice,

managers can properly make decisions on the improvement of store image attributes, and in turn increase store patronage.

Several studies have shown the relationship between consumer characteristics and retail patronage. Bustos-Reyes and González-Benito (2008) provided evidence that purchases across retail formats were linked to consumer demographics and behavioural characteristics. Davies et al. (2001) showed a relationship between consumer demographics and frequency of shopping trips and amounts of money spent. Jayasankara Prasad and Ramachandra Aryasri (2011) showed that demographic characteristics have a significant influence on grocery retail format choice. Several studies (e.g. Sampson and Tiger, 1994, Crask and Reynolds, 1978, Fox et al., 2004) have shown that consumer demographics, e.g. household income, household size, educational level, and car availability, considerably relate to store format choice. If managers know to some extent how customer characteristics affect the store format choice, they can make appropriate decisions on their planning or operations, such as sales or promotions. However, little is known regarding the effect of customers' characteristics on the retail agglomeration format choice for outshopping.

This research differs from previous studies in that, first, it provides a dimension and a new classification system of retail agglomeration formats. This new classification provides insight into several retail agglomeration formats, e.g. a periodic market, a weekend market, and a night market, particularly in Asian countries. The past studies did not focus on the management style of retail agglomeration formats; examples are fresh markets and retail parks. Second, it also investigates store image attributes and reveals important customer characteristics that affect the choice across retail agglomeration formats for a regular grocery outshopping trip from rural areas to urban districts, which the previous studies have ignored.

It is anticipated that the results from this study will provide meaningful insights into consumer choice behaviour that may help retailers' decisions and guide public policy. This study is important for retailers with either traditional or modern formats and for government authorities, who relate to the development of retailing in rural areas. The modern retailers want to operate efficiently by fitting the needs of local consumers, while the traditional retailers would like to survive the fierce competition of new, upcoming retail formats. Government authority can reduce the decline of retailers in remote areas by making or changing policies, e.g. strengthening the development of retailing in market towns.

To sum up, the study on **what a store format** and **which factors** influence a customer outshopping shopping trip from rural to urban areas is missing. It is necessary to gain more understanding about why the traditional retail formats have been existence, whether the development of traditional retail formats (agglomeration or non-agglomeration) in a market town can reduce outshopping and which factors (store image attributes and customer characteristics) affect these retail formats.

1.3 Theoretical contributions

In terms of theoretical contributions, this study employs the theory of cumulative attraction (Nelson, 1958) as theoretical lens of the study. The theory states that, *'A given number of stores dealing in the same merchandise will do more business if they are located adjacent or in proximity to each other than if they are widely scattered'.* The central concept of cumulative attraction is the principle of compatibility, which is the measure of the effect that one business has upon an adjacent or proximate business. Two adjacent businesses or attractions that affect each other in a positive manner (e.g. number of customers, volume of sales) are said to be compatible.

The theory of cumulative attraction seeks to explain the collection of retailers both the homogeneity and heterogeneity of retailers. However, this study contributes to the theory by examining further dimensions. The first contribution is to the **theory of cumulative attraction** by considering a location dimension. Due to the decline of rural retailing, it needs the development of a retail format that may be able to compete with large modern retail stores in city centres. This study employs the idea of developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004), which captures consumers in remote catchment areas. It investigates the role of retail agglomeration formats in market towns.

The second dimension contributes to **retail management** by focusing on retail management style. It investigates the retail management style in the context of Thai and some Asian countries as traditional and modern management styles, which often ignore in many studies in western countries. Another contribution is the proposed **taxonomy of retail agglomeration formats**. This study proposes the taxonomy of retail agglomeration formats and then classifies the retail formats as traditional agglomeration retail format (TAF), modern agglomeration retail format (MAF) and non-agglomeration retail format (NAF). These retail agglomeration formats are used to examine the role of retail management style. The taxonomy can classify several retail formats, which cannot be categorised by the previous studies, e.g. a periodic or weekend market, a fresh market, a night market, tourist an attraction retail site, and an exhibition retail outlet.

1.4 Structure of the thesis

This study is structured into five chapters: this introductory chapter, literature review, methodology, analysis of data and results, and conclusions. The current chapter describes the background of this study, research gaps, research questions and justification for the study, theoretical contributions and the structure of the study.

In this chapter the background of the study provides the reasons why the Thai grocery market has been selected and gives the research gaps in this study area. The next section provides the research questions and justification for the study. The research questions are (1) What form of retailers can reduce regular grocery outshopping trips from rural to urban areas? and (2) Which store image attributes and customer characteristics affect retail agglomeration format choice for a regular grocery outshopping trip? Then, the theoretical contributions are introduced. Finally, the structure and content of the study are presented.

Chapter 2 provides a review of the literature on the retail agglomeration background, which discusses the theories to explain the retail agglomeration pattern, retail agglomeration format choice, followed by the need for new classification of retail agglomeration formats. Outshopping behaviour is also reviewed, followed by a literature review on conceptual frameworks. The stimulus-organism-response (S-O-R) model is described. Then, the store image concept is offered as the stimulus in the model along with its store image attributes including: range of products, price, travel time, product quality, atmosphere, customer service, accessibility, and retailer reputation. The customer characteristics are represented as the organism in this model including: gender, age, the number of members of a household, including the number of children and elders in a household, income levels, educational levels, the residential area, and car availability. The research hypotheses are proposed. The retail agglomeration format choice resulted in *'approach'* or *'avoidance'* as a response of the model. The situational factors influencing the retail agglomeration format choice are discussed. Finally, the proposed concept framework is presented.

Chapter 3 presents the research's philosophical stance and details the methodology of this study. A store format choice model is described in detail, including store patronage modelling, choice modelling and its justification. The discrete choice model is described, along with the random utility theory, followed by the multinomial logit (MNL) model and its limitation. The mixed (random parameters) logit model is provided. Then, the store image attributes, consumer characteristics, and their measurement are discussed. A shopping situation which is operationalised by a regular grocery outshopping trip is

described. A choice set is presented including: (1) traditional agglomeration retail format (TAF), e.g. a fresh/periodic market; (2) modern agglomeration retail format (MAF), e.g. a shopping mall/hypermarket; (3) non-agglomeration retail format (NAF), e.g. a new community store. The sources of error in the data and the method of setting up choice experiments are explained. The sampling method is defined. How to develop the models is clarified in the details, including model estimation, a property of independence of irrelevant alternatives (IIA), elasticity and marginal effects. The reliability and validity are discussed, and finally how to validate the model is explained. The methods of validation consist of the goodness-of-fit of the models and hypotheses testing for the significance of parameters in the models.

Chapter 4 describes sample characteristics including members of a household, gender, age, car availability, residential area, educational level, and income levels. The important store image attributes and their satisfaction are discussed. The term *'Attribute Promoter Score'* (APS) is introduced to analyse customer satisfaction with each store image attributes for existing store formats. The internal consistency reliability and internal validity (hold-out) are examined. Then, four sequential retail agglomeration format choice models are developed. In the first model, explanatory variables consist of eight store image attributes: product range, product price, travel time, product quality, atmosphere, customer service, store accessibility, and retailer reputation. The second model shows only the significant variables (at 5% and 10% significance levels if the sign of a parameter is correct). The third model is the second model plus nine customer characteristics: gender, age, family size, the presence of children in the household, the presence of elders in the household, household income, educational levels, car availability, and residential area. The fourth model consists of significant store image attributes and significant customer characteristics. Hypotheses testing is performed and the results are discussed. Finally, store formats, store image attributes, customer characteristics, and the roles of taxonomy and retail agglomeration formats are described.

Finally, Chapter 5 is the conclusion. First, the summary of the study and findings are presented. The theoretical contributions are highlighted. It consists of the contributions to the theory of cumulative attraction, the retail management, and the taxonomy of retail agglomeration formats followed by the implications of the research. Finally, the limitations and recommendations for further research are provided.

Chapter 2 Literature review

2.1 Retail agglomeration

The term *'agglomeration'* is defined by the Oxford Advanced Learner's Dictionary (Hornby and Turnbull, 2011) as '*a group of things put together in no particular order or arrangement*'. In the retailing context, retailers often locate next to other retailers in one place or in a nearby geographical area (Berman and Evans, 2013, Guy, 2006, Ingene, 1984). When similar or different types of retailers gather in one place or nearby, they can be called '*retail agglomerations*'. Teller (2008) defines retail agglomerations as multiple retailers clustering in both a planned (e.g. shopping centres) and unplanned (e.g. strip developments) manner. There are several theories seeking to explain the spatial distribution of retailers and retail agglomeration.

The central place theory explaining retail locational pattern, size and function of shopping centres and districts, is one of the classics in the field. The theory was originally introduced in 1933 by Walter Christaller, a German geographer, who studied the settlement patterns in southern Germany (Christaller, 1966). The central place theory seeks to explain the existence of city and town shopping districts, based upon size, retail function and relative positions to one another. It proposes a hierarchy of retail centres, i.e., a large centre providing a variety of different retail functions is surrounded by sub-centres which consist of fewer varieties and specialist retailers. Then, each sub-centre is enclosed by smaller centres with basic goods retailers. The theory is useful to generalise about the existence of a hierarchical distribution of retailers. Nevertheless, the basis of the central place theory requires a similar pattern of retail outlets equidistant from the other retailers. The existence of several modern retailers indicates that the theory's basic assumption can also be challenged by changes in consumer behaviour (Gilbert, 2003), as outlined in Table 2-1. Several regular trips to purchase small amounts change to less frequent trips due to the longer period of storage and the use of large refrigerators and freezers. Non-price factors are increasingly important in purchasing decisions. Because of improved road systems, increased numbers of cars and drivers per family, the trip length increases and several single-purpose trips change to multi-purpose trips. Apart from the necessary trip purposes, other trip purposes such as a leisure shopping trips arise. The basic assumption treats each consumer to a similar experience, but the modern innovation retailers with their themed and purpose-built facilities create a variety of retail experiences. In addition, the central place theory does not account for the agglomeration of retailers where centres exist based upon a large number of similar retailers.

Table 2-1: Consumer changes and the assumptions behind central place theory

Central place assumptions of consumer	Modern retail consumer change
Trips are regular to purchase small amounts, especially those with product perishability.	The use of large refrigerators and freezers allows less frequent purchases from superstores or retail centres.
Purchase response is based upon price and product range.	Non-price factors are increasingly a more important determinant of the purchase decision.
Trips are home location based and often single-purpose trips to the nearest shopping district where goods are available.	Improved road systems, increased numbers of cars and drivers per family allows multi-purpose trips and greater distances to be covered.
The shopping visit decision is based upon the necessity of the trip.	There has been an increase in leisure shopping.
The consumer treats each shopping area as a similar experience, i.e. all retailers are assumed to adopt a uniform retail strategy.	Retail innovation has taken place, with themed and purpose-built facilities creating retail experiences which appeal to different types of consumers.

Source: Gilbert (2003)

While the central place theory describes the hierarchy of retail outlets, **the bid rent theory** assumes the spatial composition of retailers is based upon the economics of land value theory (Brown, 1992). The bid rent theory attempts to explain the internal spatial organisation of planned and unplanned shopping areas. The theory assumes that retailers prefer to locate in the central business district (CBD) in order to gain more profitability, but this leads to increased rents of these sites. Due to the increased costs, only certain kinds of retailers can afford these premium locations. As a result, other kinds of retailers will spread further out from the CBD. The bid rent theory is able to explore the distribution of retail outlets in the city centre and surrounding area. Although the theory is able to describe the spatial distribution of different types of retailers spreading from a city centre, it does not explain why some retailers seek to locate near their competitors, retailers offer the similar product, and the existence of a sub-centre retail outlet and an out-of-town retail agglomeration, such as a retail park, and a periodic market.

Retail agglomeration can be explained by the **principle of minimum differentiation** or **Hotelling's linear city model**, developed from the work of Hotelling (1929). The principle of minimum differentiation suggests that a retailer would be able to maximise profits by locating closer to a competitor in order to gain a larger market area by attracting a higher

flow of customers. The classic example is ice-cream vendors locating next to one another on the beach. Hotelling modelled the way that firms share the market. He used a simple model in which consumers are evenly dispersed along a line and buy from the nearest firm. The two firms choose to locate at the mid-point of the line. Moving away from the mid-point results in losing market share and profit. However, Hotelling's model captures the intra-centre agglomeration of similar retail outlets, but not the dissimilarity of the retailers in the nearby geographical area. Later, Chamberlin (1938) indicated that no equilibrium occurs when a third firm is added to the market. D'Aspremont et al. (1979) showed that no equilibrium price solution exists when both sellers are not far enough away from each other. They also demonstrated that when firms choose both price and location, firms move apart to decrease price competition. In addition, their model indicated there existed a price equilibrium solution everywhere, as there was a tendency for both sellers to maximise their differentiation. Hotelling's model has been enhanced by the inclusion of price competition. While price competition intensifies when firms co-locate, the intensity can be diminished by differentiation of product characteristics (Picone et al., 2009).

The **theory of cumulative attraction** (Nelson, 1958) states that, *'A given number of stores dealing in the same merchandise will do more business if they are located adjacent or in proximity to each other than if they are widely scattered'.* This theory originated in the retailing context, but it is analogous to other fields, e.g. tourist attraction study (Hunt and Crompton, 2008). The central concept of cumulative attraction is the principle of compatibility, which is the measure of the effect that one business has upon an adjacent or proximate business. Two adjacent businesses or attractions that affect each other in a positive manner (e.g. number of customers, volume of sales) are said to be compatible (Crompton and Gitelson, 1979, Nelson, 1958). Levels of compatibility have been suggested along a continuum consisting of highly compatible (11-20% of customers interchanged), moderately compatible (6-10% of customers interchanged), slightly compatible (1-5% of customers interchanged), incompatible (less than 1% of customers interchanged), and deleterious (a loss of customers) (Nelson, 1958). This high compatibility may occur because the businesses are complementary or competitive, as a result these retail outlets carry merchandise of different styles, lines, and prices, thereby raising total patronage through cumulative attraction. However, Nelson differentiated between two types of cumulative attraction: similar and complementary. Similar attractions draw customers because they provide alternatives and price competition, while the complementary attractions are dissimilar in type, but are compatible by their sharing of a relatively high percentage of customers. The theory of cumulative attraction seeks to explain both the homogeneity and heterogeneity of retailers.

From a retailer's point of view, demand and supply influence retailers to cluster into a retail agglomeration. On the supply side, firms co-locate to decrease labour and other costs, learn from other firms how to improve productivity (Myles Shaver and Flyer, 2000, Glaeser et al., 1992), learn about customers from other firms which reduces the cost of searching for the optimal location (Ridley, 2008, Caplin and Leahy, 1998) and pool labour and other inputs (Rosenthal and Strange, 2001). On the demand side, firms gather together in close proximity because of '*lumpy*' demand (Picone et al., 2009). This generates greater profit than would be the case if they were geographically dispersed (Ingene, 1984). Firms co-locate to attract customers searching for optimal product characteristics (Konishi, 2005), to provide a credible commitment to low prices (Dudey, 1990), to locate near customers attracted by the marketing or reputation of competitors (Chung and Kalnins, 2001). Another advantage of agglomerated low-order firms stems from the location of high-order firms and their ability to generate multi-purpose trips (Ghosh, 1986). In addition, there is social benefit of retail agglomeration, which leads to social interaction and the congregation of people (Ingene, 1984).

From the customer's perspective, retail agglomeration benefits customers by reducing their total shopping costs (Ghosh, 1986) and minimising shopping endeavours in a multi-purpose shopping trip (Teller et al., 2008). To reduce the time and cost of shopping, customers may bypass closer stores to visit agglomerated retailers which are farther away so as to shop for different types of goods on the same shopping trip. Retail bundling or agglomeration effects deliver additional utilitarian and hedonic shopping values to customers (Oppewal and Holyoake, 2004). Several shoppers enjoy comparison shopping as a form of leisure activity (Ingene, 1984).

2.2 Retail agglomeration format choice

Defining a retail market structure involves a degree of similarity and divergence among retailers that are relevant to strategic dimensions (Mason et al., 1993). Accordingly, González-Benito's (2005) definition is *'retail [or store] formats or types as generic profiles in a continuum of competitive positioning'*, whereas Fox and Sethuraman (2006) state that, *'A retail [or store] format is comprised of stores that offer the same, or a very nearly the same, variety of product categories'*. Sorescu et al. (2011) refer to *'retailing format'* as *'the structures for sequencing and organizing the selected retailing activities into coherent processes that fulfil the customer experience'.* Specifically, the *'retail format'* represents *'a combination of particular levels of each element of the retailing mix, such as product assortment, pricing strategy, location, customer interface, and so forth'* (Levy and Weitz, 2008). Customers often link the products they buy with a particular retail format (Newman and Cullen, 2002). In this study, the terms *'retail'* and *'store'* are regarded as

having the same meaning and are used interchangeably. Fox et al. (2004) found strong linkages between marketing policies and retail formats; they indicated that the highest variations were between formats, while those within formats were relatively small. They suggested that retail format was a good segmentation criterion for scrutinising retailers.

Retailers can be categorised into several formats by different criteria, such as amount of service, organisation, breadth and depth of product lines, prices, and sizes (Brown, 1986, Kotler et al., 2008). Retailers may offer one of three levels of service: self-service, limited service, and full service (Kotler et al., 2008). Many retailers are independently owned, others band together under some form of corporate or contractual organisation. The main categories of retail organisations are corporate chains, voluntary chains and retailer cooperatives, franchise organisations, and merchandising conglomerates (Kotler et al., 2008). Retailers can be classified by the breadth and depth of their product assortments into various formats: speciality stores, department stores, supermarkets, convenience stores, superstores, and category killers; additionally, they are able to be grouped by relative prices into discount stores, off-price retailers, independent off-price retailers, factory outlets, and warehouse clubs (Kotler et al., 2008). In terms of price strategies, they also can be categorised as Every Day Low Pricing (EDLP) and promotional pricing (HiLo) formats (Bell et al., 1998).

Many retailers are classified by a single criterion, but others are grouped by bi- or multi-criteria (e.g. Brown, 1987). The size of store as a classical threshold has been used in academic literature and official reports (Brown, 1986). It is often combined with another variable to establish other classification systems, such as price, and assortment (González-Benito, 2005, Guy, 1998). Burt and Sparks (1995) offered a classification of grocery stores according to two main dimensions: the first related to price, which is regularly opposed to service quality, and the other related to the extent of choice, which represents the variety of products and sizes of stores.

When similar or different types of retailers gather in one place or nearby, they manifest in '*retail agglomerations'* (Teller, 2008). Store-based agglomeration types, namely *'retail agglomeration formats'* can be identified. Principal criteria, i.e. how agglomeration formats are planned and constructed, as well as to what extent they are managed and marketed can be used to classify retail agglomeration formats into two main formats: '*evolved agglomeration retail formats'* (EAF) and *'created agglomeration retail formats'* (CAF) (Teller, 2008). Retail clusters in urban areas such as CBDs, inner-city locations or main streets (Levy and Weitz, 2008), or local strips in suburban/rural areas (Kumar Velayudhan, 2014) can be denoted as *evolved agglomeration retail formats* (EAF). In contrast, regional malls, supercentres and other centres, such as power, lifestyle,

speciality, outlet, theme/festival centres, are deliberately planned and constructed and then managed and marketed centrally, hence they are classified as *created agglomeration retail formats* (CAF) (Teller, 2008, Levy and Weitz, 2008).

Customer support of a store may be represented by the term *'retail/store patronage'. 'Patronage'* is defined by the Oxford Advanced Learner's Dictionary (Hornby and Turnbull, 2011) as *'the support that a person gives a shop/store, restaurant, etc. by spending money there'.* By this definition, *'retail/store patronage'* can be characterised into several dimensions, such as whether or not to shop, where to shop, how often to visit, and how much to spend. Many studies use only one dimension to represent the store patronage, with the most frequently used concerning where to shop, or *'retail/store format choice'* (e.g. Carpenter and Moore, 2006, Reutterer and Teller, 2009, González-Benito, 2001, Solgaard and Hansen, 2003) and *'retail/store choice'* (e.g. Moutinho and Hutcheson, 2007, Popkowski Leszczyc and Timmermans, 2001, Briesch et al., 2009).

Some researchers consider two or more dimensions in their studies. For example, Pan and Zinkhan (2006) regarded store patronage as having two features: (1) store choice (i.e., a consumer's choice to patronise a particular store), and (2) frequency of visit (i.e., how often a shopper patronises that store). Popkowski Leszczyc et al. (2000) focused on the problem of deciding (1) where and (2) when to shop. Fox et al. (2004) considered (1) the store choice and (2) expenditure across retail formats in their models.

Consumers typically have a primary affiliation to a '*main store*' which captures the majority of their purchases (Rhee and Bell, 2002). Consumers tend to spend twice as much in the main store as in other stores (Knox and Denison, 2000), which in turn increases market share and profitability. The most frequently used measures of business performance are market share and profitability (Green et al., 1995). Market share is considered as a direct performance outcome of a retailer's business strategy, while profitability shows the overall outcome of the business. Market share is often represented by store choice. In the same manner, the store format choice can be a representation of market share among store formats.

Evidence has shown that competition between formats is a critical issue. Cardinali and Bellini (2014) found that rivalry between store formats was more intense than the competition within a single format. Specifically, in the US, Wal-Mart harmfully affected current retailers (Artz and Stone, 2006) and the local labour market (Basker, 2005). In Italy, Viviano (2008) found that the entry of large supermarkets results in a decline in the number of small retail outlets. This pattern can also be found in developing countries, such as Uruguay, where the entry of a supermarket creates a competitive threat for the

existing small stores, reducing the probability of survival, particularly for grocery, bakery, fresh pasta, and butchers' shops (Borraz et al., 2014). In Thailand, Gorton et al. (2011) found that the market share of fresh markets has eroded sharply due to the entry of modern larger retail formats.

In recent decades, there have been two predominant trends in grocery retail markets, namely concentration and consolidation; the first leads to the domination by a few leading retail chains, while the second results in a decline of independent small retail enterprises (Burt and Sparks, 1995, Reutterer and Teller, 2009, Grewal et al., 2006). This tendency can be observed in the shift of market share from a small store format to a large store format (Popkowski Leszczyc and Timmermans, 2001). Large store formats have sought economies of scale in their operations through lower costs, modern management and distribution techniques (Burt and Sparks, 1995). This movement can be seen in trade reports on the US grocery market, especially where extra-large scale formats (supercentres) have outperformed smaller scale formats (supermarkets) (Carpenter and Moore, 2006).

Previous studies focus on specific store formats. For example, Reutterer and Teller (2009) and Solgaard and Hansen (2003) focused on store format choice among discount store, hypermarket, and supermarket. Carpenter and Moore (2006) explored the format choice of gourmet speciality, supermarket, supercentre, warehouse club and Internet format. González-Benito (2001) investigated the inter-format spatial competition of Spanish hypermarkets. Bhatnagar and Ratchford (2004) modelled retail format competition for non-durable goods among supermarkets, convenience stores, and food warehouses.

There are varieties of retail agglomeration formats to be found in Thailand as shown in Table 2-2. Several markets can be categorised as an evolved agglomeration retail format (EAF) such as a shopping strip, namely Yaowarat, while other markets are classified as a created agglomeration retail format (CAF) such as a collection of speciality stores, namely Pantip Plaza, and a supercentre, namely Central Department Store. However, by definition (Teller, 2008, Teller et al., 2016) several retail agglomeration formats, e.g. fresh markets, weekend markets, and night markets, cannot be categorised into EAF/CAF or planned/unplanned shopping sites.

Table 2-2: Real life store agglomeration formats in Thailand

Market name	Details	Product types	Market types
Pantip Plaza	A building that consists of nearly 300 outlets selling computer products. It is located in the city centre of Bangkok and is the largest agglomeration that sells computer products in Thailand (Blois et al., 2001).	Homogeneous	A collection of speciality stores
Save One	An open-air shopping area consisting of over 500 retail outlets. It is located in the suburb of Nakhon Ratchsima province, in the north-east of Thailand. There are a variety of products such as grocery, food & beverage, budget clothing & accessories, mobile phone accessories, and antiques for sale (Adventure-In-Thailand, 2017).	Heterogeneous	Night market
Yaowarat	A shopping strip, a so-called Chinatown, in Bangkok consisting of a wide variety of merchandise. There are many speciality stores selling gold, garments, textiles, stationery, souvenirs, second-hand parts and equipment, electric goods, computer parts, and antiques (Asia-for-Visitors, 2017).	Heterogeneous	Shopping strip
Warorot Market	Warorot Market is a multi-storey shopping centre with dozens of traditional shops, selling mostly food and clothes (Chiang-Mai-Best, 2017). It is regarded as the centre of the city's little Chinatown in Chiang Mai, in the northern part of Thailand.	Heterogeneous	Fresh market and a collection of speciality stores
Chatuchak Market	One of the famous landmarks located in Bangkok, where it is a must-visit both for tourists and Thais. Its sheer size and diverse collections of merchandise over 8,000 market stalls attract more than 200,000 visitors on a typical weekend (Bangkok-Attractions, 2017). It offers a wide variety of products, which can be categorised into eleven categories: clothing & accessories, handicrafts, ceramics, furniture & home decoration, food & beverage, plants & gardening tools, art & gallery, pets & pet accessories, books, antiques & collections, and miscellaneous & used clothing.	Heterogeneous	Weekend market
Central Department Store	It is one of the largest and oldest department store chains in Thailand. There are several branches in major provinces in all regions. It consists of supermarket, several retail outlets, category killers, e.g. sport equipment, stationery, and is anchored by the Central Department Store (Central, 2017).	Heterogeneous	Supercentre
The Walk	A small shopping centre consisting of several food & beverage retail outlets, and drugstore, and is anchored by a supermarket. It is designed for day-to-day convenience shopping as customers can park close to the store (The-Walk, 2017).	Heterogeneous	Neighbourhood centre

2.3 Need for new classification

Generally, a number of studies (Goldman et al., 1999, Goldman and Hino, 2005, Maruyama et al., 2016, Hino, 2010) have defined store formats as (1) traditional retail formats and (2) modern retail formats. Traditional retail formats (TF) typically are small, family operated, and employ minimum labour; they use simple retail operation tools and technologies, and lack financial, management, and marketing skills; stores are cluttered, dirty, and unorganised (Goldman et al., 1999). The TF mainly consist of grocery/mom-and-pop stores, and fresh/wet markets. Ho (2005) defined a grocery/mom-and-pop store as generally a small, family-owned neighbourhood store that sold staple foods, a variety of packaged and processed foods, and other quick-moving consumer goods; and a fresh/wet market as a grouping of individual stalls located in a multi-storey building or open space. In contrast, modern retail formats (MF) provide modern services and displays, operating with standardised management systems, and invest in technology and innovation to attract customers (USDA, 2004). The MF often locate in densely populated areas while the TF are often found in rural areas.

Previous studies classify retail agglomeration formats using the criteria as shown in Table 2-3. Gilbert (2003) categorises the retail location sites into: a solitary site, an unplanned shopping area, and a planned shopping district/centre. These retail formats are grouped based on the types of location site and the types of retail development. The solitary site may be a single free-standing retail outlet isolated from other retailers and positioned on a road or street. The unplanned shopping area site may be a retail location with two or more outlets in close proximity to each other. The planned shopping district/centre may be a retail location that has been architecturally planned to provide a unified theme for a number of outlets. The planned retail area is a deliberately developed site with complementary retail outlets.

Reimers and Clulow (2004) determine the extent to which shopping centres and shopping strips (referred to as downtown area, central business district, main street or high street) provide retail concentration, a method to measure the spatial convenience; their later study (Reimers and Clulow, 2014) determines the importance consumers assign to spatial convenience, measures how consumers perceive shopping malls and shopping strips in relation to that convenience, and compares them in their provision of such. The agglomeration retail formats are classified according to their physical characteristics in order to measure how consumers perceive the spatial convenience.

Table 2-3: Retail agglomeration format classification

Author(s)	Study objective	City/market	Study perspective	Classification dimensions	Retail formats	Product types
Gilbert (2003)	N/A	General	Managers' point of view	Location site and retail development	A solitary site, an unplanned shopping area, a planned shopping district/centre	Heterogeneous
Reimers and Clulow (2004)	To determine the extent to which shopping centres and shopping strips providing retail concentration	A major city in Australia	Consumers' point of view	Physical characteristic of retail agglomeration formats	A shopping strip and a shopping centre	Heterogeneous
Teller (2008)	To explore cross-format shopping motives among grocery consumers	Urban Central European retail market	Consumers' point of view	Planning, marketing & management of retail agglomeration formats	An evolved retail agglomeration format (EAF), and a created retail agglomeration format (CAF)	Heterogeneous
Reimers and Clulow (2014)	To determine the importance of spatial convenience, and to measure how consumers perceive shopping malls and shopping in relation to that convenience, and compare them in their provision of such	A major city in Australia	Consumers' point of view	Physical characteristics of retail agglomeration formats	A shopping strip and a shopping centre	Heterogeneous
Teller et al. (2016)	To investigate the competitive relationship between retail agglomeration format and the driver of competitiveness in the form of key agglomeration resources	Three European capital cities	Consumers' point of view	Planning, marketing & management of retail agglomeration formats	An evolved retail agglomeration format (EAF), and a created retail agglomeration format (CAF)	Heterogeneous

Teller et al. (2008) and Teller et al. (2016) classified agglomeration retail formats as an evolved agglomeration retail format (EAF) and a created agglomeration retail format (CAF). These agglomeration retail formats are categorised based on how retailers are planned and constructed, and to what extent they are managed and marketed. They followed the taxonomy by Gilbert (2003); however, their focus was on the agglomeration format. The classification by Teller et al. (2008), and Teller et al. (2016) ignored the non-agglomeration format, i.e. a solitary site, in their studies.

Gilbert (2003) notes that a retail park is architecturally planned, built on the outskirts or at an out-of-town site and consists of a purpose-built cluster of free-standing stores with parking facilities. It can be seen as '*hybrid format*' (Teller, 2008), planned centrally but managed fragmentedly. However, the dimensions previously used to classify retail agglomeration formats by location sites and retail development (Gilbert, 2003); planned/unplanned and central/fragmental management of retail agglomeration (Teller et al., 2008, Teller et al., 2016); physical characteristic of retail agglomeration formats (Reimers and Clulow, 2014, Reimers and Clulow, 2004), cannot categorise some existing retail formats, e.g. a periodic or weekend market, a fresh market, a night market, tourist an attraction retail site, and an exhibition retail outlet.

There are two main reasons why the previous retail agglomeration classification system cannot categorise some retail agglomeration formats. First, all such dimensions do not focus on the management style of the retail agglomeration format. For instance, many fresh markets are planned centrally but are managed fragmentedly, as are the retail parks; however, the fresh markets and retail parks are very different in management style. The management style of several fresh markets in Asian countries is traditional because it is family-oriented, characteristically providing an old-fashioned service, showing outdated displays, and not operating with standardised procedures (USDA, 2004). Trappey and Lai (1997) define the fresh market as a market with little central control or organisation, that lacks refrigeration, and does not process fresh foods into branded goods for resale. Goldman et al. (1999) describe a typical fresh market as an agglomeration of small vendors, where each vendor specialises in one fresh food line (meat, fish, fruit, or vegetables) or in a sub-line (e.g., leaf vegetables, exotic fruits). Traditional retailers complement each other as they offer a full assortment. Second, the term *'a planned shopping area site'* is defined as a retail location which has been architecturally planned to provide a unified theme for a number of outlets (Gilbert, 2003); however, several retail agglomeration formats are roughly planned or an *ad hoc* collection of retail outlets without an architectural plan, such as periodic or weekend markets in many Asian countries. Periodic markets are locations where people assemble in order to buy and sell goods and services (Kumar Velayudhan, 2014). These markets regularly operate in a

weekly cycle on certain day(s) of a week or a month. Another example is several night markets and periodic markets (Adventure-In-Thailand, 2017, The-Wayfaring-Soul, 2017) which are operated in the open air without a permanent, architectural site plan.

This study proposes a taxonomy of retail agglomeration formats, by how retailers are planned and constructed, to what extent they are managed and marketed, and what their management styles are, as shown in Table 2-4. The proposed taxonomy classifies the retail agglomeration formats by (1) location site and development of the retail agglomeration formats: a solitary or non-agglomeration format and a proximity or agglomeration format, and the agglomeration formats can be grouped according to the architectural site plan as permanent, temporary, or unplanned; (2) central/fragmented management and marketing; and (3) the management style: modern and traditional.

Table 2-4: Proposed taxonomy of retail agglomeration formats and the previous retail agglomeration formats classification

<table>
<tr><th rowspan="3">Management style</th><th rowspan="3">Managed & marketing</th><th colspan="3">Agglomeration formats</th><th rowspan="2">Non-agglomeration formats</th></tr>
<tr><th colspan="3">Architectural site plan</th></tr>
<tr><th>Permanent site plan</th><th>Temporary site plan</th><th>Unplanned</th><th>Solitary</th></tr>
<tr><td rowspan="3">Modern management style</td><td>Central managed & central marketing</td><td rowspan="2">Created agglomeration retail formats (CAF) e.g. Shopping malls, Retail parks</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Central managed & fragmented marketing</td><td>Exhibition retail outlets</td><td>-</td><td>-</td></tr>
<tr><td>Fragmented managed & fragmented marketing</td><td>-</td><td>-</td><td>Evolved agglomera-tion retail formats (EAF) e.g. High street shopping strips</td><td>Speciality stores, individual retail outlets</td></tr>
<tr><td rowspan="2">Traditional management style</td><td>Central managed & fragmented marketing</td><td rowspan="2">Fresh markets, tourist attraction retail sites</td><td rowspan="2">Weekend markets, periodic markets, night markets</td><td>-</td><td>-</td></tr>
<tr><td>Fragmented managed & fragmented marketing</td><td>Evolved agglomera-tion retail formats (EAF) e.g. Local shopping strips</td><td>Mom-and-pop stores, corner shops</td></tr>
</table>

The retail agglomeration format classification by Teller et al. (2008), Teller et al. (2016) as (a) created agglomeration retail formats (CAF) and (b) evolved agglomeration retail

formats (EAF) can be illustrated by how retailers are planned and constructed, to what extent they are managed and marketed, and what their management styles are. The CAF is a permanent site plan, centrally managed, has both central and fragmented marketing, with a modern management style. The EAF is an unplanned site plan, fragmentedly managed, and has fragmented marketing, regardless of what the management style is. Most weekend markets, periodic markets, and night markets are temporary site plans, both centrally managed and fragmentedly managed, and have fragmented marketing with a traditional management style, whereas most fresh markets, and tourist attraction retail sites have several characteristics similar to the weekend markets, periodic markets, and night markets, apart from having a permanent site plan.

To examine the idea of a retailing development involving a retail agglomeration format, a new classification system of retail agglomeration formats is needed. This study offers a classification of retail agglomeration format as (1) a '*traditional agglomeration retail format'* (TAF), (2) a '*modern agglomeration retail format'* (MAF) and (3) a '*non-agglomeration retail format'* (NAF), as shown in Table 2-5. This study defines the agglomeration format terms as follows. The TAF is a collection of small stores whose management style is not standardised, with old-fashioned operations and minimal investment in technology and innovation. The MAF is defined as a collection of small to large stores providing modern services and displays, operating with standardised management systems, and investing in technology and innovation to attract customers, e.g. using state-of-the-art supply chain and logistics systems. The *non-agglomeration retail format* (NAF) is defined as a single independent or chain retail store located at a solitary site, regardless of store size and management style. In this study, these agglomeration retail formats are a choice set in retail format choice models.

Table 2-5: Retail agglomeration format choice classification in this study

<table>
<tr><th rowspan="3">Management style</th><th rowspan="3">Centrally or fragmentedly managed & Central or fragmented marketing</th><th colspan="3">Agglomeration formats</th><th rowspan="2">Non-agglomeration formats</th></tr>
<tr><th colspan="3">Architectural site plan</th></tr>
<tr><th>Permanent site plan</th><th>Temporary site plan</th><th>Unplanned</th><th>Solitary</th></tr>
<tr><td rowspan="3">Modern management style</td><td>Centrally managed & central marketing</td><td colspan="3" rowspan="3">Modern agglomeration retail format (MAF)
e.g. shopping malls, retail park, exhibition retail outlets, high street shopping strips</td><td rowspan="5">Non-agglomeration retail format (NAF)
e.g. Speciality stores, individual retail outlets, mom-and-pop stores, corner shops</td></tr>
<tr><td>Centrally managed & fragmented marketing</td></tr>
<tr><td>Fragmentedly managed & fragmented marketing</td></tr>
<tr><td rowspan="2">Traditional management style</td><td>Centrally managed & fragmented marketing</td><td colspan="3" rowspan="2">Traditional agglomeration retail format (TAF)
e.g. fresh markets, tourist attraction retail sites, weekend markets, periodic markets, night markets, and local shopping strips</td></tr>
<tr><td>Fragmentedly managed & fragmented marketing</td></tr>
</table>

This new classification system highlights the importance of the management style as traditional or modern, which previous literatures have often ignored. Specifically, the previous classification of retail agglomerations by Teller (2008) focused on the development of retail agglomerations as planned or unplanned manner, the central or fragmental management, and the physical characteristics of retail agglomeration formats (Reimers and Clulow, 2014, Reimers and Clulow, 2004). The new classification can make a manager gain more understanding of how to manage the retailers according to the retail agglomeration format. The management can precisely improve the store image attributes in order to strengthen the store image of the retail agglomeration format. Not only the management style, but the new classification also distinguishes the retailer as having

agglomeration and non-agglomeration formats. It highlights the significance of the cumulative effect of retailers compared to an isolated store. The elaboration on the agglomeration formats can assist the managerial issue on how the agglomeration affects the store choice probability. This helps managers make a decision on the setting up of the location of the store.

2.4 Outshopping

LaForge et al. (1984) defined *'consumer outshopping'* as the behaviour of consumers who live in one area, but travel to another area to make retail purchases. Polonsky and Jarratt (1992) also defined *'outshopping'* as the collective purchases made by individuals outside their local or 'closest' retail trading area. Tuli and Mookerjee (2004) defined it as consumer shopping outside his or her village retail space for goods or services, which are also available within the village retail setup. However, the definition by Tuli and Mookerjee (2004) is specific to the Indian rural context. The Marketing Glossary dictionary of the American Marketing Association (AMA, 2016) defines *'outshopping'* as *'A practice whereby residents of smaller communities travel to larger communities to shop when prices become too high or assortments are not available in the smaller communities. A situation in which customers are shopping in other areas because their needs are not being met locally'.*

Jarratt (1998) pointed out two inconsistencies: (1) to distinguish outshopping from inshopping and (2) to determine how combinations of variables, such as the product categories, are purchased. The first was a variation in the definition of '*outshopping*'. Several studies use frequency of outshopping trips and the distance/boundary of the town for their definition (e.g. Herrmann and Beik, 1968, Thompson, 1971). A number of studies used the proportion of total out-of-town purchases (e.g. Papadopoulos, 1980, Samli and Uhr, 1974). Second, there is more than one shopping category, so it would appear logical that there is more than one category of outshoppers.

Outshopping occurs for many reasons. Outshopping consumers are dissatisfied with the retailing mix – merchandise selection, quality, price, and services – provided by local retailers (Blakney and Sekely, 1994). Products may not be readily available at local stores (Johnson et al., 2006). Local store outlets are not open at convenient times (Reynolds and Darden, 1972) and do not provide convenient parking facilities (Thompson, 1971). Larger formats offer a wider variety of products, cheaper merchandise and services (LaForge et al., 1984). Several residents of small communities working in other nearby cities conveniently shop in those areas (Schiffman et al., 1977). Shopping might not be the primary reason but once consumers reached a larger shopping area, they shop as a secondary activity (Papadopoulos, 1980).

Hino (2014) has observed a shopping pattern and defined the term *'selective-use'* as *'consumers shop regularly at supermarkets and hypermarkets (modern retail formats, MF) but they continue to purchase key product categories in traditional formats (TF)'.* This pattern is commonly found in non-Western economies, such as emerging economies in Asia (e.g. China, Hong Kong, India, Thailand, Vietnam), the Middle East, North Africa, and Latin America. This pattern is closely related to common consumption practices of using fresh ingredients in food preparation (Hino, 2014). The *'selective-use'* pattern can lead to outshopping, where the MF and TF are in different locations.

Several studies related to outshopping were conducted primarily in Western countries. In the US, major studies were aimed at understanding the reasons behind the flow of people from smaller urban settlement to larger urban retail outlets in search of better deals (Thompson, 1971, Samli and Uhr, 1974, Papadopoulos, 1980). In later years, studies have increasingly addressed the movement of people from downtown shopping centres to regional shopping malls, which stemmed from overcrowding in downtown areas. These studies aimed to identify the ways to attract consumers to these regional shopping malls (Bellenger et al., 1977). The predominance of regional malls led to the decline of business downtown. Therefore, later studies focused on how to prevent outshopping to the regional centres and other urban retail centres (LaForge et al., 1984). Studies on outshopping from rural retailers to other urban centres or to other regional shopping malls are less common. In Europe, studies focused on outshopping from rural areas, particularly in the UK and Scandinavian countries (Paddison and Calderwood, 2007, Home, 2002, Marjanen, 1995). There were studies focusing on patronage to regional shopping malls, following the prevention of the decline of downtown centres (Darden and Perreault Jr, 1976, Van Leeuwen and Rietveld, 2011, Guy, 1990). In Australia, studies on outshopping range from a small town to another larger city, and rural retailers to urban outlets (Polonsky and Jarratt, 1992, Jarratt, 1998, Jarratt, 2000). In Asian and African countries, research on outshopping is relatively rare. Most studies on outshopping from rural areas to other rural and urban districts have been done in India; outshopping is a prevalent phenomenon in India, because retail centres in urban and rural areas are not developed and shopping malls are largely absent (Varshney and Goyal, 2005). In Thailand high-income and more urban consumers shop at modern outlets more frequently, where rural and low-income groups and those in regions outside Bangkok and major cities, did their shopping at these outlets only occasionally (Kelly et al., 2015).

There are different ways in which outshopping may occur: outshopping between regions within an urban area; outshopping between urban areas; outshopping between rural areas; outshopping between rural and urban areas; or outshopping between a combination of areas. Varshney and Goyal (2005) provided a summary of outshopping research trends

and the different types are shown in Table 2-6. It can be seen that studies on outshopping from rural to other areas have rarely been conducted in Asian countries.

Table 2-6: Summary of different settings of outshopping

Settings	Research trends
Rural to urban outshopping. (e.g. Marjanen, 2000, Lumpkin et al., 1986)	Mostly in Europe and Australia, with US-based studies being increasingly common in recent years.
Rural to rural outshopping (large rural markets or weekly markets). (e.g. Polonsky and Jarratt, 1992, Kumar Velayudhan, 2014)	Very few studies, most of which are in Australia, and few studies in India.
Outshopping from a small town to a city. (e.g. Guy, 1990, LaForge et al., 1984)	Major area of research and the first to be studied, mostly conducted in the US with few studies from Europe and Asia.
Outshopping from downtown to regional shopping mall in suburbs/satellite towns. (e.g. Jarratt, 1998, Bearden, 1977)	Recent development; most of the studies are from the US, few from Europe and Asia.
International outshopping. (e.g. Piron, 2001, Jian Wang et al., 2010)	Very few studies, one each from Singapore and Gulf countries.
Online/Catalogue shopping. (e.g. Lennon et al., 2009, Johnson et al., 2006)	Recently developed and well researched area, primarily based in the US and Europe.
Outshopping for specialised services e.g. Health services. (e.g. Taylor and Capella, 1996)	Recent studies from the US.

Source: Adapted from Varshney and Goyal (2005)

There has been evidence that the decline of *evolved retail agglomeration formats* (EAF), especially shopping streets, and the rise of *created retail agglomeration formats* (CAF), particularly shopping malls, have been major trends in European retailing for decades (Teller, 2008). One of the main reasons for the decline of the EAF is the wane of retail agglomeration attractiveness (Yang et al., 2012). A similar pattern was found in small independent retailers, namely *non-agglomeration formats* (NAF), which are a common type of retail outlet, i.e., customers have been shifting from NAF to CAF, especially modern large formats. This trend can be observed in several grocery markets (Reutterer and Teller, 2009, Colla, 2004).

In urban areas, outshopping may not be an important problem for consumers because of the large consumer base (Jarratt, 1998). Goldman et al. (2002) observed that independent

food retailers (NAF) were not typical only to less developed economies, but also existed in highly developed countries. For instance, in highly developed Asian countries such as Japan, Hong Kong, Taiwan, and South Korea, the NAF often operate alongside modern supermarkets. In contrast, in rural areas the outshopping problem becomes significant because there are fewer retailers and limited varieties of product types (Polonsky and Jarratt, 1992), hence the prevalence of outshopping in rural areas (Lennon et al., 2009).

LaForge et al. (1984) highlight the effect of outshopping on small independent retailers as being more severe compared on larger retailers. Retailers compete not only within their trading communities, but also with larger, distant regional or urban trading areas (Polonsky and Jarratt, 1990). Tuli and Mookerjee (2004) point out that rural markets are unlike urban markets for two reasons: (1) the ability of consumers to discriminate varies, and (2) different reference points for choices to be made. Because of insufficient infrastructure and income constraints, as a result of seasonality and uncertainty, the cycle of 'awareness-penetration-adoption' is often delayed. Outshopping has a snowballing effect and leads to vicious circles (Varshney and Goyal, 2005). A small number of local outlets leads to a lack of variety of products. Shoppers therefore have to venture out in search of better varieties, hence the outshopping. As a result, smaller local retailers lose their business, consequently leading to the decline of business livelihoods in these areas.

Many Asian consumers visit fresh markets to buy their daily fresh food supplies, e.g. Taiwan (Huang et al., 2015), Malaysia (Chamhuri and Batt, 2013), Indonesia (Agriculture and Agri-Food Canada, Canada, 2012), Hong Kong (Bougoure and Lee, 2009), and India (Sinha et al., 2002). Nevertheless, in recent years, the pattern of consumers has dramatically changed due to the arrival of modern trade firms, e.g. Tesco, 7-Eleven (USDA, 2016). Agriculture and Agri-Food Canada (2012) reported that in Thailand small grocery retailers[1] such as food stalls share 62% of grocery sales. The traditional Thai retailers can be categorised as a non-agglomeration format (NAF). However, consumers are continuously shifting their shopping destination to modern and larger formats, namely modern agglomeration formats (MAF), e.g. hypermarkets, and supercentres, instead of NAF. Gorton et al. (2011) found that the market share of NAF has fallen abruptly after

[1] The traditional Thai retail store typically takes the form of a shop-house and is a family business (Feeny et al., 1996). The ground floor is a store to sell all sorts of products; the shop owners and their family occupy the upper floors.

the entry of MAF. Because most MAF are in different locations far away from consumers' residences (Wang, 2011), consumers in rural areas perform more outshopping.

Not only does outshopping pose a substantial threat to the viability of rural retail outlets, it also widely affects rural communities (Mullis and Kim, 2011). If shoppers patronise their local stores, their money remains in the local community. A multiplier effect occurs where money is spent, which leads to the community's economic growth (Gale, 1995). Vance and Scott (1994) noted that while retail sales increase after a chain store, Walmart, entered a market, the majority of financial returns went to the store rather than local retailers. They also claim that stores such as Walmart negatively impact nearby communities as a result of outshopping and consequently accelerate the decline of local retail businesses. Evidence shows that outshopping is not merely to fulfil consumers' economic needs, it is a means to achieve emotional and social benefits (Jarratt, 2000, Piron, 2001).

Evidence from previous studies in developing countries indicates that an opportunity cost for shopping several stores are more expensive than that of one-stop shopping (Goldman et al., 2002). Store agglomeration formats offer the possibility of one-stop shopping to consumers. A cluster of heterogeneous stores provides the opportunity for multi-purpose shopping, while that of homogeneous stores offers comparison shopping or cherry picking (Popkowski Leszczyc et al., 2004). Arentze et al. (2005) found that the agglomeration helped attract not only multi-purpose but also single-purpose trips. Subsequently, outshopping may be reduced by the improvement of retail agglomeration formats in geographical areas. It may slow the decline of retailing in limited access areas, particularly rural areas. Store agglomeration formats offer consumers one-stop shopping. Thus, outshopping behaviour and retail agglomeration formats are examined in this study.

2.5 Research hypotheses and a conceptual framework

2.5.1 Store image and its attributes

The concept of '*store image*' was first introduced by Martineau (1958). He defined the store image as '*the way in which the store is defined in the shopper's mind, partly by its functional qualities and partly by an aura of psychological attributes*.' The word functional refers to physical characteristics, such as location, price, product range, and merchandise. The psychological attribute refers to more abstract features, such as friendliness, and a sense of belonging. Kunkel and Berry (1968) defined the store image based on consumer perception. They place emphasis on the behavioural stimulus-response without psychological internal states. James et al. (1976) defined the store image as an attitude which is generated from the learning process. They added that the

store image was not simply a summation of the attributes; however, it was a function of the important weights and interactions among the attributes. The definitions of store image are shown in Table 2-7. It can be seen that there is no common definition of store image. However, most scholars have stated that store image consists of several dimensions: both functional and psychological factors. In addition, store image is a combination of such components as a whole impression which is greater than the sum of its individual components.

Table 2-7: Definitions of store image

Scholars	Definitions
Martineau (1958)	The way in which the store is defined in the shopper's mind, partly by its functional qualities and partly by an aura of psychological attributes.
Kunkel and Berry (1968)	The total conceptualized or expected reinforcement that a person associates with shopping at a particular store.
Oxenfeldt (1974)	A complex set of attributes that consumers feel about the store and it is more than a simple sum of objective individual attributes since parts of the attributes interact in consumers' minds.
James et al. (1976)	A set of attitudes based upon evaluation of those store attributes deemed important by consumers.
Mazursky and Jacoby (1986)	A cognition and/or affect (or a set of cognitions and/or affects) which is (are) inferred either from a set of ongoing perceptions and/or memory inputs attaching to a phenomenon (i.e., either an object or event such as a store, a product, a 'sale', etc.) and which represent(s) what that phenomenon signifies to an individual.
Cox and Brittain (2004)	Store image can be defined as the customer's perception of the store and its attributes. Several dimensions are lumped together by the customer in order to simplify matters to produce a store image.
Levy and Weitz (2008)	The way a store is defined in a shopper's mind. The store image is based on the store's physical characteristics, its retail mix, and a set of psychological attributes.
Hawkins and Mothersbaugh (2010)	A given consumer's or target market's perception of all the attributes associated with a retail outlet.
AMA (2016)	1. (consumer behaviour definition) The total of what consumers think about a particular store. 2. (retailing definition) The way in which a store is defined in a shopper's mind. It is based on the store's physical characteristics, retailing mix, and a set of psychological attributes.

The literature shows store image is linked to store choice. Bearden (1977) highlighted the importance of store image, saying that '*customers tend to seek out the retail outlets whose image closely correlated with the individual's self-image*'. The store image was an important determinant in the choice process in a shopping preference model by Sheth (1981). Malhotra (1983) proposed a store choice model based on the concept of preference thresholds and identified store images that influence the store choice. Store image cues influence consumers' decision-making processes, which are represented by store choice criteria, and then in turn store patronage intentions (Baker et al., 2002). Extant literature has also suggested that the store image is a predictor of store choice (e.g. Grewal et al., 1998, Hildebrandt, 1988, Thang and Tan, 2003).

