

The Impact of Shopping Centre Attributes on the Destination Preferences of Trip Makers in Brisbane

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Abstract, Shopping centres in Australia are playing an increasingly substantial role in providing customers with their daily and weekly requirements. This importance has increased as the advantages of purchasing retail goods in shopping centres has become more apparent to a population whose access opportunities are determined increasingly by private car use. The way in which many of these retail-oriented destinations have been located in Brisbane is explained by beneficial trade areas as well as customer preferences. A number of studies have identified that distance in addition to other destination attributes including type of retail outlet (a regional shopping centre from a local centre), retail employment and retail floor area of the centre are major factors which affect shoppers' preferences over destination choice.

This study uses discrete choice modelling to investigate the importance of destination-specific, trip-specific and individual-specific characteristics of 1,676 retail trips to 194 different shopping centre destinations reported in the Brisbane Statistical Division. Two logit choice models have been developed that use 10 variables to investigate retail destination choice for various trip types including 'grocery and food', 'clothes', 'household goods' and 'personal goods'.

The result provides a better understanding of the factors which influence Brisbane shoppers' destination choices. The results can help inform planners and decision makers to design a more sustainable retail environment.

1. Introduction

Retail trip destinations of travellers and the factors that drive customers' preferences for travelling to these destinations has long been a focus of attention for shopping centre owners. However, the last six to seven decades of substantial growth in car ownership together with the introduction of new types of large car-based shopping centres in many big cities, necessitates that planners have to set more detailed policies about how these destinations should be distributed within the city.

Australian shopping centres are generating about 41% of retail sales while comprising only 28% of the retail space (Property Council of Australia, 2007). After the huge increase in car ownership from the 1950s onwards, Australian cities, experienced a reformation from a centralised retail model accessible for the majority by walking to a car-based shopping centre model (Warner, 2013). This trend started with the Chermside shopping centre in Brisbane in 1957 and has increased to 1,338 shopping centres of different scale, from regional down to neighbourhood, today. There are 1.75 billion shoppers visiting shopping centres each year across Australia, which means that the average Australian visits a shopping centre twice a week (Property Council of Australia, 2007).

Brisbane has experienced rapid growth due to the availability of both private cars and land for growth. This growth led to low density housing areas that were unable to support small high street and corner shops. Instead, this combination of housing development, transport mode, transport infrastructure and Brisbane's climate succeeded in generating a demand for big enclosed shopping centres based on the private-cars (Baker and Wood, 2010). By the appearance of the shopping centres in Brisbane, Christaller's Central Place theory was applied to find the location of shopping centres and the method was accepted in its first town plan in 1978 and was still used in the assessment of the proposals in 1980s (Department of Business). This method was reliable for assessing the suburban proposals before the wide expansion of the large supermarkets and the planning regulations were also supportive for these developments giving the owners and developers the right to apply for a new centre anywhere based on their assessment of the maximum profitability of the new centres.

During the last decade with the focus on sustainability issues, the new centre policy came up and all the Australian planning and transport ministers have committed to a centre policy approach through the National Charter of Integrated Land Use and Transport Planning. The new centre policy "seeks to ensure that the bulk of goods and services are located at hubs and linked effectively by an efficient transport system which allows for the optimisation of investment decisions and better use to be made of existing infrastructures and services" (shopping Centre Council of Australia). While this plan looks more considerate in terms of the travel behaviour of customers, it wasn't still comprehensive in detail.

Looking at the history of the formation of the retail structure in Brisbane reveals that Australian travel demand management program is still very much behind in terms of understanding of the retail travel behaviour of people, their priorities for selecting the destinations and mode choice and also finding solutions and setting policies for the transition of current car based retail pattern to a more sustainable pattern.

The focus of this study is on shopping centres ranging from those found in a neighbourhood to those which are of a regional or city centre scale. The intention is to see which level of shopping centre is being selected by travellers for different types of shopping trips, and what the major drivers which determine peoples' destination choices are. It is a primary effort in this regards and many more factors in addition to more complicated versions of the applied model in this paper is needed to give us a more reliable understanding of the current pattern. The paper starts with a brief review of major approaches applied to identify retail destination choice of trip-makers, focusing on discrete choice models and applicable research methods. The methodology adopted and the datasets applied are then described. Data analysis is then explained and outputs described. The paper will eventuate with a discussion and conclusion addressing the limitations and avenues for future research.

2. Literature review

Making a shopping destination decision is very complicated. A range of different factors will likely influence destination and mode choice decisions. Various qualitative and quantitative studies have explored the motivation for retail trip choice based on attributes of the destination, attributes of the trip, or of destination and trip attributes in combination (Keefer 1966, Robinson and Vickerman 1974, Lord 1988, Ploeger and Baanders 1995, Marshall and McLellan 1998). Initially the focus of these studies was simple empirical observation of the trade area of the centres, while later more complicated approaches considered the attractiveness of the destination using approaches such as Reilly's Retail Gravitation Law (1931) and that of Huff (1963).