The study by Yoo and Chang (2005) showed that store image attributes of store loyalty depend on the retail format. The results showed that, in department stores, store image: store atmosphere, location, shopping facility and sales-personnel service, affect store loyalty significantly, whereas, in discount stores, advertising, quality of merchandise, credit service and store atmosphere had an influence upon store loyalty statistically. Thomas (2013) found that store image had a positive impact on customer loyalty through customer satisfaction as the mediating variable.

Martineau (1958) discussed four broad dimensions of store image including (1) layout and architecture, (2) symbols and colour, (3) advertising and (4) sales personnel. Kunkel and Berry (1968) noted that customers evaluate a retail store according to: price, quality, assortment, fashion of merchandise, sales personnel, convenience of location, other convenience factors, services, sales promotion, advertising, atmosphere, and return policies. Lindquist (1974) reviewed 26 previous studies on store image and conducted a survey on the opinions of several scholars. He categorised store image into nine dimensions as shown in Table 2-8 and noted that product, convenience, and service are the most significant attributes.

Table 2-8: Dimension and components of store image

Dimension	Components
Merchandise	Quality, selection or assortment, styling or fashion, guarantees, and pricing
Service	Service-general, salesclerk service, presence of self-service, ease of merchandise return, delivery service, and credit policies of the store
Clientele	Social class appeal, self-image congruency, and store personnel
Physical facilities	Things such as elevators, lighting, air conditioning, and washrooms. Store layout, architecture, shopping ease, and attractiveness
Convenience	Convenience-general, locational convenience, and parking
Promotion	Sales promotions, advertising, displays, trading stamps, and symbols and colours
Store atmosphere	Congeniality, warmth, acceptance, comfort
Institutional	Store reputation and reliability
Post-transaction satisfaction	Things such as merchandise in use, returns, and adjustments

Source: Lindquist (1974)

Malhotra (1983) identified five store images that influence store choice: (1) variety and selection, (2) personnel and service, (3) acceptable price, (4) convenience of location, and (5) physical facilities. Hildebrandt (1988) found that consumers evaluated three food-store competitors by providing more than 1,000 store-related judgments concerning the image attributes of fresh goods, good quality, style, good staff, special offers, and fair prices. Consumers create store images based on advertisement, commodities, word of mouth, and shopping experience (Assael, 1995).

Consumer perceptions of store characteristics play a role in the patronage of retail stores (Maruyama and Wu, 2014). Main store image attributes typically influencing store patronage, such as location, pricing, promotion, accessibility, assortment, customer services, and atmosphere, are often mentioned (e.g. Carpenter and Moore, 2006, Popkowski Leszczyc and Timmermans, 2001). Morschett et al. (2005) added that one of the critical dimensions of retail strategic strengths was ‘scope of offers’, including the variety of assortment and one-stop shopping. Gripsrud and Horverak (1986) showed that retail patronage in food retailing increased when stores were located near other retail facilities. Similarly, Hansen and Weinberg (1979) found support for this argument in the choice of bank outlet.

Pan and Zinkhan (2006) have reviewed frequently reported attributes affecting store patronage and categorised them into three groups:

- product-related attributes: product quality, price, and product selection/assortment;
- market-related attributes: convenience, service quality, friendliness of salespeople, store image, store atmosphere, and fast checkout;
- personal-related attributes: demographic variables, store/store-type attitude.

Reutterer and Teller (2009) have used a limited number of attributes focused on service/convenience-related and merchandise-related attributes, as shown in Table 2-9, which are perceived by consumers as they choose particular store formats. The study by Yavas and Babakus (2009) focused on store patronage to shopping malls, so attributes are categorised as underpinned by utilitarian, hedonic and accessibility-related motives. An empirical study conducted by Lang and Hooker (2013) has shown that food retailing experience, which is based on hedonic motivation, affected overall consumer satisfaction and varied across different grocery formats.

Table 2-9: Attributes used for measuring store format perceptions

Attributes
Service/convenience-related
• Parking space available close to the facility
• Short waiting time at the checkout
• Pleasant atmosphere in the store
• Friendly and helpful personnel
• (Spatial) distance
Merchandise-related
• High merchandise quality
• Low prices
• Wide range of goods
• Many discounts and special offers

Source: Reutterer and Teller (2009)

Bhatnagar and Ratchford (2004) argued that a convenience store may set higher prices in order to substitute for its small scale. Nevertheless, the convenience store would be preferred by consumers in *'certain situations'* because of its location, which minimises

travel. In contrast, a supermarket can be attractive when consumers purchase several categories of goods, so it should offer a wide range of goods.

In terms of attributes related to store agglomeration formats, evidence from the study by Yang et al. (2012) shows that attractive indicators of EAF have positive relationships with customer loyalty, whereas the attractive indicators of CAF have ambiguous relationships between satisfaction and loyalty. Environment-related factors (orientation, ambience, atmosphere), tenant-related factors (retail tenant mix, merchandise value), and site-related factors (accessibility) are significant attributes in the evaluation of a retail agglomeration's attractiveness from a customer's point of view. Retail tenant mix and atmosphere have the highest relative importance for EAF and CAF's attractiveness (Teller, 2008).

Table 2-10 shows studies on store choice/store format choice and relevant studies with significant factors and Table 2-11 shows studies on rural patronage, outshopping, or store agglomeration with significant factors.

Table 2-10: Store choice/store format choice and relevant studies with significant factors

Author(s)	Study objective	Significant factors
Jayasankara Prasad and Kathyayani (2014)	To explore cross-format shopping motives among grocery consumers	Value for money, value for time, price-conscious, local shopping, shopping enjoyment, social shopping, variety seeking, entertainment, and brand-conscious motives
Hino (2014)	To understand cross-shopping (interformats) behaviour through retail format selective-use patterns	Consumer economic abilities: mobility, cost of time. Retail outputs: distance, processed items, perishables. Way of life variables: fresh ingredients in cooking, meals prepared at home
Gorton et al. (2011)	To understand the shift from fresh markets to supermarkets in Thailand food retail	Retail outlet attributes: price, promotion, assortment, speed of service, product quality, atmosphere, cleanliness. Socio-economic characteristics: location, gender, age, income, level of education
Jayasankara Prasad and Ramachandra Aryasri (2011)	To understand the shopper retail format choice behaviour for food and grocery retailing in India	Age, gender, occupation, education, household income, family size, and distance travelled to store
Wang et al. (2010)	To investigate how brand choice varies for the same consumer shopping for the same brand across format	Promotion, price sensitivities
Reutterer and Teller (2009)	To identify store format attributes that impact on store format choice with shopping trip types	Service/convenience-related: parking space available close to the facility, waiting time at the checkout, pleasant atmosphere, friendly & helpful personnel, distance. Merchandise-related: merchandise quality, low prices, assortment, discounts and special offers
Goldman and Hino (2005)	To diagnose the barriers to supermarkets' market share (supermarkets vs. traditional retail stores) in an ethnic minority community in Israel	Distance variable: travel time. Socio-economic characteristics: income per person, mobility, living density, education. Perishability. Store attributes. Assortment freshness. Food preparation: meals prepared at home, fresh ingredients in cooking
Morschett et al. (2005)	To show that the influence of shopping motives is much more profound on the attitude towards retail stores than towards the perception of store attributes	Price level; quality of performance: the quality of assortment, service, processes, store design; and scope of offers/convenience including the variety of assortment and one-stop shopping
Solgaard and Hansen (2003)	To examine the consumer's choice among three different supermarket formats	Quality/service level, price level, samples (opportunity to taste/try new products), assortment, accessibility, distance

Table 2-11: Rural patronage, outshopping, and store agglomeration studies with significant factors

Author(s)	Study objective	Significant factors
Yang et al. (2012)	To investigate the attractiveness between unplanned and planned retail areas based on the framework of attractiveness, satisfaction, and loyalty from consumers' points of view	Accessibility, parking, retail tenant mix, merchandise value, atmosphere
Teller and Reutterer (2008)	To evaluate the process of a retail agglomeration attractiveness between a shopping street and a shopping mall from consumers' points of view	Buying situation related factors: distance, involvement. Site-related factors: accessibility. Tenants related factors: retail tenant mix, merchandise value. Environment related factors: orientation, ambience, atmosphere
Teller et al. (2008)	To study the impact of hedonic and utilitarian values of shopping on retail agglomeration patronage	Shopping situation related factors: hedonic or utilitarian shopping orientation. Site-related factors: accessibility. Tenants-related factors: retail tenant mix, merchandise value. Environment-related factors: orientation, ambience, atmosphere
Oppewal and Holyoake (2004)	To investigate effects of bundling and retail agglomeration on shopping behaviour, in particular on in-store purchase incidence and the sequencing of shopping activities	Experience, time pressure, shopping companion, distance to other stores, number of other stores within certain distance, cost, product brand, product, promotion
Home (2002)	To explore consumers' patronage behaviour in rural grocery stores in Finland	10 most suitable store attributes: personal customer service, friendly sales people, finding goods easily, closeness of the store, cleanliness and neatness of a store, quick and easy shopping, fast checkout, sufficient parking facility, reliable shopkeeper, and possibilities to meet friends in the store
Bearden (1977)	To explore determinant attributes of store patronage: downtown vs. outlying shopping centres	Atmosphere, location, parking facilities, and friendliness of salespeople
Sullivan and Savitt (1997)	To study outshopping grocery patterns in rural areas	Shopping environment: location, assortment breadth, services. Price including advertising. Leisure activities. Convenience. Shop around work. Family shopping. Good shopping. Credit. Name brands

A recent study for a new shopping mall in Bangkok by Vilaisai and Chaipoopirutana (2017) investigated the influential factors of several store attributes on store image. They found that physical aspects, product-related attributes, personal interaction, reliability significantly influence store image. Physical aspects refer to tangible measurements. Dabholkar et al. (1996) defined physical aspects as being both the appearance of the physical facilities and the convenience of retailers to serve customers. Personal interaction refers to the performance of employees and how they interact directly with customers (Vinhas Da Silva and Faridah Syed Alwi, 2008). Dabholkar et al. (1996) defined reliability as similar to the reliability dimension in the SERVQUAL model by Parasuraman et al. (1988), but the reliability in the study by Dabholkar et al. (1996) consisted of two sub-dimensions: *'keeping promises'* and *'doing it right'*.

The store image attributes in this study are derived from the previous studies by Lindquist (1974), Oppewal and Timmermans (1997), Tat Keh and Wei Teo (2001), and the recent studies on the Thai market by Gorton et al. (2011), Kelly et al. (2015) and Vilaisai and Chaipoopirutana (2017). These attributes were validated through face-to-face in-depth interview with 20 customers. The attributes and their rationale are summarized in Table 2-12. Eight store image attributes including (1) product quality, (2) price, (3) product range, (4) travel time, (5) accessibility (6) salesperson service/friendliness (7) overall customer perception of store atmosphere and (8) retailer reputation, are selected as input for the attributes in the model, while the clientele dimension is included in the model as customer characteristics. However, other store dimensions, i.e. promotion and post-transaction satisfaction, are included in the retail format characteristics as an alternative specific in a utility function in a model (further details will be discussed in section 3.2).

Table 2-12: Dimension and store image attributes in this study

Dimensions by Lindquist (1974)	Store image attributes in this study	Rationale
Merchandise	(1) Product quality, (2) price, and (3) product range	Product quality, price and product range are the main store image attributes influencing store format choice.
Convenience	(4) Travel time, and (5) accessibility	Travel time and accessibility are the main store image attributes influencing store format choice.
Clientele	-	This attribute is included in the customer characteristics.
Service	(6) Salesperson service/friendliness	Salesperson service/friendliness is the main store image attribute influencing store format choice.
Promotion	-	This attribute is included in the retail format characteristics as an alternative specific in a utility function in a model.
Store atmosphere /physical facilities	(7) Overall customer perception of store atmosphere	Overall customer perception of store atmosphere is the main store image attribute influencing store format choice.
Institutional	(8) Retailer reputation	Retailer reputation is the main store image attribute influencing store format choice.
Post-transaction satisfaction	-	This attribute is included in the retail format characteristics as an alternative specific in a utility function in a model.

The eight store image attributes influencing store patronage and their hypothesis development are discussed in the following sections.

2.5.1.1 A range of products

Assortment is the number of SKUs (Stock Keeping Units) within a merchandise category, also called depth of merchandise; in contrast, variety is the number of different merchandise categories within a store or department, also called breadth of merchandise (Levy and Weitz, 2008). The term '*a range of products*' in this study represents both

terms on a continuum to capture both assortment and variety of products. At the one end, it means more assortment when there are several SKUs within a category or '*narrow range of products*' e.g. a speciality store; at the other end, it represents more varieties when there are many different merchandise categories in the store or '*wide range of products*' e.g. a collection of independent stores. The *'middle range of products'* locates between the two ends of the continuum which represents a store with less variety and less assortment, such as a convenience store.

Differentiation of products may be in the form of a speciality store (narrow range of products) to a supermarket (wide range of products). The narrow range of products (assortment) is often an important factor for speciality stores, or discount stores, whereas the wide range of products (variety) is typically characteristic of large retail formats. Paige and Littrell (2002) found that craft retailers concentrated on a focused strategy, serving narrow market segments with more specialized products. The small stores benefited from market gaps owing to their small size and differentiated demand for products or services that bigger stores cannot deliver (Goodman and Remaud, 2015). Chinese consumers perceived fresh markets as offering superior product variety (Goldman et al., 1999) because the fresh markets allow customers to select a wide range of fresh produce. According to Ho (2005), in Hong Kong *'many competing stalls and the ease of comparison'* was the second important reason, after freshness, why consumers did their shopping at fresh markets. Product diversity is also an important attribute influencing the choice to use African indigenous vegetable retail outlets (Gido et al., 2016).

Several studies indicated that the range of products impacts significantly on the consumers' store format choice. A large study on the grocery retail market in Denmark indicated that product assortment was the single most influential variable affecting the retail format choice across three formats: discount stores, hypermarkets and conventional supermarkets (Hansen and Solgaard, 2006). Seiders and Tigert (2000) showed that the primary reasons for customers supporting supercentres were more product assortment and low prices, whereas those supporting traditional supermarkets do so because of location, product quality and assortment. Fox et al. (2004) agreed that product assortment was more influential on store patronage, compared to price. Maruyama and Wu (2014) found that consumers who rated assortment as an important factor were more likely to shop at traditional retail formats compared to shopping at modern retail formats for fresh food, while consumers who gave an importance to one-stop shopping tended to shop at modern retail formats more than shopping at traditional retail formats. In Thai grocery markets, product assortment was a significant attribute influencing the likelihood to shop at supermarkets (Gorton et al., 2011). A recent study of Thai food retailing by Kelly et al. (2015) showed that availability of culturally important

products was one of the significant attributes for consumers to continue to support fresh markets.

Herrmann and Beik (1968) reported an association between the desire for a greater merchandise assortment and consumers' decision to do outshopping. Non-availability of product variety in the local trade area resulted in outshopping (Hopper and Lipscomb, 1991). Varshney and Goyal (2005) claimed that the need for uniqueness may be influencing outshopping behaviour, while this factor was significant in choosing suburban regional shopping malls (Burns and Warren, 1995). One of the reasons for outshopping is also due to a limited variety of product types (Polonsky and Jarratt, 1992).

2.5.1.2 Price

Nielsen (2000) showed that value for money is the most important indicator. From an economic point of view, store attributes are commonly based on the perceived utility of consumers (Solgaard and Hansen, 2003). On the one hand, what consumers perceive is often denoted by a store's service output (Bucklin et al., 1996). On the other hand, scarcity is assumed for costs, i.e. resources in terms of time and money. Rationally, consumers will try to maximise their utility, i.e. maximise the service output per unit of resource. Accordingly, consumers will try to minimise product price in order to gain the maximum utility.

Price is the amount of money charged for a product or service; the sum of the values that customers exchange for the benefits of having or using the product or service (Kotler et al., 2008). The price here is only the out-of-pocket cost that a customer pays for a product or service. Several studies showed that price was the critical factor for store patronage. Solgaard and Hansen (2003) pointed out that the positioning of price played a more important role than products and brands, while quality and service did not distinguish between retail formats. However, their study focused only on major supermarket formats; small store formats were not included in their model. They also showed that one of the primary reasons for customers supporting supercentres was low prices.

Several studies show that price is the critical factor for store patronage and customer satisfaction (e.g. Morschett et al., 2005, Goodman and Remaud, 2015, Theodoridis and Chatzipanagiotou, 2009). Price competitiveness is the critical factor for consumers shopping at large retail formats (Carpenter and Moore, 2006, Belwal and Belwal, 2017). Blakney and Sekely (1994) found that outshoppers left the local retailers because they felt the products from local trade areas were too highly priced. Customers shop at category killers due to prices being lower than proximity stores and speciality stores (Goodman and Remaud, 2015). In Thai grocery markets, price of product was a significant

attribute that influenced the likelihood to shop at supermarkets (Gorton et al., 2011). Maruyama and Wu (2014) found similar evidence, i.e. that consumers who were concerned about price were more likely to shop at modern retail formats compared to shopping at traditional retail formats.

In several Asian countries, in terms of prices, evidence has shown that the traditional retail formats are superior to modern retail formats when shopping for fresh produce. Ho (2005) and Goldman et al. (1999) noted that the superiority of fresh markets in Hong Kong over supermarkets is lower price. Recently a study of Thai food retailing by Kelly et al. (2015) showed that lower price is one of important attributes for consumers continued support of fresh markets.

2.5.1.3 Travel time

To predict retail patronage, researchers often employ modelling based on spatial interaction theory. Models of this category are well known as *'gravity models'* which have been inspired by the works of both Reilly and Huff (Berman and Evans, 2013). These models predict consumer patronage based on (1) an attraction of stores, e.g. size of stores; and (2) an impedance, e.g. travel time or distance between stores and consumers' homes/offices. An earlier Reilly's law of retail gravitation (Reilly, 1931) is specified at an aggregate level and is deterministic, while Huff's model (Huff, 1964) is specified at a disaggregate level and is probabilistic. These models have been criticised in that they predict similar patronage when stores are the same size and distance although their attributes are different. Several researchers (e.g. Carpenter and Moore, 2006, Fox et al., 2004) have argued that it is not only the location, but also other important factors affecting store patronage.

Hino (2010) used travel distance as a measure of convenience. Briesch et al. (2009) found that convenience, represented by travel distance, has more effect on store choice than do price and assortment. The costs incurred by consumers can be determined by the price of products and the use of time and money to travel to and from a retail store, which is a function of a location.

A key factor affecting the service role of market towns is defined as proximity to local services, residential location and mobility (Powe and Shaw, 2004); in the retailing context, the first and second terms can be represented by distance between stores and consumers' homes/offices, whereas the third term involves the ability to travel between stores and consumers' homes/offices by different modes of transportation, including walking. The distance alone cannot represent mobility. Travel time is defined as '*a usually specified period of time spent in travelling at work or from the entrance of a*

business establishment to the place where work is actually done (as in portal-to-portal travel or deadheading) for which compensation may be demanded or paid' (Merriam-Webster, 2017). The travel time in this context is a specified period of time spent in travelling between stores and consumers' homes/offices. The travel time is more appropriate to represent the proximity to local services, residential location and mobility.

Several studies have shown that travel time and distance are associated with store choice behaviour and outshopping by rural consumers (Sinha et al., 2002, Kahn and Schmittlein, 1989, José Más Ruíz, 1999, Gido et al., 2016, Jayasankara Prasad and Ramachandra Aryasri, 2011). Modern retail formats are often located outside the consumers' residential area (Wang, 2011); this has led to shopping at modern retail formats requiring more travel time than shopping at traditional retail formats in close proximity. Goodman and Remaud (2015) also found that customers shopped at proximity stores rather than other stores because they are close to their home or work place. Maruyama and Wu (2014) found that the closer the traditional retail formats, the greater the chance of shopping at these formats when consumers purchased fresh food.

2.5.1.4 Product quality

Product quality can be defined as a product's overall excellence and superiority (Zeithaml, 1988). Consumer-perceived product quality is the consumer's judgment of the overall excellence or superiority of a product (Anselmsson et al., 2007). In a marketing context, Lemmink and Kasper (1994) defined product quality as the extent to which a product meets the needs of the customer. They also added that the product is an augmented product; it includes not only the physical product, but also packaging, guarantee, brand name, etc., as well as the characteristics, image and other subjective judgments consumers make about these items. Wang (2013) studied the influence of visual packaging design on food product quality. In his study, product quality was evaluated by consumers and the perceived food product quality referred to the customer's assessment of the guarantee or superiority of the food product under consideration. Product quality in the study is a product's overall excellence and superiority from the customer's point of view.

Product quality plays an important role in grocery retail markets. Positive service quality can increase retail patronage and in turn improve profitability and competitiveness (Bougoure and Lee, 2009). Vilaisai and Chaipoopirutana (2017) noted that product-related attributes influenced corporate image for customers who visited the shopping mall in Bangkok. According to Bellenger and Korgaonkar (1980), customers seek a variety of high quality merchandise. Solgaard and Hansen (2003) found that customers of the speciality

store showed that high product quality/freshness of products are critical factors. Product quality was also an important factor for hypermarket shopping (Belwal and Belwal, 2017). Interestingly, Morschett et al. (2005) noted that quality and cost/price leadership do not contradict each other, but are independent dimensions of competitive advantage. High product quality can increase retail patronage intention, and in turn influence retail format choice.

Families in several Asian cultures often cook daily and use fresh ingredients in preparation of meals; so they tend to shop at traditional retail formats (Goldman and Hino, 2005). Goldman et al. (1999) observed that in China vegetables in traditional markets were typically delivered directly from wholesalers, which reduced transit time, and resulting in fresher products. In addition, meat and poultry were recently slaughtered and fish were sold live. Consumers prefer to shop at fresh markets as they are able to touch warm meat and poultry, or live fish, to ensure quality and freshness, which in turn, creates high consumer confidence for making purchasing decisions at the fresh markets (Bougoure and Lee, 2009).

However, in China most traditional markets are usually dirty, slippery, smelly, and unorganised (Goldman et al., 1999), so food safety is often a major concern for consumers. As a result, a consumer who is highly concerned about food safety tends to shop at modern retail formats (Maruyama and Wu, 2014). According to Ho (2005), in Hong Kong food hygiene was the most important factor for consumers to shop at supermarkets, while freshness of the food produce was the most important factor for consumers to shop at fresh markets. Recent studies on Thai food retailing by Gorton et al. (2011) and Kelly et al. (2015) showed that quality of produce was one of the important attributes for consumers to continue to support fresh markets.

2.5.1.5 Atmosphere

Generally atmosphere is defined as *'the feeling or mood that you have in a particular place or situation'* (Hornby and Turnbull, 2011). In a retailing context, the meaning introduced by Kotler (1973) typically related to store designing and structuring as *'the effort to design buying environments to produce specific emotional effects in the buyer that enhance his purchase probability'*. This study defines the atmosphere as *'the overall feeling or perception that customers have in a retail outlet'*.

Bitner (1992) defined another term *'servicescapes'* which refers to the physical environment consisting of (1) ambient conditions, (2) spatial layout and functionality, and (3) signs, symbols, and artefacts. Rosenbaum and Massiah (2011) revealed that the servicescape encompasses not only objective, measurable, and managerially controllable

stimuli but also subjective, immeasurable, and often managerially uncontrollable social, symbolic, and natural stimuli, which all influence customer approach/avoidance decisions. Huang et al. (2015) categorised them into two groups: ambience and store design, which included the layout, functionality, sign/symbols and artefacts, to examine the fresh markets in Taiwan.

A store atmosphere offers a set of information cues that lead to consumer inferences and expectations about a store's merchandise, service, price, and shopping experience, which in turn influences store patronage (Grewal et al., 2003). Kumar and Kim (2014) found that store atmosphere: social cues, design cues, and ambience cues, influences internal evaluations for customers shopping at single-brand apparel retailers. Store atmosphere can be characterised by several factors. For example, music has been shown to affect consumers' response to a retail environment, commonly in a positive manner (Grewal et al., 2003). Customer density also influences consumer evaluations of the overall store atmosphere. For example, Machleit et al. (1994) found that crowding had a negative impact on satisfaction with the shopping experience.

Store environment and atmosphere influence consumers' format decisions (Baker et al., 1994, Donovan et al., 1994). Shukla and Babin (2013) showed evidence that store ambience directly affects customer shopping value and leads to store switching behaviour. Bearden (1977) found the overall store atmosphere influenced the outshopping decision. In US grocery markets, Carpenter and Moore (2006) found that cleanliness is the most important attribute for customers shopping at supercentres and warehouse clubs. In Hong Kong better environment was the important determinant why consumers did their shopping at supermarkets (Ho, 2005). In Chiang Mai, the second largest city in Thailand, hypermarkets are popular places for both shopping and entertainment (Isaacs, 2009). Praise of hypermarkets often referred to an appreciation of the atmosphere, such as store air-conditioning, cleanliness, and presentation. Gorton et al. (2011) found that store atmosphere impacted on the consumers' frequency of shopping at both fresh markets and supermarkets. However, Maruyama and Wu (2014) pointed out that consumers who give importance to bargaining were more likely to shop at traditional retail formats compared to shopping at modern retail formats.

2.5.1.6 Customer service

Service quality literature often refers to the seminal work, namely the SERVQUAL model of Parasuraman et al. (1988). This service model offers five service quality dimensions: Tangibles, which refers to physical facilities, equipment and employee dress and appearance; Reliability, which refers to the ability to perform the promised service

dependably and accurately; Responsiveness, which refers to employee willingness to help customers and provide prompt service; Assurance, which refers to knowledge and courtesy of employees and their ability to inspire trust and confidence; and finally, Empathy, which refers to the caring, individualized attention a firm provides to customers. Later, Mittal and Lassar (1996) refined the original SERVQUAL in order to make it more parsimonious and included the personal-processing service, which is suitable for retailing service. Mittal and Lassar's model, namely SERVQUAL-P, consists of Reliability, Responsiveness, Personalization and Tangibles. The Personalization dimension refers to the social content of interaction between service employees and their customers. A customer service level in this study focuses on personal services in two dimensions: responsiveness and personalization. The former relates to employee willingness to help customers and give prompt service; and the latter interacts between service employees and their customers.

It was found that customer service influences retail choice behaviour (LaForge et al., 1984, Bearden, 1977, Goodman and Remaud, 2015, Shukla and Babin, 2013, Maruyama and Wu, 2014, Bougoure and Lee, 2009, Goldman et al., 1999). Ellis and Kelley (1992) suggested the independent store's competitive advantage was based on differentiation, supported by personalized services. Goodman and Remaud (2015) noted that customers shop at speciality stores and proximity stores rather than category killers due to good customer service. They also found that customers choose speciality stores because of product knowledge. After sales service influenced customer shopping value and led to store switching behaviour (Shukla and Babin, 2013). After sales service, support services, and courteous attendants affected customers' choice of hypermarkets and store image in Oman (Belwal and Belwal, 2017). Courtesy of personnel is one of the top five attributes impacting on the likelihood of customers shopping at large retail stores in US grocery retail markets (Carpenter and Moore, 2006). Maruyama and Wu (2014) found that in China consumers who shop for fresh food gave importance to communication with salespeople and were more likely to shop at traditional stores compared to shopping at modern retail outlets. The study in Hong Kong by Bougoure and Lee (2009) showed that supermarkets outperformed fresh markets across all aspects of service quality as measured by SERVQUAL-P. However, Goldman et al. (1999) gave a reason why fresh markets survived in Hong Kong as being that they served consumers more effectively than supermarkets do. The fresh markets were in direct contact with customers, and quickly responded to consumers' requirements. In Thai grocery markets, speed of service was a significant attribute that influenced the likelihood to shop at fresh markets (Gorton et al., 2011).

2.5.1.7 Accessibility

In general, accessibility is defined as *'the quality of being able to be reached or entered'* (Hornby and Turnbull, 2011). Accessibility refers to the *'ease'* with which desired destinations may be reached and is normally measured as a function of the available opportunities moderated by some measure of impedance. Opportunities may be expressed as employment levels and retail or non-retail square footage, depending on the application; impedance is usually denoted by travel time (Niemeier, 1997). In this research, accessibility is defined as the ease of reaching a store from a customer's home or workplace. From the viewpoint of a customer who uses a personal car, accessibility means ease of parking and access from the car park to the store. From the view of a customer who uses public transport, accessibility means the ease of reaching the store using public transport, e.g. whether there are bus routes that pass the store, or a bus stop is close to the store, etc.

Accessibility is one of the critical factors in evaluating the attractiveness between unplanned and planned retail areas (Yang et al., 2012, Teller and Reutterer, 2008). Accessibility seems to be an important role for some retail formats, e.g. a neighbourhood store, where customers can park in front of the store. For an out-of-town shopping centre, which most customers access by a personal car, accessibility, measured by a car park, is a key factor for customers' patronage. Hawes and Lumpkin (1984) found the presence of specific retail facilities, such as convenient location and ease of access, increased outshopping. The presence of a car was not sufficient for outshopping, but customers preferred retailers with adequate parking facilities (Bearden, 1977).

Maruyama and Wu (2014) found that consumers who give importance to accessibility, in terms of parking, were more likely to shop at modern retail formats compared to shopping at traditional retail formats. The parking facility was one of the key factors that impacted on customers shopping at modern retail formats (Belwal and Belwal, 2017, Solgaard and Hansen, 2003). Ease of access was also rated as highly important rank for warehouse clubs' customers (Carpenter and Moore, 2006). However, in Hong Kong *'the location was more convenient'* was the second important reason after food hygiene why consumers did their shopping at supermarkets (Ho, 2005). In Thailand, accessibility operationalized by convenient location of the store was a significant variable in the likelihood of customers to visit supermarkets (Gorton et al., 2011).

2.5.1.8 A retailer reputation

The origin of brand stemmed from the attempts of craftsmen to distinguish their products from others, so as to be more easily recognised by customers. Early branding focused on

products rather than service and a definition of brand often ignored intangible components. Later, academics (Bennett and Association, 1995, Wood, 2000) and the American Marketing Association (AMA, 2016) redefined a brand as *'a name, term, design, symbol, or any other feature that identifies one seller's good or service as distinct from those of other sellers'.* So, a brand is more than a product or service; it is intangible and exists in the consumer's mind (Aaker, 2012).

By definition, all goods and services can be branded. Retailing is in the service sector, so retailers themselves can also be branded. It could implement the store-as-a-brand strategy, which requires retailers to integrate store atmosphere and merchandise image to form cohesive experiences for their customers (Burt and Davies, 2010). Retailer brands and product brands are different in several aspects. It is more difficult to develop a clear position for a retailer brand than for a product brand (Sarantidis, 2012). Retailers are in direct contact with consumers, whereas manufacturers communicate using advertising or sales promotion through retailers. Retailers gain advantages because they can be in control over in-store space and product position, promotion, and customer relationships (Corstjens and Corstjens, 1999). Manufacturers usually produce a number of different brands, each of which has its own strategy and should be managed differently, so the challenge for manufacturers is to secure a consistent brand strategy. In contrast, retailers generally manage only one retailer brand, but several stores in different locations, so the challenge is to adopt and communicate a consistent strategy to all stores and staffs.

Manufacturers have dominated the consumer goods industry for several decades, but recent evidence shows that retailers have been increasing in power over the distribution channel (Gilbert, 2003). However, retailers in a grocery market have to deal with severe competition due to the market's maturity. Retailers have to deal with a broad range of customer base and diverse shopping environments in which they operate. Goodman and Remaud (2015) stated that how stores compete and how brands compete have similar effects on consumers, both physically and mentally. They also noted that small retailers and small brands are subject to similar problems, as small retailers occupy a low proportion of the total brand communication.

Retailers can develop their store as a brand. They may enhance their basic role from selling tangible goods or services to offering added values to their customers. A retailer brand can be managed in several aspects, including product lines, product range, price, product quality, locations, employee/staff services, etc. Several researchers indicate that retailers have been increasingly market-oriented and have been developing themselves as brands (McGoldrick, 2002, Ailawadi and Keller, 2004). Jary and Wileman (2016) indicate the most important factors influencing the growth of the retailer brands

as: the globalisation of retailers, the rise of retail concentration, the centralisation of retail decision making, the shifting to large out-of-town retail outlets, the technology available to retailers, and the capability of manufacturing to supply retailers with quality retail brands.

Generally, reputation is defined as the opinion that people have about what someone or something is like, based on what has happened in the past (Hornby and Turnbull, 2011). A retailer reputation in this context is defined as the opinion that customers have about a retailer due to their own experience and/or their perception from media or other sources, e.g. word of mouth. Interestingly, in the fast moving consumer goods (FMCG) industry, people are more loyal to a retailer's name than they are to product brands (Burt, 2000). Therefore, creating a retailer reputation name is likely to attract consumers. There are some retail agglomeration forms in rural market areas, such as periodic markets and fresh markets, where the retail agglomeration name can be improved. From the systematic literature review (Meeyai, 2015), past documents have never focused on the reputation of retailer name to store agglomeration format choice.

In many Asian countries, traditional retail formats often locate in rural and suburban areas. Most of them are known locally in consumer trade areas. They may enhance their basic role from selling tangible goods or services to offering added values to their customers. The traditional retailers could make themselves have a greater reputation, i.e. from locally known to nationally known. In contrast, the modern retailers already have their store brand names, several of which are international names. Negative image towards traditional retailers and positive image towards modern retailers may lead to more outshopping.

Overall, to address the effect of eight store image attributes between the TAF and the MAF, the first hypothesis is set up; the effect of eight store image attributes between the TAF vs. the NAF is established in the second hypothesis.

H1: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to changing in store image attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

H2: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to changing in store image

attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

2.5.2 Customer characteristics

Demographic characteristics of consumers affect store patronage as explanatory variables from the demand side. Several studies have shown the relationship between consumer characteristics and retail patronage. Bustos-Reyes and González-Benito (2008) provided evidence that purchasing across retail formats was linked to consumer demographics and behavioural characteristics. Davies et al. (2001) showed a relationship between consumer demographics and frequency of shopping trips and amounts of money spent. Several studies (e.g. Jayasankara Prasad and Ramachandra Aryasri, 2011, Gorton et al., 2011, Goldman and Hino, 2005, Hino, 2010, Ihara, 2013, Gido et al., 2016, Maruyama and Wu, 2014) have shown that demographic characteristics have a significant influence on grocery retail format choice.

Many researches show that consumers across socio-economic groups tended to show characteristically differentiated psychological and behavioural patterns, which has led to different store choice behaviour (Jayasankara Prasad and Ramachandra Aryasri, 2011). However, researchers generally agree that not all demographic characteristics are good descriptors of the average outshopper (Piron, 2001). The following sections review past studies where customer characteristics impacted on retail format choice.

2.5.2.1 Gender

Several studies showed that gender influences consumers' retail format choice. Females patronised higher numbers of stores than males did. For instance, in the US grocery market nearly 75% of shoppers are female (Carpenter and Moore, 2006). In China and Taiwan, approximately 70% of the respondents who shop at fresh markets are women (Huang et al., 2015, Maruyama and Wu, 2014). In Malaysia over 80% of food shoppers are female (Chamhuri and Batt, 2013).

Luceri and Latusi (2012) found that gender impacted on the multi-store pattern for grocery purchases. Carpenter and Moore (2006) found females were more likely to shop at supercentres and warehouse clubs compared to males. Gender also affected consumers' choice of retail outlets for African indigenous vegetables (Gido et al., 2016). In India's retail market, gender had a significant association with retail format choice decisions (Jayasankara Prasad and Ramachandra Aryasri, 2011). In several cultural norms, women are not allowed to venture unaccompanied out of a certain area around the home.

So unaccompanied women can shop only at proximity stores, not at the more distant supermarkets (Goldman and Hino, 2005).

Hawes and Lumpkin (1984) found that gender influences the outshopping in that frequent outshoppers are male. However, Bellenger and Korgaonkar (1980) found that most females were recreational shoppers, who sought pleasant atmosphere with a variety of high quality merchandise. Hopper and Lipscomb (1991) also found females enjoyed outshopping more than males, the latter being satisfied with inshopping due to the cost of time and petrol.

2.5.2.2 Age

Many studies have pointed out that age influences consumers' retail format choice. Crask and Reynolds (1978) and Sampson and Tiger (1994) found that frequent patrons of department stores tended to be younger compared to those of non-frequent patrons. Similarly, a report by Stone (1995) showed that warehouse club patrons were younger compared to supermarket patrons. Solgaard and Hansen (2003) found that older consumers had a tendency to prefer to choose smaller speciality stores over large format retailers. Age impacted on consumer's choice of retail outlets for African indigenous vegetables (Gido et al., 2016). In India's retail market, age had a significant association with retail format choice decisions (Jayasankara Prasad and Ramachandra Aryasri, 2011). In Thai retail markets, Ihara (2013) reported that age was one of critical factors of hypermarket customers. Gorton et al. (2011) supported that the younger tended to visit supermarkets more frequent than the older; in contrast, the older had more chance to shop at fresh markets compared to the younger.

Several studies have often pointed out that older persons are less mobile and therefore more likely to shop close to their residence and to support the local shops (Powe and Shaw, 2004, Van Leeuwen and Rietveld, 2011, Pinkerton et al., 1995). Outshopping behaviour might be negatively related to age; i.e. younger people tend to do outshopping more frequent (Papadopoulos, 1980). Pinkerton et al. (1995) examined the outshopping from small rural communities in North-Western Missouri, US and found that age was the most strongly related to inshopping (as opposed to outshopping). Piron (2001) investigated outshopping from Singapore to Malaysia and found that age affected international outshopping frequency.

2.5.2.3 Household size and family structure

Other relevant customer characteristics are household size and family structure, i.e. whether there are children or elders in the household. Fox et al. (2004) found that

household size influences store format choice across three formats: grocery stores, mass merchandisers, and drug stores. Carpenter and Moore (2006) found when the household size increased, traditional store patronage decreased. They suggested that smaller households tended to shop at traditional neighbourhood markets rather than travel to larger grocery shopping formats. In contrast, larger households preferred to patronise the larger store formats. In the Thai retail market, family structure was a key determinant of hypermarket customers. Household size affected consumer's choice of retail outlets for African indigenous vegetables (Gido et al., 2016). In India's retail market, household size has significant association with retail format choice decisions (Jayasankara Prasad and Ramachandra Aryasri, 2011).

Evidence showed that family size effect on outshopping is contradictory. Lillis and Hawkins (1974) noted that outshoppers tended to be in smaller households, while other studies found no relationship between family size and outshopping behaviour (e.g. Hawes and Lumpkin, 1984, Papadopoulos, 1980). However, Miller and Kean (1997) found that households with children tended to do less outshopping.

2.5.2.4 Income

Income is one of the significant factors influencing store format choice (Fox et al., 2004). Carpenter and Moore (2006) found that income is a significant socioeconomic factor as the predictor of customer patronage in US grocery markets. They reported that income was only a significant predictor of speciality grocery patronage but was a strongly significant predictor of supercentre and warehouse club patronage. Sampson and Tiger (1994) found that members of a warehouse club were commonly upmarket compared to an average person. Similarly, a report by Stone (1995) showed that warehouse club patrons had higher incomes compared to supermarket patrons. Interestingly, Solgaard and Hansen (2003) found that higher income consumers had a tendency to prefer to choose smaller speciality stores over large format retailers. Crask and Reynolds (1978) and Sampson and Tiger (1994) found that frequent patrons of department stores tended to have higher incomes compared to those of non-frequent patrons.

Supermarket diffusion theory by Reardon and Berdegué (2008) indicated that in developing economies high-income households were the first group that adopted supermarkets. Evidence from many studies supported their theory. Past studies in developing countries (e.g. Anand, 2009, Amine and Lazzaoui, 2011) indicated that wealthier consumers rapidly adopted supermarkets. Goldman and Hino (2005) and Maruyama and Trung (2007) found that the high-income households were the first to adopt supermarket formats. Tessier et al. (2010) found that customers who supported large

supermarkets were much wealthier and had a more steady income. Hino (2010) found that in Middle East countries economic variables were the most influential factors affecting supermarket adoption.

Outshopping-prone customers had higher incomes than occasional outshoppers (Hawes and Lumpkin, 1984). Higher income households also tended to do one-stop shopping, so they did shopping at more distant supermarkets (Carpenter and Moore, 2006, Goldman and Hino, 2005). In contrast, the low-income households tended to shop at traditional stores due to their close proximity to home (Sinha and Banerjee, 2004). In Thai retail markets, lower income families visited fresh markets more frequently than the higher income families did (Gorton et al., 2011, Ihara, 2013).

2.5.2.5 Education

Another relevant customer characteristic is educational level. Carpenter and Moore (2006) found that the respondents with a higher education tended to shop at the supercentre, and warehouse club, whereas the respondents with lower education were less likely to shop at these formats. Fox et al. (2004) found that education influenced store format choice across three formats: grocery stores, mass merchandisers, and drug stores. Similarly, a report by Stone (1995) showed that warehouse club patrons were more educated compared to supermarket patrons. Crask and Reynolds (1978) and Sampson and Tiger (1994) found that frequently patrons of department stores tended to be more educated compared to those of non-frequent patrons. Amine and Lazzaoui (2011) remarked that upper and middle classes who sought to differentiate themselves from lower classes adopted modern retail formats as a means of social distinction. Education also impacted on consumers' choice of retail outlets for African indigenous vegetables (Gido et al., 2016). In India's retail market, education had a significant association with retail format choice decisions (Jayasankara Prasad and Ramachandra Aryasri, 2011). In Thai grocery retail, level of education was a highly significant determinant for the prediction of fresh markets and supermarkets shopping (Gorton et al., 2011).

Other studies showed education to be positively associated with outshopping (Papadopoulos, 1980, Hawes and Lumpkin, 1984). Piron (2001) investigated outshopping from Singapore to Malaysia and found that education affected international outshopping frequency.

2.5.2.6 Car ownership

Maruyama and Wu (2014) observed that customers performed two shopping patterns: shopping by car or shopping on foot. The first group preferred one-stop shopping by car

at modern retail formats, while the other preferred shopping on foot at traditional retail formats. They noted that customers who preferred to shop at the traditional stores did not have a preference due to lack of car ownership. Therefore, households without a car may be constrained to only proximity stores, most of which are small independent stores.

In the Thai retail market, Ihara (2013) reported that access to means of transport[2] was a critical factor for hypermarket customers. The percentage of car ownership of modern retail customers was higher than that of traditional retail customers (Goldman et al., 1999). Consumers with higher socio-economic status were more likely to switch to modern retail formats because of their car ownership (Goldman and Hino, 2005). Guy (1990) found that increased car access better enabled residents of small towns to shop in larger urban areas (outshopping). Broadbridge and Calderwood (2002) found that local shoppers were less likely to own a car than outshoppers.

2.5.2.7 Residential location

Geo-demographics, particularly location, are known to have been a key factor influencing store patronage since the early studies. Location of residence also affects shopping behaviour and store choice (Aylott and Mitchell, 1998). Gorton et al. (2011) found that consumers who resided outside of the capital city were more frequent visitors to fresh markets. This is likely to connect with the inaccessibility to means of transport in remote areas in rural Thailand (Ihara, 2013).

Reynolds and Darden (1972) found that outshoppers tended to be urban-orientated and were dissatisfied with local shopping conditions. Guy (1990) found that increased car access better enabled residents of small towns to shop in larger urban areas (outshopping). A further important characteristic is if residents are retired. Although as they grow older their ability and will to access services further afield is likely to decline, retired rural residents are likely to have more time to travel. Findlay et al. (2001) found the relationship between retired people and outshopping to be only present for rural incomers, who are more likely to have links with urban areas.

Goldman et al. (2002) found that multi-shopping at several independent stores was actually more expensive than one-stop shopping because it was time-consuming and led to higher opportunity costs for high-income customers. Store agglomeration formats offer

---

[2] This study does not include a motorcycle in the analysis because it is a common vehicle for most households without car ownership to have.

one-stop shopping. It is possible that consumers may shop in their local trading areas (i.e., inshopping as opposed to outshopping) at a TAF more than they do at a NAF or MAF.

To sum up, to address the effect of customer characteristics when customers do outshopping among the TAF, MAF and NAF, the third and fourth hypotheses are as follows:

H3: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to differences in customer characteristics (gender, age, household size, family structure, household income, educational level, car availability, and residential location).

H4: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to differences in customer characteristics (gender, age, household size, family structure, household income, educational level, car availability, and residential location).

2.5.3 Situational influences

A number of studies (e.g. Carpenter and Moore, 2006, Bhatnagar and Ratchford, 2004) have ignored situational influences. As a result, they cannot explain store patronage behaviour under various different several circumstances. Extensive evidence has shown that store patronage is highly dependent upon shopping situation. Many major retailers increasingly target customers according to the purpose of their shopping trips (Fox and Sethuraman, 2006). Belk (1975) pointed out that situation variables significantly influence consumer behaviour. He modified an S-O-R paradigm (Mehrabian and Russell, 1974) by splitting a stimulus into an object and a situation. He showed that an interaction between situations and products (beverage and meat) is higher than the main effect of situations or products alone. Solgaard and Hansen (2003) emphasised that researchers could depict the utility (in choice models) not only as a function of store attributes and personal characteristics, but also as a situational consideration.

Situational influence is defined as *'all those factors particular to a time and place of observation which do not follow from a knowledge of personal (intra-individual) and stimulus (choice alternative) attributes and which have a demonstrable and systematic effect on current behaviour'* (Belk, 1975). Other authors add that *'situational considerations are, finally, a function of the consumer's awareness of events (at the moment of choice) and/or the need to search for information that may affect his/her choice behaviour'* (Solgaard and Hansen, 2003).

According to Hawkins and Mothersbaugh (2010), situational factors can be categorised into four broad types: communication, purchase, usage, and disposition. In addition, a widely accepted scheme of situational dimensions is physical surroundings, social surroundings, temporal perspectives, task definition, and antecedent states (Belk, 1975). A task definition is defined by several researchers: *'task definition is the reason the consumption activity is occurring'* (Hawkins and Mothersbaugh, 2010:481); *'task definition features a situation which includes an intent or requirement to select, shop for, or obtain information about a general or specific purchase'* (Belk, 1975).

Several studies have shown the importance of situation influence to store patronage. Mattson (1982) criticised the use of individual difference variables to forecast store patronage and ignored situational factors. In his study, he pointed out the significance of two situational factors: time-pressure and shopping for gifts or oneself. He implied that the situational variables could make a prediction of store patronage more accurate. Van Kenhove et al. (1999) identified five types of task definitions experienced by customers of DIY products and indicated such task definitions had a significant impact on store patronage.

According to the theory of the allocation of time developed by Becker (1965), the opportunity costs (i.e., the time that would be used for other shopping trips or non-shopping activities) have a negative relationship with a consumer's response to his/her purchases during shopping trips. For example, opportunity costs may be high for consumers on a fill-in shopping trip since the purpose of this trip is to quickly purchase for immediate consumption, while the opportunity costs may be lower for consumers on a major shopping trip because a large amount of time is allocated to this trip. The theory of the allocation of time suggests that the opportunity costs of purchasing vary across different types of shopping trips.

Researchers seek to describe the characteristics of different shopping trips. Shopping trips have usually been characterised based on the amounts of money spent (Frisbie, 1980, Kahn and Schmittlein, 1989, Kahn and Schmittlein, 1992), the time elapsed for shopping trips (MacKay, 1973), the number of items purchased (O'Neill and Robert, 1992), random or routine trips (Kim and Park, 1998), consumers' self-reported purpose of their shopping trips (Walters and Jamil, 2003), and single- or multi-purpose trips (Arentze et al., 2005).

Many researchers (e.g. Kollat and Willett, 1967, Frisbie, 1980, Kahn and Schmittlein, 1992) have categorised shopping trips into *'major shopping trips'* and *'fill-in shopping trips'.* Walters and Jamil (2003) have further classified shopping trips into *'major shopping trips', 'fill-in shopping trips'* and also *'shopping primarily for price specials'*

because they examined how different types of shopping trips were related to purchase of products on promotion and shopping basket profit in a HiLo supermarket. Information Resources Inc. (IRI, 2006), however, categorised shopping trips into four groups*: 'quick shopping trips', 'fill-in shopping trips', 'pantry stocking trips',* and *'special purchase shopping trips'.* The IRI classification differs from the others in that it specifies *'quick shopping trips'* as trips to meet an immediate need and typically result in purchases of one to three items with a maximum spend of $10, while *'fill-in shopping trips'* covers a broad range of product categories. *'Pantry stocking trips'* and *'special purchase shopping trips'* are equivalent to major shopping trips and shopping primarily for price specials respectively in the other two classification systems.

Major shopping trips require time and effort because a large number of items are purchased to satisfy short- and long-term needs (Frisbie, 1980, Kahn and Schmittlein, 1992, Kollat and Willett, 1967). Major shopping trips are regularly conducted over a time period, such as one to two weeks or one month, and contribute to a significant share of a consumer's grocery budget (Walters and Jamil, 2003, Solgaard and Hansen, 2003). Nevertheless, many people in an upcountry area habitually do a daily grocery shop, as well as those in several Asian countries (Bougoure and Lee, 2009). Furthermore, major shopping trips are better planned compared to fill-in shopping trips (Nordfalt, 2009).

Fill-in shopping trips meet more pressing product needs with less time and effort used by consumers, compared to major shopping trips (Kollat and Willett, 1967, Kahn and Schmittlein, 1992). An example of the fill-in shopping trip is a trip to replenish perishable products that are frequently consumed. The fill-in shopping trips often result in fewer items being bought and a lower amount of the consumer's grocery spending compared with major shopping trips (Walters and Jamil, 2003). Table 2-13 shows the characterisation of the major shopping trips and the fill-in shopping trips.

Shopping primarily for specials, often referred to as *'cherry-pickers'* by practitioners, is a shopping trip where consumers visit a store for the main purpose of purchasing price specials offered by a vendor (Mulhern and Padgett, 1995).

Table 2-13: Characterisation of major and fill-in shopping trips

Characterisation	Major trips	Fill-in trips
Urgent needs and wants	Low	High
Shopping efforts (planning, transportation, picking, and packaging)	High	Low
Amount of time when doing a shopping	Large	Small
Frequency of shopping	Low	High
Shopping basket (a number of items)	Large	Small
Budget allocated for shopping	Large	Small

Sources: Kahn and Schmittlein (1992); Kollat and Willett (1967)

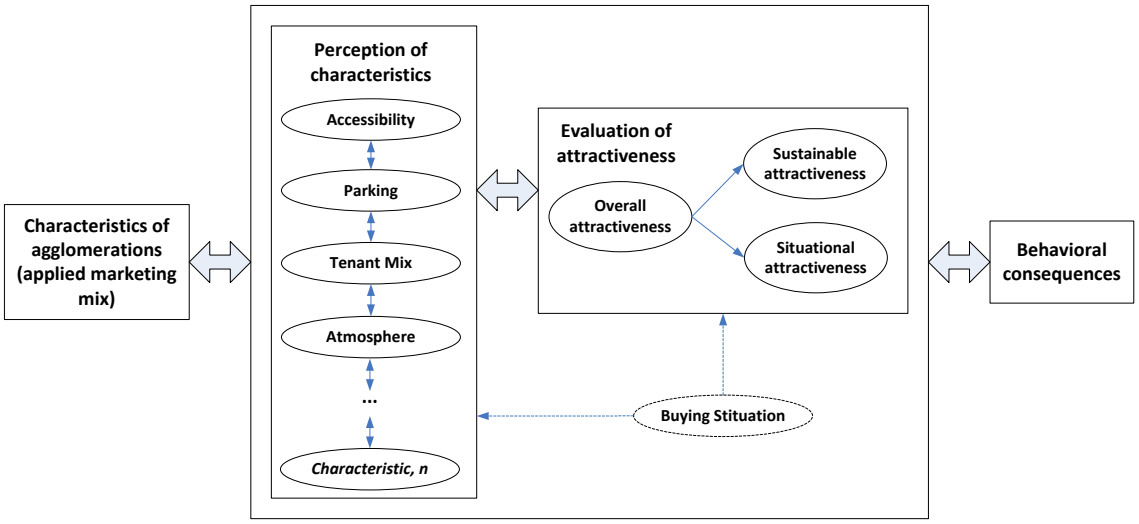
Popkowski Leszczyc and Timmermans (1997) observed that most consumers have patterns of grocery shopping trips involving more than one store. They found that while the majority of consumers tended to shop at two to five different stores, consumers often shopped and spent most money at one particular store. However, a substantial amount of switching occurred. In particular, 50% of fill-in trips were a switching trip. Luceri and Latusi (2012) found that as shopping pleasure perception increases, customers tended to shop at multiple stores. Kahn and Schmittlein (1992) examined the relationship between shopping trips and promotional tools: coupon, in-store display, and advertising in newspapers. They have shown that the likelihood of purchase related to whether the shopping trip was a major or fill-in trip. Moreover, distinguishing the different types of shopping trip can help determine the amount of money spent on such trips more accurately (Kahn and Schmittlein, 1989).

This study investigates the situational factor which is operationalised by *'a regular shopping trip'*. The **regular shopping trip** is defined as *'a routine shopping trip which involves a minor or major shopping trip, explicit and implicit planned shopping, and periodic purchasing'*. This term is defined because several rural Thai consumers do their shopping regularly, but this shopping trip differs from the shopping trip that consumers in cities do. Many rural consumers often do a minor shopping trip every day, or every two to three days, due to seeking fresh produce, but may periodically do a major shopping trip in longer time period, e.g. a month or two weeks. Both the minor shopping trip and the major shopping trip are considered to be regular shopping trips; however, other shopping trips such as a quick shopping trip, or a specific shopping trip are not regular shopping trips.

2.5.4 A conceptual framework

2.5.4.1 Introduction

In terms of conceptual frameworks of store agglomeration, there are a few studies focusing on store agglomeration and related factors. Teller and Reutterer (2008) offered a framework for retail agglomeration attractiveness, as shown in Figure 2-1. Their study focused on the evaluation of retail agglomeration attractiveness between a shopping street and a shopping mall from consumers' points of view. Significant factors related to retail agglomeration attractiveness consist of (1) site-related factors: accessibility, (2) tenants related factors: retail tenant mix, merchandise value, (3) environment related factors: orientation, ambience, atmosphere, and (4) buying situation related factors: distance, involvement. This framework seeks to describe the attractiveness of a shopping street and a shopping mall, but it does not explain the store agglomeration format choice behaviour.

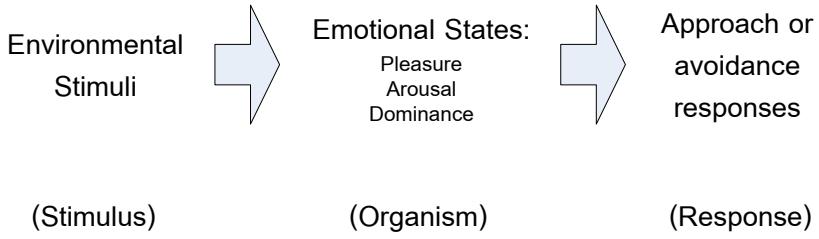


Source: Teller and Reutterer (2008)

Figure 2-1: Retail agglomeration's attractiveness

Previous studies suggest that, in addition to cognitive factors affecting the store format selection in planned purchases, in-store environment and the emotional state of consumers also play an important role in purchase behaviour (Sherman et al., 1997, Isen, 1984). Isen et al. (1982) found that people in positive emotional states tend to make a decision in a quicker and less complex manner. Mehrabian and Russell (1974) proposed an S-O-R model in their seminal work in environmental psychology, as shown in Figure 2-2. The S-O-R model attempts to bridge the gap between the connectionist and cognitive theories (Chisnall, 1994). Based on the stimulus-response theory, Tolman (1951) introduced an intervening variable referring to perceptions and beliefs, i.e. cognitions. It acted as an organising force in guiding responses and in selecting stimuli. The S-O-R model

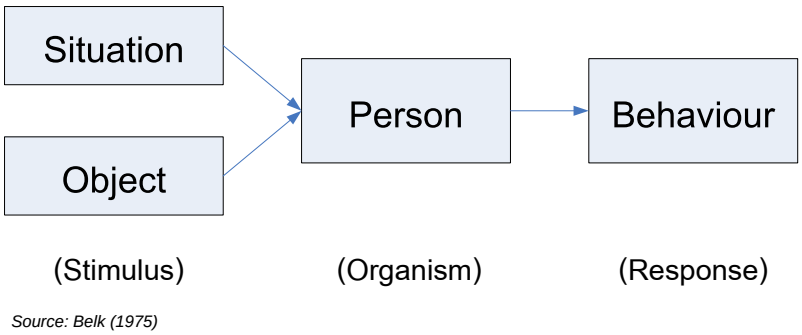
sought to describe store image attributes and related factors using stimulus and intervening variables that influenced the consumer behaviour (responses). A study by Donovan and Rossiter (1982) supported the linkage between the organism (O) and response (R) factors. They suggested that environmental stimuli might the emotional states of consumers in ways that are not necessarily conscious to consumers. Sherman et al. (1997) used the S-O-R framework to demonstrate a relationship between store environment and consumer purchase behaviour. Their model provides evidence for a consumer's emotion as a mediating factor in the purchase process.



Source: Adapt form Donovan and Rossiter (1982)

Figure 2-2: A Mehrabian-Russell Model

'*Stimulus*' is conceptualised as something that rouses or incites to action or increased action (Sherman et al., 1997, Bagozzi, 1980, Belk, 1975). The stimuli are *'external to the person and consist of both marketing mix variables and other environmental inputs'* (Bagozzi, 1986). For an individual purchase process, the stimuli can perform as external factors associated with the store environment. This pioneering research was followed by several empirical and theoretical studies. Mehrabian and Russell (1974) proposed a general measure of environmental stimulation across various physical and social settings using a mass of information. Markin et al. (1976) observed that human activities amplified the level of stimulation and proposed creating a '*psychology of stimulation'* for retail stores. Baker (1986) grouped the store environment into three categories: social factors (people in the store, e.g. customers and salespersons), design factors (visual in nature, e.g. layout, colour, cleanliness, clutter, space), and ambient factors (nonvisual elements, e.g. smell, sound, lighting). In addition, Belk (1975) modified the S-O-R model by splitting a stimulus part into an *'object'* and a '*situation'* as can be seen in Figure 2-3. He also applied this modification to the retail environment and consumers' responses.



Source: Belk (1975)

Figure 2-3: A Revised S-O-R Paradigm

'Organism' refers to *'internal processes and structures intervening between stimuli external to the person and the final actions, reactions, or responses emitted. Notice that the intervening processes and structures consist of perceptual, physiological, feeling, and thinking activities'* (Bagozzi, 1986). Donovan and Rossiter (1982) defined emotional state as the organismic (intervening) variable. The emotional state is conceptualised into three domains: pleasure-displeasure, arousal-nonarousal, and dominance-submissiveness. Pleasure-displeasure refers to the degree to which the person feels good, joyful, happy, or satisfied. Arousal-nonarousal refers to the degree to which the person feels excited, stimulated, alert, or active. Dominance-submissiveness refers to the extent to which the individual feels in control of, or free to act in, the situation (Donovan and Rossiter, 1982). However, Russell and Pratt (1980) have found the dominance dimension to be of little predictive power. Several studies did not include the dominance dimension in their models (e.g. Sherman et al., 1997).

Later, Bakker et al. (2014) showed that three dimensions: pleasure, arousal and dominance could be linked to the ABC (Affect, Behaviour, and Cognition) psychology (Rosenberg and Hovland, 1966). The ABC model was developed by adding behaviour as another dimension, in addition to affect and cognition. Pleasure and arousal were conceived as indicators of affect, while dominance was considered to be more cognitive indicator. The ABC model indicated a strong affinity with the three functions of the soul mentioned by Plato: feeling, thinking, and acting. Bakker et al. (2014) suggested the pleasure and arousal had to be considered as affective and cognitive concepts, respectively. They added that the dominance should be conceived as a conative concept. The dominance could be linked with the behaviour.

'Response' is defined as *'the outcome or final action toward or reaction of consumers, including psychological reactions such as attitudes and/or behavioural reactions'* (Bagozzi, 1986). Mehrabian and Russell (1974) suggested that all responses resulted in *'approach'* or *'avoidance'* behaviour. Approach-avoidance dimensions can be delineated into four aspects (Mehrabian and Russell, 1974):

- A desire physically to stay in (approach) or to get out of (avoidance).
- A desire or willingness to look around and to explore (approach) versus to avoid moving through or interacting with or to remain inanimate (avoidance).
- A desire or willingness to communicate with others (approach) versus to avoid interacting with others or to ignore communication attempts from others (avoidance).
- The degree of enhancement (approach) or hindrance (avoidance) of performance and satisfaction with task performances.

Donovan and Rossiter (1982) and Sherman et al. (1997) suggested several responses in a retail environment, including (1) number of items purchased, (2) amount of time spent in the store, (3) amount of money spent in the store, and (4) whether the consumer liked the store environment. Donovan and Rossiter (1982) and Donovan et al. (1994) examined the organism-response linkage of the Mehrabian and Russell model and confirmed that pleasure was a significant determinant of approach-avoidance behaviour within stores, including purchasing more than anticipated. Both studies showed that pleasure influenced intended and actual behaviours.

The S-O-R model has been applied extensively in retailing context. Baker et al. (1992) noted the stimulus-organism linkage between store environment and the emotional state of pleasure and arousal. They also found that the emotional states (pleasure and arousal) had a positive relationship with consumers' willingness to buy. Bagozzi et al. (1999) examined the stimulus-organism linkage of the Mehrabian and Russell model showing that emotions connected with consumption were formed in response to a specific consumer's judgement. Wakefield and Baker (1998) noted that the architectural design and décor of a shopping mall were the main factors in creating excitement to customers. The purchasing process of online retailing by Eroglu et al. (2001) defined the internal state as both affective and cognitive states. Jang and Namkung (2009) extended the Mehrabian and Russell model by incorporating specific stimuli and specific measures of emotion as a positive and negative emotion in a restaurant management study. Chang et al. (2015) applied the S-O-R model to identify selected store image attributes of active wear speciality stores. Their model used a consumer satisfaction factor as a mediating factor (organism) and offered word of mouth intentions and re-patronage intentions as responses. Teller and Thomson (2012) established attributes of agglomerations (applied marketing mix) as stimuli, perception of agglomerations' attributes and evaluation of agglomerations' attractiveness as organism, and agglomerations-related shopping behaviour as response to identify gender differences in perception and evaluation of retail agglomerations.

In this study, the response refers to the likelihood to shop at the retail agglomeration format (approach or avoidance). The reason is that consumers typically have a primary affiliation to a '*main store*' which captures the majority of their purchases (Rhee and Bell, 2002). Being the first-choice store, i.e. the main store, is very important because consumers tend to spend twice as much in the main store as in other stores (Knox and Denison, 2000). The store format choice can be a representation of market share among store formats, which is considered as a direct performance outcome of a retailer's business strategy (Green et al., 1995).

In terms of the likelihood to shop at the retail agglomeration format (approach or avoidance), it may be suspected that consumers may not do (actual behaviour) what they have said (intention). Several psychological studies have supported the assumption that intention is closely related to behaviour (Ajzen, 1991, Ajzen, 1985, Ajzen, 2005, Campbell and Fairhurst, 2016), i.e. individuals tend to perform corresponding to their intentions; however, individuals' intentions are dynamic and could change over time.

2.5.4.2 The proposed conceptual framework

This study adopts the S-O-R paradigm to model retail agglomeration format choice. This conceptual model shown in Figure 2-4 follows an S-O-R paradigm (Mehrabian and Russell, 1974). The S-O-R model has been applied to several studies in the retailing context (Chang et al., 2015, Belk, 1975, Donovan and Rossiter, 1982, Eroglu et al., 2001). Stimulus, mediating, and response variables should be conceptually clear, comprehensive, but parsimonious and operationally measurable (Donovan and Rossiter, 1982).

The first part (stimulus) consists of an *object* and a *situation*. For consumer decision-making process, the stimulus can be considered as external factors associated with the store environments (Chang et al., 2015). On the one hand, the *objects* that influence choice behaviour are represented by *store image attributes*. *Attributes* are related to the description of an alternative (Hensher et al., 2005), i.e. retail agglomeration formats. Store image attributes to be examined in this study are described in section 2.5.1. On the other hand, a *situation* is operationalised by a shopping trip type, where the study will focus on a regular grocery shopping trip as discuss in section 2.5.3. The stimulus refers to the influence that arouses the individual. It affects the internal and organism state (Eroglu et al., 2001).

The second part (organism) is an internal process that intervenes between external stimuli to individuals and their responses. In this study, it indicates as mediating factors, namely *characteristics,* are related to an individual's prejudices (or tastes) represented by *consumer characteristics* e.g. socio-demographics. Section 2.5.2 discusses the details

of consumer characteristics. Donovan and Rossiter (1982) adapted the S-O-R to the retailing context and examined the Mehrabian and Russell's model three-dimensional pleasure, arousal, and dominance (PAD) emotional experience as the intervening organismic state. They found that retail stimuli impacted consumers' emotional states and led to approach or avoidance behaviours. Sherman et al. (1997) also used the S-O-R model providing evidence for a consumer's emotion as a mediating factor in the purchase process.

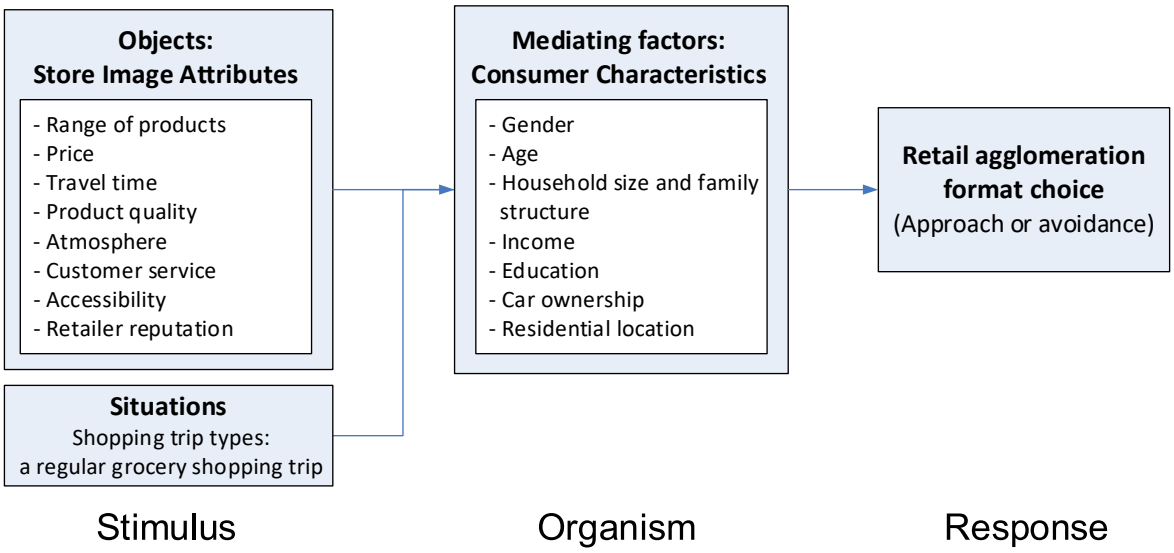


Figure 2-4: A conceptual framework

Finally, the third part (response) is an outcome or final action toward the organism such as a reaction from consumer's decision (approach or avoidance). It involves psychological reactions and behavioural reactions such as purchasing behaviour. Approach refers to all positive actions that might be directed toward a particular setting (Mehrabian and Russell, 1974). Donovan and Rossiter (1982) and Sherman et al. (1997) found customers' responses in the form of time and money spent, items purchased, store exploration, and so on. In this study, the response refers to the likelihood to shop at the retail agglomeration format. The response is characterised by the customer's reaction to retail agglomeration format choice (approach or avoidance).

The proposed S-O-R paradigm employs a discrete choice model to investigate the retail agglomeration format choice. The discrete choice model explains an individual decision process by a utility function with deterministic and stochastic factors (Train, 2003, Ben-Akiva and Lerman, 1985, McFadden, 1974). The deterministic part includes variables that can be measured and are known by researchers, while the stochastic part indicates variables that are difficult to be measured and vary according to each consumer.

The proposed model can scrutinise the research hypothesis as set up in section 2.5.1 and 2.5.2. It can examine the effect of store image attributes and consumer characteristics on individual retail formats across a choice set (a set of retail formats). The effect of a change (e.g. improved scenario) in a store image attribute of a specific retail format can be investigated; this change affects not only the choice of a specific retail format but also that of other retail formats. In other words, the discrete choice model considers the interaction between a specific alternative and other alternatives in a choice set. For example, the discrete choice model can examine the effect of a change in product price to customers when they choose to do outshopping at a TAF or other formats. The model output shows the probability to select a traditional retail format among the choice set (TAF, MAF, and NAF) in relation to the price changing.

Similar to store image attributes, the effect of customer characteristics can be investigated as well. The effect of customer characteristics (e.g. income level) on a specific retail format can be examined. By altering the income level of the model, the result indicates the probability of customers choosing a specific retail format from the choice set under the considered situation, i.e. a regular grocery outshopping trip.

2.6 Chapter summary

This chapter provides the literature review on retail agglomeration and its related matters. First, the term *'retail agglomerations'* is defined. Several theories explain the spatial distribution of retailers and retail agglomeration: central place theory, bid rent theory, the principle of minimum differentiation, and the theory of cumulative attraction. The benefits of retail agglomeration from both a retailer's and customer's perspective are identified.

The term *'store/retail formats'* is also defined. The importance of retail format choice is highlighted. From the extant literature, the previous classification system of retail agglomeration formats cannot categorise a number of retail formats, e.g. fresh markets, weekend markets, and night markets. So, a new taxonomy for retail agglomeration formats is provided, based upon three criteria: how retailers are planned and constructed; to what extent they are managed and marketed; and their management styles.

The term *'outshopping'* is identified. The reasons why outshopping occurs and the problems of outshopping from rural areas to urban districts are discussed. In addition, Thai consumers have been shifting from the non-agglomeration formats (NAF) to modern agglomeration formats (MAF). Consequently, many consumers in remote areas perform

more outshopping because most MAFs are in different locations far away from consumers' residences.

Finally, a conceptual model is constructed following the S-O-R model. Four research hypotheses are set up and the conceptual model is offered to examine them. Factors and conditions influencing store agglomeration format choice are discussed. The concept of *'store image'* is used to construct the conceptual model, including: range of products, price, travel time, product quality, atmosphere, customer service, accessibility, and retailer reputation. The customer characteristics are also investigated, including: gender, age, the number of members, children and elders in a household, income levels, educational levels, the residential area, and car availability. The term *'a regular grocery shopping trip'* is offered to operationalise the situational influence in this study.

Chapter 3 Methodology

3.1 Research philosophy

Research in retailing often deals with customer patronage. Several retailers attempt to determine where customers shop, which factors affect store patronage, to what extent these factors influence the store format choice, etc. In this sense, the ontology (assumptions made regarding the nature of reality) is positivist, by which reality exists and reacts to what is happening around it as a tangible perception, for instance, perception of product quality, product variety, price, and store atmosphere. Positivists believes that the study of consumers and marketing phenomena should be *'scientific'* in the manner of the natural sciences (Malhotra and Birks, 2007).

In this study, objectivist epistemology is assumed, so that the customer's perception can be examined and be measurable. It is based in principal on the values of reason, truth, and validity. The aim of the study is to examine the effect of store image attributes and customer characteristics on retail agglomeration format choice for outshopping. The customer's perception will be operationalised by a number of store image attributes. The theoretical and philosophical approach is shown in Figure 3-1, which has been adapted from Blaikie (2007).

The retail agglomeration can be explained by the central place theory (Christaller, 1966), the principle of minimum differentiation (Hotelling, 1929), and the theory of cumulative attraction (Nelson, 1958). The theoretical approach, as a major tool to determine the store format choice preference, is based upon discrete choice theory (McFadden, 1974).

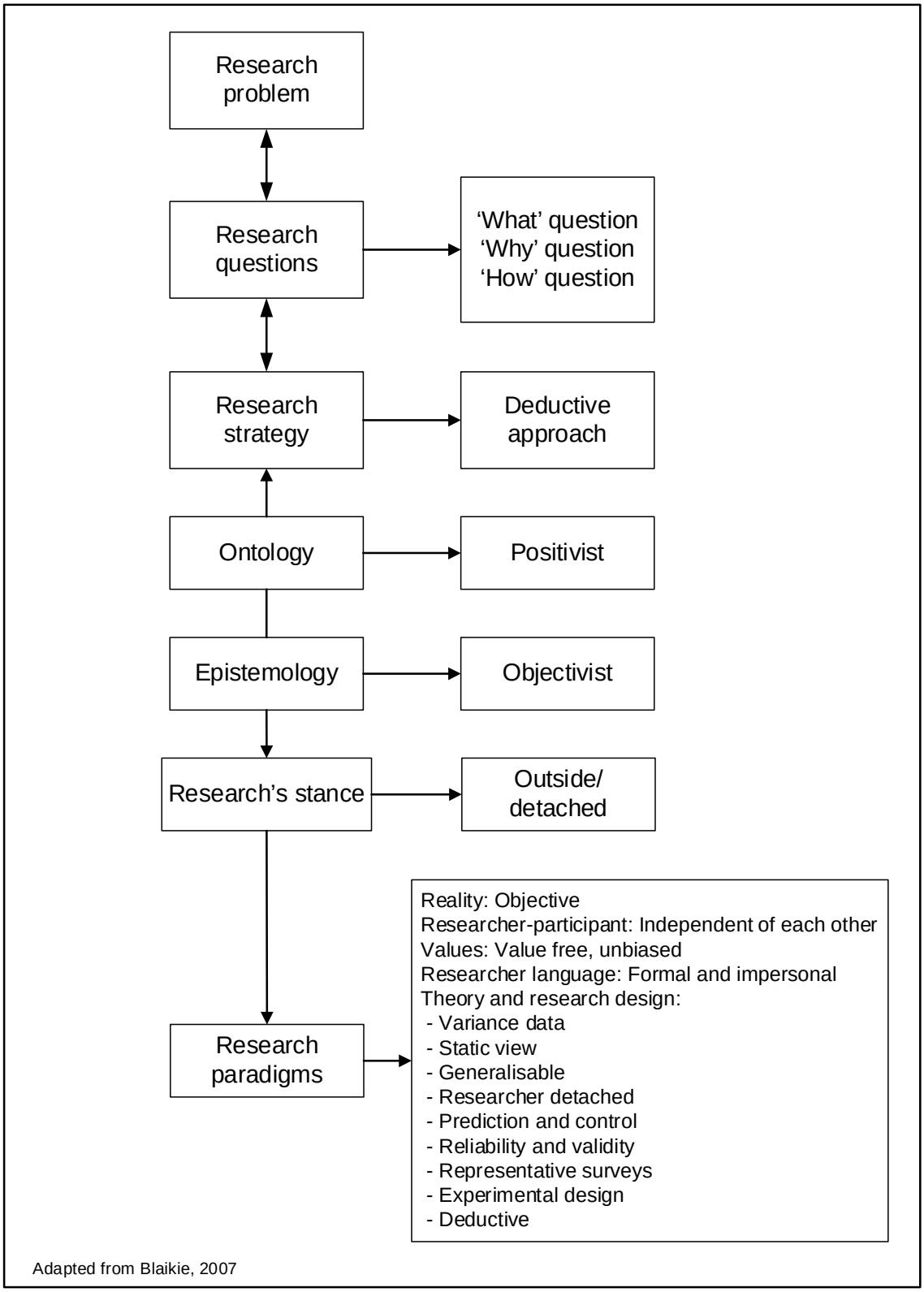


Figure 3-1: Diagram shows the philosophical approach used in the study

3.2 A store format choice model

3.2.1 Store patronage modelling

In a retail patronage context, exploratory research and descriptive research (Malhotra and Birks, 2007) often use basic statistical methods to describe the results. Several studies, e.g. Carpenter and Moore (2006), use descriptive and inferential statistics techniques (e.g. regression, ANOVA) to explain the relationship between consumer demographics, store image attributes, and retail format choice. These methods only give a general understanding of retail format choice; they do not provide information to explain individual choice behaviour; consequently, they do not have necessary capabilities to predict individual choice behaviour.

The regression models are restricted to a number of assumptions (Hair et al., 2010), especially the linearity of the relationship between dependent and independent variables, constant variance of the error terms, independence of the error terms, and normality of the error terms' distribution. Besides, the regression models only provide a continuous output. Structural equation modelling (SEM) and confirmatory factor analysis (CFA) seek to explain the relationships among multiple variables (Hair et al., 2010). In doing so, they inspect the structure of interrelationships represented by a series of equations, such as a series of linear regression equations. SEM and CFA inherit the limitations from linear regression models, in which they offer only continuous outputs as opposed to discrete outputs. Consequently, SEM and CFA approaches are often used in exploratory analysis.

Researchers often employ several methods to predict retail patronage, which can be classified into four main research streams: (1) modelling based on a spatial interaction theory, (2) approaches based on random utility theory, (3) approaches based on specific econometrics models, and (4) other approaches, e.g. multi-methods, and artificial neural network (ANN). Models of the first category are well known as *'gravity models'* which have been inspired by the work of both Reilly and Huff (Berman and Evans, 2013). These models predict consumer patronage based on (a) attraction of stores, e.g. size of stores, and (b) accessibility of stores, e.g. distance between stores and consumers' homes. An earlier Reilly's law of retail gravitation (Reilly, 1931) is specified at an aggregate level and is deterministic, while Huff's model (Huff, 1964) is specified at a disaggregate level and is probabilistic. These models have been criticised in that they predict similar patronage when stores are the same size and distance, although their attributes are different. Huff's model has been modified using various extensions, such as price,

assortment, and service levels. However, these models have a limitation in that they cannot predict individual choice behaviour.

The second approach is well known as ***'discrete choice models'*** which are often applied to determine store choice behaviour. These models have been developed under an assumption of utility-maximising behaviour by decision makers/consumers, and are often known as the random utility theory (Train, 2003). A large number of studies utilised these approaches. For example, Popkowski Leszczyc and Timmermans (1997) applied a probit model to simulate store-switching behaviour and determine whether customers made a repeat shopping or not. González-Benito (2001) used a logit model framework to study the inter-format spatial competition of retail markets. Solgaard and Hansen (2003) developed an multinomial logit (MNL) model to explain consumers' choice behaviour between different supermarket formats. Reutterer and Teller (2009) used an MNL model to identify store attributes that impact on store choice.

Third, a number of researchers have developed their own specific econometrics models for the particular purpose of their studies. For example, Bhatnagar and Ratchford (2004) identify determinant factors affecting the retail format competition by building an analytically economic model. Fox et al. (2004) focused on store choice and expenditure across retail formats in their models. Popkowski Leszczyc et al. (2000) developed a hazard model, where store choice is dependent on the timing of shopping trips, to measure the effects of consumer characteristics on grocery store choice and switching behaviour.

The gravity models, discrete choice models and analytic econometrics models have a limitation in that a functional form of the model has to be pre-specified. For instance, for the logit model, the stochastic component of the utility function is assumed to be an extreme value distribution, while that of the probit model is normally distributed (Train, 2003). Some studies applied a multi-method to predict store patronage. For example, Moutinho and Hutcheson (2007) indicated a combination of factor analysis, multinomial logistic regression and cluster analysis for modelling store patronage. Specifically, multinomial logistic regression was the main method to determine supermarket choice, while factor analysis was used to identify the key factors. Cluster analysis was used to classify the customers' profile and the store patronage was predicted according to consumer groups.

Several researchers in marketing have found an artificial neural network (ANN) to be useful for analysing and forecasting consumer behaviour (e.g. Davies et al., 2001, Bejou et al., 1996, Dasgupta et al., 1994). The ANN approach has advantages in its brevity, classification accuracy, capacity to deal with complex interactions and interpolating (out-

of-sample). Accordingly, it is a useful technique to forecast store patronage, but its main weaknesses include problems with interpretability and an intuitive appeal (Agrawal and Schorling, 1996, Kumar et al., 1995). Table 3-1 compares four retail patronage modelling approaches.

Table 3-1: Retail patronage modelling approaches

Issues	Gravity models	Discrete choice models	Other econometric models	Other methods
Methods/ theories	Based on a spatial interaction theory	Based on random utility theory	Based on specific econometrics models	Other theories such as ANN
Strengths	Robustness, theoretical background	Robustness, theoretical background; can predict individual choice behaviour	Theoretical background, flexibility	Theoretical background, flexibility
Limitations/ weaknesses	Cannot predict individual choice behaviour; a functional form of the model has to be pre-specified	A functional form of the model has to be pre-specified	General software package may not be available; a functional form of the model has to be pre-specified	May be difficult to interpret
Applications	Patronage forecast	Choice prediction	Patronage forecast, specific to the models	Patronage forecast, specific to the models

3.2.2 Choice modelling and its justification

Discrete choice problems have been of interest to researchers for many years in a variety of disciplines such as marketing (González-Benito, 2005), transportation (Garrow, 2016), and environmental studies (Hoyos, 2010). Wang et al. (2007) compared a discrete choice experiment (DCE) approach with a traditional SEM approach for modelling brand equity and predicting brand choice. They evaluated the ability to predict the actual brand choice of real consumers in real markets (external validity) in the Australian financial service

sector and found that both models performed well, but the outcome from the DCE model was consistently better than that of SEM. Wang et al. (2007) noted several reasons why a DCE approach might be a better choice than traditional SEM including: (1) in SEM explanatory variables often have little variability in a real market, which leads to difficulties in examining how dependent variables will change according to changes in explanatory variables, (2) multicollinearity typically occurs among measurement items resulting in reliability and validity of the model, and (3) DCE approaches allow researchers to systematically manipulate the explanatory variables, which leads to efficiently estimating the model parameters.

Discrete choice problems differ from other problems in that outputs from choice models are not continuous, like those of well-known simple or multiple linear regression models. A dependent variable (output from the model) is discrete (nominal), such as a binary outcome (yes/no) or a multiple outcome (choose product A/B/C). This study focuses on the effect of store image attributes and customer characteristics to store agglomeration formats including TAF, MAF and NAF for outshopping. Thus, the outcome is obviously discrete (i.e. choose to shop at TAF, MAF or NAF). Choice modelling is the most popular approach to tackle this problem (McFadden, 1974, Hensher et al., 2005, Train, 2003). There are several models within this category (e.g. Keng and Ehrenberg, 1984, Wrigley and Dunn, 1984, Wrigley and Dunn, 1985). Although such models offer good descriptions of market behaviour under equilibrium conditions, they do not provide information about the underlying causal variables explaining shopping behaviour (Popkowski Leszczyc et al., 2000). Walters and Jamil (2003) use the theory of the allocation of time developed by Becker (1965) to describe why the search for and purchase of price specials may vary across different types of shopping trips. This theory is based on the economic utility function, in which consumers balance the costs of buying with the benefits obtained from lower prices. Nevertheless, the limitation of this approach is its deterministic nature; it does not have the capability to predict individual choice behaviour.

Discrete choice models have long been an important part of marketing research. In marketing, they are applied in many aspects, including new product development (Krystallis et al., 2010), determining shopping strategies (Popkowski Leszczyc and Timmermans, 2001, Sands et al., 2009), retail format choice (Solgaard and Hansen, 2003, Reutterer and Teller, 2009), and shopping mode choice (Hsiao, 2009).

The major advantage of the discrete choice model is that it can be used to investigate the effect of interesting attributes and individual characteristics of an alternative across a choice set. The effect of a change in an interesting attribute of a specific alternative can be investigated; this change affects not only the choice of a specific alternative but

also that of other alternatives in the choice set. The discrete choice model considers the interaction between a specific alternative and other alternatives in a choice set.

Discrete choice models originated after the seminal work of Thurstone (1927), which is currently known as the multinomial probit model. Later, Luce (1959) developed an MNL model that became popularised by McFadden (1974)[3] when the latter demonstrated that the model could be derived from the principle of random utility maximisation. This is in contrast to traditional conjoint analysis that relies on the theory of conjoint measurement, which is purely mathematical and concerned with the number measurement, not the behaviour of humans or human preferences (Louviere et al., 2010). They also add that the discrete choice models have a long-standing, well-tested theoretical basis in a random utility theory.

3.2.2.1 Random utility theory and multimomial logit model

An analytical method used for investigating individual choice behaviour is discrete choice analysis, which is based on random utility theory (Domencich and McFadden, 1975). An individual's choice is dependent on *'utility',* which represents the benefits to customers when they make a choice for each alternative. An important assumption is that individuals will act rationally and always choose the option with the highest utility to them. As a result, each alternative is compared and the one that yields the highest level of utility is chosen by an individual. The utility is represented by U_{nsj}, which denotes the alternative *j* perceived by respondent *n* in the choice situation *s*. From an economic viewpoint, U_{nsj} is often represented as '*utility*', while in a marketing context, U_{nsj} can be seen as a latent measure of the attractiveness of alternative *j*. The individual decision maker's rule is to compare U_{1sj}, U_{2sj}, …, U_{nsj} and choose the one with maximum utility. In other words, the probability of an individual choosing alternative *j* is equal to the probability that the utility of alternative *j* is greater than (or equal to) the utility associated with alternative *i* after evaluating each and every alternative in the choice set. In notation:

$$P_{nsj} = \Pr ob(U_{nsj} > U_{nsi}) \quad \forall i \neq j \qquad \text{Eq.3-1}$$

However, the term U_{nsj} can be broken down into (a) a deterministic component, V_{nsj}, which is an observable, measurable, systematic or *'explainable'* component of the attractiveness of alternative *j,* and (b) a stochastic component, ε_j, which is a random,

---

[3] *Daniel L. McFadden gained the 2000 Nobel Memorial Prize in Economic Sciences with James Heckman. McFadden's share of the prize was "for his development of theory and methods for analysing discrete choice".*

non-measurable or *'unexplainable'* component of alternative *j*. Randomness arises because analysts are not able to look into consumers' minds and to observe the true attractiveness of each alternative. Randomness is from four distinct sources: unobserved attributes, unobserved taste variations, measurement errors, and model specification error (Ben-Akiva and Lerman, 1985). The equation is equivalent to:

$$P_{nsj} = \Pr ob[(V_{nsj} + \varepsilon_{nsj}) > (V_{nsi} + \varepsilon_{nsi})] \quad \forall i \neq j \qquad \text{Eq.3-2}$$

Equation (3-2) contains information that is measurable by the analyst (V_{nsj}) and information that is not directly measurable (ε_{nsj}). This shows that the analyst lacks the full information limits to a modified behavioural choice rule, which states that the information available to the analyst conditions the individual decision maker's utility maximisation rule to be a '*random utility maximisation rule*' (Hensher et al., 2005). It is useful to rearrange (3-2) to reflect this:

$$P_{nsj} = \Pr ob[(\varepsilon_{nsj} - \varepsilon_{nsi}) > (V_{nsi} - V_{nsj})] \quad \forall i \neq j \qquad \text{Eq.3-3}$$

Randomness in the utility maximisation rule that comes about because of the established way to handle the information in ε_{nsj} associated with each individual. These steps involve consideration of the unobserved elements of the utility expressions associated with each alternative. A popular distribution of the random term (ε) is independently and identically distributed (IID) with the extreme value type 1 (*EV1*) or Gumbel distribution (Train, 2003). The form of this distribution is as follows:

$$\text{Prob}(\varepsilon_j \leq \varepsilon) = \exp(-\exp-\varepsilon) \qquad \text{Eq.3-4}$$

The result of this distribution leads to the popular choice model known as the MNL model. The closed-form of the model is given as the following equation.

$$\text{Prob}(\text{Alt}_j \text{ is chosen}) = \frac{\exp(V_{nsj})}{\sum_{j=1}^{J} \exp(V_{nsj})} \quad ; \quad j = 1,..., J \qquad \text{Eq.3-5}$$

where:

j = alternative *j*.

J = All alternatives in the choice set.

V_{nsj} = The utility function of alternative *j* perceived by respondent *n* in the choice situation *s*.

$Prob_j$ = The probability to choose alternative *j*.

By far the simplest and most widely used discrete choice model is a logit model (Train, 2003). The MNL model is the most popular choice model for the great majority of practitioners for many convincing reasons (Louviere et al., 2000) as follows:

- Its simplicity in estimation – the solution set of estimated parameters is unique (there is only one set of globally optimal parameters).
- The model's closed-form specification, which enables easy implementation of predictive tests of changing market shares in response to scenarios of changing levels of attributes without complex evaluation of integrals.
- The speed of delivering 'good' or 'acceptable' models on the accepted tests of model performance (i.e., overall goodness-of-fit, *t*-statistic for the parameters of each attribute, and correct signs of parameters).
- Accessible and easy to use packaged estimation software.
- Where one has very rich and highly disaggregated data on the attributes of alternatives and agents, the model is often very robust (in terms of prediction accuracy) to the violation of very strong behavioural assumptions imposed on the profile of the unobserved effects, namely that they are independently and identically distributed (IID) amongst the alternatives in the choice set.

However, the MNL model has a property called independence of irrelevant alternatives (IIA). This indicates a certain pattern of substitution across alternatives. The IIA property indicates that the ratio of the choice probabilities of any pair of alternatives is independent of the presence or absence of any other alternative in a choice set. To illustrate the IIA property, for any two alternatives *i* and *k*, the ratio of the logit probabilities is:

$$\frac{P_i}{P_k} = \frac{\exp(V_i)}{\sum_{j=1}^{J}\exp(V_j)} \div \frac{\exp(V_k)}{\sum_{j=1}^{J}\exp(V_j)} = \frac{\exp(V_i)}{\exp(V_k)} = \exp(V_i - V_k) \qquad \text{Eq.3-6}$$

This ratio does not depend on any alternatives other than *i* and *k*, i.e. the relative odds of choosing alternative *i* over *k* are the same no matter what other alternatives are available. More specifically, the famous red-bus and blue-bus problem shows a problem of the IIA property. A traveller chooses to go to work by car or by blue bus. Assume that the utilities of both modes are the same, so the choice probabilities are: $P_{car} = P_{blue\ bus} = 1/2$. In this case, the ratio of choice probabilities equal to one: $P_{car} / P_{blue\ bus} = 1$. Suppose a red bus is introduced and the red bus is exactly like the blue bus, so the probability that

the traveller will take the red bus is the same as the blue bus. The ratio of the choice probabilities: $P_{red\ bus}$ / $P_{blue\ bus}$ = 1. However, in the logit model the ratio of P_{car} = $P_{blue\ bus}$ is the same, whether or not another alternative exists, in this case the red bus. Thus, the logit model predicts the probabilities of each alternative: P_{car} = $P_{blue\ bus}$ = $P_{red\ bus}$ = 1/3. However, in real life it would be expected that the probability of choosing a car to remain the same when a new red bus is introduced because the red bus and the blue are exactly the same. It would be expected that the probability of taking a bus would be split between the two buses when the red bus is introduced. Thus, the probabilities of the car, the blue bus and the red bus are 1/2, 1/4 and 1/4, respectively. In this situation, the logit model overpredicts the choice of two buses. The IIA property is realistic in some situations, but it is clearly inappropriate in many situations (Ben-Akiva and Lerman, 1985). Furthermore, the MNL model is restricted to taste variation among individuals, the correlation in unobserved factors over time, and the correlation in panel data (Train, 2003).

3.2.2.2 Mixed (random parameters) logit model

The mixed logit (ML) model, so-called multinomial mixed logit model, or random parameters logit, differs from the multinomial (MNL) model in that it assumes one or some of the parameters are random, following a certain probability distribution. The choice probability of the ML is shown as

$$\text{Prob}(choice_{ns} = j \mid \mathbf{x}_{nsj}, \mathbf{z}_n, \mathbf{v}_n) = \frac{\exp(V_{nsj})}{\sum_{j=1}^{J_{ns}} \exp(V_{nsj})} \quad ; \quad j = 1, \ldots, J \qquad \text{Eq.3-7}$$

where:

$$V_{nsj} = \boldsymbol{\beta}'_n \mathbf{x}_{nsj}$$

$$\boldsymbol{\beta}_n = \boldsymbol{\beta} + \boldsymbol{\Delta}\mathbf{z}_n + \boldsymbol{\Gamma}\mathbf{v}_n$$

$\mathbf{x}_{nsj}$ = the *K* attributes of alternative *j* in choice situation *s* faced by individual *n*.

$\mathbf{z}_n$ = a set of *M* characteristics of individual *n* that influence the mean of the taste parameters.

$\mathbf{v}_n$ = a vector of *K* random variables with zero means, known variances and zero covariances.

The observed part is represented by the term $\Delta \mathbf{z}_n$, while the unobserved part is reflected in the term $\Gamma \mathbf{v}_n$. The parameters to be estimated are the constant vector, $\boldsymbol{\beta}$, the K×M matrix of the parameters $\boldsymbol{\Delta}$, and the non-zero elements of the lower triangular Cholesky matrix, $\boldsymbol{\Gamma}$.

The mixed logit (ML) model is highly flexible and can estimate any random utility model (McFadden and Train, 2000). The ML model can tackle the limitations of the MNL model by allowing for random taste variation, unrestricted substitution patterns, and handling correlation in unobserved factors over time and panel data (Train, 2003). The panel data is the pattern of repeated choices (different situations) by each respondent resulting from the choice experiment (further discussed in section 3.3). Therefore, this study applies the ML model to analyse the choice behaviour of customer shopping trips.

3.2.3 Attributes, characteristics and their measurement

Store image attributes and consumer characteristics to be examined in this study are according to the conceptual model. The store image is the stimulus in the S-O-R model. The dimensions and components of store image are dependent on the purpose of the study. From the literature, most scholars agree that store image is typically multi-dimensional. The dimensions and components to measure store image in this study are derived from the prior studies by Lindquist (1974), Oppewal and Timmermans (1997), Tat Keh and Wei Teo (2001), the recent studies on the Thai market by Gorton et al. (2011), Kelly et al. (2015) and Vilaisai and Chaipoopirutana (2017). These attributes are validated through face-to-face in-depth interview with 20 customers. The store image attributes are grouped into five dimensions with eight components as shown in Table 3-2.

Table 3-2: Dimension and components of store image in this study

Dimension	Components
Merchandise	Product quality, price, a range of products
Convenience	Travel time, accessibility
Service	Customer service/friendliness
Store atmosphere	Overall customer perception of store atmosphere
Institutional	Retailer reputation

Next, the socio-demographic characteristics of consumers are the organism in the proposed conceptual S-O-R model. Consumer characteristics, including gender, age,

household size, children in the household, elders in the household, household income, educational level, car availability, residential area of consumers, will be inspected. To measure these factors, socio-demographic variables will be self-identified by customers. First, the eight store image attributes consisting of product quality/freshness, price, customer service levels/friendliness of staff, ease of access/parking, store appearance/atmosphere, a range of products, travel time, and retailer reputation, are rated using a five-point Likert scale (where 1 equals least important and 5 equals most important). To specify the frequency of visits and amount of spending, respondents fill in the answers by themselves. Finally, a choice experiment is set up. It consists of the combination of eight attributes with two to three levels (further described in section 3.3) and respondents are asked to identify the preferred choice among three agglomeration and non-agglomeration retail formats: TAF, MAF and NAF.

3.2.4 Situational influences

This study will focus on a shopping situation that is operationalised by regular shopping trips for groceries for two reasons. First, these trips represent the majority of shopping trips for grocery products (IRI, 2006). Second, this study does not intend to examine a special purchase shopping trip or a quick shopping trip (Kollat and Willett, 1967, Frisbie, 1980, Kahn and Schmittlein, 1992). In addition, groceries are specified in the study because (1) they are staples, which are bought at regular intervals or during day-to-day life (Ho, 2005), (2) a grocery shopping trip accounts for the majority of shopping frequency (Marjanen, 2000) and the largest regular repeated purchase (Ho, 2005), and (3) grocery shopping expenditures are considered to be an accurate predictor of consumer patronage (Sullivan and Savitt, 1997).

Regular vs. quick shopping trips are commonly differentiated by (1) behavioural measures of the size of the shopping bill, amounts of money spent, or the inter-shopping interval and (2) self-reported assessment. For example, Popkowski Leszczyc and Timmermans (1997) defined a quick shopping trip as that with less than $7.50 being paid and less than four days having passed since the last trip. IRI described quick shopping trips as trips to meet an immediate need and typically with purchases of one to three items valued at less than $10 (IRI, 2006). To differentiate between regular and quick shopping trips, several researchers (e.g. Kahn and Schmittlein, 1989, Nordfalt, 2009) have found that the results obtained by using the amount of money spent or inter-shopping interval as cut-off criteria were considerably different from the results of face validity. This study will apply self-reported assessment to differentiate between regular and quick shopping trips, as also practised by a number of researchers (e.g. Walters and Jamil, 2003).

3.2.5 A choice set

A *'choice set'* is the set of alternatives which an individual must have considered. Train (2003) notes that three characteristics are required as follows:

- the alternatives must be *'mutually exclusive'* from the point of view of decision makers, in the context of customers;
- the choice set must be *'exhaustive'*; and
- the number of alternatives must be *'finite'.*

Hensher et al. (2005) propose a two-stage process to set up the choice set. The first stage is to define the universal but finite list of alternatives available to decision makers within the context being studied. The second stage is to reduce the number of alternatives to a manageable size without violating the global utility maximising assumption as described in section 3.2.2. They suggest a practical approach to lessen the number of alternatives by excluding *'insignificant'* alternatives.

The choice set is a set of store formats occurring in both rural and urban areas. A store format, which is insignificant in the choice set accounting for a small market share, is removed from the choice set according to Hensher et al. (2005). The prevalent formats in rural areas consist of fresh/periodic markets (TAF), and small independent stores (NAF) e.g. mom-and-pop stores, and mobile stores (Banwell et al., 2012). However, the key retail format for people in rural areas is fresh markets. There are several features of fresh markets that hypermarkets or supermarkets cannot replicate. USDA (2004) states that most Thai consumers, particularly those who live upcountry, still visit fresh markets to buy their fresh food products. It also reports that they shop and eat at fresh markets, and often buy small amounts of mainly fresh foods daily at affordable prices. However, people in rural areas have become more accustomed to urban-style living (Banwell et al., 2012); some of them regularly do shopping outside their local community (outshopping), particularly at hypermarkets (MAF). According to the USDA (2004), Thai consumers have moved to modern and large retail formats (MAF) which provide convenience, one-stop shopping, and large parking areas, as well as a better variety and cheaper products.

In an urban area, a wide variety of store formats can be found, such as fresh markets, mobile markets, convenience stores, supermarkets, hypermarkets, etc. (Feeny et al., 1996, Gorton et al., 2011). Nevertheless, the main store formats for grocery shopping trips are similar to those of the rural area. Therefore, the main store formats for shoppers in both rural and urban areas are fresh markets (TAF) and modern large store formats (MAF).

In this research, the main purpose is to examine the effect of store image attributes and customer characteristics on store agglomeration formats choice for outshopping. To investigate this effect, this study examines the attributes and level of each store agglomeration format. The literature shows that the main store formats for both rural and urban areas include the fresh/periodic market which represents a TAF, and the shopping mall/hypermarket which represents a MAF. The existing NAF varies from mom-and-pop stores, to mobile stores, and speciality stores, etc.

A NAF should be included in the choice set as one of the alternatives in the model because removing the main alternative in the choice set will violate the global utility maximising assumption (Hensher et al., 2005). A non-agglomeration format (namely, a new community store format) is proposed and other attributes and levels of this format, such as product range, customer service, and a retailer reputation etc., will be examined in order to understand their effect on store format choice. Thus, the choice set of the store formats in this study includes: (1) traditional agglomeration retail format (TAF), i.e. a fresh/periodic market; (2) modern agglomeration retail format (MAF), i.e. a shopping mall/hypermarket; (3) non-agglomeration retail format (NAF), i.e. a new community store. These three formats will be examined in the model.

3.3 Choice experiments

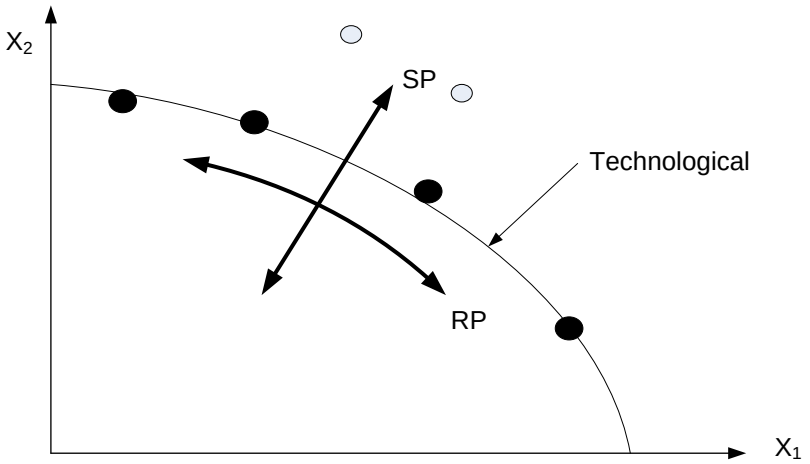
A choice survey often uses a specific type of experimental design called a *'choice experiment'*. It is frequently used to collect data for the development of a choice model. Choice experiment uses a technique, namely the stated preference (SP) technique, to collect data. As choice experiment is derived from consumer response under (quasi-) laboratory situations, it allows researchers to examine scenarios that are not readily observed in the market (Popkowski Leszczyc and Timmermans, 2001). Choice experiments closely mimic the behaviour being studied (Louviere, 1988). SP data characteristics are typically as follows (Louviere et al., 2000):

- describe hypothetical or virtual decision contexts (flexibility);
- control relationships between attributes, which permits the mapping of utility functions with technologies different from existing ones;
- can include existing and/or proposed and/or generic (i.e. unbranded or unlabelled) choice alternatives;
- cannot easily (in some cases, cannot at all) represent changes in market and personal constraints effectively;
- seem to be reliable when respondents understand, are committed to, and can respond to tasks;

- (usually) yield multiple observations per respondent at each observation point.