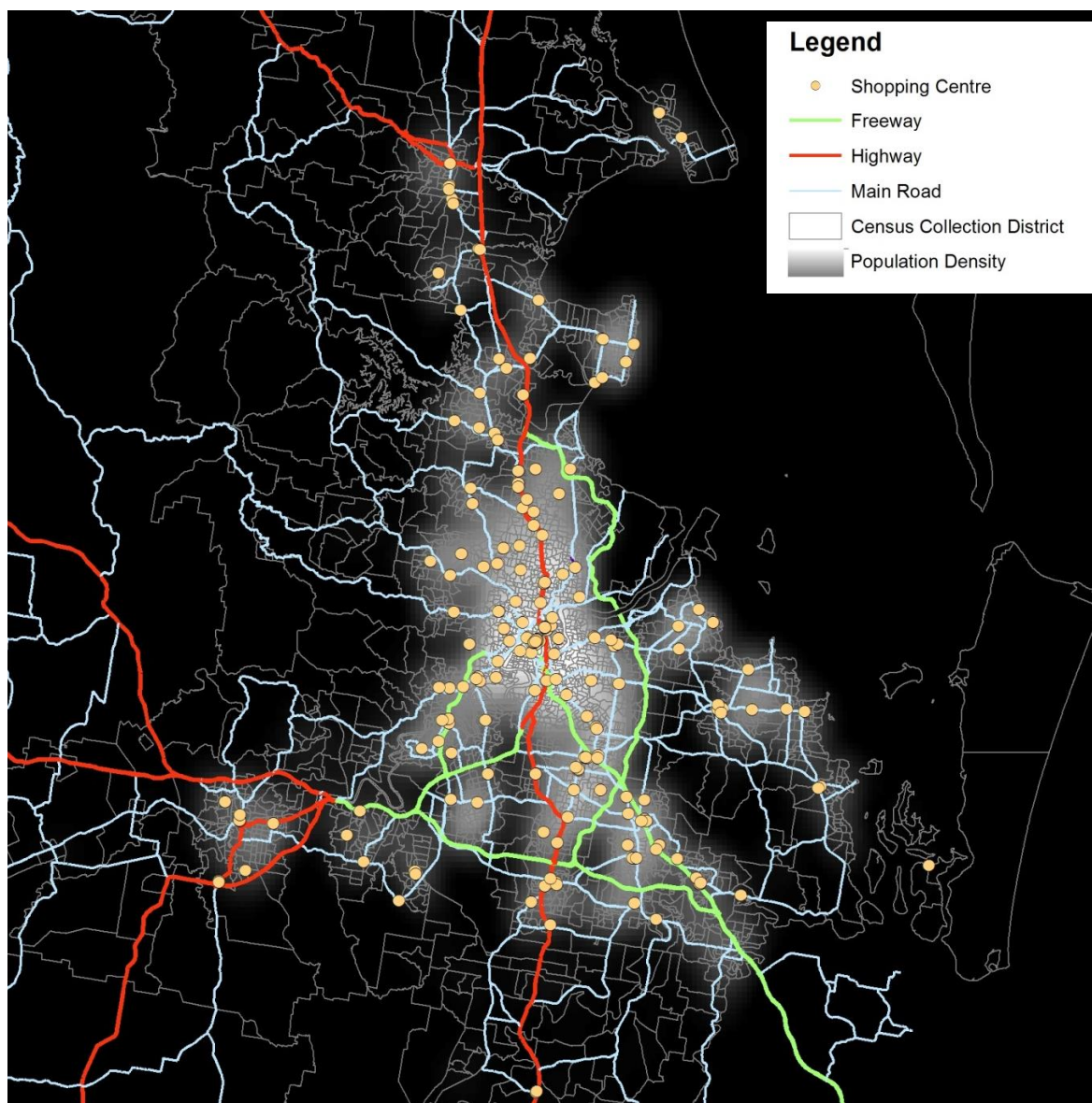


Figure 1: location of the shopping centres in the Brisbane Statistical Division BSD

Since the 1970s discrete choice analysis based on disaggregated datasets found its way into the study of retail choice and still makes its way in this field. These attraction models aimed to predict the probability of individuals choosing one alternative among various discrete alternatives based on the utility that they derived from their visit. As Hensher et al. argue, individuals make decisions consciously or sub-consciously by comparing alternatives and then select a particular choice outcome. This approach, based on random utility maximization (RUM), assumes that decision makers are utility maximisers so they select the alternative that delivers them the highest utility. The randomness arises because the analyst cannot observe all the influences which individuals take into account when maximizing their utility. This is a challenge for the analyst who wants to determine how people make their choices because many factors that affect an individual's decision are not easily observable (Hensher et al., 2005).