In contrast, a non-choice experiment, also called a revealed preference (RP) survey can be collected by existing market, or actual data. RP data generally help researchers understand preferences within an existing market and technology structure, while SP data provide insights into problems involving shifts in technology frontiers, as shown in Figure 3-2. RP data have typical features as follows (Louviere et al., 2000):

- depict the world as it is now (current market equilibrium);
- possess inherent relationships between attributes (technological constraints are fixed);
- have only existing alternatives as observables;
- embody market and personal constraints on the decision maker;
- high reliability and face validity;
- yield one observation per respondent at each observation point.



Source: Louviere et al. (2000)

Figure 3-2: The technological frontier and the roles of RP and SP data

The SP technique has a major advantage in circumstances where the product is not traded in the real market, when organisations need to estimate demand for new products with new attributes or features (Louviere et al., 2000), and when researchers need to estimate the change in consumers' perception of store attributes from an existing status (Solgaard and Hansen, 2003). In the marketing context, choice experiment is used to inspect a particular marketing strategy or a particular product, such as examining a shopping strategy (Popkowski Leszczyc and Timmermans, 2001), and evaluating an in-store event (Sands et al., 2009). Another advantage is that the SP technique leads to increasing the efficiency of data collection, because each individual can respond to a number of different hypothetical choice situations (Bradley, 1988).

RP data will not be a problem if the market being studied has a stable market equilibrium, without the possibility of new entrants, coupled with no possibility of innovative behaviour (Hensher et al., 2005). Hensher et al. (2005) define *'new entrants'* as *'new firms or new products/brands, equate to new alternatives within a market with possible impacts on choice behaviour through competition'. 'Innovative behaviour'*, possibly from both existing competitors or new entrants, '*suggests new attribute levels and possibly even new attributes being introduced to the market that may potentially impact upon choice behaviour'*.

RP data from real markets have high reliability and face validity; the data are particularly well suited to short-term forecasting of small departures from the current state of affairs (Louviere et al., 2000). However, their characteristics make RP data quite inflexible, and often inappropriate, if researchers wish to forecast to a market other than the historical one. Louviere et al. (2000) argue that SP data from choice experiments can capture a wider and broader array of preference-driven behaviour than RP. Another benefit is the richness in attribute trade-off information because wider attribute ranges can be built into experiments which, in turn, allows models estimated from SP data to be more robust than models estimated from RP data (Swait et al., 1994).

The SP technique assumes that consumers will response honestly regarding what they think and what they intend to perform. It may be suspected that consumers may not do (actual behaviour) what they have said (intention). Several psychological studies have supported the assumption that intention is closely related to behaviour (Ajzen, 1991, Ajzen, 1985, Ajzen, 2005, Campbell and Fairhurst, 2016), i.e. individuals tend to perform corresponding to their intentions; however, individuals' intentions are dynamic and could change over time.

In this research, the main purpose is to examine the effect of store image attributes and customer characteristics on retail agglomeration formats for outshopping. To investigate this effect, this study examines the attributes and level of each store agglomeration format. Retail attributes and levels to be tested do not exist in the current market, such as national reputation of TAF or excellent atmosphere of TAF, etc. To examine such attributes and levels, the SP technique is the most suitable option. Thus, this study uses the SP survey technique to collect data.

3.3.1 Sources of error in SP data

Errors are the deviation between the observed mean value and the true mean value in the population. Generally, there are two main kinds of error (Malhotra and Birks, 2007). The first is random sampling error, which occurs because the selected samples are an

imperfect representation of the population. The second type is non-sampling error, which is not caused by sampling. The random sampling error can be reduced by increasing the sample size; however, increasing the sample size does not guarantee that it will make the samples more representative of the population, if the samples do not happen randomly. When the error is systematic in nature; it is called bias.

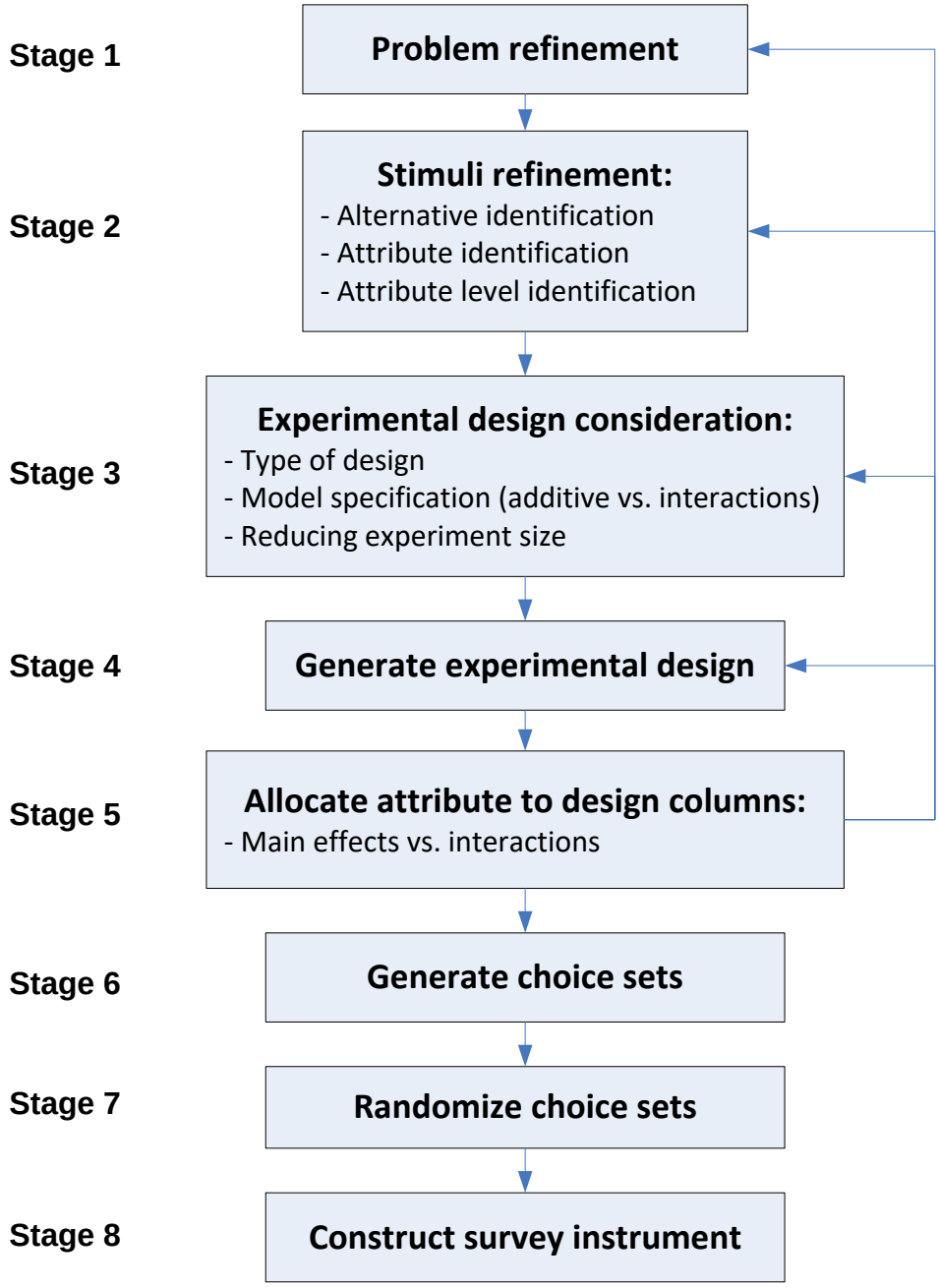
Several sources of bias in SP data need to be considered when the SP technique is applied. The most significant is probably the design and presentation used in the SP exercise because this bias gives misleading results (Widlert, 1998, Bates, 1998, Jaensirisak, 2002). A key reason for the problem is that respondents tend to simplify the task, so some factors are often ignored. This problem normally arises in complex SP tasks. Thus, the SP design needs to be concerned with the number of attributes and levels, the number of alternatives, and how to present the attributes to a respondent.

Another source of error is unreliable data due to 'wrong' answers from respondents (Swanson, 1998, Jaensirisak, 2002). The wrong answers may be given deliberately for various reasons, such as policy response bias (respondents try to influence the policy of the studies), affirmation bias (respondents alter the response according to the objective of the study), habit or *status quo* bias (respondents tend to select the alternative that sticks with what they have), and rationalisation bias (respondents give another response so that it seems rational to them). Respondents may also unintentionally provide the wrong answers. For instance, respondents do not fully understand the SP task and/or they may be fatigued due to the complex SP exercise, respondents may not consider all related constraints on their choices (unconstrained response bias), respondents may sort the choices by one variable because the task is too complicated or such a variable is more significant for them than other variables (lexicographic answer), and respondents may face difficulties to decide on their behaviour (ability to report behaviour).

All sources of error need to be thoughtfully dealt with when the SP experiment is designed. The following section will describe the methods used in setting up the stated choice experiment in order to minimise the errors. Nevertheless, some errors arise naturally when the SP is carried out. Taste variations among individuals (heterogeneity) and repeated measurement commonly occur (Train, 2003). Taste variations among respondents can be coped with by using the logit model, by adding alternative specific variable(s) (usually customer characteristics) into the utility function, whereas the repeated measurement effect does not significantly affect values of coefficients in the logit model, and only has a small effect in reducing the significance of variables in the model (Jaensirisak, 2002).

3.3.2 Set up a stated choice experiment

Hensher et al. (2005) suggest a process to set up a stated choice experiment as shown in Figure 3-3. The details are described in the following stages.



Source: Hensher et al. (2005)

Figure 3-3: The experimental design process

3.3.3 Stage 1: problem definition refinement

This study focuses on the development of retailers in rural areas. It attempts to answer the question of **what form of retailers** should be developed in rural areas. It advances the previous work by explicitly studying the role of store agglomeration. To examine the

role of the store agglomeration, this study attempts to identify store image attributes and customer characteristics that impact on retail agglomeration format choice. It tries to answer the question **which store image attributes and customer characteristics** affect retail agglomeration format choice for a regular grocery outshopping trip.

Thus, the research questions are set up as follows:

RQ1: What form of retailers can reduce regular grocery outshopping trips from rural to urban areas?

RQ2: Which store image attributes and customer characteristics affect retail agglomeration format choice for a regular grocery outshopping trip?

To answer the research questions, retail format choice models are built to determine the solutions.

3.3.4 Stage 2: stimuli refinement

First, the choice set identification has already been described in section 3.2.5. It consists of three store formats: TAF i.e. a fresh/periodic market, MAF i.e. a shopping mall/hypermarket, and NAF i.e. a new community store. The second step is to identify attributes and attribute levels of these three alternatives. The proposed attributes consist of eight attributes according to the store image as the stimuli in the S-O-R model. If too many attributes are presented in the SP exercise, respondents may ignore some attributes to simplify the task (Fowkes and Wardman, 1988, Bates, 1998). Pearmain and Kroes (1990) recommended six or seven per task, and less if the attributes are uncommon to respondents. Orme (2010) suggested that attribute descriptions should be concise statements with concrete meaning and to avoid using range to describe a single level of an attribute.

Attribute levels must be mutually exclusive and should cover as large a range as possible for relevant existing products, also products that may not exist in the market but that need to be investigated (Orme, 2010). The attribute levels are usually identified within the extreme ranges (end-points) and must be as realistic as possible. The attribute levels can be simulated interpolation and extrapolation. Interpolation is likely to give tolerable results, but extrapolation tends to make an error (Orme, 2010). Hensher et al. (2005) noted that three attribute levels provide sufficient knowledge of a good approximation of the true underlying utility function. The variation of attribute values across scenarios needs to be large enough for respondents to trade-off, otherwise they may be ignored. For most purposes, Orme (2010) suggested attribute levels should not have more than five

levels. Louviere et al. (2000) proposed a technique to reduce the number of levels by identifying only two extreme points. However, this method is useful only if researchers believe that a linear relationship exists amongst the part-worth utilities or if the researcher is using the experiment as an exploratory tool. In addition, the number of levels should be balanced across attributes, but several situations indicate some attributes have more levels than others. Orme (2010) also suggested the task should mimic reality rather than balance the number of levels. The attributes and their levels to be examined are shown in Table 3-3.

Table 3-3: The store image attributes and their levels

Store image attributes	Store formats		
	Traditional agglomerate format (TAF): a fresh / periodic market	**Modern agglomerate format (MAF): a shopping mall / hypermarket**	**Non-agglomerate format (NAF): a new community store**
A range of products	- speciality - large	- speciality - large	- speciality - large
A retailer reputation	- local reputation - national reputation	- national reputation - international reputation	- local reputation - national reputation
Price	- 20% higher - average - 20% lower	- 20% higher - average - 20% lower	- 20% higher - average - 20% lower
Travel time	- 31-60 mins - 16-30 mins - 5-15 mins	- 31-60 mins - 16-30 mins - 5-15 mins	- 16-30 mins - 5-15 mins - 0 min (home delivery)
Product quality / freshness	- low - high	- low - high	- low - high
Store appearance / atmosphere	- unattractive - attractive	- unattractive - attractive	- unattractive - attractive
Customer service levels / friendliness of staff	- low - high	- low - high	- low - high
Ease of access / parking	- difficult - easy	- difficult - easy	- difficult - easy

3.3.5 Stage 3: experimental design consideration

The combination of three alternatives, six attributes with two levels, and two attributes with three levels (as shown in Table 3-3) leads to a large number of profiles (so-called treatments). Therefore, some techniques are adopted to reduce the number of profiles. First, the number of attribute levels can be reduced to two to three levels according to the recommendation by Louviere et al. (2000) and Hensher et al. (2005) as described in Stage 2.

Next, instead of using a full factorial design, a fractional factorial design is applied. That is, profiles are randomly selected from the full factorial design without replacement and the concept of orthogonality is applied to prevent statistically inefficient or suboptimal designs. *Orthogonality* is a mathematical constraint requiring that all attributes be statistically independent of one another (Hensher et al., 2005). The fractional factorial design can dramatically reduce the number of scenarios, while it ensures that the main effects of attributes are independent of the significant interaction effects in order that the main effects are estimated efficiently. Only the main effect is examined because the form of a utility function in the model is linear without interaction terms. Such a design is called an '*orthogonal main effect only design'*. Another reduction technique is known as the blocking design. Blocking is another orthogonal column to the design, the attribute levels of which are used to segment the design (Hensher et al., 2005).

3.3.6 Stages 4 & 5: generate experimental design & allocation of attributes

For an orthogonal main effect only design, the generation of the design (stage 4) and the allocation of attributes to design columns (stage 5) occur simultaneously. To generate this design, SPSS software is employed. Appendix B1 shows an SPSS command to generate the experimental design, the result is given in Appendix B2 and the meaning of orthogonal coding is provided in Appendix B3. A number of studies conducted in several countries and languages show that there is no evidence of increasing random error within 20 profiles (Johnson and Orme, 1996). However, because a number of profiles per respondent are limited, eight to ten profiles per respondent are often employed in practice (Hensher et al., 2005). Besides, Bunch and Batsell (1989) show that a minimum of six respondents per profile is required to satisfy large sample statistical properties. So, the last column in Appendix B2 is a blocking variable that is introduced in order to segment the profile into nine parts, each of which consists of nine profiles (i.e. 81 profiles in total).

To design the response measurement, consumers can be asked to evaluate their preferences towards each profile by ranking, rating, comparing or choosing. A ranking method requires respondents to put in order the preference attribute and level options.

This approach is a more difficult task for a respondent, compared to rating, comparing and choosing (Bates, 1998), and it may not correspond to what the consumer actually does in real life and has been rarely used (Pearmain and Kroes, 1990). As a result, its reliability is questionable (Ortúzar and Garrido, 1991). A rating method requires respondents to grade the perceived benefit on a numbered scale e.g. 5, 7, 10 and 100 point scales. However, it is assumed that respondents will perceive scale spacings as being similar to graphic representation, so preference statements are used as a metric scale. Comparing with paired comparison more closely resembles the shopping environment (Malhotra and Birks, 2007). Paired comparison is useful when the number of alternatives is limited. With a large number of alternatives, the number of comparisons becomes unwieldy. Although these approaches provide rich information, the choosing measurement is more realistic and simpler than rating or ranking methods, because in the real world people express their preferences by choosing one product or another, rather than by rating or ranking them (Sawthooth, 2007). Moreover, discrete choice tasks (choosing) impose no order or metric assumptions on response data and the discrete choice tasks can be used in place of ranking and rating tasks (Louviere, 1988). Sawtooth cited in Swanson (1998) has concluded in favour of the choice-based measurement in that:

- the choice task is closer to what people actually do;
- the option not to choose any alternative offered can be included;
- if aggregate models are estimated it is feasible to estimate interactions;
- it is easy to include product-specific attribute levels;
- it is much simpler than ratings or ranking methods.

The weakness of choice-based measurement is its inefficient method to collect data (Orme, 2010). Respondents must read a considerable amount of information, such as three or four alternatives with three to eight attributes, before giving an answer. The answer shows only the best alternative, and there is no indication of degree of preference. Nevertheless, evidence shows that choice-based measurement became popular in the early 1990s and the most widely used conjoint technique (Sawthooth-Software, 2008). Although more complicated to design and analyse than traditional conjoint tasks, the choice-based measurement closely mimics the purchase process for the products in competitive contexts in the real world (Orme, 2010). Huber (1997) also suggests that the choice-based measurement is most appropriate when consumers make their decisions on the basis of competitive differences among attributes given. Importantly, there are solid statistical models for deriving utility estimated from choice data. Besides, evidence indicates that time for choosing is intensely reduced compared to rating. Specifically, a 9-attribute, 3-alternative choice task took about 30 seconds per

choice, whereas a rating task took about 90 seconds for the whole three alternatives (Orme et al., 1997). Consequently, the choice-based measurement has often been applied in SP studies. Generally, it requires respondents to choose typically among two to three options.

After pilot surveys were conducted from January 2015 to February 2015, the researcher observed that a number of respondents tended to guess the answer after the 4th profile. The reason is that the survey environment in this study may have differed from the literature, e.g. shoppers intercepted while carrying full bags in the hot climate may have been less than fully willing to participate in the survey. So, the number of profiles for each respondent was reduced to four. In addition, small gifts as well as refreshment were offered in a comfortable area for people who took part in the survey. Then it was tested and adjusted until the survey environment became suitable.

3.3.7 Stage 6: generate choice sets

To build a choice model, information on non-chosen alternative(s) needs to be known. A good strategy is to synthesise data from (a) the decision makers, based on their perception of the attribute levels for the non-chosen alternative, and (b) known information, such as socio-demographic characteristics (Hensher et al., 2005). Taking the first profile from Appendix B2, one scenario is produced in Table 3-4. The second column is the current shopping information that will be estimated by respondents themselves. The last three columns are from the profile 1 (treatment combination 1) in Appendix B2.

Table 3-4: An example choice set

Scenario 1				
Store image attributes	**Current store**	**Traditional agglomerate format (TAF): a fresh / periodic market**	**Modern agglomerate format (MAF): a shopping mall / hypermarket**	**Non-agglomerate format (NAF): a new community store**
A range of products	large	speciality	large	large
A retailer reputation	local reputation	local reputation	local reputation	local reputation
Price	average	20% higher	20% lower	average
Travel time	5-15 mins	16-30 mins	16-30 mins	5-15 mins
Product quality / freshness	high	low	low	low
Store appearance / atmosphere	average	unattractive	unattractive	unattractive
Customer service levels / friendliness of staff	high	low	low	high
Ease of access / parking	difficult	difficult	difficult	easy
I would choose…	❑	❑	❑	❑
If I no longer shop at the current store, I would choose…		❑	❑	❑

3.3.8 Stage 7: randomise choice sets

The last column in Appendix B2 is the blocking column. It is assigned the profiles (choice set) that are observed by individual respondents. Each respondent will observe four choice sets and four different decision makers will be required to complete the total

experiment design of 81 choice sets. Decision makers may become bored towards the end of the survey if each decision maker is presented with a large number of choice sets. This may affect the responses of choice sets displayed later in the survey. In practice, Hensher et al. (2005) suggest randomising the choice set shown to decision makers, such that two respondents presented with the same block will observe the same choice sets, but in different orders from one another (i.e. randomised choice sets within blocks).

3.3.9 Stage 8: construct survey instrument

First, respondents will be asked questions about a general shopping trip and the current shopping trip, e.g. the number of trips they made to a store per month, how much they spent on average per trip and evaluation of the current shopping trip. Then they will be asked to indicate the preferred store for each store format in four various scenarios as an SP survey. Finally, they will be asked about the demographics of their households. An example survey form is shown in Appendix C.

The questionnaire can be either written down on paper, programmed into software for computer-assisted personal interviewing (CAPI), or implemented as an Internet survey. Both CAPI and Internet survey are much more flexible, i.e. choice situations can be responsive to earlier responses or automatically tailor-made for each respondent, and this makes the data readily available without human data entry errors. Most stated choice surveys are computer-based (Rose and Michael, 2008). Therefore, CAPI is used to conduct this survey.

3.4 Sampling

A store intercept survey is one of the most widely used market research data-gathering techniques because of low costs and minimum travelling being required by interviewers (Sudman, 1980). With face-to-face interviews, researchers can test visual material such as print or TV ads, package designs, and new product designs which cannot be tested in telephone surveys. Personal interviews can obtain the highest response rates (Mayer, 1974). A store intercept respondent is generally a more frequent shopper compared to a telephone respondent, such that the former may be more knowledgeable about shopping and more able to give relevant information (Bush and Hair Jr, 1985). Additionally, the store intercept method shows accuracy with less distortion in responses, compared to telephone interviews (Bush and Hair Jr, 1985). Goodman and Remaud (2015) noted that the store intercept survey had several advantages. The responses received align directly to the activity they had just completed. Their activity was directly related to the question they were asked; this assists with the realism and reliability of the responses. The store

intercept survey can increase the response rate because of the perceived relevance of the questions asked in the survey.

Importantly, store intercept surveys allow researchers to collect both SP and RP data. More specifically, SP data are collected by a choice experiment, whereas RP data are collected as current data when exiting a store, which allows a customer to easily recall from a fresher memory about his/her shopping experience. Previous studies suggest that a longer time lag leads to lower reliability (Bateson et al., 1985).

However, the store intercept survey has some disadvantages. It is not suitable for probability sampling which can be better executed by methods such as postal survey, home interview, and telephone interview. The sample is not suitable for direct expansion to the total population, as it is only generalisable to the sub-population of choosers. However, if the sample is drawn by a standard random process within the chooser group, then it is unbiased for the sub-population of choosers (Stopher, 2008). With control for frequency of shopping visits and the use of quota sampling, this weakness can be remedied (Bush and Hair Jr, 1985). Some researchers (e.g. Nordfalt, 2009), however, use a systematic random sampling method, e.g. by interviewing every 10^{th} consumer who is about to exit the store, to alleviate this drawback.

Large stores or shopping centres are surrounded by roads, car parks, or public transport facilities. As a result, customers at different exits are generally of different characteristics. Sampling from only one exit can, therefore, be biased due to the difference of socioeconomic or geographic characters of the sample (Sudman, 1980, Blair, 1983).

Hensher et al. (2005) note that pilot studies should include 30-40 respondents. The pilot study should identify potential problems that may occur at the data collection stage, considering both the survey administration and the instrument itself.

3.4.1 Sampling method

The unit of analysis is a household in a regional city that does grocery shopping regularly. A regional city is chosen for the survey because it consists of both rural and urban areas. First, a stratified random sampling will be employed by dividing the population into urban and rural. As discussed by Louviere et al. (2000), the basis for categorisation can be any characteristics common to the population (e.g. age, income, location, gender etc.) with the exception of choice. Then, a random sample is drawn within each stratum by a simple random sampling of a store format from a list of stores, which is published officially.

To maintain randomness, a systematic random sampling will be utilised by intercepting each household representative every, e.g. 10th consumer, who is about to exit the store. This number is, however, adjusted to suit each store location.

The interviews were conducted at all exits of a sampled store, and the time of sampling was varied to include both weekdays and weekends. A pilot survey was conducted with 40 respondents according to a recommendation by Hensher et al. (2005).

In addition, the dimensions and components to measure store image in this study are derived from the prior study by Lindquist (1974), Oppewal and Timmermans (1997), Tat Keh and Wei Teo (2001) and the recent studies on Thai market by Gorton et al. (2011), Kelly et al. (2015), and Vilaisai and Chaipoopirutana (2017) are validated through face-to-face in-depth interview with 20 customers.

The sample size will be calculated by equation Eq.3-8, and applied to establish the minimum total sample size and subsequent partition into a number of samples for each stratum. The minimum sample size is defined as:

$$n \geq \frac{q}{pa^2}\left[\Phi^{-1}\left(1-\frac{\alpha}{2}\right)\right]^2 \qquad \text{Eq.3-8}$$

where p represents the true choice proportion of the population. q is defined as 1-p and $\Phi^{-1}\left(1-\frac{\alpha}{2}\right)$ is the inverse cumulative distribution function of a standard normal taken at $\left(1-\frac{\alpha}{2}\right)$. a is the level of allowable error, and α is a level of significance. In addition to the above equation, Hensher et al. (2005) note that the best strategy for choice-based sampling is a minimum sample size of 50 decision makers choosing each alternative. Orme (2010) suggests that sample sizes generally range from 150 to 1,200 respondents. However, for robust quantitative research, he recommends a minimum of 300 respondents when one does not intend to compare sub-groups. If the objective of the study is to compare groups of respondents and detect significant differences, the sample sizes of each group should be at least 200 per group.

The chosen city for this study is Nakhon Ratchasima province which is one of the regional cities in north-eastern Thailand. It consists of 2,600,000 people (around 830,000 households) and about 75% of the total population live in a rural area. According to Gorton et al. (2011), average percentage of spending by types of retail outlet is shown in Table 3-5. The market shares of fresh products by fresh markets, hypermarkets, and others are

about 57%, 36% and 7%, whereas those of packaged goods are 30%, 60% and 10% respectively.

Table 3-5: Percentage spent by type of store format and product categories

Product categories	Store format		
	Fresh market (TAF)	Hypermarket (MAF)	Others
Fresh fruit and vegetables	55.5	36.8	7.6
Fresh meat	53.4	40.3	6.1
Fresh fish	62.4	31.0	7.1
Packaged goods	30.1	59.9	10.0

Source: Gorton et al. (2011)

The extreme values from the figures in Table 3-5 for main store formats (30% for TAF, i.e. fresh market and 60% for MAF, i.e. modern large store) are calculated according to the sample size as shown in Table 3-6. As a result, the total sample consists of 1,152 households, with 288 living in urban areas and 864 in rural areas.

Table 3-6: Strata sample sizes for households in urban and rural areas

Main store formats	p	a	q	$\left[\Phi^{-1}\left(1-\frac{\alpha}{2}\right)\right]^2$	N	R	$\frac{N}{R}$	Households	
								Urban	Rural
TAF: fresh market	0.30	0.05	0.70	3.84	3,585	4	896	224	672
MAF: modern large store	0.60	0.05	0.40	3.84	1,024	4	256	64	192
Total	-	-	-	-	4,609	-	1,152	288	864

3.5 Model Building

3.5.1 Model estimation

Generally, maximum likelihood estimation is used to solve complex problems involving the simultaneous estimation of a number of parameters. It has been a popular method of

model estimation due to its robustness and ability to deal with complex data (Hensher et al., 2005). The parameters in MNL models are also estimated using the maximum likelihood estimation. The likelihood function (*L*) is written as:

$$L_{NS}(\beta) = \prod_{n=1}^{N} \prod_{s \in S_n} \prod_{j \in J_{ns}} (P_{nsj})^{y_{nsj}} \qquad \text{Eq.3-9}$$

where:

j = alternative *j*, i.e. TAF, MAF, or NAF.

β = the parameters to be estimated.

N = the number of decision makers.

S_n = the set of choice situations faced by decision maker *n*.

y_{nsj} = 1 if customer *n* chose alternative *j* for choice situation *s*, and = 0 otherwise.

P_{nsj} = the function of the data and unknown parameters *β*.

The log-likelihood function (*LL*) then becomes:

$$LL_{NS}(\beta) = \ln \left[\prod_{n=1}^{N} \prod_{s \in S_n} \prod_{j \in J_{ns}} (P_{nsj})^{y_{nsj}} \right] \qquad \text{Eq.3-10}$$

The above equation can be rewritten as:

$$LL_{NS}(\beta) = \sum_{n=1}^{N} \sum_{s \in S_n} \sum_{j \in J_{ns}} y_{nsj} \ln P_{nsj} \qquad \text{Eq.3-11}$$

and the estimator is the value of *β* that maximises this function. The maximum likelihood estimation determines the value of *β* that satisfies the first-order derivative with respect to each parameter, where the value of the first-order derivative equals to zero as the following equation:

$$\frac{d\ LL(\beta)}{d\beta} = 0 \qquad \text{Eq.3-12}$$

where:

$\frac{d\ LL(\beta)}{d\beta}$ = a first-order derivative of *LL* over parameter *β*.

McFadden (1974) shows that *LL*(*β*) is globally concave for linear-in-parameters utility. This means that the estimated parameters are the best value in the solution space. In other words, there is no another parameter better than these estimated parameters. These estimators are based on the idea that the values of parameters are most likely to occur for the sampled data. These parameters can be interpreted as relative weights of attributes in the utility function. They can be varied across individuals as random parameters.

The mixed logit (ML) probability is the integrals of standard logit probabilities over a density of parameters, *β*. The probability that respondent *n* in choice situation *s* will choose alternative *j* can be written as:

$$L_{nsj} = \int_{\beta} P_{nsj}(\beta) f(\beta) d\beta \qquad \text{Eq.3-13}$$

where:

$$P_{nsj} = \frac{\exp(V_{nsj})}{\sum_{j=1}^{J} \exp(V_{nsj})} \quad ; \quad j = 1, ..., J$$

$f(\beta)$ = probability density function of *β*.

$d\beta$ = a derivative over parameter, *β*.

The ML probability is a weighted average of the logit formula evaluated at different values of *β*, with the weights given by the density $f(\beta)$. Standard logit is a special case where the term $f(\beta)$ is fixed as $f(\beta)=1$, then the choice probability becomes the MNL. The integrals in the ML equation above do not have a closed analytical form. Researchers often use simulation methods involve taking R draws for each of the *K* random terms or parameters, calculating the choice probabilities for each of the draws, and averaging the probabilities over the draws (Train, 2003). Let $\beta^{(r)}$ denote a *K*×1 vector of parameters associated with draw *r*, *r* = 1,…,*R*. The $\beta^{(r)} = \left[\beta_1^{(r)}, ..., \beta_K^{(r)}\right]$, with corresponding random distributions described by probability density functions. Given data, *X*, the estimate of the choice probability can be illustrated as:

$$L_{nsj} = E(P_{nsj}) \approx \frac{1}{R}\sum_{r=1}^{R} f(\beta^{(r)} \mid X) \qquad \text{Eq.3-14}$$

The simulated *LL* function is then calculated using the expected probability computed from Eq.3-14. The expected likelihood function is maximised based on the simulated draws, where this is referred to as '*simulated maximum likelihood*' (Stern, 1997). Then, the *LL* function becomes:

$$LL(E(L_{ns})) = \ln E\left[\prod_{n=1}^{N}\prod_{s\in S_n}\prod_{j\in J_{ns}} (P_{nsj})^{y_{nsj}}\right] \qquad \text{Eq.3-15}$$

Assuming independence between the respondent *n*, and choice situation *s*, the simulated maximum likelihood is as follows:

$$\begin{aligned} LL(E(L_{ns})) &= \ln E\left[\prod_{n=1}^{N}\prod_{s\in S_n}\prod_{j\in J_{ns}} (P_{nsj})^{y_{nsj}}\right] \\ &= \sum_{n=1}^{N}\sum_{s\in S_n}\sum_{j\in J_{ns}} y_{nsj} \ln E(P_{nsj}) \end{aligned} \qquad \text{Eq.3-16}$$

Assuming independence between the respondent *n*, choice situations are correlated, which represents the panel data from the SP survey. The simulated maximum likelihood becomes:

$$\begin{aligned} LL(E(L_{ns})) &= \ln E\left[\prod_{n=1}^{N}\prod_{s\in S_n}\prod_{j\in J_{ns}} (P_{nsj})^{y_{nsj}}\right] \\ &= \sum_{n=1}^{N} \ln E\left(\prod_{s\in S_n}\prod_{j\in J_{ns}} (P_{nsj})^{y_{nsj}}\right) \end{aligned} \qquad \text{Eq.3-17}$$

3.5.2 Independence of irrelevant alternatives (IIA)

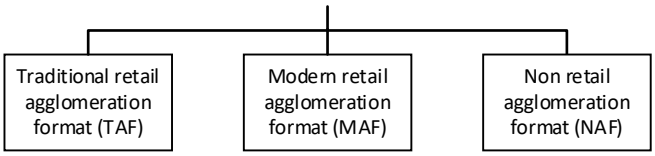
The MNL model has a property called independence of irrelevant alternatives (IIA). This indicates a certain pattern of substitution across alternatives. The IIA property indicates that the ratio of the choice probabilities of any pair of alternatives is independent of the presence or absence of any other alternative in a choice set. A particularly important behavioural implication of IIA is that all pairs of alternatives are equally similar or

dissimilar. To illustrate the IIA property, for any two alternatives *i* and *k*, the ratio of the logit probabilities is:

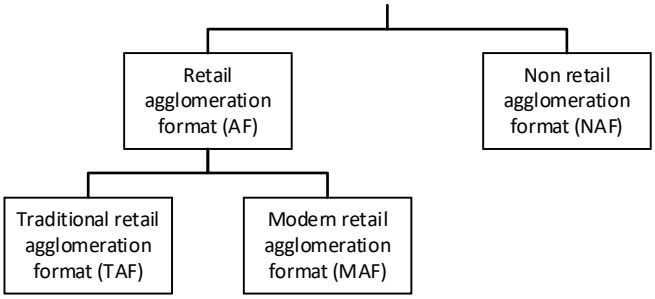
$$\frac{P_i}{P_k} = \frac{\exp(V_i)}{\sum_{j=1}^{J}\exp(V_j)} \div \frac{\exp(V_k)}{\sum_{j=1}^{J}\exp(V_j)} = \frac{\exp(V_i)}{\exp(V_k)} = \exp(V_i - V_k) \qquad \text{Eq.3-18}$$

This ratio does not depend on any alternatives other than *i* and *k*. That is the relative odds of choosing alternative *i* over *k* are the same no matter what other alternatives are available. The IIA property is realistic in some situations, but is clearly inappropriate in others (Ben-Akiva and Lerman, 1985).

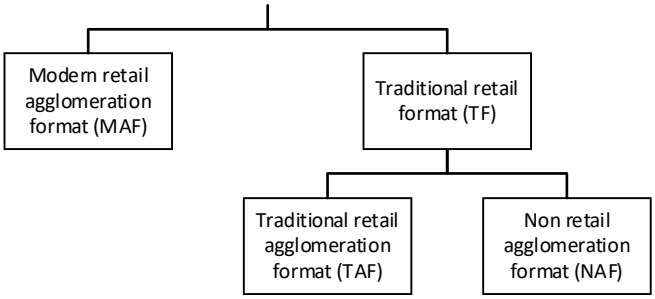
The first discrete choice model that tried and accommodated violations of IID/IIA was known as the *'nested logit model'* (Hensher et al., 2005), as shown in Figure 3-4. It is also referred to as a hierarchical logit. The nested logit model recognises the possibility that each alternative may have information in the unobserved influences of each alternative that has a role to play in determining a choice outcome that is different across the alternatives. That is specific alternatives have different error distributions (ε_j). It is possible that the information may be the same among subsets of alternatives and some amount of correlation may exist among pairs of alternatives. The nested logit model represents a partial relaxation of the IID and IIA assumptions. More advanced models such as the mixed logit model, also relax the IID assumption in terms of the covariances.



(a) Multinomial Logit Model



(b) Nested Logit Model (Form 1)



(c) Nested Logit Model (Form 2)

Figure 3-4: Multimomial logit models and nested logit models

Hausman and McFadden (1984) proposed a specification test for the MNL model to test the IIA assumption. This test is performed in two stages. First, an unrestricted model with all alternatives is estimated and then a restricted model is estimated. The test is known as the Hausman-test of the IIA assumption. The test statistic is shown as:

$$q = [\mathbf{b}_u - \mathbf{b}_r]'[\mathbf{v}_r - \mathbf{v}_u]^{-1}[\mathbf{b}_u - \mathbf{b}_r] \qquad \text{Eq.3-19}$$

Where:

$\mathbf{b}_u$ = a column vector of parameter estimates for the unrestricted model.

$\mathbf{b}_r$ = a column vector of parameter estimates for the restricted model.

$\mathbf{v}_u$ = a variance-covariance matrix for the unrestricted model.

$\mathbf{v}_r$ = a variance-covariance matrix for the restricted model.

3.5.3 Elasticity and marginal effects

Elasticity is defined as a measure that describes the relationship between the percentage change for a variable (i.e. an attribute or a customer characteristic) and the percentage change in the quantity demanded, while other variables are unchanged. There are two types of elasticities: direct elasticities and cross-elasticities. Louviere et al. (2000) defined them as follows: 'A direct elasticity measures the percentage change in the probability of choosing a particular alternative in the choice set with respect to a given percentage change in an attribute of that same alternative. A cross elasticity measures the percentage change in the probability of choosing a particular alternative in the choice set with respect to a given percentage change in a competing alternative.' Two main methods of calculation are arc elasticity and point elasticity. The direct point elasticity for the multinomial and mixed logit model is given as

$$E_{X_{ikn}}^{P_{in}} = \frac{\partial P_{in}}{\partial X_{ikn}} \times \frac{X_{ikn}}{P_{in}} \qquad \text{Eq.3-20}$$

where:

i = alternative i.

n = customer n.

k = attribute k.

X_{ikn} = an explanatory variable k of alternative i for customer n in the utility function.

P_{in} = the probability of customer n choosing alternative i.

$E_{X_{ikn}}^{P_{in}}$ is interpreted as the elasticity of the probability of alternative i for customer n with respect to a marginal change in the attribute k of the alternative i, as observed by customer n. Louviere et al. (2000) simplify the above formula into the direct-point elasticity as

$$E_{X_{ikn}}^{P_{in}} = -\beta_{ik} X_{ikn} (1 - P_{in}) \qquad \text{Eq.3-21}$$

and the cross-point elasticity as

$$E_{X_{jkn}}^{P_{in}} = -\beta_{jk} X_{jkn} P_{jn} \qquad \text{Eq.3-22}$$

To calculate sample elasticities, Hensher et al. (2005) suggest calculating the elasticity for each individual customer and weighting each individual elasticity by the customer's associated choice probability, known as 'probability weighted sample enumeration'.

The arc elasticity is determined by an average of the before- or after-change values as the following formula:

$$E_{X_{ikn}}^{P_{in}} = \frac{\partial P_{in}}{\partial X_{ikn}} \cdot \frac{\overline{X}_{ikn}}{\overline{P}_{in}} \qquad \text{Eq.3-23}$$

Unlike elasticity, a marginal effect is not described as percentage changes. The marginal effect is expressed as unit changes, i.e. the interpretation of the marginal effect for a choice is the change in probability, given a unit change in a variable, while other variables are unchanged. Similar to elasticity, the marginal effect can be represented as direct and cross marginal effects. Direct marginal effects represent the change in the choice probability for an alternative, given a one-unit change in an interesting variable, and this variable belongs to that same alternative, on the condition that other variables are unchanged. Cross marginal effects represent the change in the choice probability for competing alternatives, given a one-unit change in an interesting attribute, and that attribute does not belong to that alternative, while other attributes are unchanged.

It is possible to determine the elasticities for categorical variables, but the result is meaningless. Unlike elasticity, the marginal effect works with categorical coding. The result can be interpreted and makes sense. For instance, a one-unit change in the gender variable (a dummy code of zero and one represents male and female) represents the change in choice probabilities, given a change from male to female (or vice versa).

The direct marginal effect for the multinomial and mixed logit model can be shown as the following formulae:

$$M_{X_{ikn}}^{P_{in}} = \frac{\partial P_{in}}{\partial X_{ikn}} \qquad \text{Eq.3-24}$$

$$M_{X_{ikn}}^{P_{in}} = [1 - P_{in}]\beta_{ik} \qquad \text{Eq.3-25}$$

The cross marginal effect becomes:

$$M_{X_{jkn}}^{P_{in}} = -\beta_{jk} P_{jn} \qquad \text{Eq.3-26}$$

Similarly to elasticity, to calculate the sample marginal effects, Hensher et al. (2005) suggest calculating the marginal effect for each individual customer and weighting each individual marginal effect by the customer's associated choice probability.

3.5.4 Reliability and validity

3.5.4.1 Reliability

In a marketing context, reliability is the extent to which a measurement reproduces consistent results if the process of measurement were to be repeated (repeatability) (Malhotra and Birks, 2007). In an SP survey, reliability means the SP experiment provides the same results independently of the task format used, or the specific combination of attribute levels chosen. Reliability is essential; if the procedure is not reliable then it cannot be valid. The reliability should be examined in line with the validity. Huber (1997) noted that the different experiment formats give different results because each of them measures different things; the results are also different even if using the same method in different contexts. He explained several typical processes when respondents exercised the SP task. First, they usually looked for dominating, easy choices. If they did not find the dominating alternative, they checked to see if they could exclude any of these alternatives. When the alternative was simplified to two, they skimmed through the important attribute differences and then finalised a preferred choice. Due to this simplification, the reliability is questionable. In some cases, the repeated choice with the same alternatives (five attributes, and four alternatives) was selected only from 70%-80% (Huber et al., 1993).

There are a number of different reliabilities: reliability over time, reliability over stimulus set, reliability over attribute set, and reliability over data collection procedure (Bateson et al., 1985). First, reliability over time asks whether the results are the same at a different point in time, when measures are taken and repeated with the same individual and the same measurement instrument. Second, reliability over stimulus set asks whether the results are the same if a different set of stimuli or profiles are performed. Third, reliability over attribute set asks whether the utilities for a given set of attribute levels are the same if these attribute levels are included in a study with other attributes or levels in the stimuli. Finally, reliability over data collection procedure asks whether the results are the same if a different data collection procedure is applied.

In this study, however, because time and budget are limited, the reliability of the SP task cannot be measured directly. More specifically, the study cannot perform a repeat response with the same survey instrument in different periods of time. It can scarcely perform reliability over stimulus set, reliability over attribute set, and reliability over

data collection procedure. Instead, internal consistency reliability is used to measure the reliability indirectly. Cronbach's coefficient alpha is the most commonly accepted formula for assessing the reliability of a measurement scale with multi-point items, so, it is used to measure the internal consistency reliability. In doing so, the respondents are asked to rate the importance of store image attributes using a five-point Likert scale (where 1 equals least important and 5 equals most important). The Cronbach's coefficient alpha assesses the reliability of a summative rating scale composed of the variables specified. A scale is simply the sum of the individual item scores, reversing the scoring for statements that have negative correlations with the factor being measured.

Previous studies found that the reliability of conjoint measurement is generally high; the Pearson correlation of test/retest reliability is approximately 0.85 in some studies (Rao, 2014). In addition, the paired comparison method (SP task-like) indicated the highest reliability compared to the full profile method and the trade-off method (Reibstein et al., 1988).

3.5.4.2 Validity

In the marketing context, validation is the extent to which a measurement represents characteristics that exist in the phenomenon under investigation (Malhotra and Birks, 2007). To validate the discrete choice models, for the first step, goodness-of-fit and hypothesis testing are employed. The next section will describe details of how to perform this validation. Then in the second step, internal validity and external validity are performed.

'Internal validity' refers to the ability of a choice model or market simulator to accurately predict some additional choice question not used in the estimation of part-worth utilities, such as a hold-out question. The *'hold-out test'* suggested by several scholars (e.g. Swanson, 1998, Green and Srinivasan, 1978) is often applied. Specifically, respondents are asked to perform the additional choice experiment tasks, but these data are not used in the stage of calibrating the model. Such data are treated as external to the model and will be tested for the difference between the model results and the actual customer responses. Orme (2010) reported that respondent's hold-out choices can usually be predicted with a hit rate of approximately 75-85%. This study will perform the internal validity using the hold-out test.

'External validity' refers to the ability of a choice model or market simulator to accurately predict some outcome outside of the realm of the survey, such as a subsequent choice or purchase by an individual, or market shares for a population (Orme, 2010). Several researches have often ignored external validity. External validity has rarely been

tested on real choice behaviour (Louviere, 1988). Comparing model predictions with hold-out data measures, measures of choice intentions, and not actual choices, do not measure external validity. External validity requires the prediction of the model compared to the real choices of real people in real markets. It needs such data to perform external validity. So, external validity is outside the scope of this study. It may be further validation for a future study.

3.5.5 Goodness-of-fit and hypothesis testing

The first test is a *'likelihood ratio test'*. This test compares two different choice models between: (a) the model with estimated parameters and (b) the base model that assumes all parameters are zero. This comparison can be accomplished as

$$-2(LL_{base} - LL_{estimated}) \sim \chi^2_{K-c} \qquad \text{Eq.3-27}$$

where:

χ^2_{K-c} = a chi-squared distribution with the difference in the number of parameters estimated in the model (*K*) and that of the base model (*c*) as degrees of freedom.

The null hypothesis can be expressed as the two models are different. If this value exceeds the critical value of chi-squared with the appropriate degrees of freedom, then the null hypothesis is rejected. Not only is the comparison of the above models applied, but the likelihood (*LL*) test can also be used for the comparison of a restricted model and an unrestricted model, when the models are being developed.

Second, a statistic called the *'likelihood ratio index', ρ^2,* so-called '*McFadden's pseudo* R^2' is used for discrete choice models to indicate the overall model's goodness-of-fit. It measures how well the model fits with the data. This statistic measures how well the model (with its estimated parameters) performs compared to the base model when the parameters are zero (equivalent to no model at all) (Train, 2003). This statistic is defined as

$$\rho^2 = 1 - \frac{LL_{estimated}}{LL_{base}} \qquad \text{Eq.3-28}$$

The ρ^2 is parallel to the R^2 for a linear regression model. However, the ρ^2 is not at all similar in the interpretation of the R^2. R^2 indicates the percentage of the variation in the dependent variable that is explained by the estimated model. The ρ^2 does not provide

intuitive interpretation for the value between zero and one. It is the proportional increase in the log-likelihood function over the values of parameters equal to zero, and it is valid to interpret that the higher ρ^2 fits the data better than the lower ρ^2. Hensher et al. (2005) note that a range for ρ^2 between 0.3 and 0.4 is equivalent to R^2 between 0.6 and 0.8 in a linear regression model. The ρ^2 value tends to be much lower. The values around 0.2 and 0.4 indicate an extremely good fit (Louviere et al., 2000), in particular, for SP studies values of about 0.1 are typical.

Next, in linear regression models, to test the significance of each parameter in the model, $\beta_i = 0$, a *t*-test is performed. For the multinomial and mixed logit model, neither the *t*-test nor *F*-test is available. However, the asymptotic equivalent test, known as the Wald-statistic, is available (Hensher et al., 2005). The Wald-statistic is calculated and interpreted in the same manner as the *t*-test for linear regression models. The Wald-statistic is in the following form:

$$\text{Wald-statistic} = \frac{\beta_i}{\text{standard error}_i} \qquad \text{Eq.3-29}$$

The Wald-statistic helps to determine whether a variable should be in the model, or a variable is statistically significant $(\beta_i \neq 0)$ or not $(\beta_i = 0)$. If the absolute value of the Wald-statistic (the value is equivalent to the *t*-statistic) calculated from the estimated model is less than the critical Wald-value, the null hypothesis $(\mathrm{H}_0: \beta_i = 0)$ cannot be rejected; therefore, the variable is not statistically significant. On the other hand, the Wald-statistic from the estimated model exceeding the critical Wald-value indicates that the variable is statistically significant. Generally, when the Wald-statistic exceeds the critical value at the 95% confidence level or the absolute value greater than 1.96, it is considered to be significant. However, the critical absolute value of a Wald-statistic as low as 1.6 (the 90% confidence level) is sometimes accepted, if the sign is correct and magnitude is reasonable (Jaensirisak, 2002).

Another indicator is the *'percent correctly predicted'* also called the *'hit rate'*. This index is calculated by identifying the highest probability of choosing a particular alternative, and then determining whether or not this was the alternative that the customer actually chose. This index is based on the idea that the consumer is predicted by the researcher to choose the alternative for which the model provides the highest probability. However, Train (2003) advocates using caution with this statistic because it incorporates a notion that is opposed to the meaning of probabilities and the purpose of specifying choice probabilities. The researcher has only enough information to state the probability that

the customer will choose a particular alternative. As a result, this statistic will be applied to the internal validation only, i.e. the comparison of the model results from choosing the highest probability alternative and the customers' responses from hold-out data.

3.6 Chapter summary

This chapter focuses on the methodology to develop the choice models in order to investigate the effects of store image attributes and customer characteristics on retail agglomeration format choice. First, several retail patronage modelling approaches are described. A discrete choice model and its justification are presented. The discrete choice model is described along with the random utility theory followed by the multinomial logit model and its limitations. The mixed logit model is used to develop the retail agglomeration format choice model. The choice set of the store formats consists of: (1) traditional agglomeration retail format (TAF), i.e. a fresh/periodic market; (2) modern agglomeration retail format (MAF), i.e. a shopping mall/hypermarket; (3) non-agglomeration retail format (NAF), i.e. a new community store.

Next, several sources of bias in SP data need to be considered when the SP technique is applied. A choice experiment is constructed in order to minimise the errors. It is set up using the SP survey. The SP is offered because there are attribute levels such as the national reputation of TAF or excellent atmosphere of TAF and a new community format (NAF) which are not in the current market. The unit of analysis is a household in a regional city that does grocery shopping regularly. The stratified random sampling divides the population into an urban area and a rural area. Then, a random sample is drawn within each stratum by a simple random sampling in a store format. A systematic random sampling is applied by intercepting each household representative in order to maintain randomness. A choice experiment was conducted by SP survey, while other information was obtained from current data from customers who were about to exit the store.

In terms of model building, the parameters in the mixed logit models are estimated using the simulated maximum likelihood. The limitation of the logit model is discussed, which is known as a property called the independence of irrelevant alternatives (IIA). A specification test for the IIA assumption, known as the Hausman-test, is offered. Then, elasticity and marginal effects are discussed so as to examine the effects of store image attributes or customer characteristics on the retail format choice.

Finally, reliability and validity are discussed. Internal consistency reliability is used to measure the reliability indirectly. Cronbach's coefficient alpha is applied. The goodness-of-fit and hypothesis testing are used to validate the discrete choice models. The first goodness-of-fit is a *'likelihood ratio test'*; the second is a statistic called the *'likelihood*

ratio index', ρ^2. The Wald-statistic is used to test the significance of each parameter in the model. Internal validity is performed using the hold-out test.

Chapter 4 Data analysis and results

The total sample consists of 1,521 household representatives. The sample has been examined to understand the data and relationships between variables and to ensure that the data underlying the analysis meet all of the requirements for analytical techniques. Missing data have been checked and cleaned within the same day of data collection. As a result, there are only a few cases of missing data in all variables with the exception of income level. The majority of missing data (51 cases or 3.4% of the total sample) pertain to income level. Nevertheless, nearly half of the missing values are the income generated by students, which is negligible because most students do not regularly generate income themselves. The rest of the missing data can be ignored because it represents less than 10% and the missing data do not occur in a specific non-random fashion (Hair et al., 2010).

4.1 Sample characteristics

The sample (*N*=1521) indicates the majority are females (71.2%) compared to males (28.8%) as shown in Table 4-1 and Table 4-2. These percentages are different from recent Thailand census data which consists of females (49.1%) and males (50.9%). This means that females are responsible for doing shopping in general households which does not differ from other studies, such as in the US grocery market where a majority of females (73%) compared to males (27%) does the shopping (Carpenter and Moore, 2006); in Malaysia over 80% of food shoppers are female (Chamhuri and Batt, 2013); and in China and Taiwan approximately 70% of the respondents who shop at fresh markets are women (Huang et al., 2015, Maruyama and Wu, 2014). The age of respondents ranges from younger than 19 to over 60, with a mode of 20-24 years old. A household size mode is four persons (average 4.1 persons per household), while that of the province and the whole country are three persons (average 2.94 and 2.71, respectively). The different figures indicate that the samples of the households consisting of one or two persons are under collected, whereas those of larger household sizes are over collected. The likely reason is that a smaller household may do less shopping compared to a bigger one and may have a different lifestyle which prioritises spending on other means such as fast/street food due to time constraints.

Income levels are distributed similarly to a bell-curve across the samples, 6.5%, 15.7%, 26.7%, 21.8%, 11.0%, 6.5%, and 11.8% at less than 5,000 baht a month, 5,000-9,999 baht a month, 10,000-19,999 baht a month, 20,000-29,999 baht a month, 30,000-39,999 baht a month, 40,000-49,999 baht a month, and greater than 50,000 baht a month, respectively (one-pound sterling is about 45 Thai baht, using an average exchange rate

between 2015 and 2016). About 20.7% of the sample are shown to have attained less than high-school level education, 35.3% of the respondents have a high school/vocational qualification, and around 44.0% have been studying at colleges/universities or have graduated from them. The data indicate that consumers with a higher educational level tend to shop more than those with a lower educational level. About 40% of the sample live in urban areas, while the rest (around 60%) are in suburban and rural areas. The majority of consumers have at least one personal car (77.6%).

Table 4-1: Sample characteristics comparing to province and country data

Variables	Level	Frequency	Samples	Province data	Thailand data
Members of a household	Average		4.1	2.9	2.7
Gender	Male	437	28.8%	49.4%	49.1%
	Female	1,082	71.2%	50.6%	50.9%
	Total	1,519	100%	100%	100%
Age	<19	292	19.3%	24.1%	24.4%
	20-24	416	27.5%	7.3%	7.6%
	25-29	152	10.1%	7.2%	7.2%
	30-34	142	9.4%	8.0%	8.0%
	35-39	121	8.0%	8.7%	8.3%
	40-44	83	5.5%	8.6%	8.4%
	45-49	103	6.8%	8.3%	8.3%
	50-54	65	4.3%	7.3%	7.4%
	55-59	69	4.6%	5.6%	5.9%
	60+	67	4.4%	14.8%	14.5%
	Total	1,510	100%	100%	100%
Car available	Yes	1,181	77.6%	n/a	n/a
	No	340	22.4%	n/a	n/a
	Total	1,521	100%	n/a	n/a

Table 4-2: Sample characteristics compared to province and country data (cont.)

Variables	Level	Frequency	Samples	Province data	Thailand data
Residence	**Urban**	**609**	**40.1%**	**24.0%**	**34.0%**
	Suburban	**414**	**27.2%**	**76.0%**	**66.0%**
	Rural	**497**	**32.7%**		
	Total	**1,520**	**100%**	**100%**	**100%**
Education	Primary school	184	12.3%	14.7%	16.7%
	Secondary school	124	8.3%	43.0%	31.3%
	High school	395	26.5%	27.3%	37.1%
	Vocational qualification	132	8.9%	6.4%	1.9%
	Undergraduate	597	40.0%	8.6%	11.6%
	Postgraduate	59	4.0%	0%	1.4%
	Total	1,491	100%	100%	100%
Income (baht/month)	<5,000	96	6.5%	n/a	5.9%
	5,000-9,999	230	15.7%	n/a	19.6%
	10,000-19,999	392	26.7%	n/a	28.1%
	20,000-29,999	320	21.8%	n/a	23.0%
	30,000-39,999	162	11.0%	n/a	6.8%
	40,000-49,999	95	6.5%	n/a	6.8%
	50,000+	174	11.8%	n/a	9.7%
	Total	1,469	100%	n/a	100%

4.2 Store image attributes and their satisfaction

The Net Promoter Score (NPS) introduced by Reichheld (2003) is often used to analyse customer satisfaction. The NPS measures the likelihood of recommendation, which fits well with the concepts of customer satisfaction and purchase behaviour (Schneider et al., 2008). Schneider et al. (2008) suggest that the likelihood of recommendation leads to actual recommendation, which results in positive impressions in other potential customers and eventually to new purchases and growth in sales. Originally, the NPS simply

asked "How likely is it that you would recommend our company to a friend or colleague?" The scoring for this answer is often based on a 0 to 10 scale. Respondents who give a score of 9 to 10 are called *'Promoters'*, and are likely to perform value-creating behaviours such as purchasing more, being loyal, and giving positive word of mouth. Those who respond with a score of 0 to 6 are labelled *'Detractors'*, are less likely to be value-creating customers, and may have negative attitude and may even spread negative word of mouth. Responses between 7 and 8 are called *'Passives'*, and their behaviour falls between Promoters and Detractors. The NPS is calculated as follows:

$$NPS = \%\ \text{of Promoters} - \%\ \text{of Detractors} \qquad \text{Eq.4-1}$$

The NPS value greater than 0 implies that the majority of customers are likely to be value-creating customers and may spread positive word of mouth about the retail format. The NPS value less than 0 indicates interprets that most customers may have a negative attitude towards the retail format and may spread negative word of mouth.

This study defines the term *'Attribute Promoter Score'* (APS), which is calculated in the same way as the NPS. However, the APS measures individual attributes, instead of net company scores, such as the NPS. The questions ask respondents to rate the performance of each store image attribute, and the measurement is on a five-point Likert scale (where 1 equals the worst performance and 5 equals the best performance). It assumes that the highest rate of an attribute leads to the most likely recommendation of that store based on such attribute. Close to the NPS, the APS scale of 5 is considered to be *'Promoters'*, the APS scale of 1 to 3 is assigned to *'Detractors'*, and the APS scale of 4 is the *'Passives'*. The implication of APS is the same as that of NPS.

The results of rating important store attributes to choose a typical store for shopping are shown in Table 4-3. It can be said that (a) product quality (4.16) e.g. freshness is the most important factor in store selection, (b) price (3.95) is the second most important factor, and (c) customer service levels (3.91) e.g. friendliness of staff and ease of access (3.89) are the third and fourth factors with somewhat similar importance. Other important factors are store appearance/atmosphere (3.76), range of products (3.70), travel time (3.64), and retailer reputation (3.24), respectively.

Table 4-3: Important store image attributes rating

Store image attributes	Mean	Standard deviation	Rank
Product quality / freshness	4.16	0.897	1
Price	3.95	0.941	2
Customer service levels / friendliness of staff	3.91	0.943	3
Ease of access / parking	3.89	0.995	4
Store appearance / atmosphere	3.76	0.925	5
Range of products	3.70	0.926	6
Travel time	3.64	0.948	7
Retailer reputation	3.24	0.928	8

Remark: a value in the mean column is from a Likert scale (1=least important, 5=most important)

The Attribute Promoter Score (APS) on store image attributes for each store format is indicated in Table 4-4. The respondents indicate that supermarkets and hypermarkets (physically large retail stores, also called supercentres, superstores, or big box stores) provide better product quality/freshness (APS = 20.28% for supermarkets/ hypermarkets) than other store formats do (APS = -41.74%, -66.62%, and -86.46% for fresh markets, convenience store, and mom-and-pop store, respectively). The result also shows that mom-and-pop stores provide the lowest product quality/freshness (APS = -86.46%) compared to other store formats. In terms of price, fresh markets offer the cheapest products (APS = -3.32%) followed by supermarkets (APS = -36.12%), mom-and-pop stores (APS = -40.50%) and, as the researcher expected, convenience stores charge the highest price (APS = -76.36%). Supermarkets and hypermarkets provide the best customer service (APS = 15.04%), while mom-and-pop stores (APS = -65.18%) and fresh markets (APS = -63.55%) are rated low among other store formats. However, mom-and-pop stores are easily accessible by respondents (APS = 19.88%) while supermarkets and hypermarkets (APS = -44.54%) are quite difficult to access or park at. As also expected, supermarkets and hypermarkets (APS = 24.46%) provide better atmosphere and/or appearance compared to others, while mom-and-pop stores are ranked the lowest (APS = -85.78%). In terms of product range, supermarkets and hypermarkets (APS = 50.79%) provide the widest variety, followed by fresh markets (APS = 13.03%), whereas mom-and-pop (APS =

-59.54%) is again ranked the lowest among other retail formats. In contrast, travel time to mom-and-pop stores is rated as the shortest (APS = 59.20%), while supermarkets and hypermarkets take the longest travel time (APS = -73.93%). Finally, also as expected, supermarkets and hypermarkets (mean Likert scale = 2.901) are better recognised by customers as they have a higher degree of internationalisation compared to mom-and-pop stores (mean Likert scale = 1.259) and fresh markets (mean Likert scale = 1.263).

Table 4-4: Attribute Promoter Score (APS) on store image attributes for each store format

Store image attributes	Fresh market	Supermarket /Hypermarket	Convenience store	Mom-and-pop store
Product quality / freshness	-66.62%	20.28%***	-41.74%	**-86.46%**
(1=very bad, 5=excellent)	(3.117)	(4.134)***	(3.420)	**(2.648)**
Price *(1=very expensive,*	-3.32%***	-36.12%	**-76.36%**	-40.50%
5=very cheap)	(3.838)***	(2.809)	**(2.699)**	(3.228)
Customer service levels / friendliness of staff	-63.55%	15.04%***	-22.93%	**-65.18%**
(1=very bad, 5=excellent)	(3.108)	(4.064)***	(3.646)	**(2.991)**
Ease of access / parking *(1=very*	-15.52%	**-44.54%**	-12.66%	19.88%***
difficult, 5=very easy)	(3.499)	**(2.877)**	(3.579)	(4.021)***
Store appearance / Atmosphere *(1=very bad,*	-68.23%	24.46%***	-38.94%	**-85.78%**
5=excellent)	(2.988)	(4.188)***	(3.475)	**(2.617)**
Range of products *(1=very*	13.03%	50.79%***	-14.61%	**-59.54%**
narrow, 5=very broad)	(3.716)	(4.256)***	(3.544)	**(2.835)**
Travel time				
(1=very long time, 5=very short time)	30.81% (4.111)	**-73.93% (2.280)**	21.69% (4.031)	59.20%*** (4.467)***
Retailer reputation	N/A	N/A	N/A	N/A
(1=local, 5=international)	(1.263)	(2.901)	(2.554)	(1.259)

*Remark: a value in bold is the worst rating value, while *** shows the best among store formats; a value is the Attribute Promoter Score; a value in ( ) is a mean in the Likert scale from 1 to 5.*

To analyse customer satisfaction and store image attributes, two dimensions between APS and the ranking of important store image attributes are presented. On the one hand, the APS is categorised into three groups: (1) APS between -100% and -50%, (2) APS between -49% and +49%, (3) APS between +50% and +100%. (1) indicates a more negative attitude and may spread negative word of mouth about the store image attribute; (2) is likely to be passive, neither positive nor negative compared to the first and last groups; (3) is likely to be value-creating customers, such as being loyal, and giving positive word of mouth. On the other hand, the ranking of important store image attributes is grouped into (1) ranking 1 to 3, (2) ranking 4 to 5, and (3) ranking 6 to 8.

The product quality and customer service are the first and second important attributes, see Table 4-5 (ranked 1 to 3), and they exhibit very low APS (APS between -100% and -50%) for fresh markets. Customers are also dissatisfied with the store appearance/ atmosphere of the fresh markets (very low APS), but these are less important than product quality and customer service level. This figure suggests that the existing fresh markets should improve their product quality and customer service as their highest priority, followed by store appearance / atmosphere.

Table 4-5: Important store image attributes and Attribute Promoter Scores (APS) for fresh markets

Important store attribute ranking	APS between -100% and -50%	APS between -49% and +49%	APS between +50% and +100%
Ranking 1 to 3	**Product quality / freshness (-66.62%), customer service levels / friendliness of staff (-63.55%)**	Price (-3.32%)	-
Ranking 4 to 5	Store appearance / atmosphere (-68.23%)	Ease of access / parking (-15.52%)	-
Ranking 6 to 8	-	Range of products (13.03%), travel time*** (30.81%)	-

*Remark: the value in parenthesis is APS, a bold character is the APS between -100 and -50, and ranking 1 to 3, and *** shows the highest APS.*

For convenience stores, price is the highly importance attribute while APS (-76.36%) is the lowest among the eight store image attributes (see Table 4-6). The results show that

most attributes for the convenience store are rated around average (APS between -49% and +49%) compared to other formats.

Mom-and-pop stores indicate that product quality and customer service level are the first and second highest important store image attributes, but APS is very low (see Table 4-7). The result shows the APS as between -100% and -50% for product quality, customer service level, store appearance / atmosphere, and range of products. The benefit of the mom-and-pop store is only in its location, where less travel time is needed to get to the store (APS between +50% and +100%).

Table 4-6: Important store image attributes and Attribute Promoter Scores (APS) for convenience stores

Important store attribute ranking	APS between -100% and -50%	APS between -49% and +49%	APS between +50% and +100%
Ranking 1 to 3	**Price (-76.36%)**	Product quality / freshness (-41.74%), customer service levels / friendliness of staff (-22.93%)	-
Ranking 4 to 5	-	Ease of access / parking (-12.66%), store appearance / atmosphere (-38.94%)	-
Ranking 6 to 8	-	Range of products (-14.61%), travel time*** (21.69%)	-

*Remark: the value in parenthesis is APS, a bold character is the APS between -100 and -50, and ranking 1 to 3, and *** shows the highest APS.*

Table 4-7: Important store image attributes and Attribute Promoter Scores (APS) for mom-and-pop stores

Important store attribute ranking	APS between -100% and -50%	APS between -49% and +49%	APS between +50% and +100%
Ranking 1 to 3	**Product quality / freshness (-86.46%), customer service levels / friendliness of staff (-65.18%)**	Price (-40.50%)	-
Ranking 4 to 5	Store appearance / atmosphere (-85.78%)	Ease of access / parking (19.88%)	-
Ranking 6 to 8	Range of products (-59.54%)	-	Travel time*** (59.20%)

*Remark: the value in parenthesis is APS, a bold character is the APS between -100 and -50, and ranking 1 to 3, and *** shows the highest APS.*

For supermarkets and hypermarkets (see Table 4-8), customers perceive that most store image attributes: product quality, price, customer service levels, ease of access/parking, and store appearance are APS between -49% and +49%. However, several customers indicate that it takes a long time to travel to the stores (the lowest APS = -73.93%). Among these store formats, the supermarkets and hypermarkets show high APS (between +50% and +100%) for a wide range of products; nevertheless, its ranking (between 6 and 8) is low. In other words, other attributes are more important than the product range.

Table 4-8: Important store image attributes and Attribute Promoter Scores (APS) for supermarkets and hypermarkets

Important store attribute ranking	APS between -100% and -50%	APS between -49% and +49%	APS between +50% and +100%
Ranking 1 to 3	-	Product quality / freshness (20.28%), price (-36.12%), customer service levels / friendliness of staff (15.04%)	-
Ranking 4 to 5	-	Ease of access / parking (-44.54%), store appearance / atmosphere (24.46%)	-
Ranking 6 to 8	Travel time (-73.93%)	-	Range of products*** (50.79%)

*Remark: the value in parenthesis is APS, a bold character is the APS between -100 and -50, and ranking 1 to 3, and *** shows the highest APS.*

4.3 Retail agglomeration format choice models

In this section, retail agglomeration format choice models are developed according to the methodology discussed in the previous chapter. First, instead of measuring the reliability of the SP task, the internal consistency reliability is indirectly examined by Cronbach's coefficient alpha. The respondents are asked to rate the importance of store image attributes using a five-point Likert scale (where 1 equals least important and 5 equals most important). The results indicated that Cronbach's coefficient alpha is 0.821 which is greater than the value of 0.7, the lower limit of acceptability (Hair et al., 2010).

After the reliability has been examined, data are randomly split into 80/20, where the majority (80%) is used to develop the models and the minority (20%) is used to validate internally, as discussed in section 3.5.4. The Hausman-test for IIA assumption is utilised in two stages by (1) the estimation of an unrestricted model, in this case all alternatives with significant parameters, and (2) the estimation of restricted models, in this case removing the MAF and TAF alternatives of the choice set with the same parameters in the first stage, respectively. The test-statistic indicates that *p*-values when removing the MAF and TAF alternatives are 0.2681 and 0.1283, respectively. Compared to the *p*-value of 0.05, the null hypothesis of the IIA assumption is not rejected. This suggests that the MNL model does not violate the IIA assumption. Although it does not violate the IIA assumption, the MNL model restricts the correlation of choice situations for each respondent, which

represents the panel data from the SP survey. Therefore, the mixed logit (ML) is applied to overcome this limitation.

In terms of internal validity, the 80% of total samples are used to develop the models and the rest (20%), also called hold-out data, are used to validate the models. The results show that the overall percentage correction (50.91%) is higher than the case when there is no knowledge about the information on the three alternatives (33.33%) and the case when only alternative specific parameters are estimated (33.72%). The difference of the overall percentage correction between the developed models (50.91%) and the hold-out data (51.35%) is very little. Thus, there is no evidence to show that the developed models are not internally valid.

Then, four sequential retail agglomeration format choice models have been developed. In the first model, explanatory variables consist of eight store image attributes: product range, product price, travel time, product quality, atmosphere, customer service, store accessibility, and retailer reputation. The second model shows only the significant variables (at 5% and 10% significance levels if the sign of a parameter is correct). The third model is the second model plus nine customer characteristics: gender, age, family size, the presence of children in the household, the presence of elders in the household, household income, educational levels, car availability, and residential area. The fourth model consists of significant store image attributes and significant customer characteristics (at 5% and 10% significance levels if the sign of a parameter is correct). Finally, the fourth model is applied for further analysis, i.e. hypothesis testing.

The form of the model is given as the following equation:

$$\text{Prob}(choice_{ns} = j \mid \mathbf{x}_{nsj}, \mathbf{z}_n, \mathbf{v}_n) = \frac{\exp(V_{nsj})}{\sum_{j=1}^{J_{ns}} \exp(V_{nsj})} \quad ; \quad j = 1, \ldots, J \qquad \text{Eq.4-2}$$

where:

$$V_{nsj} = \boldsymbol{\beta}'_n \mathbf{x}_{nsj}$$

$$\boldsymbol{\beta}_n = \boldsymbol{\beta} + \boldsymbol{\Delta}\mathbf{z}_n + \boldsymbol{\Gamma}\mathbf{v}_n$$

$\mathbf{x}_{nsj}$ = the *K* attributes of alternative *j,* i.e. TAF, MAF, or NAF, in choice situation *s* faced by individual *n*.

$\mathbf{z}_n$ = a set of *M* characteristics of individual *n* that influence the mean of the taste parameters.

$\mathbf{v}_n$ = a vector of *K* random variables with zero means, known variances and zero covariances.

V_{nsj} = the utility function of alternative *j* in choice situation *s* faced by individual *n.*

The form of the first and second models (Models 1 and 2) can be shown as the following utility functions.

V(TAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter* Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + ReputationParameter*Reputation +
ReputationInterParameter*ReputationInter

V(MAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter* Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + ReputationParameter*Reputation +
ReputationInterParameter*ReputationInter + AscMAF

V(NAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter* Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + ReputationParameter*Reputation +
ReputationInterParameter*ReputationInter + AscNAF

The form of the third and fourth models (Models 3 and 4) can be shown as the following utility functions.

V(TAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter*Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + GenderParameter*Gender +
MemberParameter*Member + ElderParameter*Elder +
Education1Parameter*Education1 + ResidentialAreaParameter*ResidentialArea
+ CarAvailabilityParameter*CarAvailability

V(MAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter*Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + IncomeParameter*Income +
Education2Parameter*Education2 + CarAvailabilityParameter*CarAvailability

V(NAF) = RangeParameter*Range + PriceParameter*Price +
TravelTimeParameter*TravelTime + ProductQualityParameter*ProductQuality +
AtmosphereParameter*Atmosphere + ServiceParameter*Service +
AccessibilityParameter*Accessibility + AgeParameter*Age +
ChildrenParameter*Children + ResidentialAreaParameter*ResidentialArea +
AscNAF

The meaning of each variable is given in the following details:

AscMAF = alternative specific dummy variable for MAF

AscNAF = alternative specific dummy variable for NAF

Range = product range; = 1 if wide product range, = 0 if otherwise

Price = product price; = 1 if high price, = 0 if otherwise

TravelTime = travel time; = 1 if travel time to store is greater than 15 mins, = 0 if otherwise

ProductQuality = product quality; = 1 if high product quality, = 0 if otherwise

Atmosphere = store atmosphere; = 1 if good atmosphere, = 0 if otherwise

Service = customer service; = 1 if good customer service, = 0 if otherwise

Accessibility = store accessibility; = 1 if easy accessibility/parking, = 0 if otherwise

Reputation = national store reputation; = 1 if national store reputation, = 0 if otherwise

ReputationInter = international store reputation; = 1 if international store reputation, = 0 if otherwise

Gender = gender; = 1 if male, = 0 if female

Age = age; = 1 if age greater than 25 years, = 0 if otherwise

Member = family size or the number of members in family

Children = the presence of a child or children (age < 5) in a family; = 1 if there is a child or children, = 0 if otherwise

Elder = the presence of an elder or elders (age > 60) in a family; = 1 if there is an elder or elders, = 0 if otherwise

Income = household income level; = 1 if household income >= 20,000 baht per month, = 0 if otherwise

Education1 = educational level 1; = 1 if educational level is a vocational degree, = 0 if otherwise

Education2 = educational level 2; = 1 if educational level is an undergraduate degree or higher, = 0 if otherwise

ResidentArea = customer's residential area; = 1 if rural area, = 0 if otherwise

CarAvailability = car availability; = 1 if there is at least a car in a household, = 0 if otherwise

The coefficient of explanatory variables and the statistic of the four models are shown in Table 4-9 and Table 4-10. The first model indicates that seven store image attributes including: product range (Wald statistic = 3.69), product price (Wald statistic = -5.08), travel time (Wald statistic = -2.25), product quality (Wald statistic = 10.16), atmosphere (Wald statistic = 3.81), customer service (Wald statistic = 8.70), store accessibility (Wald statistic = 5.47), and an alternative specific constant for NAF, AscNAF (Wald statistic = -4.63) are significant variables at 5% significance level; however national reputation (Wald statistic = 0.37), international reputation (Wald statistic = 1.58) and an alternative specific constant for MAF, AscMAF (Wald statistic = -1.21) are not significant and they should be removed from the model. Model 2 has only the variables that are significant in Model 1. It can be seen that the three highest magnitudes of the coefficients (regardless of the +/- sign) of store attributes are product quality (0.75884), customer service (0.63447), and price (-0.47180). Because the parameters of all significant store image attributes are generic for the three alternatives and they are all nominal variables (dummy 1 or 0), these coefficients indicate that customers give priority to product quality, customer service, and price, respectively, when they choose to shop at the retail agglomeration formats (TAF, MAF, and NAF). The *'likelihood ratio index', ρ^2,* of Models 1 and 2 are 0.0743 and 0.0873, whereas the log likelihood function of Models 1 and 2 are -1798.072 and -1772.932, respectively. The *'likelihood ratio test'* indicates that Model 2

is better than Model 1, where the value of -2(LL_{base} – $LL_{estimated}$) = 50.280 is greater than the critical Chi-square at 0.05 significance level = 14.067.

The third model is Model 2 plus all customer characteristic variables. However, the results show that three customer characteristics: age (Wald statistic = 2.40), household income (Wald statistic = 2.62), residential area (Wald statistic = 2.40), and an alternative specific constant for NAF, AscNAF (Wald statistic = -2.96) are significant variables at 5% significance level, whereas the presence of children in the household (Wald statistic = 1.72) is significant at 10% significance level. However, gender (Wald statistic = -1.20), family size (Wald statistic = 0.84), the number of elders in the household (Wald statistic = 0.39), educational level (Wald statistic = 0.34 and 0.38), and car availability (Wald statistic = 0.46) are not significant. The *'likelihood ratio index', ρ^2,* of Model 3 is 0.0942, while the log likelihood function of Model 3 is -1759.313. Model 3 indicates the higher value of ρ^2 (0.0942) compared to that of Model 2 (0.0873).

Finally, Model 4 is only the significant attributes and significant customer characteristics of Model 3. In terms of customer characteristics, the results show that residential area (Wald statistic = 2.47) is one of the significant factors that affects the retail agglomeration format choice. The 'residential area' dummy variable is equal to one if the residence of a customer is in a rural area. This is a specific variable for TAF and NAF alternatives, which means that customers who live in rural areas have a greater chance to shop at TAF and NAF than at MAF. Because income level (Wald statistic = 2.20) is a specific variable for the MAF alternative, this positive sign (coefficient = 0.27935) indicates that higher income families tend to shop at MAF compared to shopping at TAF and NAF. Finally, age (Wald statistic = 2.49) is a specific variable for NAF, so this positive sign (coefficient = 0.40744) suggests that the older customers support NAF more than TAF and MAF. The ρ^2 of Model 4 (0.1059) is the highest among the four models; although the ρ^2 seems low compared to the R^2 in a traditional regression model. Hensher et al. (2005) note that a range for ρ^2 between 0.3 and 0.4 is equivalent to R^2 between 0.6 and 0.8 in a linear regression model, but the ρ^2 value tends to be much lower. The values around 0.2 and 0.4 indicate an extremely good fit (Louviere et al., 2000), in particular, for SP studies, values of about 0.1 are typical.

The log likelihood function of Models 3 and 4 are -1759.313 and -1736.656, respectively. The *'likelihood ratio test'* indicates that Model 4 is better than Model 3, where the value of -2(LL_{base} – $LL_{estimated}$) = 45.314 is greater than critical Chi-square at 0.05 significance level = 24.996. When the model with only significant store image attributes (Model 2) is compared with the model with the significance of both store image attributes and customer characteristics (Model 4), the *'likelihood ratio test'* indicates that Model 4 is

better than Model 2, where the value of $-2(LL_{base} - LL_{estimated})$ = 72.552 is higher than the critical Chi-square at 0.05 significance level = 32.671. Model 4 shows the best statistical index among the four models for both the ρ^2 and log likelihood function. Thus, it is further used in hypothesis testing in the next step.

The best model (Model 4) indicates an alternative specific constant for NAF (-0.6118) is significant and negative. It also indicates that most consumers viewed TAF and MAF as superior to NAF, if all factor levels of the three retail formats are equal. However, the perception of consumers varies individually according to the standard deviation of the service level (1.10940), price (0.93684), alternative specific constant for NAF (0.89304), and product quality (0.82511). The difference between customer characteristics: income level, age, and residential area, affecting store format choice are varied according to the standard deviations 1.16369, 1.16036, and 1.08113, respectively.

Table 4-9: Coefficient of explanatory variables and model statistic of Models 1 and 2

Attributes / characteristics	Model 1		Model 2	
	Coefficient (Wald statistic)	SD (Wald statistic)	Coefficient (Wald statistic)	SD (Wald statistic)
Range	0.24399*** (3.69)	-	0.26930*** (3.61)	-
Price	-0.34003*** (-5.08)	-	-0.47180*** (-5.18)	0.77168*** (4.83)
Travel time	-0.14434** (-2.25)	-	-0.19511** (-2.67)	-
Product quality	0.66290*** (10.16)	-	0.75884*** (9.08)	0.61237*** (4.27)
Atmosphere	0.24585*** (3.81)	-	0.29627*** (4.05)	-
Service	0.55566*** (8.70)	-	0.63447*** (7.21)	0.95725** (2.49)
Accessibility	0.34866*** (5.47)	-	0.40156*** (5.40)	-
National reputation	0.02907 (0.37)	-	-	-
International reputation	0.21627 (1.58)	-	-	-
Alternative specific for MAF	-0.10510 (-1.21)	-	-	-
Alternative specific for NAF	-0.30248*** (-4.63)	-	-0.39623*** (-4.94)	0.71204*** (5.62)
Rho-square	0.0743		0.0873	
Log likelihood function	-1798.072		-1772.932	

*Remark: ***, **, * are significant at 1%, 5%, 10% level. Random coefficient is normally distributed. Value in (…) is Wald statistic, which is close to t-statistic.*

Table 4-10: Coefficient of explanatory variables and model statistic of Models 3 and 4

Attributes / characteristics	Alternatives	Model 3		Model 4	
		Coefficient	Standard deviation	Coefficient	Standard deviation
Range	All	0.26886*** (3.60)	-	0.29263*** (3.57)	-
Price	All	-0.47954*** (-5.23)	0.79098*** (4.97)	-0.51042*** (-5.01)	0.93684*** (5.37)
Travel time	All	-0.20103*** (-2.75)	-	-0.22994*** (-2.86)	-
Product quality	All	0.76866*** (9.11)	0.64352*** (4.40)	0.86732*** (8.93)	0.82511*** (4.48)
Atmosphere	All	0.29653*** (4.05)	-	0.30880*** (3.87)	-
Service	All	0.64078*** (7.25)	0.96437** (2.57)	0.72581*** (7.23)	1.10940** (3.91)
Accessibility	All	0.39752*** (5.34)	-	0.43645*** (5.34)	-
Gender	TAF	-0.14771 (-1.20)	-	-	-
Age	NAF	0.34333** (2.40)	-	0.40744** (2.49)	1.16036*** (3.79)
Member	TAF	0.02183 (0.84)	-	-	-
Children	NAF	0.27280* (1.72)	-	-	-
Elder	TAF	0.03148 (0.39)	-	-	-
Income	MAF	0.30363*** (2.62)	-	0.27935** (2.20)	1.16369*** (4.88)
Education1	TAF	0.08271 (0.38)	-	-	-
Education2	MAF	0.03968 (0.34)	-	-	-
Residential area	TAF, NAF	0.26490** (2.40)	-	0.32772** (2.47)	1.08113*** (4.58)
Car availability	TAF, MAF	0.07480 (0.46)	-	-	-
Alternative specific for NAF	NAF	-0.54498*** (-2.96)	0.62886*** (4.75)	-0.61180*** (-4.52)	0.89304*** (4.44)
Rho-square		0.0942		0.1059	
Log likelihood function		-1759.313		-1736.656	

*Remark: ***, **, * are significant at 1%, 5%, 10% level. Random coefficient is normally distributed. Value in (…) is Wald statistic, which is close to t-statistic.*

4.4 Hypothesis testing

This section will apply the developed model to test the proposed hypotheses. The first hypothesis is as follows:

H1: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to changing in store image attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

The first hypothesis tests the effect of store image attributes on a marginal choice probability for outshopping at both TAF and MAF. The marginal effects of TAF and MAF for each attribute are given in Table 4-11. Seven store image attributes: a range of products, price, travel time, product quality, atmosphere, personal service, and store accessibility are significant factors that affect the marginal choice probability for both TAF and MAF, apart from the reputation of a retailer does not affect the marginal choice probability for TAF and MAF. The marginal effect for a range of products indicates that a wide product range at TAF will increase the choice probability to shop over the same store format with a narrow product range by 5.91%, while the choice probability to shop at MAF when the store has a wide product range will rise over the probability to shop at the same store format with a narrow product range by 5.86%. Both figures, 5.91% and 5.86%, are not very different. A similar pattern for the marginal effects of TAF and MAF are found for other store image attributes, i.e. price (-9.43% and -9.48%), travel time (-4.95% and -4.91%), product quality (14.89% and 14.85%), atmosphere (7.39% and 7.33%), service (12.17% and 12.15%), and store accessibility (5.26% and 5.23%). Improving store image attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion.

Thus, there is no evidence to support H1. Nevertheless, the marginal effects indicate the important figure that shows the probability to choose the retail agglomeration format if each store image attribute is improved. The results show that improving product quality from a low to a high level, and customer service similarly, can increase the probability to choose both retail agglomeration formats (TAF and MAF) at approximately 14.9%, and 12.2%, respectively. However, improving other store image attributes: price, atmosphere, a range of products, accessibility, and travel time from a low to a high level can raise the likelihood of shopping at these retail agglomeration formats by around 9.5%, 7.4%, 5.9%, 5.3%, and 4.9% respectively.

Table 4-11: Reporting the marginal effects of TAF and MAF

Attribute / characteris-tics	Alterna-tive	Coefficient (Wald statistic)	Marginal effect of TAF [TAF, MAF, NAF]	Marginal effect of MAF [TAF, MAF, NAF]
Range	All	0.29263*** (3.57)	[5.906%,-3.540% -2.355%]	[-3.541%,5.861%,-2.320%]
Price	All	-0.51042*** (-5.01)	[-9.428%,5.218% 4.211%]	[5.320%,-9.478%,4.158%]
Travel time	All	-0.22994*** (-2.86)	[-4.953%,3.035% 1.918%]	[3.032%,-4.909%,1.876%]
Product quality	All	0.86732*** (8.93)	[14.886%,-8.924%,-5.962%]	[-9.008%,14.851%,-5.843%]
Atmosphere	All	0.30880*** (3.87)	[7.385%,-4.435%,-2.950%]	[-4.432%,7.329%,-2.897%]
Service	All	0.72581*** (7.23)	[12.169%,-7.529%,-4.640%]	[-7.514%,12.153%,-4.639%]
Accessibility	All	0.43645*** (5.34)	[5.255%,-3.152%,-2.103%]	[-3.157%,5.226%,-2.069%]
Age	NAF	0.40744** (2.49)	-	-
Income	MAF	0.27935** (2.20)	-	[-3.145%,5.497%,-2.352%]
Residential area	TAF, NAF	0.32772** (2.47)	[-3.816%,2.327%,1.490%]	-
Alternative specific for NAF	NAF	-0.61180*** (-4.52)	-	-
Rho-square		0.1059		
Log likelihood function		-1736.656		

*Remark: ***, **, * are significant at 1%, 5%, 10% level. Value in (…) is Wald statistic, which is close to t-statistic.*

H2: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to changing in store image attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

The second hypothesis tests the effect of store image attributes on a marginal choice probability for outshopping at both TAF and NAF. The marginal effects of TAF and NAF for each attribute are given in Table 4-12. Similarly, to the same store image attributes in H1, seven attributes including: a range of products, price, travel time, product quality, atmosphere, personal service, and store accessibility, are significant factors that affect the marginal choice probability between TAF and NAF; however, the reputation of a retailer does not affect the marginal choice probability for TAF and NAF. The marginal

effect for the range of products indicates that the wide product range at TAF will increase the probability to shop over the same store format with a narrow product range by 5.91%, whereas the probability to shop at NAF when the store has a wide product range will rise over the probability to shop at the same store format with a narrow product range by 4.74%. The difference in these figures (5.91% and 4.74%) is higher than that of H1 figures (5.91% and 5.86%). Similar differences for the marginal effects of TAF and NAF are found in other store image attributes, i.e. price (-9.43% and -7.90%), travel time (-4.95% and -3.87%), product quality (14.89% and 12.06%), atmosphere (7.39% and 5.91%), service (12.17% and 10.10%), and store accessibility (5.26% and 4.23%). These figures indicate that improving store image attributes for both TAF and NAF will increase the probability to shop at TAF slightly higher than the probability to shop at NAF.

Thus, there is evidence to support H2, apart from reputation of the store. However, the difference in the choice probability to shop between TAF and NAF with respect to these store image attributes is very little. The figure indicates that the improvement of store image attributes for both TAF and NAF will increase the probability to shop more at TAF than at NAF. In addition, the results show that improving product quality from low to high level, and customer service similarly can increase the probability to choose NAF – approximately 12.1%, and 10.1%, respectively. However, improving other store image attributes: price, atmosphere, a range of products, accessibility, and travel time from low to high level can raise the likelihood of shopping at this retail format by approximately 7.9%, 5.9%, 4.7%, 4.2%, and 3.9%, respectively.

Table 4-12: Reporting marginal effects of TAF and NAF

Attribute / characteris-tics	Alterna-tive	Coefficient (Wald statistic)	Marginal effect of TAF [TAF, MAF, NAF]	Marginal effect of NAF [TAF, MAF, NAF]
Range	All	0.29263*** (3.57)	[5.906%,-3.540%,-2.355%]	[-2.391%,-2.344%,4.735%]
Price	All	-0.51042*** (-5.01)	[-9.428%,5.218%,4.211%]	[3.977%,3.923%,-7.899%]
Travel time	All	-0.22994*** (-2.86)	[-4.953%,3.035%,1.918%]	[1.956%,1.915%,-3.870%]
Product quality	All	0.86732*** (8.93)	[14.886%,-8.924%,-5.962%]	[-6.121%,-5.935%,12.056%]
Atmosphere	All	0.30880*** (3.87)	[7.385%,-4.435%,-2.950%]	[-2.988%,-2.921%,5.909%]
Service	All	0.72581*** (7.23)	[12.169%,-7.529%,-4.640%]	[-5.179%,-4.920%,10.100%]
Accessibility	All	0.43645*** (5.34)	[5.255%,-3.152%,-2.103%]	[-2.135%,-2.090%,4.225%]
Age	NAF	0.40744** (2.49)	-	[-2.815%,-3.279%,6.094%]
Income	MAF	0.27935** (2.20)	-	-
Residential area	TAF, NAF	0.32772** (2.47)	[-3.816%,2.327%,1.490%]	[1.487%,1.736%,-3.223%]
Alternative specific for NAF	NAF	-0.61180*** (-4.52)	-	-
Rho-square		0.1059		
Log likelihood function		-1736.656		

*Remark: ***, **, * are significant at 1%, 5%, 10% level. Value in (…) is Wald statistic, which is close to t-statistic.*

H3: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to differences in customer characteristics (gender, age, family size, educational level, household income, residence location, and car availability).

To test this hypothesis, the marginal effect of customer characteristics for TAF and MAF is performed. The results are shown in Table 4-11. Only income level and residential area of customers are significant factors that affect the choice probability between TAF and MAF, whereas other customer characteristics do not affect the choice probability between them. First, the marginal effect of TAF for a residential area indicates that customers who live in rural areas will increase the probability to shop at TAF over those who live in urban/suburban areas by 3.8%, whereas the probability to shop at MAF is not

affected by the difference of residential area. Second, household income level indicates that the household with a higher income will increase the probability to shop at MAF over that with a lower income family by 5.5%, whereas the income level does not affect the probability to shop at TAF.

Thus, there is evidence partially supporting H3 that residential area and income level affect the choice probability for outshopping at TAF differently from that for outshopping at MAF, whereas gender, age, family size, the presence of children in the household, the presence of elders in the household, educational level, and car availability do not support H3. This evidence supports the idea of the development of the TAF in the rural areas.

H4: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to differences in customer characteristics (household income, age, educational level, gender, family size, residence location, and car availability).

The fourth hypothesis tests the effect of customer characteristics on a marginal choice probability for outshopping at both TAF and NAF. The report for marginal effect is shown in Table 4-12. Age and residential area of customers are significant factors that affect the choice probability between TAF and NAF, whereas other customer characteristics do not affect the choice probability between these formats. First, the marginal effect of TAF for a residential area indicates that customers who live in rural areas will increase the probability to shop at TAF over those who live in urban/suburban areas by 3.8%, whereas customers who live in rural areas will increase the probability to shop at NAF over those who live in urban/suburban areas by 3.2%. Second, the evidence indicates that the elders tend to support the NAF more than the younger generation does by 6.1%, whereas there is no difference between elders and younger people when they shop at TAF.

Thus, there is evidence shows that age and residential area of customers support H4; however, gender, family size, the presence of children and elders in the household, income level, educational level, and car availability do not support H4.

4.5 Discussions

4.5.1 Store formats (What form of store?)

This study sheds light on the development of retailers in rural areas. It tries to answer the question of what forms of retailer should be developed in rural areas. An opportunity exists in rural retailing to develop a retail format that may be able to effectively compete with the large modern retail stores in city centres. This study employs the idea of

developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). The study of five European countries by Van Leeuwen and Rietveld (2011) confirmed that small and medium-sized towns providing retail services to local households are still important places for customer shopping. Over half of the purchases of households in the small and medium-sized towns or the direct hinterland are bought in those towns. However, this study advances the previous work by explicitly studying the role of the store agglomeration.

This study develops the store choice models covering consumers in urban and rural areas. The best model shows the alternative specific constant for NAF is significant and negative. This indicates that most consumers viewed the TAF and MAF as superior to the NAF. However, the perception of consumers varies individually according to the standard deviation of the alternative specific constant. The marginal effect analysis shows that improving store image attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion, if other factors are the same. Furthermore, the marginal effects of the TAF and NAF for residential location indicate that consumers living in the countryside tend to shop at TAF and NAF more than consumers living in the cities, 6.2% and 5.4% respectively. This gives customers an advantage in the catchment areas of the market town. Instead of outshopping further afield to city centres, customers in remote areas can shop at the market town which is relatively closer than the further city centres.

The result supports the study in the market town in UK by Powe and Shaw (2004) that improving services i.e. supermarket, shopping in general, non-food shops etc. in market town can potentially encourage rural residents to visit their nearest market town. However, it is inconsistent with their study that the main purpose of customers visits the market town is to do supermarket shopping. The reason of this inconsistence is possibly because the TAF did not exist in the study area.

There are forms of agglomeration retail formats in existing rural market areas, for instance, periodic markets, fresh markets, and shopping strips in market towns, which can be developed and improved. An alternative form that can be developed in the market towns is the improvement of shopping strips (the collection of small independent stores in a proximity area). This is similar to the past development in the market towns in Western countries (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). A case study in the remote area in Thailand found that the hypermarkets are mostly inaccessible to the poor, despite their low price policies, comfortable store layout, and engaging entertainment (Ihara, 2013). Another form that could serve the poor

in the remote countryside is to develop periodic markets. This may fit well in remote areas in Asian countries, for example, in India (Kumar Velayudhan, 2014).

4.5.2 Store image attributes (Which attributes?)

Most store image attributes are significant in the retail agglomeration format choice model (at the 5% significance level), apart from national or international retailer reputation. The customers' choice models indicate that among eight store image attributes product quality and service level are the first and second most important attributes affecting the choice probability of three store formats: TAF, MAF, and NAF. Improving the product quality and service level from a low to high level will increase the choice probability (approximately 12% to 15%) compared to improving other attributes: a range of products, price, travel time, atmosphere, and accessibility (approximately 5% to 9%).

This study confirms several notions of the study of Thai retail grocery markets, regarding their impact on fresh markets and supermarkets shopping, by Gorton et al. (2011). However, the findings are inconsistent with Goldman et al. (2002) who claimed that supermarkets as MAF in East Asia were relatively low penetration compared to wet/fresh markets as TAF because TAF retained a competitive advantage over MAF in terms of costs, freshness and fresh food image, which attracted effectively to consumers. The store image attributes that are consistent with such studies include assortment, price, convenient location, product quality, atmosphere, and customer service, whereas there are other attributes that are inconsistent with the findings, as the following details.

Several studies (e.g. Paige and Littrell, 2002, Hansen and Solgaard, 2006) show that differentiation of products may be in the form of a speciality store (narrow range of products) to a supermarket/hypermarket (wide range of products). With respect to **a range of products**, the finding shows that wider product ranges will attract customers to the TAF similarly to the MAF. This is inconsistent with Gorton et al. (2011) who suggested that product assortment was a significant attribute that influences the likelihood to shop at supermarkets. The reason may be such studies focus on the capital city and urban area, while this study focuses on both urban and rural areas. Supermarkets are easily accessed by consumers in the city and the supermarkets provide the products assortment corresponding to the urban lifestyle because the supermarket first diffuses in the major city according to the supermarket diffusion theory (Reardon and Berdegué, 2008). Nonetheless, the finding shows that increasing the product range at the TAF/MAF will attract more consumers than it would at the NAF. Similarly, the finding suggests the NAF should not be developed as a speciality store but as a store with a variety of products.

For example, it should consist of various basic products, such as those provided in a convenience store. The reason may be that this study focuses on the regular grocery shopping trip. So, a specific product shopping trip is not included in this study. The speciality store may be suitable for other shopping purpose. The finding suggests TAF, MAF and NAF should provide the differentiation of product as having a wide variety of products.

The **price** reduction at the TAF/MAF attracts more consumers than at the NAF, while the same price reduction at the TAF and MAF provides the same choice probability for customers. Although price is the second highest ranking importance score, the price affects the store format choice probability less than product quality and customer service. This finding is contradictory to the study by Solgaard and Hansen (2003), who pointed out that the positioning of price played a more important role than products and brands. However, their study focused only on major supermarket formats; small store formats were not included in their model. The past study in Hong Kong by Goldman et al. (1999) showed that most consumers perceive the fresh markets to be cheaper than supermarkets. They suggested that there are no indications of possible future changes in the superiority of fresh markets in terms of price. However, the recent study by Maruyama and Wu (2014) showed that modern retail formats had made progress in improving on price. In terms of pricing strategy, Bell and Lattin (1998) observed that large basket shoppers prefer to shop at the store using everyday low price (EDLP) formats, whereas small basket shoppers prefer a high and low (HiLo) pricing strategy. Because customers tend to spend more time and money at large store formats, compared to customers at small store formats (Reutterer and Teller, 2009), the practical implication may adapt the EDLP strategy to the TAF and MAF, and the HiLo strategy to the NAF.

This study also indicates that **travel time** between stores and consumers' homes/offices is not as important compared to product quality, price, customer service, ease of access/parking, atmosphere, and a range of products. Although Goodman and Remaud (2015) suggested that customers shopped at proximity stores rather than other stores because they are closer to their home or workplace, this finding reveals that reduced or increased travel time does not change the choice probability between the TAF and MAF, but it increases the choice probability to shop at the TAF/MAF compared to shopping at the NAF. This implies that the changing in travel time of the TAF and MAF attract the same likelihood of customer choice between both formats. So, instead of developing the MAF in market towns, which may not be suitable in terms of economics (Powe and Shaw, 2004), developing the TAF in market towns can attract the same number of customers as the MAF does. Maruyama and Wu (2014) state that the closer the traditional retail formats, the greater the chance of shopping at these formats when consumers purchase

fresh food. This suggestion highlights the conclusion of Goldman and Hino (2005) that the geographical diffusion barrier (distance) is the main limitation to supermarkets' market share growth.

Among eight store image attributes, consumers rate **product quality** as the most important. Improving product quality from a low to high level will increase the choice probability of TAF, MAF, and NAF (approximately 12% to 15%). It is interesting that product quality/freshness does not affect the consumers' choice between TAF and MAF. This finding is consistent with the study by Maruyama and Wu (2014). However, many studies show inconsistent results regarding consumers giving priority to freshness when they purchase fresh food (Gorton et al., 2011, Ho, 2005, Kelly et al., 2015). This inconsistency may be because this study is interested in grocery as a whole; it does not focus on different product categories. In Hong Kong, Chinese consumers defined fresh meat and poultry as *'warm'*, which meant having recently been slaughtered; for fish, it meant buying live fish. Chilled or frozen meat or fish were perceived as not fresh (Goldman et al., 1999). According to Ho (2005), in Hong Kong freshness of food produce was the most important factor for consumers to do their shopping at fresh markets, while hygiene of food was the most important factor for consumers to shop at supermarkets. The studies in Thai food retailing by Gorton et al. (2011) and Kelly et al. (2015) showed that quality of produce is one of the important attributes for consumers to continue to support fresh markets. Furthermore, this result shows that improving product quality/freshness at the TAF/MAF will attract more consumers than at the NAF.

For modern retailers, **atmosphere,** such as a clean environment and superior comfort, was regarded as a competitive advantage over traditional retail formats (Suryadarma et al., 2010). This is consistent with the finding in this study that improving the store atmosphere will increase the likelihood to shop at the MAF compared to the NAF. In Thailand, hypermarkets are popular places for both shopping and entertainment (Isaacs, 2009). Many hypermarket customers describe atmosphere as having air-conditioning, cleanliness, and presentation. They refer to a shopping trip to the store as a 'family picnic' or a visit to an 'artificial amusement park' (Ihara, 2013). Interestingly, Gorton et al. (2011) reported frequency of fresh market visits was negatively related to atmosphere. This may be interpreted as fresh market customers not liking the 'fresh market atmosphere' when they visited fresh markets. In addition, this finding from the choice model and APS suggested the atmosphere should be improved. In contrast, frequency of supermarket visits was positively related to atmosphere. Additionally, improving the store atmosphere does not change the choice probability to shop at the TAF and MAF, which is consistent with the study by Maruyama and Wu (2014) who state that atmosphere was not an important determinant for the store choice between fresh markets and supermarkets.

In terms of **customer service**, the finding reveals that improving customer service does not change the choice probability between the TAF and the MAF, but it increases the choice probability to shop at the TAF/MAF compared to shopping at the NAF. This finding is inconsistent with previous studies by Hino (2010), and Maruyama and Wu (2014) who suggested that familiarity with and close relationship between consumers and small traditional independent stores is benefit to these stores. The reason may be that the fresh markets in their studies are superior to the supermarkets and are better positioned to cater to consumers' needs because they can offer higher levels of service and a quick response to the dynamics of consumers' demand, as opposed to the supermarkets (Goldman et al., 1999). In contrast, the finding from this survey indicates that the APS of service level for the traditional retailers (mom-and-pop stores, APS around -65%) is much lower than that for the modern retailers (supermarkets and hypermarkets, APS around +15%). Although service is important, the marginal effect of the TAF/MAF is greater than that of the NAF. In addition, shopping at the traditional retailers does not benefit from social interaction as it is based on functional shopping (Goldman et al., 1999). Evidence from the Thai grocery market shows that hypermarket shopping is frequently driven by convenience rather than time pressure (Shannon and Mandhachitara, 2008). Thai customers tend to shop in groups and enjoy this experience because of collectivism in the Thai culture. Goldman et al. (1999) noted that in Hong Kong fresh markets serve consumers more effectively than supermarkets do. The fresh markets had direct contact with customers, and quickly respond to consumers' requirements. However, the study by Bougoure and Lee (2009) showed the opposite results, i.e. supermarkets outperformed fresh markets across all aspects of service quality as measured by SERVQUAL-P. Many reasons may explain this difference. First, they did the research with different perspectives; SERVQUAL-P in the study by Bougoure and Lee (2009) measured the values based on a positivist approach, whereas Goldman et al. (1999) sought to explain the existence of fresh markets using an institutional-ecological approach. Second, the time lag between both studies is around 10 years. Finally, the study by Bougoure and Lee (2009) used convenience sampling, which results in relatively young respondents with the majority being under 29 years old.