In the planning context, discrete choice models have been used to study decision makers' spatial preferences in a number of different settings such as the choice of residential location (Habib and Kockelman, 2008) or the choice of the recreational destination (Termansen et al., 2004). In terms of retail trips, different factors have been considered to influence the level of utility that a customer can achieve from their trip. Factors such as trip distance, retail floor space, retail employment and zonal destination population have been considered as influential factors (Adler and Ben-Akiva, 1976), (Recker and Kostyniuk, 1978), (Gautschi, 1981, Kitamura and Kermanshah, 1984), (Ghosh, 1984),

(Bernard, 1987), (Innes et al., 1990), (Limanond et al., 2005), (Carrasco, 2008). Various types of logit models have been applied in these studies including the simple MNL model, Nested Logit model, Mixed Logit models, etc. to show the important factors which influence retail trip makers' decisions. Sivakumar and Bhat (2007) developed a comprehensive review of the conceptual and econometric framework for non-work activity location choice in which variables considered in shopping destination choice models were categorized as zonal size attributes, zonal non-size attributes (e.g. population density, geographic dummy indicators), zonal impedance measures, demographic variables (generally interacted with other variables), attributes of choice occasion (e.g. time of the day, day of the week, accompanying person) and feedback effects (variables that account for past experience) (Bekhor and Prashker, 2008).

2.1. Destination choice

A major problem with discrete choice models is defining the available choice-set from which trip makers choose their trip-destinations. Swait (2001) suggests that the actual number of alternatives available to a trip maker is not known to the analyst, since the analyst is only aware of the actual decision made by the traveller. Therefore the analyst has to come up with some way of defining an available choice set which includes meaningful alternatives to the destination which was actually chosen (Swait, 2001, Yang et al., 2009). In many activity- and travel-related dimensions, regarding the spatial context of the destination, the number of alternatives in the available choice-set will be very large. For example, for residential choice situations or shopping trip destinations, a decision maker can potentially have up to a few hundred choice alternatives to choose from (Nerella and Bhat, 2004), (Bernard, 1987). In 1985, Ben_Akiva and Lerman developed a practical approach to manage large choice sets called "Simple random sample of alternatives". Based on this method, a simple random sample of alternatives is drawn from all the available alternatives excluding the chosen one, and then the chosen alternative is added into the constructed sample choice set (Akiva and Lerman, 1985). In terms of the number of alternatives, it is always advisable to consider sampled sets of choice alternatives that are not too small (Nerella and Bhat, 2004). Yang et al. (2009) claimed that 50 is a good number for the size of the destination choice-set for shopping trips in an MNL model (Yang et al., 2009), while Termansen et al. (2003) showed that in their recreation choice application: "as choice set increases, the variation in estimated parameters between different choice sets decreases" (Termansen et al., 2004).

3. Methodology

Discrete choice analysis has been applied using different forms of logit models to study and predict the probability of individuals choosing a particular alternative among various discrete alternatives based on the utility that they derive from their choice decision. The multinomial logit model (MNL) is the most widely used discrete choice model when more than two choice alternatives are available. An important property of the MNL is its assumption of independence from irrelevant alternatives (IIA), which means that the likelihood of selecting one alternative over the other is independent of the presence of any other alternative(s) in the choice set. This IIA property renders MNL models inappropriate for some choice applications. In practice, however, a simple MNL model is almost always developed to provide a 'starting point' description of choice behaviour, from which more sophisticated models which relax the IID assumption can be developed such as the mixed logit or Latent class models while they would also give us more flexibility and precision for considering different influential variables in a more meaningful and closer to realistic way. This study presents results from an initial MNL model of destination choice by retail trip makers in Brisbane. These results will inform development of more flexible models and also provide an initial indication of which destination-specific, trip-specific and individual-specific attributes appear to influence retail destination choice among Brisbane shoppers.

In an RUM framework, Equation [1] represents the utility of chosen alternative i in the choice set C_n of decision-maker n (U_{ni}).

$$[1] \quad U_{ni} = V_{ni} + \epsilon_{ni}$$

This utility consists of an observed systematic component (V_{ni}) and a randomly distributed unobserved component (ϵ_{ni}) capturing the uncertainty.