Accessibility seems to be an important role for some retail formats, e.g. a neighbourhood store, where customers can park in front of the store. In terms of accessibility, the finding reveals that increased accessibility does not change the choice probability between the TAF and MAF, but it increases the choice probability to shop at the TAF/MAF compared to shopping at the NAF. The finding supports the study by Maruyama and Wu (2014) who state that consumers who give importance to accessibility were more likely to shop at modern retail formats compared to shopping at traditional retail formats. This is

consistent with the study of Thai grocery markets by Gorton et al. (2011), where accessibility operationalized by convenient location of the store was a significant variable in the prediction of customers visiting supermarkets.

In the FMCG industry, Burt (2000) noted that people are more loyal to a retailer reputation name than to a product name. However, this study shows **retailer reputation** neither local, national nor international is significant in the store format choice models. The Thai grocery market is quite different from Western countries' markets. Cultural differences: individualism/collectivism, time pressure, and power distance, may lead to different consumer behaviour. Shoppers in a collectivism culture with low time pressure enjoy the shopping experience and the social interaction. Thai consumers tend to shop in groups and seek various shopping experiences (Shannon, 2009, Shannon and Mandhachitara, 2008). Vilaisai and Chaipoopirutana (2017) pointed out that Thai consumers preferred to visit the malls which are unique in design, have space for dynamics creativity, and fulfilment of ultimate experiences. Additionally, because Thai customers typically do their shopping at several stores (Ihara, 2013), they occasionally switch stores in order to benefit from cherry picking due to lower prices.

4.5.3 Customer characteristics (Which characteristics?)

This study confirms several notions from the studies by Goldman et al. (1999), Gorton et al. (2011), Hino (2010), Ihara (2013), Jayasankara Prasad and Ramachandra Aryasri (2011), and Maruyama and Wu (2014) that have impacted on fresh markets and supermarket shopping. The socio-economic characteristics that are consistent with such studies include age, income and residential location, whereas there are other characteristics that are inconsistent with the findings, as detailed in the following.

One of the important customer-related factors is **age**. The finding indicates that age of consumers does not affect the choice probability between the traditional retail format and the modern retail format. It is similar to the study in Hong Kong by Goldman et al. (1999) and in China by Maruyama and Wu (2014) when consumers shopped for fresh food. However, the result is inconsistent with the finding by Gorton et al. (2011) who found that younger consumers tended to shop at the modern retail format compared to older consumers. Interestingly, the finding shows the older consumers have more opportunity to support the NAF compared to the younger ones.

Regarding the customer characteristics that impact on consumers' choice among store formats, the results show that high-**income** households tended to shop at the modern retail format. This finding corresponds to previous studies by Goldman et al. (2002),

Gorton et al. (2011), Hino (2010), and Ihara (2013). However, the study in China by Maruyama and Wu (2014) suggested that the traditional retail format was still attractive to high-income consumers for purchasing fresh food. The finding is inconsistent with Goldman and Hino (2005) who found that income did not impact on the choice between traditional and modern retail formats for packaged food. This suggests why the modern retail format has penetrated the low-income segment in packaged food. This inconsistency may be because this study is interested in grocery as a whole; it does not focus on different product categories. Interestingly, the finding shows the difference between low- and high-income has no impact on the decision to shop at the TAF and NAF. It implies that the TAF can attract low-income consumers who are existing NAF customers.

Gender has no impact on the choice probability among TAF, MAF, and NAF. This reflects that consumers who want to shop at TAF, MAF or NAF were not restricted by such socioeconomic characteristics. This is consistent with studies in several countries (Ihara, 2013, Maruyama and Wu, 2014), apart from the Middle East. Unlike several cultural norms, women were not allowed to travel unaccompanied outside a certain area around the home. So unaccompanied women can shop only at proximity stores, not in the more distant supermarkets (Goldman and Hino, 2005).

Household size and **family structure,** i.e. whether there are children or elders in the household, do not influence the choice probability among TAF, MAF, and NAF. This supports the finding in the previous Thai retail studies (Ihara, 2013, Isaacs, 2009). Nevertheless, it is inconsistent with studies in many Western countries (Carpenter and Moore, 2006, Fox et al., 2004, Miller and Kean, 1997), because the Thai culture is based on collectivism, meaning that there are several persons in families to take care of each other. They can usually do shopping without the restriction of household size or even if there are children or elders in the household.

Education level has no impact on the choice probability among TAF, MAF, and NAF. This is inconsistent with previous studies (Gorton et al., 2011, Carpenter and Moore, 2006). The reason may be that their studies focus on urban areas, while this study focuses on a regional city which includes urban and rural areas. Consumers in the city have a different lifestyle from those in rural areas. Most respondents in the city can easily visit the modern retail formats which are located near their home/office. So, most of them do not regularly shop at traditional stores in line with Tessier et al. (2010) who found that clients supporting medium supermarkets were mostly urban customers.

Car availability has no impact on the choice probability among TAF, MAF, and NAF. Although in the Thai retail market Ihara (2013) reported that access to means of transport

was a critical factor for hypermarket customers. This is true for modern large store formats' diffusion, but it does not restrict customers from shopping at them. There are other means of transport, such as the motorcycle and public transport. In addition, shopping in a modern large store occurs from time to time for packaged food as a major shopping trip.

For urban retailers, consumers may do outshopping at a MAF relatively more than a TAF, because goods offered by a MAF relatively tend to be heterogeneous and provide a wide variety of activities, and also give an opportunity for multi-purpose shopping (Popkowski Leszczyc et al., 2004) and other activities such as entertainment (Ihara, 2013). The **residential location**, i.e. whether consumers' home is in urban or rural areas, affects consumers' choice across retail formats. This finding indicates that households in rural areas have more opportunity to shop at TAF and NAF than households in urban districts. This implies that MAF may not fit with consumers in rural areas. In addition, TAF will have a positive impact over the NAF, if the product quality, customer service, and price of both store formats are equally improved. This supports the finding in Thai grocery markets by Gorton et al. (2011), that consumers who reside outside the capital city are more frequent visitors to fresh markets. This evidence **supports** the **idea of the development of the TAF in market towns**.

4.5.4 Roles of taxonomy and retail agglomeration formats

The development process of the taxonomy of retail agglomeration formats show in Figure 4-1. It stems from the decline of rural retailing. People in rural areas commonly do outshopping because of poorer services in local communities (Jarratt, 2000) resulting in the decline and closure of several local and village retail outlets (Findlay and Sparks, 2008). This decline in rural services has been noticed by several studies (Jarratt, 2000, Home, 2002, Kumar Velayudhan, 2014, Marjanen, 2000).

This study employs the idea of developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). However, it advances the previous work by studying the role of store agglomeration formats. To examine the idea of retailing development in market towns, a new classification system of retail agglomeration formats is needed. In doing so, the taxonomy of retail agglomeration formats is proposed to classify the existing retail formats. The taxonomy is established follows the theory of cumulative attraction (Nelson, 1958); however, it is further investigated a location dimension, i.e. rural and urban areas, in order to examine the role of store agglomeration formats in the market towns. In addition, it embraces the retail management style in the context of Thai and some Asian countries as traditional and

modern management styles. Both the agglomeration formats and the management styles are used to cluster the retail agglomeration formats into TAF, MAF, and NAF. These retail agglomeration formats are the alternatives in the choice set in the models, which are the main tool to further analysis and to answer research questions.

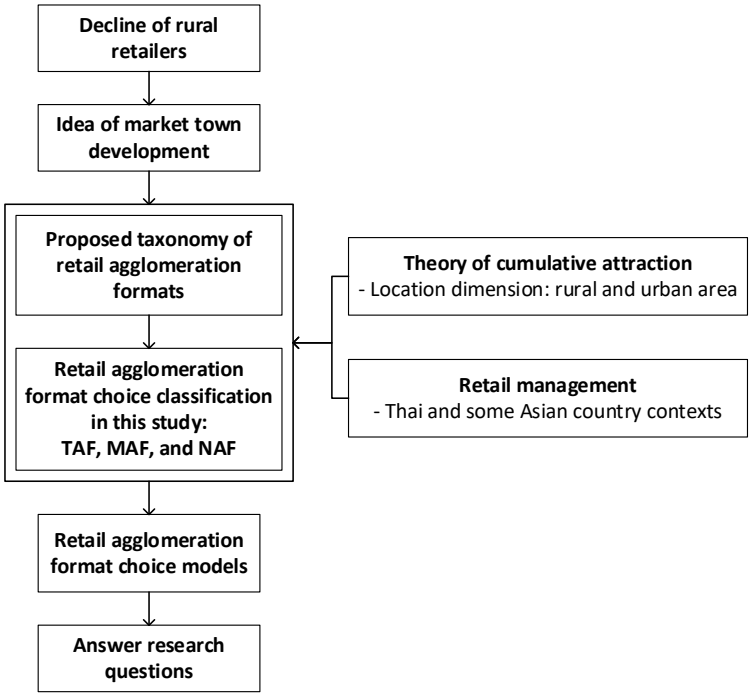


Figure 4-1: The development of the taxonomy of retail agglomeration formats and its application

To answer the first research question '*What form of retailers can reduce regular grocery outshopping trips from rural to urban areas*?', the proposed taxonomy of retail agglomeration formats is set up to classify the retail formats as shown in Table 4-13. The taxonomy categorises the agglomeration formats by (1) location site and development of the retail agglomeration formats: a solitary or non-agglomeration format and a proximity or agglomeration format, and the agglomeration formats can be grouped according to the architectural site plan as permanent, temporary, or unplanned; (2) central/fragmented management and marketing; and (3) the management style: modern and traditional.

The benefits of this taxonomy are twofold. First, it can categorise some existing retail formats, i.e. a periodic or weekend market, a fresh market, and a night market, which the previous work cannot classify. Second, it is a mechanism to investigate the role of retail agglomeration. In doing so, the taxonomy is used to cluster the retail agglomeration formats into TAF, MAF, and NAF in order to examine the idea of developing retailers in market towns as shown in Table 4-14.

The models show evidence supporting the theory of cumulative attraction (Nelson, 1958) that retail agglomeration formats (AF) attract more customers than retail non-agglomeration formats (NAF). First, the finding shows that improving store image attributes: a range of products, price, travel time, product quality, atmosphere, personal service, and store accessibility, for both TAF and NAF will increase the opportunity to shop at the TAF greater that the opportunity to shop at the NAF (support H2). Second, there is no evidence shows that the marginal choice probability for outshopping at a TAF differs significantly from that for outshopping at MAF (not support H1). Thus, it can be implied that improving store image attributes for the AF (both the TAF and the MAF) can increase the probability of customers to shop at the AF compared to that at the NAF.

The results confirm several notions of retail agglomeration formats in the previous studies. May (1981) found that consumers tended to make a decision on store patronage based on the shopping complex instead of the individual store. Gripsrud and Horverak (1986) indicated that retail patronage in food retailing increased when stores were located near other retail facilities. Competition-Commission (2000) found that the main reason for customers do a weekly grocery shop was because the stores were under one roof. Morschett et al. (2005) noted that one of the critical factors of retail strategic strengths is 'scope of offers', including the variety of assortment and one-stop shopping, which, of course, it became store agglomeration format.

Table 4-13: Proposed taxonomy of retail agglomeration formats and the previous retail agglomeration formats classification

<table>
<tr><th rowspan="3">Management style</th><th rowspan="3">Managed & marketing</th><th colspan="3">Agglomeration formats</th><th rowspan="2">Non-agglomeration formats</th></tr>
<tr><th colspan="3">Architectural site plan</th></tr>
<tr><th>Permanent site plan</th><th>Temporary site plan</th><th>Unplanned</th><th>Solitary</th></tr>
<tr><td rowspan="3">Modern management style</td><td>Central managed & central marketing</td><td rowspan="2">Created agglomeration retail formats (CAF)
e.g. Shopping malls, Retail parks</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Central managed & fragmented marketing</td><td>Exhibition retail outlets</td><td>-</td><td>-</td></tr>
<tr><td>Fragmented managed & fragmented marketing</td><td>-</td><td>-</td><td>Evolved agglomera-tion retail formats (EAF) e.g. High street shopping strips</td><td>Speciality stores, individual retail outlets</td></tr>
<tr><td rowspan="2">Traditional management style</td><td>Central managed & fragmented marketing</td><td rowspan="2">Fresh markets, tourist attraction retail sites</td><td rowspan="2">Weekend markets, periodic markets, night markets</td><td>-</td><td>-</td></tr>
<tr><td>Fragmented managed & fragmented marketing</td><td>Evolved agglomera-tion retail formats (EAF) e.g. Local shopping strips</td><td>Mom-and-pop stores, corner shops</td></tr>
</table>

Table 4-14: Retail agglomeration format choice classification in this study

<table>
<tr><th rowspan="3">Management style</th><th rowspan="3">Centrally or fragmentedly managed & Central or fragmented marketing</th><th colspan="3">Agglomeration formats</th><th rowspan="2">Non-agglomeration formats</th></tr>
<tr><th colspan="3">Architectural site plan</th></tr>
<tr><th>Permanent site plan</th><th>Temporary site plan</th><th>Unplanned</th><th>Solitary</th></tr>
<tr><td rowspan="3">Modern management style</td><td>Centrally managed & central marketing</td><td colspan="3" rowspan="3">Modern agglomeration retail format (MAF)
e.g. shopping malls, retail park, exhibition retail outlets, high street shopping strips</td><td rowspan="5">Non-agglomeration retail format (NAF)
e.g. Speciality stores, individual retail outlets, mom-and-pop stores, corner shops</td></tr>
<tr><td>Centrally managed & fragmented marketing</td></tr>
<tr><td>Fragmentedly managed & fragmented marketing</td></tr>
<tr><td rowspan="2">Traditional management style</td><td>Centrally managed & fragmented marketing</td><td colspan="3" rowspan="2">Traditional agglomeration retail format (TAF)
e.g. fresh markets, tourist attraction retail sites, weekend markets, periodic markets, night markets, and local shopping strips</td></tr>
<tr><td>Fragmentedly managed & fragmented marketing</td></tr>
</table>

4.6 Chapter summary

The total sample consists of 1,521 household representatives. Missing data are checked and cleaned. The household characteristics are described. The results of rating important store image attributes in order to choose a typical store for shopping indicate that product quality is the most important factor, and price is the second, followed by customer service levels and ease of access which are the third and fourth important factors, respectively.

The Attribute Promoter Score (APS) is used to analyse customer satisfaction with each store image attribute for existing retail formats. Among the retail formats in this study,

supermarkets and hypermarkets show the highest satisfaction with their wide variety of products, store atmosphere, product quality, and customer service levels, but the lowest satisfaction is with travel time, and ease of access/parking. Fresh market shopping shows only the highest satisfaction with the lowest price. In contrast, convenience stores exhibit the lowest satisfaction with the highest price. Although mom-and-pop stores have an advantage in shortest travel time required and ease of access/parking, they indicate the weakest in most attributes: product quality/freshness, store appearance/atmosphere, customer service level, and narrow product variety.

In terms of reliability, the results indicated that Cronbach's coefficient alpha is 0.821 which is greater than the lower limit of acceptability. Comparison of the overall percentage correction between the developed models and the hold-out data indicates that there is no evidence to show that the developed models are not internally valid.

Four sequential retail agglomeration format choice models have been developed. After examine the goodness-of-fit of the models and the statistical test for each parameter, all store image attributes are statistically significant in the models, apart from retailer reputation. A number of customer characteristics including: age, income level, and the residential area of customers, are statistically significant in the models.

The hypothesis tests are performed. The results indicate that there is no evidence to support H1. Improving store image attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion. There is evidence to support H2, apart from the reputation of the store. The results indicate that improving store image attributes for both TAF and NAF will increase the probability to shop at TAF slightly higher than the probability to shop at NAF. There is evidence partially supporting H3 that residential area and income level affect the choice probability for outshopping at TAF differently from that for outshopping at MAF, whereas gender, age, family size, the presence of children in the household, the presence of elders in the household, educational level, and car availability do not support H3. There is evidence partially supporting H4. The results show that age, and the residential area of customers support H4; however, gender, family size, elders in the household, the presence of children in the household, income level, educational level, and car availability do not support H4.

To answer the question of what forms of retailer should be developed in rural areas, store formats are discussed. The best model shows the alternative specific constant for NAF is significant and negative. This indicates that most consumers viewed the TAF and MAF as superior to the NAF. The marginal effect analysis shows that improving store image

attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion, if other factors are the same.

Most store image attributes are significant in the retail agglomeration format choice model (at the 5% significance level), apart from national or international retailer reputation. The customers' choice models indicate that among eight store image attributes product quality and service level are the first and second most important attributes affecting the choice probability of three store formats: TAF, MAF, and NAF. Improving the product quality and service level from a low to high level will increase the choice probability (approximately 12% to 15%) compared to improving other attributes.

The finding shows elder consumers have more opportunity to support the NAF compared to the younger ones. The TAF can attract low-income consumers who are existing NAF customers. Gender, education level, car availability, household size and family structure do not influence the choice probability among TAF, MAF, and NAF. This finding indicates that households in rural areas have more opportunity to shop at TAF and NAF than households in urban districts. This implies that MAF may not fit with consumers in rural areas. This evidence supports the idea of the development of the TAF in market towns.

Finally, the roles of taxonomy and retail agglomeration formats are discussed. The proposed taxonomy of retail agglomeration formats can categorise some existing retail formats, which the previous work cannot classify, e.g. a periodic or weekend market, a fresh market, and a night market. It is a mechanism to investigate the role of retail agglomeration by clustering the retail agglomeration formats into TAF, MAF, and NAF in order to examine the idea of developing retailers in market towns. The results show evidence supporting the theory of cumulative attraction (Nelson, 1958) that retail agglomeration formats (AF) attract more customers than retail non-agglomeration formats (NAF).

Chapter 5 Conclusions

5.1 Summary of the study

Chapter 1 describes the background of the study providing the reasons why the Thai grocery market is selected in this study. This chapter overviews the impacts of recent retail formats arrival into the Thai grocery market. It shows evidence that Thai consumers shift from traditional retail formats to modern retail formats and frequently do outshopping, particularly from rural areas to town centres. This leads to the decline of rural retailers. Research on what a store format and which factors influence a customer outshopping trip is missing in the past studies.

First, this study attempts to answer the question **what form of retailers** should be developed in rural areas. An opportunity exists in rural retailing to develop a retail format that may be able to effectively compete with the large, modern retail stores in the city centre. This study employs the idea of developing retailers in market towns. However, it also advances the previous work by explicitly studying the role of store agglomeration.

Second, to examine the role of store agglomeration, this study attempts to identify store image attributes and customer characteristics that impact on retail agglomeration format choice. It tries to answer the question **which store image attributes and customer characteristics** affect retail agglomeration format choice for a regular grocery outshopping trip.

The research questions are set up as follows:

RQ1: What form of retailers can reduce a regular grocery outshopping trip from rural to urban areas?

RQ2: Which store image attributes and customer characteristics affect retail agglomeration format choice for a regular grocery outshopping trip?

This research differs from previous studies in that, first, it provides a dimension and a new classification system of retail agglomeration formats. This new classification gains insight into several retail agglomeration formats, e.g. a periodic market, a weekend market, and a night market, particularly in Asian countries. The past studies did not focus on the management style of retail agglomeration formats. Examples are fresh markets and retail parks. Second, it also investigates store image attributes and reveals important customer characteristics that affect the choice across retail agglomeration formats for a

regular grocery outshopping trip from rural areas to urban districts, which previous studies have ignored.

It is anticipated that the results from this study will provide meaningful insights into consumer choice behaviour that may help retailers' decisions and guide public policy. This study is important for retailers of either traditional or modern formats and for government authorities, who relate to the development of retailers in rural areas. Modern retailers want to operate efficiently by fitting with the needs of local consumers, while traditional retailers would like to survive the fierce competition of new incoming retail formats. Government authorities can reduce the decline of retailers in remote areas by making or changing policies, e.g. strengthening the development of retailing in the market towns. Better understanding of consumers' shopping behaviour may assist governments to make more efficient and effective policies.

Chapter 2 provides a literature review of retail agglomeration and its related matters. First, the term *'store/retail agglomerations'* is defined as similar or different types of retailers gathered in one place or nearby. Several theories explain the spatial distribution of retailers and retail agglomeration. These theories are the central place theory, the bid rent theory, the principle of minimum differentiation, and the theory of cumulative attraction. Then, the benefits of retail agglomeration from retailers' and customers' perspectives are identified.

The term *'store/retail formats'* is defined as a combination of particular levels of each element of the retailing mix, such as product assortment, pricing strategy, location, customer interface, and so forth. The importance of retail format choice is highlighted because consumers typically have a primary affiliation to a '*main store*' which captures the majority of their purchases and consumers tend to spend twice as much in the main store as in other stores. The store format choice can be a representation of market share among store formats.

From the extant literature, the prior classification system of retail agglomeration formats cannot categorise a number of retail formats e.g. fresh markets, weekend markets, and night markets. So, a new taxonomy for retail agglomeration formats is provided. It is based upon three criteria consisting of how retailers are planned and constructed, to what extent they are managed and marketed, and what their management styles.

This study offers a new classification of retail format in order to examine the idea of a retailing development involving a retail agglomeration format as (1) a '*traditional agglomeration retail format'* (TAF), (2) a '*modern agglomeration retail format'* (MAF) and (3) a '*non-agglomeration retail format'* (NAF). The TAF is a collection of small stores

whose management style is not standardised, with old-fashioned operations and minimal investment in technology and innovation. The MAF is defined as a collection of small to large stores providing modern services and displays, operating with standardised management systems, and investing in technology and innovation to attract customers, e.g. using state-of-the-art supply chain and logistics systems. The NAF is defined as a single independent or chain retail store located at a solitary site, regardless of store size and management style.

Next, several definitions of the term *'outshopping'* are discussed. The reasons why outshopping occurs and the problems of outshopping from rural areas to urban districts are provided. In rural areas the outshopping problem becomes significant because there are fewer retailers and limited varieties of product types; hence, the prevalence of outshopping in rural areas. Thai consumers have been shifting from the traditional store formats to modern store formats. Consequently, many consumers in remote areas perform more outshopping because most modern store formats are in different locations far away from consumers' residences.

Furthermore, the concept of *'store image'* is used to construct the conceptual model in this study. Store image attributes are investigated in the study including the range of products, price, travel time, product quality, atmosphere, customer service, accessibility, and retailer reputation. Customer characteristics are also investigated in this study; they consist of gender, age, the number of members, children and elders in a household, income levels, educational levels, the residential area, and car availability. The factors and conditions influencing store agglomeration format choice are discussed. The term *'a regular grocery shopping trip'* is offered to operationalise the situational influence in this study. Then, four research hypotheses are proposed. In addition, a conceptual model is offered to examine these hypotheses. The conceptual model is constructed following the S-O-R model.

Chapter 3 focuses on the methodology to develop the choice models in order to investigate the effects of store image attributes and customer characteristics on retail agglomeration format choice. First, it presents the research's philosophical stance. Then, several retail patronage modelling approaches are described. A discrete choice model and its justification are presented. The discrete choice model is described, along with the random utility theory, followed by the MNL model and its limitations. However, a mixed logit model, so-called multinomial mixed logit model, random parameters logit, is used to develop the retail agglomeration format choice model in order to tackle the limitations of the MNL model by allowing for random taste variation, unrestricted substitution patterns, and handling correlation in unobserved factors over time and panel data. Panel

data means the pattern of repeated choices (different situations) by each respondent resulting from the choice experiment.

The dimensions and components to measure store image in this study are derived from the previous studies and the recent study of the Thai market. These store image attributes are validated through face-to-face in-depth interviews. The choice set of the store formats consists of: (1) traditional agglomeration retail format (TAF), i.e. a fresh/periodic market; (2) modern agglomeration retail format (MAF), i.e. a shopping mall/hypermarket; (3) non-agglomeration retail format (NAF), i.e. a new community store.

All sources of error need to be thoughtfully dealt with when the SP experiment is designed. A choice experiment is constructed in order to minimise the errors. It is set up using the stated preference (SP) survey. The SP is offered because there are attribute levels and a new community format (as NAF) which are not in the current market. To set up the choice experiment, several steps are performed: (1) problem refinement, (2) stimuli refinement, (3) experimental design consideration, (4) generate experimental design, (5) allocate attribute to design columns, (6) generate choice sets, (7) randomise choice sets, and (8) construct survey instrument. Computer-assisted personal interviewing (CAPI) is used to conduct the SP survey.

The unit of analysis is a household in a regional city that does grocery shopping regularly. The stratified random sampling divided the population into an urban area and a rural area. Then, a random sample was drawn within each stratum by a simple random sampling in a store format. A systematic random sampling was applied by intercepting each household representative in order to maintain randomness. The chosen city is Nakhon Ratchasima province which is one of the regional cities in north-eastern Thailand. It consists of 2,600,000 people (around 830,000 households) and about 75% of the total population live in a rural area. The total sample consists of 1,521 households.

The parameters in the mixed logit models are estimated using the simulated maximum likelihood approach. Then, elasticity and marginal effects are discussed so as to examine the effects of store image attributes or customer characteristics on the retail agglomeration format choice. Reliability and validity are discussed. Internal consistency reliability is used to measure the reliability indirectly. Cronbach's coefficient alpha is applied. To validate the discrete choice models, for the first step, goodness-of-fit and hypothesis testing are employed. The first goodness-of-fit is a *'likelihood ratio test'*. This test compares two different choice models between: the model with estimated parameters and the base model by assuming all parameters are zero. The second goodness-of-fit is a statistic called the *'likelihood ratio index'*, ρ^2 is used to indicate the

overall model goodness-of-fit. Next, the asymptotic equivalent to the *t*-test, known as the Wald-statistic, is used to test the significance of each parameter in the model. Then the second step, the internal validity, is performed using the hold-out test.

5.2 Summary of the findings

The total sample consists of 1,521 household representatives. Missing data are checked and cleaned. The missing data can be ignored because they represent less than 10% and do not occur in a specific non-random fashion. The samples indicate a majority of females compared to males. A household size mode is four persons (average 4.1 persons per household). Income levels are distributed similarly to a bell-curve across the samples. About 40% of the sample live in urban areas, while the rest are in suburban and rural areas.

The results of rating important store image attributes, in order to choose a typical store for shopping, indicate that product quality is the most important factor, and price the second, followed by customer service levels and ease of access which are third and fourth, respectively.

The Attribute Promoter Score (APS) is used to analyse customer satisfaction. The results indicate that supermarkets and hypermarkets show high satisfaction with their wide variety of products, store atmosphere, product quality, and customer service level (APS = 50.79%, 24.46%, 20.28%, and 15.04%, respectively), but lower satisfaction with travel time, and ease of access/parking (APS = -73.93%, and -44.54%, respectively). Fresh markets show only highest satisfaction with lowest price (APS = -3.32%). In contrast, convenience stores exhibit the lowest satisfaction with the highest price (APS = -76.36%). Although mom-and-pop stores have an advantage in needing the shortest travel time and ease of access/parking (APS = 59.20%, and 19.88%, respectively), they are the weakest in many attributes: product quality/freshness, store appearance/atmosphere, customer service level, and narrow product variety (APS = -86.46%, -85.78%, -65.18% and -59.54%, respectively).

The internal consistency reliability is indirectly examined by Cronbach's coefficient alpha; the results indicate that this is 0.821, which is greater than the lower limit of acceptability at the value of 0.7. The Hausman-test suggests that the MNL model can be used without violation of the IIA assumption. Although it does not violate the IIA assumption, the MNL model also restricts to the correlation of choice situations for each respondent, which represents the panel data from the SP survey. Therefore, the mixed logit (ML) is applied to overcome this limitation.

The internal validity is performed using the hold-out test. The comparison of the overall percentage correction between the developed models and the hold-out data indicates that there is no evidence that the developed models are not internally valid.

Four sequential retail agglomeration format choice models have been developed. After examining the goodness-of-fit of the models and the statistical test for each parameter, all store image attributes are statistically significant in the models, apart from the retailer reputation. A number of customer characteristics including: age, income level, and the residential area of customers, are statistically significant in the model.

Finally, the hypothesis tests are performed. The first hypothesis is as follows:

H1: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to changing in store image attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

The results indicate that there is no evidence to support H1. Improving store image attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion.

H2: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to changing in store image attributes (a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer).

There is evidence to support H2, apart from the reputation of the store. The figures indicate that improving store image attributes for both TAF and NAF will increase the probability to shop at TAF slightly higher than the probability to shop at NAF.

H3: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a modern agglomeration retail format (MAF) with respect to differences in customer characteristics (gender, age, household size, family structure, household income, educational level, car availability, and residential location).

There is evidence partially supporting H3 that residential area and income level affect the choice probability for outshopping at TAF differently from that for outshopping at MAF, whereas gender, age, family size, the presence of children and elders in the household, educational level, and car availability do not support H3.

H4: Marginal customers' choice probability for outshopping at a traditional agglomeration retail format (TAF) differs significantly from that for outshopping at a non-agglomeration retail format (NAF) with respect to differences in customer characteristics (gender, age, household size, family structure, household income, educational level, car availability, and residential location).

There is evidence partially supporting H4. The results show that the age, and the residential area of customers support H4; however, gender, family size, the presence of elders and children in the household, income level, educational level, and car availability do not support H4.

To answer the question of what forms of retailer should be developed in rural areas, store formats are discussed. The best model shows the alternative specific constant for NAF is significant and negative. This indicates that most consumers viewed the TAF and MAF as superior to the NAF. The marginal effect analysis shows that improving store image attributes for TAF and MAF will increase the probability to shop at both retail formats with approximately the same proportion, if other factors are the same.

Most store image attributes are significant in the retail agglomeration format choice model (at the 5% significance level), apart from national or international retailer reputation. The customers' choice models indicate that among eight store image attributes product quality and service level are the first and second most important attributes affecting the choice probability of three store formats: TAF, MAF, and NAF. Improving the product quality and service level from a low to high level will increase the choice probability (approximately 12% to 15%) compared to improving other attributes.

The finding shows the older consumers have more opportunity to support the NAF compared to the younger ones. The TAF can attract low-income consumers who are existing NAF customers. Gender, education level, car availability, household size and family structure do not influence the choice probability among TAF, MAF, and NAF. This finding indicates that households in rural areas have more opportunity to shop at TAF and NAF than households in urban districts. This implies that MAF may not fit with consumers in rural areas. This evidence supports the idea of the development of the TAF in market towns.

Finally, the roles of taxonomy and retail agglomeration formats are discussed. The proposed taxonomy of retail agglomeration formats can categorise some existing retail formats, which the previous work cannot classify, e.g. a periodic or weekend market, a fresh market, and a night market. It is a mechanism to examine the role of retail agglomeration. The results show evidence supporting the theory of cumulative attraction.

5.3 Theoretical and other contributions

5.3.1 Theory of cumulative attraction

The first contribution is to the **theory of cumulative attraction** (Nelson, 1958). The theory of cumulative attraction seeks to explain the collection of retailers both the homogeneity and heterogeneity of retailers. This study utilises the theory of cumulative attraction as theoretical lens of the study; nevertheless, it contributes to the theory by examining further dimension, i.e. a location. It investigates the role of retail agglomeration formats in the rural areas. Due to the decline of rural retailing (Jarratt, 2000, Home, 2002, Kumar Velayudhan, 2014, Marjanen, 2000), it needs the development of a retail format that may be able to compete with large modern retail stores in city centres. This study employs the idea of developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004) which captures consumers in remote catchment areas. The agglomeration pattern is a mechanism to investigate the role of retail agglomeration by clustering the retail agglomeration formats into TAF, MAF, and NAF. These retail agglomeration formats are the alternatives in the choice set in the models, which are the main tool to investigate the role of retail agglomeration. The results show evidence supports the theory of cumulative attraction that agglomeration retail formats (AF) both MAF and TAF attract more customers than NAF.

5.3.2 Retail management

The second dimension contributes to **retail management** by focusing on the management style in the context of Thai and some Asian countries as traditional and modern management styles, which often ignore in many studies in western countries. Thailand modern retails control half the food sales, but traditional fresh markets remained essential, approximately half of shoppers went to traditional retailers and the rest either supported modern or traditional formats (Kelly et al., 2015). Traditional markets remain the largest portion of food retailing. This study scrutinises the traditional management style in Thai grocery market. The findings show evidence supports the traditional management style as the TAF. Several studies in Thailand indicate that traditional retail formats coexist with modern retail formats (e.g. Ihara, 2013, Banwell et al., 2012, Gorton et al., 2011, Kelly et al., 2015). This traditional formats also exists in many developing countries (Maruyama and Wu, 2014, Gorton et al., 2011, Anand, 2009, Maruyama and Trung, 2007, Dholakia et al., 2012, Chamhuri and Batt, 2013) and even in many developed Asian countries, e.g. Hong Kong, Singapore, Taiwan, South Korea (Huang et al., 2015, Goldman and Hino, 2005). Goldman et al. (2002) suggested that, at least in Asian

countries, the development of modern retail formats might not be sufficient to replace traditional format shopping.

5.3.3 Taxonomy of retail agglomeration formats

One of the most important contributions of this study is the **taxonomy of retail agglomeration formats** in Table 4-13. It stems from the decline of rural retailing (Jarratt, 2000, Home, 2002, Kumar Velayudhan, 2014, Marjanen, 2000). People in rural areas usually do outshopping to further city centres resulting in the decline and closure of several local and village retail outlets (Findlay and Sparks, 2008). This study employs the idea of developing retailers in market towns (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). Market towns can play a major role and act as the focal point for the provision of services for rural areas (Powe and Shaw, 2004). The market towns can provide an acceptable compromise for a range of services, where the town catchment may be sufficiently large to allow economies of scale and a degree of specialisation (Powe and Shaw, 2004). The concept of market town development is not new, and has recently been employed in some rural districts in the UK (Phillips and Swaffin-Smith, 2004, Findlay and Sparks, 2008, Powe and Shaw, 2004). The past work focused on individual local shops. It has never been applied to a traditional agglomeration retail format (TAF), particularly in Asian countries. There are several forms of the TAF such as a weekend market (Bangkok-Attractions, 2017), a periodic market (Kumar Velayudhan, 2014), a night market (Adventure-In-Thailand, 2017), a local shopping strip (Asia-for-Visitors, 2017) that could be applied in the market town, and in turn be possible to reduce the outshopping from rural areas to urban districts. Therefore, this study advances the previous work by studying the role of store agglomeration formats and their management styles.

To examine the idea of retailing development in market towns, a new classification system of retail agglomeration formats is needed. In doing so, this study provides a taxonomy of retail agglomeration formats. The taxonomy categorises the retail agglomeration formats by how retailers are planned and constructed, to what extent they are managed and marketed, and what their management styles are. Specifically, the proposed taxonomy classifies the retail agglomeration formats by (1) location site and development of the retail agglomeration formats, i.e. a solitary or non-agglomeration format and a proximity or agglomeration format, and the agglomeration formats can be grouped according to the architectural site plan as a permanent site plan, temporary site plan, and unplanned; (2) central/fragmented management and marketing; and (3) the management style, i.e. modern and traditional management style.

The proposed taxonomy of retail agglomeration formats is used to categorise the retail agglomeration formats into TAF, MAF, and NAF. It is a mechanism to examine the form of retailers by investigating the role of retail agglomeration and the retail management style. Besides, the taxonomy of retail agglomeration formats can categorise the previous defined retail agglomeration formats (Teller, 2008, Teller et al., 2016, Reimers and Clulow, 2004, Reimers and Clulow, 2014, Gilbert, 2003) and existing retail formats i.e. weekend markets, periodic markets, night markets, tourist attraction retail sites, and exhibition retail outlets, which cannot be classified by the past work. In summary, the proposed taxonomy of retail agglomeration formats adds more understanding the role of retail agglomeration and management styles in Thai grocery markets.

5.3.4 Other contributions

This study fills the research void of extant studies that does not focus on the **retail agglomeration format choice** for outshopping, particularly from rural areas to urban districts. Past studies focus on specific store formats, in particular cities and metropolitan areas. They often ignore the retailers in rural areas even though a large number of rural people regularly do outshopping. In doing so, it examines the idea of retail development in the market towns to identify the retailer that should be developed in the rural areas. Although it has been suggested that market towns play an important role in servicing their hinterlands, it is unclear **what form** (e.g. store format) this takes and on **which factors** (store image attributes and customer characteristics) the role depends. This study advances the previous work by explicitly studying the role of the retail agglomeration (both an agglomeration retail format and a non-agglomeration retail format) in remote areas. To examine the role of the store agglomeration, it also examines the effect of store image attributes including: a range of products, price, travel time, product quality, atmosphere, personal service, store accessibility, and reputation of a retailer on retail agglomeration format choice. It also examines the effect of customer characteristics including: gender, age, family size, educational level, household income, residence location, and car availability on retail agglomeration format choice.

Moreover, this study investigates attributes and levels which do not exist in the present market; i.e. a new community store (a NAF) is examined with attribute levels, i.e. home delivery and national reputation, which are not currently in the market. Although fresh markets (a traditional retail agglomeration format) are in the present market, their attribute level, i.e. international reputation which cannot be seen in the current market, is examined too. A choice experiment using the SP survey is conducted in order to examine such formats, attributes and levels.

5.4 Managerial implication

Traditional store formats exist if they create and deliver value to customers. Goldman et al. (2002) suggested that, at least in Asian countries, the development of modern retail formats might not be sufficient to replace traditional format shopping. In Thailand, studies (e.g. Ihara, 2013, Banwell et al., 2012, Gorton et al., 2011, Kelly et al., 2015) showed that **traditional retail formats coexist with modern retail formats**. Many consumers perform selective adoption, i.e. consumers do their shopping regularly at the traditional retail format, whereas they shop at the modern retail format occasionally. This selective adoption exists in many developing countries (Maruyama and Wu, 2014, Gorton et al., 2011, Anand, 2009, Maruyama and Trung, 2007, Dholakia et al., 2012, Chamhuri and Batt, 2013) and even in many developed Asian countries, e.g. Hong Kong, Singapore, Taiwan, South Korea (Huang et al., 2015, Goldman and Hino, 2005). Maruyama and Wu (2014) found that the Chinese tended to shop for fresh food at the traditional retail format and for packaged and cooked food at the modern retail format. Chamhuri and Batt (2013) observed that Malaysian consumers preferred to shop at the traditional stores for fresh meat. In Thailand, a number of studies report that consumers regularly purchase fresh food at the traditional retail formats and packaged food at the modern retail formats occasionally (Ihara, 2013, Gorton et al., 2011, Banwell et al., 2012). For most Thais, particularly those in rural areas, the daily purchase of fresh food at the fresh market has become routine shopping.

5.4.1 Fresh market as the TAF

The fresh markets as the **main traditional store format** for Thai consumers should be developed both in product quality and customer service; as their main rivals, the hypermarkets, provide a similar shopping experience with better performance, more and more Thais are supporting modern grocery retailers (Canada, 2012). On the one hand, product quality should be developed, such as using a cold chain network to keep perishable goods fresh (Salin and Nayga Jr, 2003), making the safety of products better and providing greater food diversity (Banwell et al., 2012). On the other hand, customer service, such as friendliness and helpfulness of staff, should also be improved. In Thailand, customer service is not only a significant factor for the retail sector. It has also become increasingly important for other service sectors in recent years (Saha and Theingi, 2009).

There has been an interesting experiment in China recently. The Chinese government started the 'Wet/Fresh Market Transforming into Food Supermarket (WMTFS)' programme that aims to transform the traditional fresh food retailing into a more efficient one in

2002; however, the process of implementing the WMTFS programme has been painfully slow after years of effort (Maruyama et al., 2016). The experiment in the modernization of fresh food retailing in China showed that traditional retail formats were still preferred by many Chinese consumers. On the supply side, the reasons were high cost of transformation, how to arrange the sellers in the original traditional market, and the high cost of fresh products operation (Maruyama et al., 2016). On the demand side, the problems were related to consumers' attitudes and patronage decisions. Maruyama et al. (2016) found that freshness, accessibility, and whether customers can bargain were influencing factors.

The study by Banwell et al. (2012) has shown that fresh markets are under pressure and are declining in number; they have been attempting to resist the competition from supermarkets by improving convenience, food variety, quality and safety. Ihara (2013) and Kelly et al. (2015) reported that traditional retailers responded to the opening of hypermarkets by installing air-conditioners, altering the store layout, changing opening hours, providing more hygienic produce or joining an existing convenience store chain.

To this end, the government has taken several remedial measures to enhance the competitiveness of traditional markets against the hypermarkets. The Thai government has introduced zoning laws, incorporated as The Town Planning Act and the Building Control Act, into the Retail and Wholesale Act since 2004. The zoning laws stipulated that stores with selling space of 300-4,000 square metres should be located at least 15 kilometres away from city zones (Ihara, 2013). Kelly et al. (2015) claimed that in the short to medium term Thais purchase fresh food at traditional and modern retailers, both of which retain market share. However, for longer term survival the traditional retailers may require government support. Such assistance may take the form of improvements in physical infrastructure and facilities, improving food distribution systems, rent subsidization (as the major cost factor), as well as the active promotion of fresh markets as healthy food sources and as repositories of Thai food culture.

5.4.2 Mom-and-pop stores and convenience stores as the NAF

Feeny et al. (1996) reported the huge success of the master franchise of 7-Eleven in Thailand. As a result, the impact of 7-Eleven on Thai retailing and Thai life has been enormous; 7-Eleven stores are everywhere. 7-Eleven has rolled out a smart card system, a bill payment counter service, even airline tickets can be purchased from the stores (Shannon, 2009). Key to their success has been in their strategic location, such as bus stops, together with bright lighting, cleanliness, efficient service and a limited range of reliable goods. However, Bhatnagar and Ratchford (2004) noted that convenience stores

require higher prices because of the small scale of their operation, but can be attractive in certain situations by minimising travel and inventory costs. In comparison to their main rivals (mom-and-pop stores), which cater for similar shopping habits, most attributes for convenience stores are rated better than those of mom-and-pop stores, except for the price.

The finding indicates that improving store image attributes will increase the probability to shop at NAF slightly less than the probability to shop at TAF. The NAF should contemplate high product quality as the most significant attributes followed by customer service. Meanwhile, accessibility, price, atmosphere, and variety of product can also raise the probability to shop at the NAF. An existing traditional retail format, such as the mom-and-pop store, should improve product quality as well as the customer service level as the first and second positions according to the highest important store image attribute rating and the lowest Attribute Promoter Score (APS). The strength of the mom-and-pop store is only in its location, while other attributes are worse than its rival, the convenience store. Shannon (2009) has suggested that the new format discount convenience stores, which are principally small supermarkets, may be well suited to Thai consumers, who tend to shop frequently but spend small amounts each time.

5.4.3 Supermarket and hypermarket as the MAF

Over four decades, supermarkets have made the biggest impact of all on Thai retailing, especially when forming a part of larger shopping centre complexes. However, in the capital city, supermarkets reached saturation (Feeny et al., 1996) and had then spread into other parts of the country, particularly regional cities. Several attributes, i.e. product quality, customer service, store appearance/atmosphere, range of products of supermarkets and hypermarkets are rated the highest among formats. However, several customers perceive that these stores are difficult to access/park and it takes a long time to travel to the stores. Ease of access/parking and travel time should be improved, particularly traffic congestion (Laowagul et al., 2008, ThaiPBS, 2016) and availability of car parking (Sunalai, 2006) but these attributes seem not to have much relative importance to customers compared to other attributes. Evidence shows that major hypermarkets incorporate 'imitation fresh markets' into their formats: spatial layout, and spiritual functions such as aquariums of live fish, butchers and fishmongers cutting portions and trimming for customers' requirement, (Isaacs, 2009, Gorton et al., 2009). Highlighting one-stop shopping, both functional and hedonic, can increase the strength of supermarkets and hypermarkets, as Thai consumers perceive their shopping trips as family outings, entertainment, and an opportunity to observe new things and experiences (Ihara, 2013, Isaacs, 2009, Vilaisai and Chaipoopirutana, 2017).

5.5 The limitations and recommendation for future research

Although this research can provide the answers for two research questions, it has some limitations. First, the main limitation of this research is that it uses only one Thai regional city, so it is difficult to generalise the findings to other countries and markets. The phenomenon of the store formats is also rather local and country-specific. Thus, a replication of the study in other retail locations or other cultures may reveal other findings and may verify the purposed taxonomy of retail agglomeration formats.

Second, the reliability of the SP survey exercise could not be examined directly, because the time and budget were limited. Instead, internal consistency reliability is used to measure the reliability indirectly. Future research may be designed to measure the reliability of the SP survey directly. Future research could measure the reliability over time, reliability over stimulus set, reliability over attribute set, and reliability over data collection procedures (Bateson et al., 1985).

Third, this study cannot perform external validity because to measure external validity a different data set is needed. Such data is a real choice in real markets. To perform the external validity, if there is an implementation of the study retail format, it should measure the real choice in the real market. Then the choice probability of such implementation and that of this study can be validated externally. Several examples of external validity can be seen in the report by Louviere (1988).

Fourth, since the data are cross-sectional at a specific period of time for the study, it cannot measure the dynamic choice behaviour of customers over time. Store format switching behaviour (e.g. Popkowski Leszczyc and Timmermans, 1997) cannot be examined unless longitudinal data are collected. In addition, some models ignore multi-format shopping (e.g. Jayasankara Prasad and Kathyayani, 2014) but instead treat each store visit as independent among store formats. Future research may capture store switching, repeat choice over time, and multi-format shopping behaviour.

Fifth, the choice model focuses on the situational factor which is operationalised only by a regular grocery shopping trip. A future study may cover other product categories and other shopping situations. It may give some information and in turn knowledge about retail format choice, its attributes and related customer characteristics.

Finally, the developed models provide a relative choice probability because it is calibrated based upon the SP data. Swanson (1998) suggested that SP data should never be used to produce absolutely forecasts because respondents may not be able or willing to give accurate answers to SP choices, and therefore SP must be re-scaled using observed

choices. So, if these models need to predict the absolute results, they need to be recalibrated with a combination of SP and observed data, i.e. revealed preference (RP), to make sure that the prediction has minimum error.

References

AAKER, D. A. 2012. *Building Strong Brands*, Simon & Schuster UK.

ADVENTURE-IN-THAILAND. 2017. *Visiting Nakhon Ratchasima, the gate to Isan* [Online]. Available: https://www.adventureinthailand.com/blog/visiting-nakhon-ratchasima-gate-isan/ [Accessed 21 February 2017].

AGRAWAL, D. & SCHORLING, C. 1996. Market Share Forecasting: An Empirical Comparison of Artificial Neural Networks and Multinomial Logit Model. *Journal of Retailing,* 72**,** 383-407.

AILAWADI, K. L. & KELLER, K. L. 2004. Understanding retail branding: conceptual insights and research priorities. *Journal of retailing,* 80**,** 331-342.

AJZEN, I. 1985. From intentions to actions: A theory of planned behavior. *Action control.* Springer.

AJZEN, I. 1991. The theory of planned behavior. *Organizational behavior and human decision processes,* 50**,** 179-211.

AJZEN, I. 2005. *Attitudes, personality, and behavior*, McGraw-Hill Education (UK).

AMA. 2016. *Marketing Glossary dictionary of the American Marketing Association* [Online]. American Marketing Association. Available: https://www.ama.org/resources/Pages/Dictionary.aspx [Accessed 31 July 2016 2016].

AMINE, A. & LAZZAOUI, N. 2011. Shoppers' reactions to modern food retailing systems in an emerging country: the case of Morocco. *International Journal of Retail & Distribution Management,* 39**,** 562-581.

ANAND, J. 2009. Supermarketization, consumer choices, and the changing food retail market structure: the case of Citlalicalli, Mexico. *Economic Development, Integration, and Morality in Asia and the Americas.* Emerald Group Publishing Limited.

ANSELMSSON, J., JOHANSSON, U. & PERSSON, N. 2007. Understanding price premium for grocery products: a conceptual model of customer-based brand equity. *Journal of Product & Brand Management,* 16**,** 401-414.

ARENTZE, T. A., OPPEWAL, H. & TIMMERMANS, H. J. P. 2005. A Multipurpose Shopping Trip Model to Assess Retail Agglomeration Effects. *Journal of Marketing Research,* 42**,** 109-115.

ARTZ, G. M. & STONE, K. E. 2006. Analyzing the impact of Wal-Mart supercenters on local food store sales. *American journal of agricultural economics,* 88**,** 1296-1303.

ASIA-FOR-VISITORS. 2017. *Bangkok's Chinatown District* [Online]. Available: http://bangkokforvisitors.com/chinatown/ [Accessed 22 Feb 2017].

ASSAEL, H. 1995. *Consumer Behavior and Marketing Action*, South-Western College Pub.

AYLOTT, R. & MITCHELL, V.-W. 1998. An exploratory study of grocery shopping stressors. *International Journal of Retail & Distribution Management,* 26**,** 362-373.

BAGOZZI, R. P. 1980. *Causal models in marketing*, Wiley New York, NY.

BAGOZZI, R. P. 1986. *Principles of marketing management*, Science Research Associates.

BAGOZZI, R. P., GOPINATH, M. & NYER, P. U. 1999. The role of emotions in marketing. *Journal of the academy of marketing science,* 27**,** 184-206.

BAKER, J. 1986. The role of the environment in marketing services: The consumer perspective. *The services challenge: Integrating for competitive advantage,* 1**,** 79-84.

BAKER, J., GREWAL, D. & PARASURAMAN, A. 1994. The influence of store environment on quality inferences and store image. *Journal of the academy of marketing science,* 22**,** 328-339.

BAKER, J., LEVY, M. & GREWAL, D. 1992. An experimental approach to making retail store environmental decisions. *Journal of retailing,* 68**,** 445.

BAKER, J., PARASURAMAN, A., GREWAL, D. & VOSS, G. B. 2002. The influence of multiple store environment cues on perceived merchandise value and patronage intentions. *Journal of marketing,* 66**,** 120-141.

BAKKER, I., VAN DER VOORDT, T., VINK, P. & DE BOON, J. 2014. Pleasure, arousal, dominance: Mehrabian and Russell revisited. *Current Psychology,* 33**,** 405-421.
BANGKOK-ATTRACTIONS. 2017. *Chatuchak Market in Bangkok* [Online]. Available: https://bangkokattractions.com/chatuchak-market-bangkok/ [Accessed 21 February 2017].
BANWELL, C., DIXON, J., SEUBSMAN, S.-A., PANGSAP, S., KELLY, M. & SLEIGH, A. 2012. Evolving food retail environments in Thailand and implications for the health and nutrition transition. *Public health nutrition,* 16**,** 608-615.
BASKER, E. 2005. Job creation or destruction? Labor market effects of Wal-Mart expansion. *Review of Economics and Statistics,* 87**,** 174-183.
BATES, J. 1998. Reflections on Stated Preference: Theory and Practice. *In:* ORTUZARS, J. D. D., HENSHER, D. A. & JARA-DIAZ, S. (eds.) *Travel Behaviour Research: Updating The State of Play.* Oxford: Pergamon Press Inc.
BATESON, J. E., REIBSTEIN, D. J. & BOULDING, W. 1985. *Conjoint analysis reliability and validity: A framework for future research*, Graduate School of Business, Stanford University.
BEARDEN, W. O. 1977. Determinant attributes of store patronage-downtown versus outlying shopping centers. *Journal of Retailing,* 53**,** 15-&.
BECKER, G. S. 1965. A Theory of the Allocation of Time. *The Economic Journal,* 75**,** 493-517.
BEJOU, D., WRAY, B. & INGRAM, T. N. 1996. Determinants of relationship quality: an artificial neural network analysis. *Journal of Business Research,* 36**,** 137-143.
BELK, R. W. 1975. Situational variables and consumer behavior. *Journal of Consumer research,* 2**,** 157-164.
BELL, D. R., HO, T.-H. & TANG, C. S. 1998. Determining Where to Shop: Fixed and Variable Costs of Shopping. *Journal of Marketing Research,* 35**,** 352-369.
BELL, D. R. & LATTIN, J. M. 1998. Shopping behavior and consumer preference for store price format: Why "large basket" shoppers prefer EDLP. *Marketing Science,* 17**,** 66-88.
BELLENGER, D. N. & KORGAONKAR, P. K. 1980. Profiling the Recreational Shopper. *Journal of Retailing,* 56**,** 77.
BELLENGER, D. N., ROBERTSON, D. H. & GREENBERG, B. A. 1977. Shopping center patronage motives. *Journal of Retailing,* 53**,** 29-38.
BELWAL, R. & BELWAL, S. 2017. Factors affecting store image and the choice of hypermarkets in Oman. *International Journal of Retail & Distribution Management,* 45.
BEN-AKIVA, M. E. & LERMAN, S. R. 1985. *Discrete choice analysis: theory and application to travel demand*, MIT press.
BENNETT, P. D. & ASSOCIATION, A. M. 1995. *Dictionary of Marketing Terms*, NTC Business Books.
BERMAN, B. & EVANS, J. R. 2013. *Retail Management: A Strategic Approach*, Prentice Hall.
BHATNAGAR, A. & RATCHFORD, B. T. 2004. A model of retail format competition for non-durable goods. *International Journal of Research in Marketing,* 21**,** 39-59.
BITNER, M. J. 1992. Servicescapes: The impact of physical surroundings on customers and employees. *The Journal of Marketing***,** 57-71.
BLAIKIE, N. 2007. *Approaches to Social Enquiry,* Cambridge, Polity Press.
BLAIR, E. 1983. Sampling Issues in Trade Area Maps Drawn from Shopper Surveys. *Journal of Marketing,* 47**,** 98-106.
BLAKNEY, V. L. & SEKELY, W. 1994. Retail attributes: Influence on shopping mode choice behavior. *Journal of Managerial Issues***,** 101-118.
BLOIS, K., MANDHACHITARA, R. & SMITH, T. 2001. Retailing in Bangkok: An intriguing example of agglomeration. *International Journal of Retail & Distribution Management,* 29**,** 472-479.
BORRAZ, F., DUBRA, J., FERRÉS, D. & ZIPITRÍA, L. 2014. Supermarket entry and the survival of small stores. *Review of Industrial Organization,* 44**,** 73-93.

BOUGOURE, U. & LEE, B. 2009. Service quality in Hong Kong: wet markets vs supermarkets. *British Food Journal,* 111**,** 70-79.
BRADLEY, M. 1988. Realism and adaptation in designing hypothetical travel choice concepts. *Journal of Transport Economics and Policy***,** 121-137.
BRIESCH, R. A., CHINTAGUNTA, P. K. & FOX, E. J. 2009. How Does Assortment Affect Grocery Store Choice? *Journal of Marketing Research (JMR),* 46**,** 176-189.
BROADBRIDGE, A. & CALDERWOOD, E. 2002. Rural grocery shoppers: do their attitudes reflect their actions? *International Journal of Retail & Distribution Management,* 30**,** 394-406.
BROWN, S. 1986. Retail classification: a theoretical note. *Quarterly Review of Marketing,* 11**,** 12-16.
BROWN, S. 1987. An Integrated Approach to Retail Change: The Multi-Polarisation Model. *Service Industries Journal,* 7**,** 153-164.
BROWN, S. 1992. *Retail location: a micro-scale perspective*, Avebury.
BUCKLIN, L. P., RAMASWAMY, V. & MAJUMDAR, S. K. 1996. Analyzing channel structures of business markets via the structure-output paradigm. *International Journal of Research in Marketing,* 13**,** 73-87.
BUNCH, D. S. & BATSELL, R. R. 1989. A Monte Carlo comparison of estimators for the multinomial logit model. *Journal of Marketing Research***,** 56-68.
BURNS, D. J. & WARREN, H. B. 1995. Need for uniqueness: shopping mall preference and choice activity. *International Journal of Retail & Distribution Management,* 23**,** 4-12.
BURT, S. 2000. The strategic role of retail brands in British grocery retailing. *european Journal of marketing,* 34**,** 875-890.
BURT, S. & DAVIES, K. 2010. From the retail brand to the retail-er as a brand: themes and issues in retail branding research. *International Journal of Retail & Distribution Management,* 38**,** 865-878.
BURT, S. & SPARKS, L. 1995. Understanding the arrival of limited line discount stores in Britain. *European Management Journal,* 13**,** 110-119.
BUSH, A. J. & HAIR JR, J. F. 1985. An assessment of the mall intercept as a data collection method. *Journal of Marketing Research***,** 158-167.
BUSTOS-REYES, C. A. & GONZÁLEZ-BENITO, Ó. 2008. Store and store format loyalty measures based on budget allocation. *Journal of Business Research,* 61**,** 1015-1025.
CAMPBELL, J. M. & FAIRHURST, A. E. 2016. Reducing the intention-to-behaviour gap for locally produced foods purchasing: The role of store, trust, and price. *International Journal of Retail & Distribution Management,* 44**,** 508-523.
CANADA, A. A. A.-F. 2012. Modern Grocery Retailing in Major ASEAN Markets (Indonesia, Thailand, Malaysia, Singapore and the Philippines). *In:* CANADA, A. A. A.-F. (ed.). International Markets Bureau: The Government of Canada.
CAPLIN, A. & LEAHY, J. 1998. Miracle on sixth avenue: information externalities and search. *The Economic Journal,* 108**,** 60-74.
CARDINALI, M. G. & BELLINI, S. 2014. Interformat competition in the grocery retailing. *Journal of Retailing and Consumer Services,* 21**,** 438-448.
CARPENTER, J. M. & MOORE, M. 2006. Consumer demographics, store attributes, and retail format choice in the US grocery market. *International Journal of Retail & Distribution Management,* 34**,** 434-452.
CENTRAL. 2017. *Central Department Store* [Online]. Available: http://www.central.co.th/ [Accessed 22 February 2017].
CHAMBERLIN, E. 1938. *The theory of monopolistic competition: a re-orientation of the theory of value*, Harvard University Press.
CHAMHURI, N. & BATT, P. J. 2013. Exploring the factors influencing consumers' choice of retail store when purchasing fresh meat in Malaysia. *International Food and Agribusiness Management Review,* 16**,** 99-122.
CHANG, H. J., CHO, H. J., TURNER, T., GUPTA, M. & WATCHRAVESRINGKAN, K. 2015. Effects of store attributes on retail patronage behaviors: Evidence from

activewear specialty stores. *Journal of Fashion Marketing and Management,* 19**,** 136-153.
CHIANG-MAI-BEST. 2017. *7 Markets You Need to See When Visiting Chiang Mai* [Online]. Available: http://chiangmaibest.com/7-markets-you-need-to-see-when-visiting-chiang-mai/ [Accessed 22 February 2017].
CHISNALL, P. M. 1994. *Consumer Behaviour*, McGraw-Hill Ryerson, Limited.
CHRISTALLER, W. 1966. *Central places in southern Germany*, Prentice-Hall.
CHUNG, W. & KALNINS, A. 2001. Agglomeration effects and performance: A test of the Texas lodging industry. *Strategic Management Journal,* 22**,** 969-988.
COLLA, E. 2004. The outlook for European grocery retailing: competition and format development. *The International Review of Retail, Distribution and Consumer Research,* 14**,** 47-69.
COMPETITION-COMMISSION 2000. Supermarkets: A report on the supply of groceries from multiple stores in the United Kingdom.
CORSTJENS, J. & CORSTJENS, M. 1999. *Store Wars: The Battle for Mindspace and Shelfspace*, Wiley.
COX, R. & BRITTAIN, P. 2004. *Retailing: An Introduction*, Financial Times Prentice Hall.
CRASK, M. R. & REYNOLDS, F. D. 1978. An Indepth Profile of the Department Store Shopper. *Journal of Retailing,* 54**,** 23.
CROMPTON, J. & GITELSON, R. 1979. The theory of cumulative attraction and compatibility: a case study of two major commercial leisure enterprises. *Baylor Business Studies,* 10**,** 7.
D'ASPREMONT, C., GABSZEWICZ, J. J. & THISSE, J.-F. 1979. On Hotelling's" Stability in competition". *Econometrica: Journal of the Econometric Society***,** 1145-1150.
DABHOLKAR, P. A., THORPE, D. I. & RENTZ, J. O. 1996. A measure of service quality for retail stores: scale development and validation. *Journal of the Academy of marketing Science,* 24**,** 3.
DARDEN, W. R. & PERREAULT JR, W. D. 1976. Identifying interurban shoppers: Multiproduct purchase patterns and segmentation profiles. *Journal of Marketing Research***,** 51-60.
DASGUPTA, C. G., DISPENSA, G. S. & GHOSE, S. 1994. Comparing the predictive performance of a neural network model with some traditional market response models. *International Journal of Forecasting,* 10**,** 235-244.
DAVIES, F. M., GOODE, M. M. H., MOUTINHO, L. A. & OGBONNA, E. 2001. Critical factors in consumer supermarket shopping behaviour: A neural network approach. *Journal of consumer behaviour,* 1**,** 35-49.
DHOLAKIA, N., DHOLAKIA, R. R. & CHATTOPADHYAY, A. 2012. India's emerging retail systems: Coexistence of tradition and modernity. *Journal of Macromarketing,* 32**,** 252-265.
DOMENCICH, T. A. & MCFADDEN, D. 1975. *Urban Travel Demand: A Behavioral Analysis,* Amsterdam, North-Holland.
DONOVAN, R. & ROSSITER, J. 1982. Store atmosphere: an environmental psychology approach. *Journal of retailing,* 58**,** 34-57.
DONOVAN, R. J., ROSSITER, J. R., MARCOOLYN, G. & NESDALE, A. 1994. Store atmosphere and purchasing behavior. *Journal of retailing,* 70**,** 283-294.
DUDEY, M. 1990. Competition by choice: The effect of consumer search on firm location decisions. *The American Economic Review***,** 1092-1104.
ELLIS, B. & KELLEY, S. W. 1992. Competitive advantage in retailing. *International Review of Retail, Distribution and Consumer Research,* 2**,** 381-396.
EROGLU, S. A., MACHLEIT, K. A. & DAVIS, L. M. 2001. Atmospheric qualities of online retailing: A conceptual model and implications. *Journal of Business research,* 54**,** 177-184.
FEENY, A., VONGPATANASIN, T. & SOONSATHAM, A. 1996. Retailing in Thailand. *International Journal of Retail & Distribution Management,* 24**,** 38-44.
FINDLAY, A. & SPARKS, L. 2008. Weaving new retail and consumer landscapes in the Scottish Borders. *Journal of Rural Studies,* 24**,** 86-97.

FINDLAY, A. M., STOCKDALE, A., FINDLAY, A. & SHORT, D. 2001. Mobility as a driver of change in rural Britain: an analysis of the links between migration, commuting and travel to shop patterns. *Population, Space and Place,* 7**,** 1-15.

FOWKES, T. & WARDMAN, M. 1988. The design of stated preference travel choice experiments: with special reference to interpersonal taste variations. *Journal of transport economics and policy***,** 27-44.

FOX, E. J., MONTGOMERY, A. L. & LODISH, L. M. 2004. Consumer Shopping and Spending across Retail Formats. *Journal of Business,* 77**,** S25-S60.

FOX, E. J. & SETHURAMAN, R. 2006. Retail Competition. *In:* KRAFFT, M. & MANTRALA, M. K. (eds.) *Retailing in the 21st Century: Current and Future Trends.* Springer.

FRISBIE, G. A. 1980. Ehrenberg's negative binomial model applied to grocery store trips. *Journal of Marketing Research***,** 385-390.

GALE, H. F. 1995. Rural consumers go to town with retail dollars. *Rural Development Perspectives,* 11**,** 8-15.

GARROW, L. A. 2016. *Discrete choice modelling and air travel demand: theory and applications*, Routledge.

GHOSH, A. 1986. The value of a mall and other insights from a revised central place model. *Journal of retailing,* 62**,** 79-97.

GIDO, E. O., AYUYA, O. I., OWUOR, G. & BOKELMANN, W. 2016. Consumer's choice of retail outlets for African indigenous vegetables: Empirical evidence among rural and urban households in Kenya. *Cogent Food & Agriculture,* 2**,** 1248523.

GILBERT, D. 2003. *Retail Marketing Management*, Financial Times/ Prentice Hall.

GLAESER, E. L., KALLAL, H. D., SCHEINKMAN, J. A. & SHLEIFER, A. 1992. Growth in cities. *Journal of Political Economy,* 100.

GOLDMAN, A. & HINO, H. 2005. Supermarkets vs. traditional retail stores: diagnosing the barriers to supermarkets' market share growth in an ethnic minority community. *Journal of Retailing and Consumer Services,* 12**,** 273-284.

GOLDMAN, A., KRIDER, R. & RAMASWAMI, S. 1999. The persistent competitive advantage of traditional food retailers in Asia: wet markets' continued dominance in Hong Kong. *Journal of Macromarketing,* 19**,** 126-139.

GOLDMAN, A., RAMASWAMI, S. & KRIDER, R. E. 2002. Barriers to the advancement of modern food retail formats: theory and measurement. *Journal of Retailing,* 78**,** 281-295.

GONZÁLEZ-BENITO, Ó. 2001. Inter-format spatial competition of Spanish hypermarkets. *The International Review of Retail, Distribution and Consumer Research,* 11**,** 63-81.

GONZÁLEZ-BENITO, Ó. 2005. Spatial competitive interaction of retail store formats: modeling proposal and empirical results. *Journal of Business Research,* 58**,** 457-466.

GOODMAN, S. & REMAUD, H. 2015. Store choice: How understanding consumer choice of 'where'to shop may assist the small retailer. *Journal of Retailing and Consumer Services,* 23**,** 118-124.

GORTON, M., SAUER, J. & SUPATPONGKUL, P. Investigating Thai shopping behavior: wet-markets, supermarkets and the 'big middle'. International Association of Agricultural Economists Conference, Beijing, China, 2009. 16-22.

GORTON, M., SAUER, J. & SUPATPONGKUL, P. 2011. Wet markets, supermarkets and the "big middle" for food retailing in developing countries: evidence from Thailand. *World Development,* 39**,** 1624-1637.

GREEN, D. H., BARCLAY, D. W. & RYANS, A. B. 1995. Entry strategy and long-term performance: Conceptualization and empirical examination. *The Journal of marketing***,** 1-16.

GREEN, P. E. & SRINIVASAN, V. 1978. Conjoint Analysis in Consumer Research: Issues and Outlook. *Journal of Consumer Research,* 5**,** 103-123.

GREWAL, D., BAKER, J., LEVY, M. & VOSS, G. B. 2003. The effects of wait expectations and store atmosphere evaluations on patronage intentions in service-intensive retail stores. *Journal of retailing,* 79**,** 259-268.

GREWAL, D., KRISHNAN, R., BAKER, J. & BORIN, N. 1998. The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions. *Journal of retailing,* 74**,** 331-352.
GREWAL, D., KRISHNAN, R., LEVY, M. & MUNGER, J. 2006. Retail Success and Key Drivers. *In:* KRAFFT, M. & MANTRALA, M. K. (eds.) *Retailing in the 21st Century: Current and Future Trends.* Springer.
GRIPSRUD, G. & HORVERAK, Ø. 1986. Determinants of retail patronage. A 'natural' experiment. *International Journal of Research in Marketing,* 3**,** 263-272.
GUY, C. 2006. *Planning for Retail Development: A Critical View of the British Experience*, Taylor & Francis.
GUY, C. M. 1990. Outshopping from Small Towns a British Case Study. *International Journal of Retail & Distribution Management,* 18.
GUY, C. M. 1998. Classifications of retail stores and shopping centres: some methodological issues. *GeoJournal,* 45**,** 255-264.
HAIR, J. F., BLACK, W. C., BABIN, B. J. & ANDERSON, R. E. 2010. *Multivariate data analysis: A Global Perspective*, Pearson Prentice Hall.
HANSEN, M. H. & WEINBERG, C. B. 1979. Retail Market Share in a Competitive Market. *Journal of Retailing,* 55**,** 37.
HANSEN, T. & SOLGAARD, H. S. 2006. *New perspectives on retailing and store patronage behavior: A study of the interface between retailers and consumers*, Springer Science & Business Media.
HAUSMAN, J. & MCFADDEN, D. 1984. Specification tests for the multinomial logit model. *Econometrica: Journal of the Econometric Society***,** 1219-1240.
HAWES, J. M. & LUMPKIN, J. R. 1984. Understanding the outshopper. *Journal of the Academy of Marketing Science,* 12**,** 200-217.
HAWKINS, D. I. & MOTHERSBAUGH, D. L. 2010. *Consumer Behavior: Building Marketing Strategy*, McGraw-Hill Education.
HENSHER, D. A., ROSE, J. M. & GREENE, W. H. 2005. *Applied Choice Analysis: A Primer*, Cambridge University Press.
HERRMANN, R. O. & BEIK, L. L. 1968. Shoppers' movements outside their local retail area. *The Journal of Marketing***,** 45-51.
HILDEBRANDT, L. 1988. Store image and the prediction of performance in retailing. *Journal of Business Research,* 17**,** 91-100.
HINO, H. 2010. Antecedents of supermarket formats' adoption and usage: A study in the context of non-western customers. *Journal of Retailing and Consumer Services,* 17**,** 61-72.
HINO, H. 2014. Shopping at different food retail formats: Understanding cross-shopping behavior through retail format selective use patterns. *European Journal of Marketing,* 48**,** 674-698.
HO, S.-C. 2005. Evolution versus tradition in marketing systems: the Hong Kong food-retailing experience. *Journal of Public Policy & Marketing,* 24**,** 90-99.
HOME, N. 2002. Rural consumers' patronage behaviour in Finland. *The International Review of Retail, Distribution and Consumer Research,* 12**,** 149-164.
HOPPER, J. A. & LIPSCOMB, T. J. 1991. An investigation of differences between male and female outshoppers: strategic implications. *Akron Business and Economic Review,* 22**,** 109-120.
HORNBY, A. S. & TURNBULL, J. 2011. *Oxford Advanced Learner's Dictionary of Current English*, Oxford University Press.
HOTELLING, H. 1929. Stability in Competition. *The Economic Journal,* 39**,** 41-57.
HOYOS, D. 2010. The state of the art of environmental valuation with discrete choice experiments. *Ecological economics,* 69**,** 1595-1603.
HSIAO, M.-H. 2009. Shopping mode choice: Physical store shopping versus e-shopping. *Transportation Research Part E: Logistics and Transportation Review,* 45**,** 86-95.
HUANG, C.-T., TSAI, K.-H. & CHEN, Y.-C. 2015. How do wet markets still survive in Taiwan? *British Food Journal,* 117**,** 234-256.

HUBER, J. 1997. What We Have Learned from 20 Years of Conjoint Research: When to Use Self-Explicated, Graded Pairs, Full Profiles or Choice Experiments. *Research Paper Series.* Washington, USA: Sawtooth Software.

HUBER, J., WITTINK, D. R., FIEDLER, J. A. & MILLER, R. 1993. The effectiveness of alternative preference elicitation procedures in predicting choice. *Journal of Marketing Research,* 30**,** 105.

HUFF, D. L. 1964. Defining and estimating a trading area. *The Journal of Marketing***,** 34-38.

HUNT, M. A. & CROMPTON, J. L. 2008. Investigating attraction compatibility in an East Texas City. *International Journal of Tourism Research,* 10**,** 237.

IHARA, M. 2013. Impact of hypermarkets on consumption and distribution in rural areas: case study of Ubon Ratchathani in northeastern Thailand. *The International Review of Retail, Distribution and Consumer Research,* 23**,** 174-188.

INGENE, C. A. 1984. Productivity and Functional Shifting in Spatial Retailing: Private and Social Perspectives. *Journal of Retailing,* 60**,** 15.

IRI 2006. IRI defines shopping trips, spending patterns.(NEWS). *Frozen Food Age.*

ISAACS, B. A. 2009. Imagining Thailand in European Hypermarkets: New Class-Based Consumption in Chiang Mai's 'Cruise Ships'. *The Asia Pacific Journal of Anthropology,* 10**,** 348-363.

ISEN, A. M. 1984. Toward understanding the role of affect in cognition. *Handbook of social cognition,* 3**,** 179-236.

ISEN, A. M., MEANS, B., PATRICK, R. & NOWICKI, G. Some factors influencing decision making strategy and risk-taking. Affect and cognition: The 17th annual Carnegie Mellon symposium on cognition, 1982. 241-261.

JAENSIRISAK, S. 2002. *Road User Charging: Acceptability and Effectiveness.* Doctor of Philosophy, University of Leeds.

JAMES, D. L., DURAND, R. M. & DREVES, R. A. 1976. The Use of a Multi-Attribute Model in a Store Image Study. *Journal of Retailing,* 52**,** 23-32.

JANG, S. S. & NAMKUNG, Y. 2009. Perceived quality, emotions, and behavioral intentions: Application of an extended Mehrabian–Russell model to restaurants. *Journal of Business Research,* 62**,** 451-460.

JARRATT, D. 1998. Modelling outshopping behaviour: a non-metropolitan perspective. *The International Review of Retail, Distribution and Consumer Research,* 8**,** 319-350.

JARRATT, D. 2000. Outshopping behaviour: an explanation of behaviour by shopper segment using structural equation modelling. *The International Review of Retail, Distribution and Consumer Research,* 10**,** 287-304.

JARY, M. & WILEMAN, A. 2016. *Retail Power Plays: From Trading to Brand Leadership*, Palgrave Macmillan UK.

JAYASANKARA PRASAD, C. & KATHYAYANI, G. 2014. Cross-format shopping motives and shopper typologies for grocery shopping: a multivariate approach. *The International Review of Retail, Distribution and Consumer Research,* 24**,** 79-115.

JAYASANKARA PRASAD, C. & RAMACHANDRA ARYASRI, A. 2011. Effect of shopper attributes on retail format choice behaviour for food and grocery retailing in India. *International Journal of Retail & Distribution Management,* 39**,** 68-86.

JIAN WANG, Y., DOSS, S. K., GUO, C. & LI, W. 2010. An investigation of Chinese consumers' outshopping motives from a culture perspective: Implications for retail and distribution. *International Journal of Retail & Distribution Management,* 38**,** 423-442.

JOHNSON, K. K., YOO, J.-J., RHEE, J., LENNON, S., JASPER, C. & LYNN DAMHORST, M. 2006. Multi-channel shopping: channel use among rural consumers. *International Journal of Retail & Distribution Management,* 34**,** 453-466.

JOHNSON, R. M. & ORME, B. K. 1996. How many questions should you ask in choice-based conjoint studies. *Sawtooth software technical paper*.

JOSÉ MÁS RUÍZ, F. 1999. Image of suburban shopping malls and two-stage versus uni-equational modelling of the retail trade attraction: An empirical application. *European Journal of Marketing,* 33**,** 512-531.

KAHN, B. E. & SCHMITTLEIN, D. C. 1989. Shopping trip behavior: an empirical investigation. *Marketing Letters,* 1**,** 55-69.
KAHN, B. E. & SCHMITTLEIN, D. C. 1992. The relationship between purchases made on promotion and shopping trip behavior. *Journal of Retailing,* 68**,** 294-315.
KELLY, M., SEUBSMAN, S.-A., BANWELL, C., DIXON, J. & SLEIGH, A. 2015. Traditional, modern or mixed? Perspectives on social, economic, and health impacts of evolving food retail in Thailand. *Agriculture and human values,* 32**,** 445-460.
KENG, K. A. & EHRENBERG, A. S. C. 1984. Patterns of store choice. *Journal of Marketing Research***,** 399-409.
KIM, B.-D. & PARK, K. 1998. Studying patterns of consumer's grocery shopping trip. *Journal of retailing,* 73**,** 501-517.
KNOX, S. D. & DENISON, T. J. 2000. Store loyalty: its impact on retail revenue. An empirical study of purchasing behaviour in the UK. *Journal of retailing and consumer services,* 7**,** 33-45.
KOLLAT, D. T. & WILLETT, R. P. 1967. Customer impulse purchasing behavior. *Journal of Marketing Research,* 4**,** 21-31.
KONISHI, H. 2005. Concentration of competing retail stores. *Journal of Urban Economics,* 58**,** 488-512.
KOTLER, P. 1973. Atmospherics as a marketing tool. *Journal of retailing,* 49**,** 48-64.
KOTLER, P., ARMSTRONG, G., WONG, V. & SAUNDERS, J. A. 2008. *Principles of Marketing*, Pearson Prentice Hall.
KRYSTALLIS, A., LINARDAKIS, M. & MAMALIS, S. 2010. Usefulness of the discrete choice methodology for marketing decision-making in new product development: an example from the European functional foods market. *Agribusiness,* 26**,** 100-121.
KUMAR, A. & KIM, Y.-K. 2014. The store-as-a-brand strategy: The effect of store environment on customer responses. *Journal of Retailing and Consumer services,* 21**,** 685-695.
KUMAR, A., RAO, V. R. & SONI, H. 1995. An Empirical Comparison of Neural Network and Logistic Regression Models. *Marketing Letters,* 6**,** 251-263.
KUMAR VELAYUDHAN, S. 2014. Outshopping in rural periodic markets: a retailing opportunity. *International Journal of Retail & Distribution Management,* 42**,** 151-167.
KUNKEL, J. H. & BERRY, L. L. 1968. A behavioral conception of retail image. *The Journal of Marketing***,** 21-27.
KURABAYASHI, T., NIIMI, Y. & YATSUNAMI, S. 2013. Understanding ASEAN consumer markets through country-specific questionnaires. *Nomura Research Institute,* 192**,** 1-13.
LAFORGE, R. W., REESE, R. M. & STANTON, W. W. 1984. Identifying and attracting consumer outshoppers. *Journal of Small Business Management,* 22**,** 22-29.
LANG, M. & HOOKER, N. H. 2013. An empirical test of experiential shopping in food retailing. *British Food Journal,* 115**,** 639-652.
LAOWAGUL, W., YOSHIZUMI, K., MUTCHIMWONG, A., THAVIPOKE, P., HOOPER, M., GARIVAIT, H. & LIMPASENI, W. 2008. Characterisation of ambient benzene, toluene, ethylbenzene and m-, p-and o-xylene in an urban traffic area in Bangkok, Thailand. *International Journal of Environment and Pollution,* 36**,** 241-254.
LEMMINK, J. & KASPER, H. 1994. Competitive reactions to product quality improvements in industrial markets. *European journal of Marketing,* 28**,** 50-68.
LENNON, S. J., HA, Y., JOHNSON, K. K., JASPER, C. R., DAMHORST, M. L. & LYONS, N. 2009. Rural consumers' online shopping for food and fiber products as a form of outshopping. *Clothing and Textiles Research Journal,* 27**,** 3-30.
LEVY, M. & WEITZ, B. A. 2008. *Retailing management*, McGraw-Hill Irwin.
LILLIS, C. M. & HAWKINS, D. I. 1974. RETAIL EXPENDITURE FLOWS IN CONTIGUOUS TRADE AREAS. *Journal of Retailing,* 50**,** 30.
LINDQUIST, J. D. 1974. Meaning of Image: A Survey of Empirical and Hypothetical Evidence. *Journal of retailing,* 50**,** 29-+.

LOUVIERE, J. J. 1988. Conjoint analysis modelling of stated preferences: a review of theory, methods, recent developments and external validity. *Journal of transport economics and policy*, 93-119.
LOUVIERE, J. J., FLYNN, T. N. & CARSON, R. T. 2010. Discrete choice experiments are not conjoint analysis. *Journal of Choice Modelling,* 3, 57-72.
LOUVIERE, J. J., HENSHER, D. A. & SWAIT, J. D. 2000. *Stated Choice Methods: Analysis and Applications*, Cambridge University Press.
LUCE, R. D. 1959. *Individual Choice Behavior a Theoretical Analysis*, John Wiley and sons.
LUCERI, B. & LATUSI, S. 2012. The importance of consumer characteristics and market structure variables in driving multiple store patronage. *Journal of Retailing and Consumer Services,* 19, 519-525.
LUMPKIN, J. R., HAWES, J. M. & DARDEN, W. R. 1986. Shopping patterns of the rural consumer: Exploring the relationship between shopping orientations and outshopping. *Journal of Business Research,* 14, 63-81.
MACHLEIT, K. A., KELLARIS, J. J. & EROGLU, S. A. 1994. Human versus spatial dimensions of crowding perceptions in retail environments: a note on their measurement and effect on shopper satisfaction. *Marketing Letters,* 5, 183-194.
MACKAY, D. B. 1973. A spectral analysis of the frequency of supermarket visits. *Journal of Marketing Research,* 10, 84-90.
MAI, L.-W. & ZHAO, H. 2004. The characteristics of supermarket shoppers in Beijing. *International journal of retail & distribution management,* 32, 56-62.
MALHOTRA, N. K. 1983. A threshold model of store choice. *Journal of Retailing*.
MALHOTRA, N. K. & BIRKS, D. F. 2007. *Marketing Research: An Applied Approach*, Pearson Education, Limited.
MARJANEN, H. 1995. Longitudinal study on consumer spatial shopping behaviour with special reference to out-of-town shopping : Experiences from Turku, Finland. *Journal of Retailing and Consumer Services,* 2, 163-174.
MARJANEN, H. 2000. Retailing in rural Finland and the challenge of nearby cities. *International Journal of Retail & Distribution Management,* 28, 194-206.
MARKIN, R. J., LILLIS, C. M. & NARAYANA, C. L. 1976. Social-psychological significance of store space. *Journal of Retailing,* 52, 43-&.
MARTINEAU, P. 1958. The personality of the retail store.
MARUYAMA, M. & TRUNG, L. V. 2007. Supermarkets in Vietnam: Opportunities and obstacles. *Asian Economic Journal,* 21, 19-46.
MARUYAMA, M. & WU, L. 2014. Quantifying barriers impeding the diffusion of supermarkets in China: The role of shopping habits. *Journal of Retailing and Consumer Services,* 21, 383-393.
MARUYAMA, M., WU, L. & HUANG, L. 2016. The modernization of fresh food retailing in China: The role of consumers. *Journal of Retailing and Consumer Services,* 30, 33-39.
MASON, J. B., MAYER, M. L. & WILKINSON, J. B. 1993. *Modern retailing: theory and practice*, Irwin.
MATTSON, B. E. 1982. Situational influences on store choice. *Journal of retailing,* 58, 46-58.
MAY, E. G. 1981. Product positioning and segmentation: strategy: adaptable to retail stores? *In:* STAMPFL, R. W. & HIRSCHMAN, E. (eds.) *Theory in Retailing: Traditional and Nontraditional Sources.* Chicago: American Marketing Association.
MAY, K. J. 2006. *Transnational retailers and supply network.* Ph.D., The University of Manchester.
MAYER, C. S. 1974. Data Collection Methods: Personal Interviews. *In:* FERBER, R. (ed.) *Handbook of Marketing Research.* New York: McGraw-Hill.
MAZURSKY, D. & JACOBY, J. 1986. Exploring the development of store images. *Journal of retailing,* 62, 145-165.
MCFADDEN, D. 1974. Conditional logit analysis of qualitative choice behavior. *Frontiers in Econometrics*, 105-142.
MCFADDEN, D. & TRAIN, K. 2000. Mixed MNL models for discrete response. *Journal of applied Econometrics,* 15, 447-470.

MCGOLDRICK, P. J. 2002. *Retail Marketing*, McGraw-Hill.
MEEYAI, S. 2015. Modeling Store Patronage: A Systematic Review. *3rd International Conference on Marketing and Business Development (MBD 2015).* Bucharest, Romania.
MEHRABIAN, A. & RUSSELL, J. A. 1974. *An approach to environmental psychology*, the MIT Press.
MERRIAM-WEBSTER. 2017. *Merriam-Webster's online dictionary* [Online]. Available: https://www.merriam-webster.com/ [Accessed 12 March 2017].
MILLER, N. J. & KEAN, R. C. 1997. Factors contributing to inshopping behavior in rural trade areas: Implications for local retailers. *Journal of Small Business Management,* 35**,** 80.
MITTAL, B. & LASSAR, W. M. 1996. The role of personalization in service encounters. *Journal of retailing,* 72**,** 95-109.
MORSCHETT, D., SWOBODA, B. & FOSCHT, T. 2005. Perception of store attributes and overall attitude towards grocery retailers: The role of shopping motives. *The International Review of Retail, Distribution and Consumer Research,* 15**,** 423-447.
MOSELEY, M. J. 2000. England's village services in the late 1990s: entrepreneurialism, community involvement and the state. *Town Planning Review,* 71**,** 415.
MOUTINHO, L. & HUTCHESON, G. D. 2007. Store choice and patronage: a predictive modelling approach. *International Journal of Business Innovation and Research,* 1**,** 233-252.
MULHERN, F. J. & PADGETT, D. T. 1995. The Relationship between Retail Price Promotions and Regular Price Purchases. *Journal of Marketing,* 59**,** 83-90.
MULLIS, K. & KIM, M. 2011. Factors determining inshopping in rural US communities: Consumers' and retailers' perceptions. *International Journal of Retail & Distribution Management,* 39**,** 326-345.
MYLES SHAVER, J. & FLYER, F. 2000. Agglomeration economies, firm heterogeneity, and foreign direct investment in the United States. *Strategic Management Journal,* 21**,** 1175-1193.
NELSON, R. L. 1958. *The Selection of Retail Locations*, F.W. Dodge Corporation.
NEWMAN, A. & CULLEN, P. 2002. *Retailing: Environment & Operations*, Thomson Learning.
NIELSEN, A. C. 2000. *The retail pocket book 2000,* Henley-on-Thames, England, NTC Publications.
NIEMEIER, D. A. 1997. Accessibility: an evaluation using consumer welfare. *Transportation,* 24**,** 377-396.
NORDFALT, J. 2009. Unplanned grocery purchases: the influence of the shopping-trip type revisited. *Journal of Consumer Behaviour,* 8**,** 1-13.
O'NEILL & ROBERT, E. 1992. How consumers shop. *Progressive Grocer,* 71**,** 62.
OPPEWAL, H. & HOLYOAKE, B. 2004. Bundling and retail agglomeration effects on shopping behavior. *Journal of Retailing and Consumer Services,* 11**,** 61-74.
OPPEWAL, H. & TIMMERMANS, H. 1997. Retailer self-perceived store image and competitive position. *The International Review of Retail, Distribution and Consumer Research,* 7**,** 41-59.
ORME, B. K. 2010. *Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research*, Research Publishers.
ORME, B. K., ALPERT, M. I. & CHRISTENSEN, E. 1997. Assessing the Validity of Conjoint Analysis - Continued. *Sawtooth software technical paper.*
ORTÚZAR, J. D. D. & GARRIDO, R. 1991. Rank, rate or choice?: an evaluation of SP methods in Santiago. *Planning and Transportation Research and Computation,* 347.
OXENFELDT, A. R. 1974. Developing a Favorable Price-Quality Image. *Journal of Retailing,* 50**,** 8.
PADDISON, A. & CALDERWOOD, E. 2007. Rural retailing: a sector in decline? *International Journal of Retail & Distribution Management,* 35**,** 136-155.
PAIGE, R. C. & LITTRELL, M. A. 2002. Craft retailers' criteria for success and associated business strategies. *Journal of small business management,* 40**,** 314-331.

PAN, Y. & ZINKHAN, G. M. 2006. Determinants of retail patronage: a meta-analytical perspective. *Journal of retailing,* 82**,** 229-243.
PAPADOPOULOS, N. G. 1980. Consumer Outshopping Research: Review and Extension. *Journal of Retailing,* 56**,** 41-58.
PARASURAMAN, A., ZEITHAML, V. A. & BERRY, L. L. 1988. Servqual: A multiple-item scale for measuring consumer perc. *Journal of retailing,* 64**,** 12.
PEARMAIN, D. & KROES, E. P. 1990. Stated preference techniques: a guide to practice.
PHILLIPS, M. & SWAFFIN-SMITH, C. 2004. Market towns–victims of market forces? *International Journal of Retail & Distribution Management,* 32**,** 557-568.
PICONE, G. A., RIDLEY, D. B. & ZANDBERGEN, P. A. 2009. Distance decreases with differentiation: Strategic agglomeration by retailers. *International Journal of Industrial Organization,* 27**,** 463-473.
PINKERTON, J. R., HASSINGER, E. W. & O'BRIEN, D. J. 1995. Inshopping by Residents of Small Communities. *Rural Sociology,* 60**,** 467-480.
PIRON, F. 2001. International retail leakages: Singaporeans outshopping in Malaysia. *Singapore Management Review,* 23**,** 35.
POLONSKY, M. J. & JARRATT, D. G. 1990. *An Expenditure Based Estimate of Outshoppers and Its Implications for Rural Areas: The Australian Case*, Department of Management, University of Newcastle.
POLONSKY, M. J. & JARRATT, D. G. 1992. Rural outshopping in Australia: the Bathurst-Orange region. *European Journal of Marketing,* 26**,** 5-16.
POPKOWSKI LESZCZYC, P. T. L., SINHA, A. & SAHGAL, A. 2004. The effect of multi-purpose shopping on pricing and location strategy for grocery stores. *Journal of Retailing,* 80**,** 85-99.
POPKOWSKI LESZCZYC, P. T. L., SINHA, A. & TIMMERMANS, H. J. P. 2000. Consumer store choice dynamics: an analysis of the competitive market structure for grocery stores. *Journal of Retailing,* 76**,** 323-345.
POPKOWSKI LESZCZYC, P. T. L. & TIMMERMANS, H. J. P. 1997. Store-switching behavior. *Marketing Letters,* 8**,** 193-204.
POPKOWSKI LESZCZYC, P. T. L. & TIMMERMANS, H. J. P. 2001. Experimental choice analysis of shopping strategies. *Journal of Retailing,* 77**,** 493-509.
POWE, N. A. & SHAW, T. 2004. Exploring the current and future role of market towns in servicing their hinterlands: a case study of Alnwick in the North East of England. *Journal of Rural Studies,* 20**,** 405-418.
RAO, V. R. 2014. *Applied Conjoint Analysis*, Springer Berlin Heidelberg.
REARDON, T. & BERDEGUÉ, J. A. 2008. The retail-led transformation of agrifood systems and its implications for development policies. *World Development report 2008: Agriculture for Development.* World Bank.
REIBSTEIN, D., BATESON, J. E. & BOULDING, W. 1988. Conjoint analysis reliability: Empirical findings. *Marketing Science,* 7**,** 271-286.
REICHHELD, F. F. 2003. The one number you need to grow. *Harvard business review,* 81**,** 46-55.
REILLY, W. J. 1931. *The Law of Retail Gravitation*, W.J. Reilly.
REIMERS, V. & CLULOW, V. 2004. Retail concentration: a comparison of spatial convenience in shopping strips and shopping centres. *Journal of Retailing and Consumer Services,* 11**,** 207-221.
REIMERS, V. & CLULOW, V. 2014. Spatial convenience: bridging the gap between shopping malls and shopping strips. *International Journal of Retail & Distribution Management,* 42**,** 864-883.
REUTTERER, T. & TELLER, C. 2009. Store format choice and shopping trip types. *International Journal of Retail & Distribution Management,* 37**,** 695-710.
REYNOLDS, F. D. & DARDEN, W. R. 1972. Intermarket patronage: A psychographic study of consumer outshoppers. *The Journal of Marketing***,** 50-54.
RHEE, H. & BELL, D. R. 2002. The inter-store mobility of supermarket shoppers. *Journal of Retailing,* 78**,** 225-237.
RIDLEY, D. B. 2008. Herding versus hotelling: market entry with costly information. *Journal of Economics & Management Strategy,* 17**,** 607-631.

ROSE, J. M. & MICHAEL, C. J. B. 2008. Stated Preference Experimental Design Strategies. *In:* HENSHER, D. A. & BUTTON, K. J. (eds.) *Handbook of Transport Modelling.* Great Britain: Emerald Group Publishing Limited.

ROSENBAUM, M. S. & MASSIAH, C. 2011. An expanded servicescape perspective. *Journal of Service Management,* 22**,** 471-490.

ROSENBERG, M. J. & HOVLAND, C. I. 1966. Attitude organization and change: An analysis of consistency among attitude components.

ROSENTHAL, S. S. & STRANGE, W. C. 2001. The determinants of agglomeration. *Journal of urban economics,* 50**,** 191-229.

RUSSELL, J. A. & PRATT, G. 1980. A description of the affective quality attributed to environments. *Journal of personality and social psychology,* 38**,** 311.

SAHA, G. C. & THEINGI 2009. Service quality, satisfaction, and behavioural intentions: A study of low-cost airline carriers in Thailand. *Managing Service Quality: An International Journal,* 19**,** 350-372.

SALIN, V. & NAYGA JR, R. M. 2003. A cold chain network for food exports to developing countries. *International Journal of Physical Distribution & Logistics Management,* 33**,** 918-933.

SAMLI, A. C. & UHR, E. B. 1974. The Outshopping Spectrum: Key for An a lysing Intermarket Leak ages. *Journal of Retailing,* 50**,** 70-&.

SAMPSON, S. D. & TIGER, D. J. 1994. The impact of warehouse membership clubs: the wheel of retailing turns one more time. *International Review of Retail, Distribution and Consumer Research,* 4**,** 33-59.

SANDS, S., OPPEWAL, H. & BEVERLAND, M. 2009. The effects of in-store themed events on consumer store choice decisions. *Journal of Retailing and Consumer Services,* 16**,** 386-395.

SARANTIDIS, P. 2012. *Factors Affecting Store Brand Purchase in The Greek Grocery Market.* PhD, University of Stirling.

SAWTHOOTH-SOFTWARE. 2008. *Update on Conjoint Usage Survey* [Online]. Sawthooth Software. Available: http://www.sawtoothsoftware.com/about-us/news-and-events/sawtooth-solutions/ss29-cb/1093-update-on-conjoint-usage-survey [Accessed May 06 2017].

SAWTHOOTH, S. 2007. ACA System for Adaptive Conjoint Analysis. Washington, USA: Sawthooth Software.

SCHIFFMAN, L. G., DASH, J. F. & DILLON, W. R. 1977. Contribution of Store-Image characteristics to Store-Type choice. *Journal of Retailing,* 53**,** 3-&.

SCHNEIDER, D., BERENT, M., THOMAS, R. & KROSNICK, J. Measuring customer satisfaction and loyalty: improving the 'Net-Promoter'Score. Poster presented at the Annual Meeting of the American Association for Public Opinion Research, New Orleans, Louisiana, 2008.

SEIDERS, K. & TIGERT, D. J. 2000. The impact of supercenters on traditional food retailers in four markets. *International Journal of Retail & Distribution Management,* 28**,** 181-193.

SHANNON, R. 2009. The transformation of food retailing in Thailand 1997–2007. *Asia Pacific Business Review,* 15**,** 79-92.

SHANNON, R. & MANDHACHITARA, R. 2008. Causal path modeling of grocery shopping in hypermarkets. *Journal of Product & Brand Management,* 17**,** 327-340.

SHERMAN, E., MATHUR, A. & SMITH, R. B. 1997. Store environment and consumer purchase behavior: mediating role of consumer emotions. *Psychology and Marketing,* 14**,** 361-378.

SHETH, J. N. 1981. *An integrative theory of patronage preference and behavior*, College of Commerce and Business Administration, Bureau of Economic and Business Research, University of Illinois, Urbana-Champaign.

SHUKLA, P. & BABIN, B. J. 2013. Effects of consumer psychographics and store characteristics in influencing shopping value and store switching. *Journal of Consumer Behaviour,* 12**,** 194-203.

SINHA, P. K. & BANERJEE, A. 2004. Store choice behaviour in an evolving market. *International Journal of Retail & Distribution Management,* 32**,** 482-494.

SINHA, P. K., BANERJEE, A. & UNIYAL, D. P. 2002. Deciding where to buy: Store choice behaviour of Indian shoppers. *Vikalpa,* 27**,** 13-28.
SMITH, T. & MANDHACHITARA, R. 2000. The internationalization of retailing in Thailand. *In:* DAVIES, R. & YAHAGI, T. (eds.) *Retail Investment in Asia/Pacific: Local Responses and Public Policy Issues.* Oxford: The Oxford Institute of Retail Management.
SOLGAARD, H. S. & HANSEN, T. 2003. A hierarchical Bayes model of choice between supermarket formats. *Journal of Retailing and Consumer Services,* 10**,** 169-180.
SORESCU, A., FRAMBACH, R. T., SINGH, J., RANGASWAMY, A. & BRIDGES, C. 2011. Innovations in retail business models. *Journal of Retailing,* 87**,** S3-S16.
STERN, S. 1997. Simulation-based estimation. *Journal of economic Literature,* 35**,** 2006-2039.
STONE, K. E. 1995. *Competing with the Retail Giants: How to Survive in the New Retail Landscape*, Wiley.
STOPHER, P. R. 2008. Suryey and Sampling Strategies. *In:* HENSHER, D. A. & BUTTON, K. J. (eds.) *Handbook of Transport Modelling.* Great Britain: Emerald Group Publishing Limited.
SUDMAN, S. 1980. Improving the Quality of Shopping Center Sampling. *Journal of Marketing Research (JMR),* 17**,** 423-431.
SULLIVAN, P. & SAVITT, R. 1997. Store patronage and lifestyle factors: implications for rural grocery retailers. *International Journal of Retail & Distribution Management,* 25**,** 351-364.
SUNALAI, P. 2006. Urban environmental tourism destination management: Phimai case study, Nakhon Ratchasima Province, Thailand. *Community destination management in developing economies***,** 139-152.
SURYADARMA, D., POESORO, A., BUDIYATI, S., ROSFADHILA, M. & SURYAHADI, A. 2010. Traditional food traders in developing countries and competition from supermarkets: Evidence from Indonesia. *Food policy,* 35**,** 79-86.
SWAIT, J., LOUVIERE, J. J. & WILLIAMS, M. 1994. A sequential approach to exploiting the combined strengths of SP and RP data: application to freight shipper choice. *Transportation,* 21**,** 135-152.
SWANSON, J. Factors affecting the validity of stated preference. European Transport Conference, 1998 Loughborough University, UK.
TAT KEH, H. & WEI TEO, C. 2001. Retail customers as partial employees in service provision: a conceptual framework. *International Journal of Retail & Distribution Management,* 29**,** 370-378.
TAYLOR, S. L. & CAPELLA, L. M. 1996. Hospital outshopping: determinant attributes and hospital choice. *Health care management review,* 21**,** 33-44.
TELLER, C. 2008. Shopping streets versus shopping malls–determinants of agglomeration format attractiveness from the consumers' point of view. *The International Review of Retail, Distribution and Consumer Research,* 18**,** 381-403.
TELLER, C. & REUTTERER, T. 2008. The evolving concept of retail attractiveness: What makes retail agglomerations attractive when customers shop at them? *Journal of Retailing and Consumer Services,* 15**,** 127-143.
TELLER, C., REUTTERER, T. & SCHNEDLITZ, P. 2008. Hedonic and utilitarian shopper types in evolved and created retail agglomerations. *The International Review of Retail, Distribution and Consumer Research,* 18**,** 283-309.
TELLER, C. & THOMSON, J. A. 2012. Gender differences of shoppers in the marketing and management of retail agglomerations. *The Service Industries Journal,* 32**,** 961-980.
TELLER, C., WOOD, S. & FLOH, A. 2016. Adaptive resilience and the competition between retail and service agglomeration formats: an international perspective. *Journal of Marketing Management***,** 1-25.
TESSIER, S., TRAISSAC, P., BRICAS, N., MAIRE, B., EYMARD-DUVERNAY, S., EL ATI, J. & DELPEUCH, F. 2010. Food shopping transition: socio-economic characteristics and motivations associated with use of supermarkets in a North African urban environment. *Public health nutrition,* 13**,** 1410-1418.

THAIPBS. 2016. *Metropolitan police tackle traffic problems at shopping malls* [Online]. Bangkok: Thai PBS. Available: http://englishnews.thaipbs.or.th/content/53369 [Accessed 17 February 2016].
THANG, D. C. L. & TAN, B. L. B. 2003. Linking consumer perception to preference of retail stores: an empirical assessment of the multi-attributes of store image. *Journal of retailing and consumer services,* 10**,** 193-200.
THE-WALK. 2017. *The Walk Shopping Center* [Online]. Available: http://www.thewalk.co.th/ [Accessed 22 February 2017].
THE-WAYFARING-SOUL. 2017. *One Night Market You Should Visit in Bangkok* [Online]. Available: http://thewayfaringsoul.com/one-night-market-you-should-visit-in-bangkok/ [Accessed 21 February 2017].
THEODORIDIS, P. K. & CHATZIPANAGIOTOU, K. C. 2009. Store image attributes and customer satisfaction across different customer profiles within the supermarket sector in Greece. *European Journal of Marketing,* 43**,** 708-734.
THOMAS, S. 2013. Linking customer loyalty to customer satisfaction and store image: a structural model for retail stores. *Decision,* 40**,** 15-25.
THOMPSON, J. R. 1971. Characteristics and behavior of out-shopping consumers. *Journal of Retailing,* 47**,** 70-80.
THURSTONE, L. L. 1927. A law of comparative judgment. *Psychological review,* 34**,** 273.
TOLMAN, E. C. 1951. *Purposive behavior in animals and men*, Univ of California Press.
TRAIN, K. E. 2003. *Discrete Choice Methods With Simulation*, Cambridge University Press.
TRAPPEY, C. & LAI, M. K. 1997. Differences in Factors Attracting Consumers to Taiwan's Supermarkets and Traditional Wet Markets. *Journal of Family and Economic Issues,* 18**,** 211-224.
TULI, R. & MOOKERJEE, A. 2004. Retail formats: Patronage behavior of Indian rural consumers. *South Asian Journal of Management,* 11**,** 57.
USDA 2004. Thailand Retail Food Sector. *In:* SERVICE, U. F. A. (ed.). Global Agricultural Information Network.
USDA 2016. Thailand Retail Food Sector. *In:* SERVICE, U. F. A. (ed.). Global Agricultural Information Network.
VAN KENHOVE, P., DE WULF, K. & VAN WATERSCHOOT, W. 1999. The impact of task definition on store-attribute saliences and store choice. *Journal of Retailing,* 75**,** 125-137.
VAN LEEUWEN, E. S. & RIETVELD, P. 2011. Spatial consumer behaviour in small and medium-sized towns. *Regional Studies,* 45**,** 1107-1119.
VANCE, S. S. & SCOTT, R. V. 1994. *Wal-Mart: a history of Sam Walton's retail phenomenon*, Twayne Pub.
VARSHNEY, S. & GOYAL, A. 2005. A review and extension of the outshopping paradigm to the Indian context. *Asia Pacific Journal of Marketing and Logistics,* 17**,** 30-62.
VILAISAI, K. & CHAIPOOPIRUTANA, S. 2017. The Corporate Image of the New Shopping Mall in Bangkok. *Journal of Business and Behavioral Sciences,* 29**,** 74-84.
VINHAS DA SILVA, R. & FARIDAH SYED ALWI, S. 2008. The link between offline brand attributes and corporate brand image in bookstores. *Journal of Product & Brand Management,* 17**,** 175-187.
VIVIANO, E. 2008. Entry regulations and labour market outcomes: Evidence from the Italian retail trade sector. *Labour Economics,* 15**,** 1200-1222.
WAKEFIELD, K. L. & BAKER, J. 1998. Excitement at the mall: determinants and effects on shopping response. *Journal of retailing,* 74**,** 515-539.
WALTERS, R. G. & JAMIL, M. 2003. Exploring the relationships between shopping trip type, purchases of products on promotion, and shopping basket profit. *Journal of Business Research,* 56**,** 17-29.
WANG, E. 2011. Understanding the 'retail revolution' in urban China: a survey of retail formats in Beijing. *Service Industries Journal,* 31**,** 169-194.
WANG, E. 2013. The influence of visual packaging design on perceived food product quality, value, and brand preference. *International Journal of Retail & Distribution Management,* 41**,** 805-816.