Systematic utility V_{ni} is expressed as a function of X_{ni} attributes of alternative i and decision-maker n and corresponding estimated coefficients, β_{ni} . The general form of systematic utility is:

$$[2] \quad V_{ni} = \sum \beta_{ni} X_{ni}$$

It is assumed that the alternative with highest utility is chosen. The probability P_{ni} of decision maker n choosing alternative i from choice set C_n is given as:

$$[3] \quad P_{ni} = \text{Prob}(V_{ni} + \epsilon_{ni} > V_{nj} + \epsilon_{nj}) \text{ where } j \neq i \text{ and } i, j \in C_n$$

$$P_{ni} = \text{Prob}(\epsilon_{nj} - \epsilon_{ni} > V_{ni} - V_{nj})$$

The logit model is obtained by assuming that error components $(\epsilon_{nj} - \epsilon_{ni})$, are independently and identically Gumbel distributed across alternatives, which means there is no covariance between errors for alternatives i and j , i.e. $\text{COV} \epsilon_{nj} - \epsilon_{ni} = 0$ and that the error structure is identical for decision maker n across both alternatives i and j . The Logit choice model for two alternatives is as follows:

$$[4] \quad P_{n1} = \exp(V_{n1}) / \exp(V_{n1}) + \exp(V_{n2})$$

$$P_{n2} = 1 - P_{n1} = \exp(V_{n2}) / \exp(V_{n1}) + \exp(V_{n2})$$

With more than two alternatives, the model expands to the Multinomial Logit (MNL) model, with choice probability for alternative i and decision maker n given by (Train, 2003, Koppelman and Bhat, 2006):

$$[4] \quad P_{ni} = \exp(V_{ni}) / \sum_{j=1, \dots, i, \dots, J} \exp(V_{nj})$$

Factors such as the day of the week or the characteristics of individual n which are similar for all the available alternatives for one trip decision can be incorporated by interacting dummy variables for their categories D_n^k with a destination-specific or trip-specific attribute Z_{ni} as:

$$[5] \quad V_{ni} = \sum \beta_{ni} X_{ni} + \sum_{k=1}^{k=K-1} D_n^k Z_{ni}$$

An unlabelled dataset has been used for this; therefore we do not separately identify the 100 randomly selected alternatives in each choice set. Therefore all the parameters associated with the various attributes of destinations are considered as being generic and no constant (ϵ_{nj}) is included in the model.

3.1. Data preparation

This study used a Revealed Preferences (RP) dataset drawn from Household Travel Survey data which reports actual trips taken by travellers in South East Queensland. Data preparation requires that existing information about the retail trips' attributes, retail destinations' characteristics which are known to trip-makers and the socio-demographic features of the travellers themselves are combined to form the set of attributes which the analyst considers might be influencing destination choice. Three data sources have been used in combination to derive these data:

1-South East Queensland Household Travel Survey data (SEQ-HTS): The 7-day 2009 SEQ-HTS provides records of shopping trips. We considered only trips for which the stated purpose of the trip was to buy something and for which the chosen destination provided shopping opportunities (trips solely for the petrol purchases were excluded). A total of 3,354 shopping trips for individuals over 5 years old were identified within the Brisbane Statistical Division (BSD).

2-Brisbane Strategic Transport/Land use Model (BSTM): This is a strategic transport and land use model, provided by Department of Transport and Main Roads and calibrated with household travel survey data. It includes zonal data for 1,493 zones covering the BSD, detailing the number of retail jobs in the each destination zone, plus the walking, car and public transport distance/time/cost for traveling between zones.

3- Directory of Shopping Centres/Queensland 2011 (SCD): This dataset produced by the Property Council of Australia provides the spatial characteristics of shopping destinations in Queensland. The information for 194 shopping centres inside the BSD have been applied and linked to BSTM zones to construct the available destination options for retail trip makers. The SCD follows the classification of shopping centres employed in all of the Property Council's shopping centre directories; in descending order of size these are city centre, super-regional, major regional, regional, sub-regional, neighbourhood shopping centres, with separate categories for themed and bulky goods shopping destinations. For this study based on the similarities between the centres' characteristics and the total number of centres in the study area, categories have been merged to form only five groups comprising: city centre, regional, sub-regional, neighbourhood and bulky goods.