WANG, H.-M. D., BEZAWADA, R. & TSAI, J. C. 2010. An investigation of consumer brand choice behavior across different retail formats. *Journal of Marketing Channels,* 17**,** 219-242.

WANG, P. Z., MENICTAS, C. & LOUVIERE, J. J. 2007. Comparing structural equation models with discrete choice experiments for modelling brand equity and predicting brand choices. *Australasian Marketing Journal (AMJ),* 15**,** 12-25.

WIDLERT, S. 1998. Stated preference studies: the design affects the results. *In:* ORTUZARS, J. D. D., HENSHER, D. A. & JARA-DIAZ, S. (eds.) *Travel Behaviour Research: Updating The State of Play.* Oxford: Pergamon Press Inc.

WOOD, L. 2000. *Brands and brand equity: definition and management*.

WRIGLEY, N. & DUNN, R. 1984. Stochastic panel-data models of urban shopping behaviour: 2. Multistore purchasing patterns and the Dirichlet model. *Environment and Planning A,* 16**,** 759-778.

WRIGLEY, N. & DUNN, R. 1985. Stochastic panel-data models of urban shopping behaviour: 4. Incorporating independent variables into the NBD and Dirichlet models. *Environment and Planning A,* 17**,** 319-331.

YANG, H.-W., HSIAO, J.-M., CHEN, Y.-Y. & CHEN, A. Y.-C. 2012. The Agglomeration Effect of Unplanned and Planned Retail Area Based on Consumers'points of View: Evidence from Taichung, Taiwan. *International Journal of Organizational Innovation (Online),* 4**,** 131.

YAVAS, U. & BABAKUS, E. 2009. Modeling patronage behavior: a tri-partite conceptualization. *Journal of consumer marketing,* 26**,** 516-526.

YOO, S. & CHANG, Y. 2005. An exploratory research on the store image attributes affecting its store loyalty.

ZEITHAML, V. A. 1988. Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence. *The Journal of marketing***,** 2-22.

Appendices

Appendix A Glossary

Several terms refer to the definition in Orme (2010) and Hensher et al. (2005).

Accessibility The ease of reaching a store from a customer's home or a customer's office.

Adaptive choice-based conjoint (ACBC) A computer-administered choice-based conjoint interview proposed by Sawtooth Software (Orme, 2010). It involves three main phases: (1) configurator phase in which respondents specify the product they would most likely purchase by selecting preferred levels for each attribute, (2) screening phase during which respondents are asked whether they would consider as 'a possibility' or 'not a possibility' each of usually two-dozen or more product concepts constructed based on small variations to the configured product from the previous phase, and (3) choice tasks phase in which respondents choose among the products marked as 'a possibility' from the previous phase until an overall winning product is identified.

Agglomeration A group of things put together in no particular order or arrangement.

Aggregate model Models that estimate the average parameter of utilities for a group of individuals, rather than for each respondent individually. Aggregate models are often used when there just is not enough information available within each individual to estimate separate (disaggregate) models for each. Multinomial logit (MNL) is commonly used as an aggregate model for choice analysis.

Alternative-specific attribute An attribute (product feature) that is only applicable to a specific alternative in a discrete choice experiment.

Alternative-specific constant (ASC) A parameter for a particular alternative that is used to represent the role of unobserved sources of utility. In discrete choice or choice-based conjoint models, each product concept (alternative) typically is associated with, say, a different brand. In addition to the brands, other attributes, such as colours, speed, and prices, may be included in the choice task. The ASC is the remaining utility associated with a product alternative after accounting for all other attributes except the concept label, or in this case, the brand. In this context, it is therefore the brand intercept, or utility for brand. The ASC may reflect things other than brand; transportation mode choice (e.g., bus, car, rail) is another example. The ASC may also represent convenience, comfort, etc.

Assortment The number of SKUs within a merchandise category, also called depth of merchandise.

Atmosphere The overall feeling or perception that customers have in a retail outlet.

Attributes Characteristics of an alternative or a fundamental product or service features, such as brand, colour, price, speed, etc. Some refer to attributes as factors or features. Each attribute in choice analysis must have at least two levels. Most attributes used in choice analysis involve relatively definite (concrete) dimensions. Each attribute should be as unique in meaning and independent from the others as possible. While choice analysis cannot include all attributes that influence preference for buying a product of service, often most of the decision process for purchasers can be modelled using a reasonably small number of attributes.

Attribute levels A specific value taken by an attribute; experimental designs require that each attribute takes on two or more levels, which may be quantitative or qualitative.

Attribute Promoter Score (APS) An index to measure the likelihood for recommendation based upon an attribute, i.e. a store image attribute. It is calculated by the percentage of the promoter minus the percentage of the detractor. On a Likert scale of 1 to 5, the scale of 5 is considered to be '*promoters'*, the scale of 1 to 3 is assigned to '*detractors'*, and the scale of 4 is '*passives'*.

Balanced design A design in which the levels of any given attribute appear the same number of times as all other levels for that particular attribute.

Bias A systematic error in the data collection process.

Blocking The use of an additional design column to assign subsets of treatment combinations to decision makers. When there are many more choice questions in the total design than any one respondent can evaluate, the questions can be divided into carefully constructed blocks, or subsets of the total design plan. For instance, consider a choice experiment with 80 unique choice questions. The researcher realizes that any one respondent does not have the time or ability to evaluate all 80 questions, so the questions are divided into ten blocks of eight. Each respondent is randomly assigned to receive one of the ten blocks. Ideally, each block should reflect a high degree of level balance (each attribute level occurs nearly an equal number of times). Blocking is often used when the method of interviewing favours managing only a limited number of questionnaire versions (such as with a paper-

and-pencil format) and the estimation method involves some type of aggregation or data sharing across respondents (Orme, 2010).

Categorical attribute Also known as nominal attribute. Attributes include brand, style, or colour, in which the levels represent discrete categories, often with no logical or *a priori* preference order.

Choice-based conjoint (CBC) Choice-based conjoint goes by many names, including *'discrete choice model'*, *'discrete choice'*, or *'choice analysis'*. It is a relatively recent flavour of conjoint analysis and the most popular current conjoint-based technique (as of about the 2000s) (Orme, 2010). The CBC shows a few product or service concepts at a time and asks respondent to choose their preferred alternative. Each question in CBC is usually called a choice task. The CBC questionnaire presents the choice task, which consists of a different variation of product concepts.

Choice-based sampling A sampling method involving the deliberate over- and under-sampling of each alternative that makes up a particular choice probability.

Choice experiment A specific type of experimental design used to collect data for developing a choice model.

Choice set A choice set is a collection of alternatives from which the respondent can choose. The choice set must be mutually exclusive, exhaustive, and the number of alternatives must be finite.

Closed-form Mathematically tractable, involving only mathematical operations.

Coding The use of numbers to designate a particular state of an attribute (e.g. zero denotes male and one denotes female).

Coefficient A scalar value by which a particular element in a model is multiplied in the estimation process.

Computer-assisted personal interview (CAPI) Data collection by using a computer, such as a laptop or personal computer, to administer a survey.

Conjoint analysis A quantitative market research technique that asks respondents to rank, rate, or choose among multi products or services, where each product is described using multiple characteristics, called attribute levels. Some think the work conjoint comes from the idea that respondents are asked to trade off product characteristics considered jointly (Orme, 2010).

Continuous A variable that can take an infinite level of values.

Correlation A measure of the strength of magnitude of the relationship that may exist between two random variables.

Covariance Statistical measure representative of the degree to which two random variables vary together.

Cross-section Data relating to multiple members of a population.

Customer service Refers to personal services in two dimensions: responsiveness and personalization. The former relates to employee willingness to help customers and give prompt service; and the latter is the interaction between service employees and their customers.

Degrees of freedom The number of observations in a sample minus the number of independent (linear) constraints imposed during the modelling process; these constraints are the estimated parameters.

Disaggregate models Generally refers to models developed within individuals separately.

Discrete A variable that can take only a finite level of values.

Discrete choice models (DCM) This term is commonly applied to CBC analysis, although actually it is a much broader classification and CBC represents a small subset of DCM models (Orme, 2010). DCM refers to a class of models in which the nominal dependent variable reflects choice. Many DCM models are built to explain scanner sales data using consumer/household characteristics. Some experienced analysts (particularly those with an econometric background) point out that DCM encompasses more flexible kinds of choice experiments than traditional conjoint analysis wherein different product alternatives can have unique (alternative-specific) sets of attributes and choice tasks can include multiple constant alternatives.

Created agglomeration retail (CAF) format Regional malls, supercentres and other centres, such as power, lifestyle, speciality, outlet, theme/festival centres, are deliberately planned and constructed and then managed and marketed centrally.

Customer (socio-economic) characteristics Information regarding individuals or customers that serves as a proxy for their tastes. Examples include income, age, gender, and occupation.

Dummy coding A data coding method for representing the presence or absence of product features, in which a 0 means 'not present' and a 1 means 'present'.

Elasticity The percentage change in one variable with respect to a percentage change in another.

Evolved agglomeration retail format (EAF) Retail clusters in urban areas, such as central business districts, inner-city locations or main streets, or local strips in suburban/rural areas.

Experiment The manipulation of one variable with the purpose of observing the effect of that manipulation upon a second variable.

Experimental design The specification of attributes and attribute levels for use in an experiment.

External validity The ability of a choice model or market simulator to predict accurately some outcome outside of the realm of the survey, such as a subsequent choice or purchase by an individual, or market shares for a population.

Fractional factorial design A design consisting of some treatment combinations. With a choice analysis study, if there are five attributes each with four levels, there are 1,024 possible product concept realizations. What makes choice analysis work in practice is that it is usually not necessary to ask respondents to evaluate all possible product combinations. Typically, just a carefully selected fraction of the total possible combinations is needed to estimate the utility effects that account for the vast majority of the variation in respondents' product evaluations/choices. In the previous example, all 1,024 possible combinations define the full factorial or complete design, whereas a carefully selected subset of these realizations (as an example, 32 out of 1,024 combinations) is termed a fractional factorial or reduced design.

Full factorial design A design in which all possible treatment combinations are enumerated.

Generic attribute An attribute (product feature) that is applicable to all product alternatives in a discrete choice experiment. For instance, if studying purchases of laptop computers, the various attributes (e.g., screen size, installed software, RAM, and storage space) are applicable and present in all competing alternatives from different suppliers. In contrast, alternative-specific attributes are those that only apply to certain brands or product alternatives.

Hausman-test A test for the existence of the independence of irrelevant alternatives (IIA).

Heterogeneity Generally refers to differences in tastes and preferences among people. A data set that includes respondents who are quite different in terms of preferences is termed heterogeneous, as opposed to a homogeneous data set where people are very similar. Conjoint methods and preference estimation methods differ in terms of their ability to capture heterogeneity across respondents. Traditional conjoint analysis, as developed in the early 1970s, usually developed separate part-worth utility scores for each individual. Individual-level models offer the greatest opportunity to capture respondent heterogeneity, especially when each respondent answers many conjoint questions. Conjoint models that reflect heterogeneity often produce more accurate predictions than those that do not. With discrete choice or choice-based conjoint (CBC) methods, the main estimation model available until the mid-1990s was aggregate logit, which pooled data across respondents, estimating a summary set of part-worth utilities for the sample. Aggregate models assume homogeneity and cannot distinguish true heterogeneity from random noise. Exceptions to that rule are aggregate models that incorporate observed respondent characteristics (such as gender, age, or income) as explanatory variables.

Hold-out Refers to discrete choice questions not used to estimate part-worth utilities, but held out separately to assess the quality or performance of the estimated part-worths. If the responses to held-out questions can be predicted accurately using estimated part-worths, this lends greater credibility to the model. Assessing the quality of part-worth estimation using hold-out questions is more indicative of internal reliability than of predictive validity. True validity tests usually require real-world sales or choice data rather than hold-out choice questions asked during the same survey as the other choice tasks.

Hypothesis testing The process by which one determines the worth of an estimate of a population parameter or a sample parameter.

Independently and identically distributed (IID) The assumption that the unobserved components of utility of all alternatives are uncorrelated with the unobserved components of utility for all other alternatives, combined with the assumption that each of these error terms has the exact same distribution.

Independence of irrelevant alternatives (IIA) A restrictive assumption, which is part of the multinomial logit (MNL) model; the IIA property states that the ratio of the choice probabilities is independent of the presence or absence of any other

alternative in a choice set. It is commonly known as the 'red bus/blue bus problem' (Ben-Akiva and Lerman, 1985). IIA is a property of the MNL model, in which the ratio of any two product alternatives' shares is constant, irrespective of changes to (or introductions of) other product alternatives.

Interaction effect An effect upon the response variable obtained by combining two or more attributes which would not have been observed had each of the attributes been estimated separately. Typical choice analysis models assume that the utility of a product alternative is equal to the sum of the values of its independent parts. However, there are situations in which the levels from two attributes combine to create something considerably better, or worse, than their independent values might suggest. Interaction effects are parameters that are estimated in addition to the main attribute level effects (main effects).

Internal validity Refers to the ability of a choice model or market simulator to accurately predict some additional choice question not used in the estimation of part-worth utilities, such as a hold-out question. Internal validity is a less demanding standard than external validity, which characterises the model's ability to predict events outside the survey, such as actual market purchases.

Latent class analysis Also known as finite mixture model. A model and estimation technique for analysing discrete choice (CBC) data that finds groups (classes) of respondents that exhibit similar choice patterns and develops a set of part-worth utilities for each class. Like cluster analysis, the analyst specifies how many groups to model, and the technique finds relatively homogeneous groups where the individuals' preferences are similar within groups and dissimilar between groups. Unlike cluster analysis, latent class analysis is model driven in that a solution is found subject to independent variables (variations in attributes) best predicting respondent choices for product concepts. The fit is often measured in terms of likelihood, and an MNL model is developed within each group. In latent class analysis, all respondents within each group are assumed to have identical preferences, except for random noise. Respondents are not discretely assigned to groups (as in cluster analysis), but have probabilities of membership in each group. Latent class analysis is valuable for discovering needs-based segments. Latent class models also generally perform better than aggregate logit models, both in terms of fit and predictive validity, given the same model specification.

Level A degree or amount of an attribute. Every attribute in choice analysis must have at least two levels. Levels should have concrete meaning, and be mutually exclusive

within each attribute, meaning a product concept is defined using one and only one level of each attribute.

Level balance A desirable property for choice designs is that levels within the same attribute should appear an equal number of times in the questionnaire. Some orthogonal arrays published in design catalogues or produced by design software lack level balance and are suboptimal. Computer search routines that pay attention to both level balance and orthogonality can produce designs that lead to more precise estimates of part-worth utilities for levels, even though they may sacrifice a small degree of orthogonality.

Likelihood A measure of fit used in discrete choice analysis, indicating the probability that the observed choices would have resulted, given the estimated part-worths. Multiplying probabilities across many choice tasks and respondents results in extremely tiny numbers near zero, so the logs of the likelihoods are accumulated across tasks and respondents to link model fit to choices. Log-likelihoods are negative values, where the best possible log-likelihood fit (assuming 1.00 probability for all choice tasks across the sample) is zero.

Likelihood ratio test This test compares two different choice models between: (a) the model with estimated parameters and (b) the bases model assuming all parameters are zero. The null hypothesis can be expressed as the two models are different. If this value exceeds the critical value of chi-squared with the appropriate degrees of freedom, then the null hypothesis is rejected. Not only is the comparison of the above models applied, but the likelihood ratio test can also be used for the comparison of a restricted model and an unrestricted model, when the models are developing.

Likelihood ratio index Also known as ρ^2, so-called 'McFadden's pseudo'. It is used for discrete choice models to indicate the overall models' goodness-of-fit. It measures how well the models fit with the data. This statistic measures how well the model (with its estimated parameters) performs compared to the base model when the parameters are zero (equivalent to no model at all). The ρ^2 is parallel to the R^2 for a linear regression model. However, the ρ^2 is not at all similar in the interpretation of the R^2. R^2 indicates the percentage of the variation in the dependent variable that is explained by the estimated model. The ρ^2 does not provide intuitive interpretation for the value between zero and one. It is the proportion increasing in the log-likelihood function over the values of parameters equal to zero, and it is valid to interpret that the higher ρ^2 fits the data better than the lower ρ^2. Hensher

et al. (2005) note that a range for ρ^2 between 0.3 and 0.4 is equivalent to R^2 between 0.6 and 0.8 in a linear regression model. The ρ^2 value tends to be much lower. The values around 0.2 and 0.4 indicate an extremely good fit (Louviere et al., 2000). In particular, for SP studies values of about 0.1 are typical.

Log-likelihood See **Likelihood**.

Main effect The direct independent effect of each factor upon a response variable; for experimental designs, the main effect is the difference in the means of each level of an attribute and the overall or grand mean.

Major shopping trip A shopping trip requires much time and effort because a large number of items are purchased, usually conducted over a time period of about one to two weeks or one month and contribute to a significant share of a consumer's grocery budget.

Marginal effects The change in the probability of selecting an alternative with respect to a one-unit change in an attribute.

Market share Most choice practitioners use the term 'market share' to refer to actual purchases (usually percentage of volume) made by buyers in real markets. Academics sometimes refer to the share predictions from choice market simulators as market shares as well. Practitioners prefer to apply the term '*shares of preference'* to the predictions from choice market simulators in recognition that only under controlled situations will the predicted shares of preference closely match actual market shares. There are many other factors not incorporated in the choice model that shape market shares in the real world, such as distribution, awareness, effectiveness of sales force, and time in the market.

Maximum likelihood estimation (MLE) A method for estimating part-worth utilities or coefficients where the goal is to maximise the fit to respondents' choices (usually in a CBC questionnaire) in terms of likelihood.

Mixed logit (ML) Also known as a random parameter logit. The mixed logit assumes one or some of the parameters are random, following a certain probability distribution. The mixed logit is a highly flexible model that can approximate any random utility model. The mixed logit model can tackle the limitations of the multinomial logit model by allowing for random taste variation, unrestricted substitution patterns, and handling correlation in unobserved factors over time and panel data.

Modern agglomeration retail format (MAF) A collection of small to large stores providing modern services and displays, operating with standardised management systems, and investing in technology and innovation to attract customers, e.g. using state-of-the-art supply chain and logistics systems.

Multicollinearity The state of two variables being so closely correlated that the effects of one cannot be isolated from the effects of the other.

Multinomial logit (MNL) A multivariate statistical model for relating utilities to probabilities of choice. MNL is often used for estimating part-worth utilities based on discrete choice (CBC) questionnaires involving multiple product alternatives per choice task. An MNL model fits a set of part-worth utilities (often referred to as effects within the logit framework) to the data, either across many respondents or for an individual respondent, such that the choices actually made are more faithfully predicted. The MNL model is often used in pooling or aggregating across respondents so that estimates of part-worth utility parameters can be stabilized. Obtaining an aggregate solution based only on product characteristics ignores differences across respondents (heterogeneity), and such aggregate logit models are subject to IIA difficulties.

Multivariate Involving more than one variable.

Nested Hierarchical, or belonging to a mutually exclusive subset of a group of outcomes.

Net Promoter Score (NPS) An index to measure the likelihood to recommend the company. The NPS question simply asked is "How likely is it that you would recommend our company to a friend or colleague?" It is calculated by the percentage of the promoter minus the percentage of the detractor. The scoring for this answer is often based on a 0 to 10 scale. The score of 9 to 10 is considered to be 'promoters', the score from 0 to 6 is assigned to 'detractors', and the score between 7 and 8 is the 'passives'.

Non-agglomeration retail format (NAF) A single independent or a chain retail store located at a solitary site, regardless of store size and management style.

Orthogonal Independent of all other factors.

Orthogonality A statistical term that, when applied to a choice experimental design, refers to experiments in which the attributes are uncorrelated across product concepts. In more technical terms, the columns in the design matrix have zero correlation between levels of different attributes. The independence of attributes

is important to the choice analysis studies because it allows the researcher to estimate each part-worth utility independently of the levels of other attributes in the model. Orthogonality allows separate estimations for each attribute, independently of the others, but it does not, by itself, guarantee precision. Orthogonal designs were very popular for many years in choice analysis. However, particularly since the 1990s, researchers have learned that orthogonal designs are not necessarily the best option. Here are some reasons:

- Orthogonal designs are quite inflexible with regard to how many conjoint questions should be shown, so it is difficult to choose precisely the number of questions that are right for respondents and that provide the desired degrees of freedom.
- For choice studies in which the numbers of levels differ across attributes, orthogonal designs are sometimes not balanced, meaning that some attribute levels can appear more times than others. When this occurs, the more frequently occurring levels are measured with greater precision than the less frequent levels within the same attribute.
- Orthogonal designs often yield product concepts or comparisons among product concepts that are quite unrealistic or for which there is a clear winner or dominant alternative. Such situations are usually not desirable in choice analysis surveys, and designs that sacrifice a modest degree of orthogonality have the potential to produce better overall results.

Orthogonal coding Coding in which all values for a given attribute sum to zero; in the case of even numbers of code levels, each positive code level is matched by its negative value, in the case of odd numbers of code levels, the median level is assigned the value zero – for example, in the two-level case, the levels assigned are –1 and 1; in the three-level case, the levels assigned are –1, 0, and 1.

Orthogonal main effects only design An orthogonal design in which only the main effects are estimated; all other interactions are assumed to be insignificant.

Outshopping A situation in which customers are shopping in other areas because their needs are not being met locally.

Part-worth The proportion of utility that can be attributed to a specific attribute. The total utility for the product is made up of the part-worths of its separate attributes (components).

Percent correctly predicted Also known as 'hit rate'. This index is calculated by identifying for each sampled customer the alternative with the highest probability, and determining whether or not this was the alternative that the customer actually chose. It measures the ability of choice models to predict individual responses to hold-out profiles. For example, a respondent may have completed 18 choice tasks in a choice experiment, followed by another choice task that is held out for validation purposes (not used in the estimation of part-worth utilities). Using the part-worth utilities developed from the first 18 choice tasks, the responses to the hold-out choice task are then predicted. If the prediction matches the respondent's choice, a hit is recorded for this respondent; if not, a miss is recorded. This index across the sample is the percentage of correctly predicted hold-out responses using the model. The percent correctly predicted for hold-out choice tasks involving three or four product alternatives usually ranges from 70 to 85% (Orme, 2010). Successful choice models feature both a high percent correctly predicted and excellent share prediction accuracy.

Preferences The forces leading an individual to select one alternative over another.

Price The amount of money charged for a product or service.

Probit Choice model that assumes a normal distribution for the random errors (in contrast to EV1 for logit).

Profiles Combinations of attributes, each with unique levels.

Product quality A product's overall excellence and superiority from customers' points of view.

Pseudo-R^2 See **Likelihood ratio index**.

***p*-value** represents the probability of an erroneous finding in terms of accepting the conclusion drawn from a test conducted on a sample as being valid, or representative of the population.

Quick shopping trip Also known as a fill-in trip. A shopping trip that meets more pressing product needs with less time and effort, fewer items, and is more frequent than major shopping trips.

Random parameter A parameter with a mean value and an associated standard deviation, yielding a distribution of estimated values.

Randomised design With choice experiment studies, respondents can be randomly selected to receive one of many unique, available questionnaires, where each one reflects the design principles of level balance and independence of attributes. Given enough respondents, such randomised design plans approximate the full factorial. In other words, across many respondents every possible product configuration is presented. Randomised designs have the benefit of very good statistical efficiency, and due to the great deal of variation in the choice tasks, they control for many order, learning, and context effects. A truly random design may be developed that draws product concepts randomly from the universe of possible product concepts, without recourse to ensuring strict level balance and independence of attributes within individual respondents. Such an approach typically leads to fairly reasonable (but never optimal) design efficiency when considering pooled analysis. However, given a large enough sample, a truly random design supports relatively efficient group or aggregate analysis of main effects plus all potential interactions and cross-effects.

Random utility maximisation The analysis of the maximisation of utility, taking into account the unobserved sources of utility for all alternatives.

Random variable A variable that can take on more than one value.

Range of product Represents both assortment and variety on a continuum. On the one hand, it means more assortment when there are several SKUs within a category or 'narrow range of products', e.g. a speciality store; on the other hand, it represents more varieties when there are many different merchandise categories in the store or 'wide range of products', e.g. a collection of independent stores.

Regular shopping trip A routine shopping trip which involves a minor or major shopping trip, explicit and implicit planned shopping, and periodic purchasing. Many rural consumers often do a minor shopping trip every day, or every two to three days, due to seeking fresh produce, but may periodically do a major shopping trip in longer time period, e.g. a month or two weeks. However, other shopping trips such as a quick shopping trip, or a specific shopping trip are not regular shopping trips.

Reliability Refers to how consistent respondents are in applying an evaluative strategy and assigning ratings or choices of product concepts. Reliability is often characterised in terms of R^2 (the percentage of total variation in the product ratings explained by the model) for ratings-based conjoint methods, or likelihood if considering choice-based methods. High reliability does not necessarily lead to accurate models of real-world purchases. Respondents may answer a choice

questionnaire very reliably, but they may not be in a realistic mindset, or the choice questionnaire may be seriously flawed in some way. Good reliability does not necessarily imply better data. Respondents who adopt extremely simple decision rules (such as always picking the same brand or whichever product has the lowest price) will typically receive much higher reliability scores than respondents who conscientiously consider the complex trade-offs among all attributes before making a product choice or rating.

Restricted Involving parameters that are constrained to a particular value.

Retailer reputation The opinion that customers have about a retailer due to their own experience and/or their perception from media or other sources, e.g. word of mouth.

Retail agglomeration Similar or different types of retailers gathered in one place or nearby.

Retail/store format A combination of particular levels of each element of the retailing mix, such as product assortment, pricing strategy, location, customer interface, and so forth.

Retail/store format choice The selection of a retail/store format which is regardless of brand or chain name.

Retail/store patronage The support that a customer gives to a retailer/store.

Revealed preference (RP) A term often used by researchers with a background in econometrics to refer to predictive models built using actual store purchases or real-world choices of existing products, as well as other variables describing buyers or households. In contrast, choice models, based on survey data, are often called stated preference models by this same class of researchers.

Sampling error Random variability resulting from the particular sample that is drawn; i.e., if different samples are drawn, different means, variances, correlations and covariances are likely to be observed.

Sampling frame The subset of the population to whom the experiment may be administered.

Significance The probability that a given parameter estimate is equal to a particular value, generally given in reference to zero.

Significance level A value representing the probability that the analyst is willing to reject the null hypothesis when in fact the null hypothesis is correct; alternatively, a value representing the probability that the analyst has not rejected the null hypothesis when it is correct.

Situational factor A factor particular to a time and place of observation which does not follow from a knowledge of personal and stimulus (choice alternative) attributes and which has a demonstrable and systematic effect on current behaviour.

Stated-preference (SP) A term often used by researchers with a background in econometrics to refer to predictive models built using the choices/ratings of a product, which is generated by some systematic and planned design process where the attributes and their levels are predefined. In contrast, models built using actual sales (scanner) data or real-world choices are often called revealed preference models by this same class of researchers.

Stated-preference experiment An experiment involving hypothetical choice scenarios and researcher-specified attributes and attribute levels.

Stimulus A more technical term referring to the product profile (concept) shown to respondents.

Stock Keeping Unit (SKU) A category of unit with a unique combination of form, fit, and function (i.e. unique components held in stock).

Store image The way a store is defined in a shopper's mind. The store image is based on the store's physical characteristics, its retail mix, and a set of psychological attributes.

Substitution effect The change in quantity demanded that can be attributed to a change in the relative prices of two goods.

Substitution patterns The manner in which it is inferred that people move away from one alternative towards another in response to changes in attribute levels.

Task Generally refers to a single choice question (set) in a discrete choice (CBC) questionnaire. In this context, a task is a collection of product alternatives from which the respondent can choose. One might state, "There were 18 total cards in the choice task." Task might also be used in the phrase 'task complexity' to refer to the difficulty of answering an individual discrete choice question or the entire choice interview.

Tastes The component of an individual's personal preferences, which are specific to that individual, rather than being tied to the relevant attributes in the choice set.

Test-retest reliability Researchers sometimes repeat a choice question or choice task later in the questionnaire to see if respondents will answer the same way twice. The measure of how consistently respondents answer if given the same question at a later point in the survey is called test-retest reliability. When respondents choose from among three available product alternatives, research has shown that about 75 to 80% of respondents can answer identically in the repeated task.

Travel time A specified period of time spent in travelling between stores and consumers' homes/offices.

Treatment The specific factor level for a particular attribute.

Treatment combination Combinations of attributes, each with unique levels.

Traditional agglomeration retail format (TAF) A collection of small stores in which management style is not standardised, with old-fashioned operations and minimal investment in technology and innovation.

***t*-test** A test-statistic relating to the sample standard deviation through a normal distribution.

Unbalanced design A design in which the levels of any given attribute do not appear the same number of times as all other levels for that particular attribute.

Utility The level of happiness that an alternative yields to an individual.

Utility maximisation The act of seeking the alternative that yields the highest level of utility.

Validity A significant relationship between the results inferred through estimation and real world behaviour.

Variety The number of different merchandise categories with a store or department, also called breadth of merchandise.

***Wald*-statistic** The ratio of an importance weight to its standard error.

***Wald*-test** A test of whether a *Wald*-statistic is significantly different to zero.

Appendix B The design of stated choice experiments

B.1 SPSS code to generate a main effect orthogonal design

```
*Generate Orthogonal Design.

ORTHOPLAN

 /FACTORS=

     Range1 'Range of products format1' (-1 'Speciality' 1 'Large')

     Brand1 'Brand or chain name format1' (-1 'Local brand/chain name' 1 'National brand/chain name')

     Price1 'Price levels format1' (-1 '20% higher' 0 'No difference' 1 '20% lower')

     TravelTime1 'Travel time from home/office format1' (-1 '31-60 mins' 0 '16-30 mins' 1 '5-15 mins')

     Quality1 'Product quality format1' (-1 'Low' 1 'High')

     Appearance1 'Store appearance / atmosphere format1' (-1 'Unattractive' 1 'Attractive')

     Service1 'Customer service levels / friendliness format1' (-1 'Low' 1 'High')

     Accessibility1 'Ease of access / parking format1' (-1 'Difficult'1 'Easy')

     Range2 'Range of products format1' (-1 'Speciality' 1 'Large')

     Brand2 'Brand or chain name format1' (-1 'Local brand/chain name' 1 'National brand/chain name')

     Price2 'Price levels format1' (-1 '20% higher' 0 'No difference' 1 '20% lower')

     TravelTime2 'Travel time from home/office format1' (-1 '31-60 mins' 0 '16-30 mins' 1 '5-15 mins')

     Quality2 'Product quality format1' (-1 'Low' 1 'High')

     Appearance2 'Store appearance / atmosphere format1' (-1 'Unattractive' 1 'Attractive')

     Service2 'Customer service levels / friendliness format1' (-1 'Low' 1 'High')

     Accessibility2 'Ease of access / parking format1' (-1 'Difficult'1 'Easy')

     Range3 'Range of products format1' (-1 'Speciality' 1 'Large')

     Brand3 'Brand or chain name format1' (-1 'Local brand/chain name' 1 'National brand/chain name')

     Price3 'Price levels format1' (-1 '20% higher' 0 'No difference' 1 '20% lower')

     TravelTime3 'Travel time from home/office format1' (-1 '16-30 mins' 0 '5-15 mins' 1 '0 mins or home delivery')

     Quality3 'Product quality format1' (-1 'Low' 1 'High')

     Appearance3 'Store appearance / atmosphere format1' (-1 'Unattractive' 1 'Attractive')

     Service3 'Customer service levels / friendliness format1' (-1 'Low' 1 'High')

     Accessibility3 'Ease of access / parking format1' (-1 'Difficult'1 'Easy')

 /REPLACE.
```

B.2 Orthogonal design for main effect only

Treatment	Range1	Brand1	Price1	TravelTime1	Quality1	Appearance1	Service1	Accessibility1	Range2	Brand2	Price2	TravelTime2	Quality2	Appearance2	Service2	Accessibility2	Range3	Brand3	Price3	TravelTime3	Quality3	Appearance3	Service3	Accessibility3	Blocking
1	-1	-1	-1	0	-1	-1	-1	-1	1	-1	1	0	-1	-1	-1	-1	1	-1	0	0	-1	-1	1	1	1
2	1	1	-1	0	1	-1	-1	1	1	-1	-1	0	-1	1	1	1	1	-1	1	-1	-1	-1	-1	1	5
3	-1	-1	-1	0	-1	1	-1	-1	1	1	0	0	-1	-1	-1	-1	1	-1	-1	1	1	-1	-1	1	9
4	1	-1	1	-1	-1	1	-1	1	-1	-1	1	-1	-1	-1	1	-1	1	-1	-1	0	-1	1	-1	-1	9
5	-1	-1	0	0	-1	-1	-1	1	1	-1	1	1	-1	-1	-1	-1	-1	-1	1	1	-1	1	-1	-1	4
6	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	0	0	-1	1	-1	-1	-1	1	-1	-1	-1	-1	1	-1	8
7	-1	-1	-1	1	1	1	-1	1	1	-1	1	-1	1	-1	-1	-1	1	-1	1	1	-1	-1	-1	-1	8
8	-1	1	0	0	-1	1	-1	-1	1	-1	0	1	-1	1	-1	-1	-1	-1	0	-1	1	1	-1	-1	3
9	-1	-1	1	-1	1	-1	-1	1	-1	1	1	1	-1	-1	1	-1	-1	-1	0	-1	-1	-1	-1	-1	6
10	1	-1	1	0	1	-1	-1	1	-1	1	0	0	1	1	-1	-1	-1	-1	0	1	-1	1	-1	-1	9
11	-1	-1	0	0	-1	1	-1	1	-1	1	1	-1	-1	-1	-1	1	1	1	0	-1	-1	-1	1	-1	7
12	-1	1	0	-1	1	-1	-1	1	-1	-1	-1	1	1	-1	-1	1	-1	-1	-1	1	1	-1	-1	1	7
13	-1	1	0	-1	-1	-1	-1	1	-1	1	-1	0	1	1	-1	-1	1	1	0	0	-1	1	1	1	4
14	-1	-1	0	-1	-1	-1	-1	-1	-1	-1	0	1	1	-1	-1	-1	-1	-1	0	0	-1	-1	-1	1	2
15	1	-1	-1	1	-1	-1	-1	-1	1	1	-1	-1	1	1	-1	-1	1	-1	-1	0	1	-1	-1	-1	3
16	1	-1	-1	-1	-1	1	-1	1	-1	1	0	-1	-1	-1	-1	1	-1	-1	0	1	1	-1	-1	-1	5
17	1	-1	-1	1	-1	-1	-1	1	-1	-1	1	1	1	-1	-1	1	-1	1	-1	0	-1	-1	1	-1	5
18	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	-1	-1	-1	1	0	-1	-1	-1	-1	-1	9
19	1	1	0	-1	-1	1	1	1	1	-1	-1	-1	1	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	1	1
20	1	1	-1	-1	-1	1	-1	-1	-1	-1	1	0	-1	-1	1	-1	-1	1	0	1	-1	-1	-1	-1	3
21	-1	-1	-1	1	-1	-1	1	1	-1	1	1	0	1	1	-1	-1	-1	-1	0	-1	1	1	-1	-1	2
22	-1	-1	0	-1	1	-1	-1	-1	-1	-1	1	0	1	-1	1	-1	1	1	-1	1	-1	1	-1	1	3
23	-1	-1	0	-1	1	-1	1	-1	1	1	0	-1	1	1	-1	-1	-1	-1	-1	1	-1	-1	1	1	5
24	-1	-1	0	1	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	0	-1	1	1	-1	3
25	1	1	1	0	1	-1	1	-1	-1	-1	1	1	1	-1	-1	-1	1	-1	0	1	1	-1	1	-1	4
26	1	-1	0	-1	-1	1	-1	-1	-1	-1	0	0	1	-1	-1	1	1	1	1	-1	1	1	-1	1	8
27	-1	1	-1	1	-1	-1	-1	-1	1	-1	0	-1	1	-1	1	1	1	-1	0	-1	-1	-1	1	-1	4
28	-1	-1	1	1	-1	-1	1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1	1	8
29	-1	-1	0	0	-1	1	1	-1	-1	-1	-1	0	-1	-1	1	-1	-1	-1	0	-1	-1	-1	-1	-1	5
30	-1	1	-1	1	1	1	-1	-1	-1	1	0	1	1	1	1	-1	-1	1	1	1	1	-1	-1	-1	1
31	1	1	0	1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	-1	1	-1	-1	0	1	-1	1	-1	-1	8
32	-1	-1	1	1	-1	-1	-1	-1	1	1	0	1	-1	-1	1	1	-1	1	-1	1	-1	1	-1	1	1
33	-1	1	1	1	-1	-1	-1	1	-1	-1	-1	0	-1	1	-1	-1	1	-1	-1	1	-1	-1	-1	1	6
34	-1	1	1	-1	-1	-1	-1	-1	-1	1	0	-1	-1	-1	-1	-1	1	-1	1	1	-1	1	-1	-1	5
35	1	-1	1	0	1	-1	-1	-1	1	-1	-1	-1	1	-1	1	1	-1	1	0	1	-1	-1	-1	-1	2
36	-1	1	1	-1	1	-1	1	-1	1	-1	0	0	-1	-1	-1	-1	-1	1	0	-1	-1	-1	-1	-1	8
37	-1	-1	0	1	1	1	1	-1	-1	-1	-1	1	-1	1	-1	1	1	1	-1	-1	-1	-1	-1	-1	9
38	-1	-1	1	0	-1	-1	-1	-1	-1	-1	-1	0	1	-1	1	-1	-1	-1	-1	-1	1	1	1	-1	5
39	-1	-1	1	0	-1	-1	1	1	-1	-1	0	1	1	-1	-1	1	1	-1	-1	-1	-1	-1	-1	-1	3
40	-1	-1	0	-1	-1	-1	1	-1	1	-1	1	-1	1	-1	1	1	-1	-1	0	0	1	-1	-1	1	9

Treatment	Range1	Brand1	Price1	TravelTime1	Quality1	Appearance1	Service1	Accessibility1	Range2	Brand2	Price2	TravelTime2	Quality2	Appearance2	Service2	Accessibility2	Range3	Brand3	Price3	TravelTime3	Quality3	Appearance3	Service3	Accessibility3	Blocking
41	-1	1	-1	0	-1	-1	-1	1	-1	1	-1	1	-1	-1	1	-1	-1	-1	0	0	1	-1	-1	1	8
42	-1	-1	-1	1	1	1	1	-1	-1	-1	-1	0	1	-1	-1	1	-1	-1	1	1	-1	1	1	-1	6
43	1	-1	0	-1	-1	1	-1	-1	-1	1	1	1	1	1	1	-1	-1	-1	1	-1	-1	-1	1	1	6
44	1	-1	-1	-1	-1	1	1	-1	1	-1	-1	1	-1	1	-1	-1	1	-1	0	1	-1	1	1	-1	7
45	-1	1	0	1	1	1	-1	-1	1	1	1	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	2
46	-1	1	1	0	-1	1	-1	-1	-1	-1	1	0	1	-1	-1	1	-1	-1	1	0	-1	1	-1	-1	1
47	-1	1	0	1	-1	-1	1	-1	-1	-1	1	1	-1	-1	-1	-1	1	1	1	0	1	-1	-1	-1	5
48	-1	1	-1	0	-1	1	1	1	-1	-1	-1	-1	-1	-1	1	-1	-1	1	-1	1	-1	1	1	1	2
49	-1	-1	1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	1	1	-1	0	-1	1	1	1	-1	1
50	-1	-1	0	1	-1	-1	-1	1	1	-1	0	0	-1	1	1	1	-1	-1	1	0	-1	-1	-1	-1	7
51	-1	1	-1	-1	-1	-1	1	-1	1	1	1	1	-1	-1	1	1	1	-1	-1	-1	1	1	-1	-1	6
52	1	-1	-1	0	1	-1	1	-1	-1	1	1	-1	-1	-1	-1	-1	-1	1	1	-1	1	1	-1	1	7
53	1	-1	1	1	-1	-1	1	-1	-1	-1	0	-1	-1	1	1	-1	-1	-1	1	-1	-1	-1	-1	1	4
54	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	-1	1
55	1	-1	0	0	1	-1	-1	-1	1	1	-1	1	-1	-1	1	1	-1	-1	-1	0	-1	1	1	-1	8
56	-1	1	0	0	-1	-1	1	-1	-1	1	0	0	-1	-1	-1	1	-1	-1	1	1	-1	-1	1	-1	9
57	1	1	0	0	1	-1	-1	-1	-1	-1	0	-1	-1	-1	-1	-1	1	1	-1	0	-1	-1	-1	-1	6
58	-1	-1	0	0	-1	-1	-1	-1	-1	-1	-1	-1	-1	1	1	-1	1	1	1	1	1	-1	-1	-1	2
59	1	1	1	1	-1	-1	-1	1	1	-1	-1	1	-1	-1	-1	-1	-1	1	1	-1	1	1	1	1	9
60	1	1	-1	1	-1	-1	1	-1	-1	-1	0	0	1	-1	1	-1	-1	-1	-1	0	-1	1	-1	-1	7
61	-1	-1	1	0	-1	1	-1	1	1	-1	0	-1	1	-1	-1	-1	-1	1	1	0	1	-1	1	-1	6
62	-1	-1	1	1	1	1	-1	-1	-1	-1	0	0	-1	-1	1	-1	1	-1	0	0	1	-1	1	1	7
63	1	-1	0	0	1	-1	1	1	-1	-1	1	0	-1	1	-1	-1	-1	-1	-1	0	1	-1	-1	-1	1
64	-1	1	-1	-1	1	-1	-1	-1	-1	-1	1	-1	-1	1	1	-1	-1	-1	1	0	-1	-1	1	-1	9
65	-1	-1	1	-1	-1	-1	1	1	1	-1	1	0	-1	1	1	1	-1	1	1	1	1	-1	1	-1	3
66	-1	-1	1	1	1	1	-1	-1	1	-1	1	1	-1	1	-1	-1	-1	1	0	0	-1	1	-1	1	5
67	1	-1	-1	0	1	-1	-1	-1	-1	-1	0	1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1	1	1	3
68	-1	-1	-1	-1	1	-1	1	1	1	-1	0	1	-1	-1	-1	-1	1	-1	1	0	-1	1	-1	-1	2
69	-1	1	1	0	-1	-1	-1	-1	1	1	1	-1	1	1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	7
70	-1	-1	1	-1	-1	-1	-1	-1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1	1	1	-1	-1	-1	-1	7
71	-1	-1	-1	0	-1	1	-1	-1	-1	-1	1	1	-1	1	-1	1	-1	-1	-1	1	-1	-1	-1	1	4
72	-1	-1	1	0	-1	1	1	-1	-1	1	-1	1	1	1	1	-1	1	-1	1	0	-1	-1	-1	-1	8
73	-1	-1	-1	-1	1	-1	-1	-1	-1	1	-1	0	-1	-1	-1	1	-1	1	1	0	1	-1	-1	-1	4
74	1	-1	0	1	-1	-1	-1	-1	1	-1	-1	0	-1	-1	-1	-1	-1	-1	0	1	1	-1	-1	-1	6
75	-1	-1	0	1	1	1	-1	1	-1	-1	0	-1	-1	-1	1	-1	-1	-1	-1	-1	1	1	-1	-1	4
76	-1	-1	-1	0	-1	-1	1	-1	-1	-1	0	-1	-1	1	-1	1	-1	1	0	0	-1	1	-1	1	6
77	1	-1	0	1	-1	-1	1	1	-1	1	0	1	-1	-1	1	-1	1	1	0	1	-1	-1	1	-1	1
78	1	1	1	-1	-1	1	-1	-1	-1	-1	0	1	-1	1	-1	1	-1	-1	-1	0	1	-1	1	-1	2
79	1	-1	1	-1	-1	1	1	-1	1	1	-1	0	-1	-1	-1	-1	-1	1	-1	0	-1	-1	-1	-1	4
80	1	-1	1	1	-1	-1	-1	-1	-1	1	1	0	-1	-1	-1	1	1	-1	1	-1	-1	-1	-1	1	2
81	-1	1	1	1	1	1	1	1	-1	1	-1	-1	-1	-1	-1	1	-1	-1	0	0	-1	-1	-1	1	3

B.3 Meaning of attributes labels to attribute levels

Attributes	Store formats		
	Traditional agglomerate format (TAF): a fresh / periodic market	**Modern agglomerate format (MAF): a shopping mall / hypermarket**	**Non-agglomerate format (NAF): a new community store**
A range of products	-1: speciality 1: large	-1: speciality 1: large	-1: speciality 1: large
A retailer reputation	-1: local reputation 1: national reputation	-1: national reputation 1: international reputation	-1: local reputation 1: national reputation
Price	-1: 20% higher 0: average 1: 20% lower	-1: 20% higher 0: average 1: 20% lower	-1: 20% higher 0: average 1: 20% lower
Travel time	-1: 31-60 mins 0: 16-30 mins 1: 5-15 mins	-1: 31-60 mins 0: 16-30 mins 1: 5-15 mins	-1: 16-30 mins 0: 5-15 mins 1: 0 min (home delivery)
Product quality / freshness	-1: low 1: high	-1: low 1: high	-1: low 1: high
Store appearance / atmosphere	-1: unattractive 1: attractive	-1: unattractive 1: attractive	-1: unattractive 1: attractive
Customer service levels / friendliness of staff	-1: low 1: high	-1: low 1: high	-1: low 1: high
Ease of access / parking	-1: difficult 1: easy	-1: difficult 1: easy	-1: difficult 1: easy

Appendix C Survey instrument

Survey of household shopping behaviours:

I am working on a PhD research project at the University of Glasgow. We are studying the grocery shopping behaviour of households in this area and therefore, your invaluable contribution is necessary for successful completion of the project. The information we gather is confidential and will only be used for academic purpose. Will it be possible to speak with the person in the household who usually makes the grocery purchases?

Thank you so much.

Please answer the following questions as they relate to the grocery shopping trips made by all members of the household.

A. A general shopping trip:

1. How many times do you shop for groceries in a given month? …
2. How much money do you spend on average on groceries in a given month? …
3. In a typical month, how many times do you shop at each of the following markets for your regular grocery shopping?

   - Fresh market …
   - Hypermarket/supermarket …
   - Mom-and-pop store/Convenience store …
   - Others (please specify a store name) …

Note: A *regular* grocery shopping trip is a routine grocery shopping trip which involves a minor or major shopping trip, explicit and implicit planned shopping, and periodic purchasing. However, other shopping trips such as a quick shopping trip, or a specific shopping trip are not regular shopping trips.

B. A current shopping trip:

4. How much money do you spend on this store? …
5. How long do you spend in this store? …
6. How do you travel to this store? …
7. What is the type of this shopping trip?

   - ❑ A regular trip
   - ❑ A quick trip
   - ❑ Others (please specify) …

8. What are the purpose(s) of this shopping trip?

- ❑ Buy groceries
- ❑ Buy other product(s)
- ❑ Lunch or dinner
- ❑ Other services: ATM/Banking, post office etc.
- ❑ Recreation: do a window shopping, watch a movie, do sport/exercise etc.
- ❑ Others (please specify) …

9. Please rate the following attributes for the current shopping store:

Attribute	**Store perceptions**		
A range of products	❑ speciality	❑ limited	❑ large
A retailer reputation	❑ local reputation	❑ national reputation	❑ international reputation
Price	❑ lower than average	❑ average	❑ higher than average
Travel time	❑ 5-15 mins	❑ 16-30 mins	❑ 30-60 mins
Product quality / freshness	❑ low	❑ medium	❑ high
Store appearance / atmosphere	❑ unattractive	❑ average	❑ attractive
Customer service levels / friendliness of staff	❑ low	❑ medium	❑ high
Ease of access / parking	❑ easy	❑ medium	❑ difficult

C. Stated choice experiment:

Please choose a store in the following scenarios (4 scenarios):

Scenario 1				
Attribute	**Current store**	**Fresh market**	**Modern large store**	**New community store**
A range of products	large	speciality	large	large
A retailer reputation	local reputation	local reputation	local reputation	local reputation
Price	average	20% higher	20% lower	average
Travel time	5-15 mins	16-30 mins	16-30 mins	5-15 mins
Product quality / freshness	high	low	low	low
Store appearance / atmosphere	average	unattractive	unattractive	unattractive
Customer service levels / friendliness of staff	high	low	low	high
Ease of access / parking	difficult	difficult	difficult	easy
I would choose…	❑	❑	❑	❑
If I no longer shop at the current store, I would choose…		❑	❑	❑

And then the rest of the scenarios are presented until the 4th scenario.

D. Demographic information:

10. How many members are in your household? …
11. How many children (under age 5) are in your household? …
12. How many elders (age over 60) are in your household? …
13. In which village/district do you live? …
14. In which of the following categories does your house fall?

- ❑ Urban area
- ❑ Suburban area
- ❑ Rural area

15. Are there public transport services to your home?

- ❑ Yes
- ❑ No

16. What is your gender? …

- ❑ Male
- ❑ Female

17. What year were you born in? …
18. Do you own a car?

- ❑ Yes
- ❑ No

19. In which of the following categories does your highest educational level fall?

- ❑ Primary school
- ❑ Secondary school
- ❑ High school
- ❑ Vocational qualification
- ❑ Undergraduate
- ❑ Postgraduate
- ❑ Others …

20. In which of the following categories does household income fall?

- ❑ Less than 5,000 Baht
- ❑ 5,000 – 9,999 Baht
- ❑ 10,000 – 19,999 Baht
- ❑ 20,000 – 29,999 Baht
- ❑ 30,000 – 39,999 Baht
- ❑ 40,000 – 49,999 Baht
- ❑ Over 50,000 Baht

Appendix D List of papers presented at conferences

Meeyai, S. (2016). *Store patronage models for a grocery market in a regional city in Thailand: frequency of visits and amount of spending*. Paper presented at the 4th International Conference on Contemporary Marketing Issues (ICCMI 2016), Heraklion, Greece.

Meeyai, S. (2015). *Modeling Store Patronage: A Systematic Review*. Paper presented at the 3rd International Conference on Marketing and Business Development (MBD 2015), Bucharest, Romania.