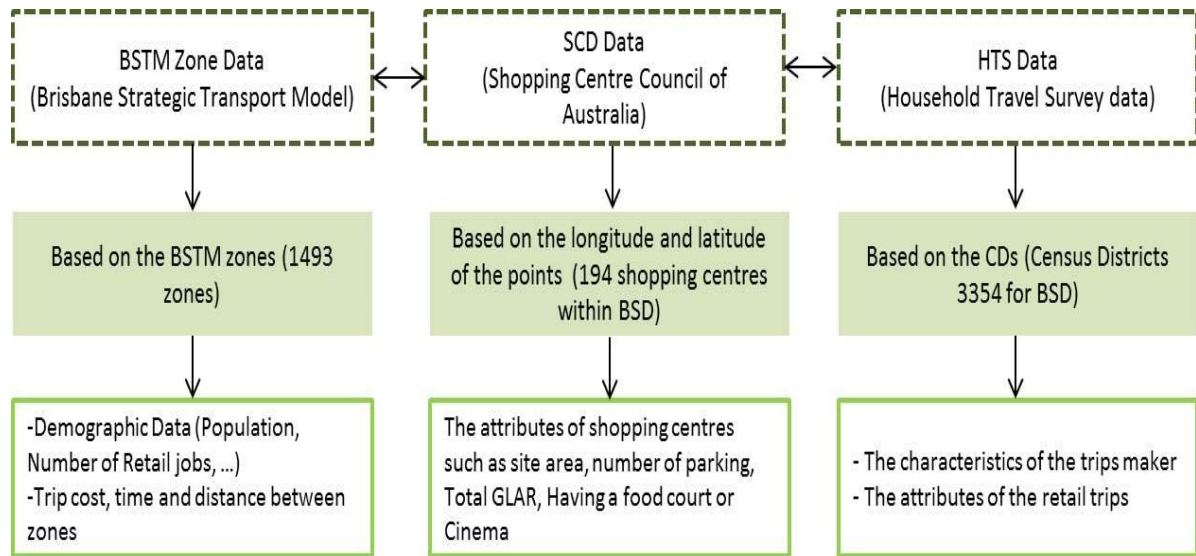


Figure 2: Available datasets used in the preparation of the choice-set and the dataset describing attributes of choice alternatives, trips and trip-maker socio-demographics.

These three datasets were arranged and linked to form a composite dataset for application in the destination choice model. ArcGIS software was applied to overlay the different zonal systems used from the HTS, BSTM model and the geocoded location of the shopping destinations. The BSTM zonal system provided the basic origin and destination divisions for the trip-makers decisions. The origin and destination zones of the trips (based on Census Collection Districts numbers (CCDs)) were then compared and matched with the zone-numbers in BSTM model. The 194 geocoded shopping centres available in the SCD were then overlaid and matched with the BSTM zones and the zones' attributes were linked to the spatial characteristics of each shopping centre.

The resulting composite dataset comprised 3,354 retail trips, each associated with trip attributes such as trip origin and destination zones, day of the week for the trip, socio-demographic characteristics of the trip makers, (age, gender, having a driving licence etc. all from the HTS), in addition to available destination zone and trip attributes from the BSTM zones including the number of retail jobs, the distance, cost and time of trips between the zones' centroids. Attributes of shopping centres located in the same zone such as site area, number of parking, number of major tenants, etc. are also attached to each trip (for destination zones that only include one shopping centre). For destination zones containing more than one shopping centre, random selection between the available shopping centres was used to assign destination zone characteristics (as will be explained shortly).

As discussed in previous sections, the focus of this research is only on retail trips to shopping centres, therefore only 1,676 reported trips that have ended at a destination in the BSTM zone which contained at least one shopping centre were retained in the dataset. As discussed in the literature, preparation of the choice-set of available alternatives is an important issue that arises in RUM-based destination choice modelling. In this study 99 randomly selected alternative destinations were assigned for each recorded trip, together with the chosen actual destination to form the available choice-set for the trip-maker. Two steps of random selection were applied in the choice-set specification process. Initially, for each trip, 99 BSTM zones were randomly selected as potential alternative trip destinations. These destinations all had to be different from the actual chosen destination, and also different from all other 98 alternatives. For each zone selected as an alternative, if only one shopping centre was located in

that zone, then the attributes of that centre were allocated to the zone, otherwise, a second random selection was undertaken between the available shopping centres within the destination zone. It was assumed that if there were shopping centres in one zone, these were the only available retail destinations for trip-makers. The final choice set thus includes one chosen trip destination, together with 99 alternatives destinations for each trip, producing a dataset with 167600 different rows (potential destinations) in total.

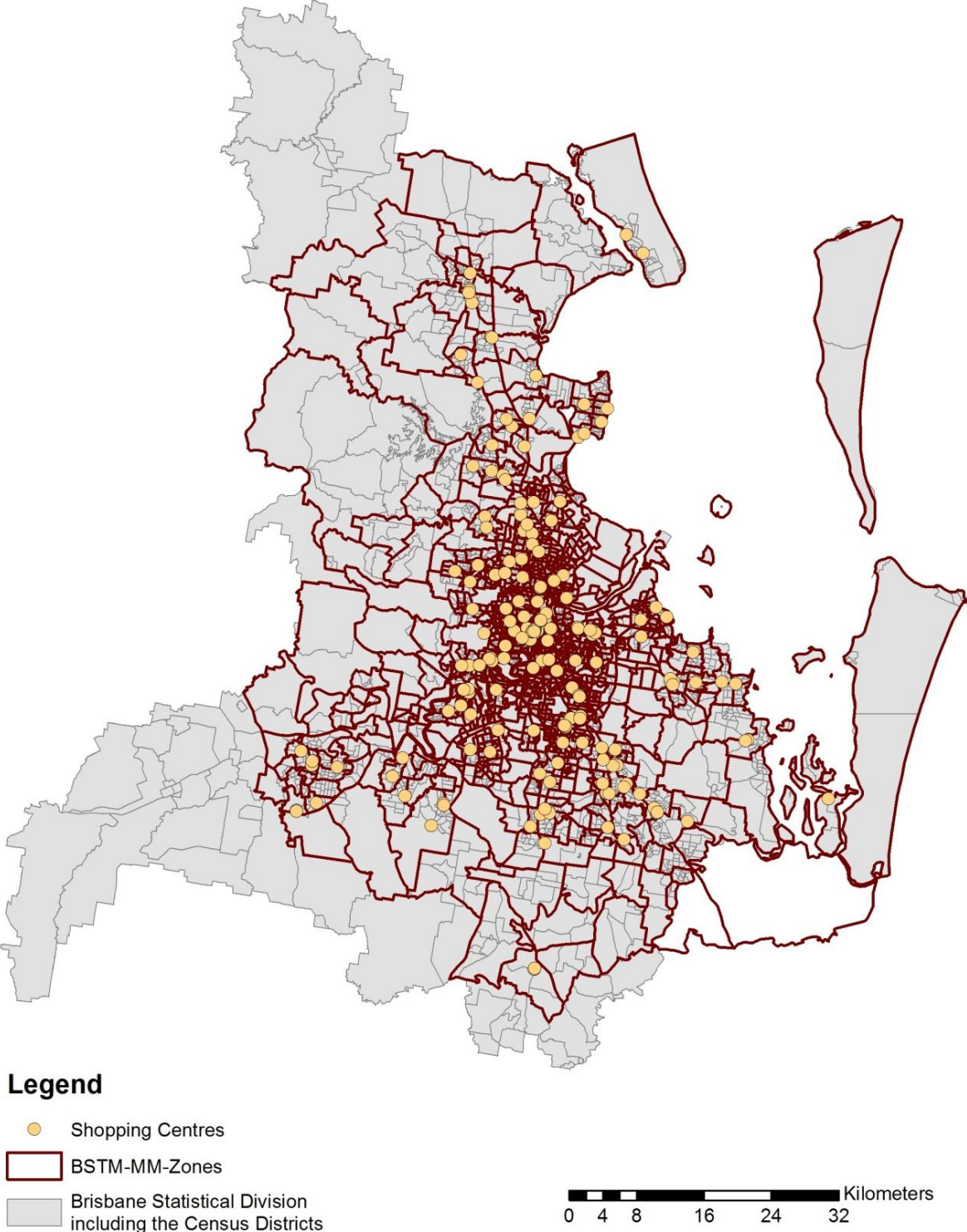


Figure 3: The zonal boundaries for the Census Collection District and the BSTM model

3.2. Variables

As has explained, the dataset provides the analyst with a number of different types of information, including destination-specific information, trip-specific information and individual-specific information. Destination-specific information includes the type of shopping centre (city centre, regional centre, sub-regional centre, neighbourhood centre or bulky goods), the site area of the centre, the number of major tenants (such as Coles, David Jones, Myer, Big W, etc.) and specialty stores plus their total lettable area, total number of parking places, the presence of a cinema and a food court in the centre and, finally, total centre Ground Lettable Area for Retail (GLAR). Trip-specific data included were trip distance, trip time and trip cost between origin and destination zones, as extracted from the BSTM model. The model also includes information about the total level of retail employment in each transport zone which can be a proxy for the number of available shopping opportunities for the customers and is considered as another attributes of the destination site. Each observed trip extracted from the HTS also included the individual-specific characteristics of the trip makers in addition to information on the trip origin and destination, trip purpose and the day of the week on which the trip was undertaken.

Not all of these potentially influential factors could be included in a destination choice model simultaneously since many of them are highly correlated. A simple initial scatter plot and R^2 correlations between pairs of independent variables showed high correlations between many of these parameters. For example, the type of destination including type of the centres is implicitly indicating the site area of the centre, the number of parking spaces and the GLAR for that centre. As the level of the centre in the retail hierarchy increases, there would be an associated increase in the level of indicated attributes, and also a higher chance that the centre also contains a food court or cinema. Furthermore, the total site area of the centre was found to be highly correlated with the number of parking spaces and the number, and retail floor area, of the major tenants or specialty stores. Based on the level of correlation between variables, two sets of variables were selected to make the two models.

The first set of variables only included the hierarchy of the destination centre (city centre, regional centre, sub-regional centre, neighbourhood centre or bulky good centre) in addition to the distance required to travel between the origin and destination zones as potential factors influencing the attractiveness of a destination to a trip maker.

$$[6] \quad V_{ni} = \sum P_{Distance} * Distance + P_{City-centre} * City - centre + P_{Regionalcentre} * Regionalcentre \\ + P_{Sub-regionalcentre} * Sub - regionalcentre + P_{neighbourhood\ centre} \\ * neighbourhoodcentre(or)P_{bulky-goods} * bulky - goods$$

The second model replaced the shopping centre size categories with alternative variables describing the number of major tenants in the centre and the presence of a food court. The second model variables can be replaced by other factors such as total number of parking, site area of the centre, etc. but they cannot be included in one model because of the high level of correlation between them. This model also includes the distance between origin and destination and the number of retail jobs in the destination zone as potential drivers of destination choice. The only interacting socio-demographic variables considered in our model were possession of a driving licence and the actual day (week or weekend) of the trip. Dummy variables were created for the categorical variables including trip day of week and driving licence possession, and these dummy variables were interacted with trip distance).

$$[7] \quad V_{ni} = \sum P_{Distance} * Distance + P_{Weekdays-distance} * weekdays - distance + P_{carlicence-distance} \\ * carlicence - istance + P_{retailjobs-number} * retailjobs - number \\ + P_{major-tenants-GLAR} * major_tenants - GLAR + P_{foodcourt-y} * foodcourt_y$$

4. Data Analysis

The Nlogit software package was used to estimate the MNL models as specified in [6] & [7] and Table 1. Other socio-demographic attributes will be introduced in later studies. Among potential trip-specific attributes, only trip distance was considered. Parameter estimates are produced by maximum likelihood methods, knowing the observed destinations and given randomly synthesised choice sets for each trip. Parameter estimates report the influence which the two sets of explanatory variables defined in Table 1 exert over destination choice for various categories of shopping trips based on the type of items purchased: 'groceries and foods', 'clothes', 'household goods' and 'personal goods'. Model results and parameter estimates are shown in Tables 2, 3, 4, 5 and discussed for each type of

shopping trip in the following subsections. Each model has been compare with the base model in each case to see how well the model works.

Table 1: Explanatory variables considered in the MNL models

Variables	
Model 1	Model 2
Distance (Km) ¹	Day of the week (weekdays) * Distance ⁷
City Centre ²	Having a driving licence * Distance ⁸
Regional Centre ³	Distance (Km) ¹
Sub-Regional Centre ⁴	Retail jobs ⁹
Neighbourhood Centre ⁵	Major tenants GLAR (m ²) ¹⁰
Bulky Goods ⁶	Having a Food court ¹¹

¹DIST, ²C_CT, ³REG, ⁴SUB-REG, ⁵NEIGH, ⁶WD-DIST, ⁷CARLIC, ⁸RETAIL, ⁹MAJ-GLAR, ¹⁰FOOD-C-Y

Based on the expenditure code allocated to shopping trip regarding the type of goods which were bought, our shopping trips have been categorized in 5 major categories. 'Grocery and food' trips includes trips with the purpose of buying bread, milk, fruit and vegetables, meat and fish and food (the important point here is that trips with the purpose of eating or drinking were categorized as 'recreational trips' rather than shopping trips in the HTS), 'clothes shopping' includes trips for purchasing clothes and shoes, 'Household goods' trips include trips to purchase tools and hardware, household furnishings, household appliances, recreational equipment, audio-visuals, etc. 'Personal goods' trips comprised trips for books and newspapers, pharmaceutical products, personal grooming products, tobacco, etc.

Grocery and Food trips

In terms of the grocery trips, almost all variables have appeared to be significantly influential over trip destination decisions, except for the Neigh and WD_DIST parameters (Table 2). The results showed that, for the trips to buy groceries and food, trip distance exerts a significant negative impact on destination choice in both models. Looking at the destination retail hierarchy for these types of trip, all else being equal, regional and sub-regional centres are considerably preferred (against a baseline of bulky goods centres), no positive preference is observed for neighbourhood centres, and there is an aversion to shopping for grocery and food purchases in the city centre. This can be explained by the fact that many neighbourhood centres do not have a major tenant such as Coles, Woolworth or ALDI working as an anchor point for travellers' attraction, as would be the case for the larger types of shopping centres. Grocery shopping in neighbourhood centres will typically be confined to a convenience store where prices will be substantially higher than in the big supermarkets. The aversion to city centre shopping for food and groceries could perhaps be driven by a scarcity of supermarkets in these locations, together with elevated parking charges.

While the negative influence of distance explains peoples' innate preference for closer destinations for the food and grocery shopping, results from Model 2 (Table 2) also show – as expected – that having a car licence significantly decreases trip-makers' distance aversion. Therefore when a bigger supermarket with cheaper prices is not available in the neighbourhood, licence holders will be more willing than non-licence holders travel further for their food and groceries. The results show that all else being equal food and grocery shopping trips would preferably take place during weekdays rather than at the weekend, although this effect is not statistically significant. Number of retail jobs at the destination zone is significantly important on the trip-makers' preferences. The model shows that as the total GLAR of major tenants such as Woolworth, Coles and ALDI increases, this significantly increase where people will travel to shop. Ceteris paribus, having a food-court in the centre is having a significant inverse impact on the customers' preferences. Having a food-court can be delegate proxy for a bigger shopping centre. A bigger shopping centre can bring problems such as having more traffic around and a reduced chance of finding a parking space, therefore customers might prefer to go to smaller shopping centres with easier access to do their daily or weekly grocery shopping.

Table2: Groceries-Foods

Model 1		Model 2	
CHOSEN	Coefficient	CHOSEN	Coefficient
P_DIST	- .323***	P_WD_DIST	.031
P_C_CT	-1.014***	P_CARLIC	.094**
P_REG	.850***	P_DIST	-.436***
P_SUP_REG	1.026***	P_RETAIL	.001***
P_NEIGH	.244	P_MAJ_GLAR	.191e-04***
*show how significant the parameter is		P FOOD C_Y	-.294***
'Bulky goods' is the dummy baseline for type of centre here			
Log likelihood function: -1913.594		Log likelihood function: -1942.017	
Base model: -4121.82251			

Clothes trips

For trips to buy clothes, Model 1 shows that all being equal, regional centres are strongly preferred (Table 3) (again relative to a baseline of bulky goods centres). Perhaps surprisingly, the attractiveness of city centre destinations is not significantly higher than that of bulky goods centres for clothes shopping, and sub-regional or neighbourhood centres actually appeared to be significantly less preferred. These preferences might be related to the type and variety of retail destinations available at the different sizes of centres.

A city centre location might not be a significant reason to attract customers because of the similarity between the provided options and retail brands and the uniform offers between these centres with the other regional centres and Direct Factory Outlets (DFOs). Therefore, people are discouraged from travelling to the city centre while they could easily access similar clothes shopping options at closer regional shopping centres with cheaper parking areas.

Table3: Clothes

Model 1		Model 2	
CHOSEN	Coefficient	CHOSEN	Coefficient
P_DIST	-.210***	P_WD_DIS	-.121***
P_C_CT	.007	P_CARLIC	-.089**
P_REG	.776***	P_DIST	-.091***
P_SUP_REG	-1.424***	P_RETAIL	.001***
P_NEIGH	-1.596***	P_MAJ_GLAR	.380e-04***
*show how significant the parameter is		P FOOD C_Y	.660**
'Bulky goods' is the dummy baseline for type of centre here			
Log likelihood function: -335.541		Log likelihood function: -310.925	
Base model: -760.467			

Model 2 reveals that the number of retail jobs at the destination and major tenants' GLAR have a significant positive impact on the attractiveness of the destination. As the number of retail jobs and the area of major tenants such as David Jones, Big W, etc. increases, customers show an increased tendency to travel to these centres for their clothes shopping. Ceteris paribus, peoples' aversion to travel farther distances on weekdays is evident in comparison to weekends, for clothes shopping trips. Trip distance has, once again, a negative impact on a destination's attractiveness, but now a food court significantly increases the attractiveness of a clothes shopping destination. This can perhaps be explained by the longer hours travellers spend in shopping centres when buying clothes. The apparent increased distance aversion of car licence holders, compared with non-licence holders, in Model 2 is difficult to explain. This can be explained maybe by the availability of public transport for some of the bigger regional centres that gives people a better option to travel to these destinations if they don't have a car license although it might be even farther in terms of distance.

Household-Goods Shopping

Model 1 produces significant positive coefficients for regional, sub-regional and bulky goods destinations [compared with neighbourhood centres as the baseline centre type in this model], indicating that all of these centre types are preferred over neighbourhood centres for household goods shopping. Overall, there are strong similarities with the clothes shopping results; distance aversion is again present, as is a preference for weekend shopping to farther destinations and a preference for centres more retail jobs and larger GLAR for major. This similarity might arise because purchasing

furniture, curtains and bedding, for example, entails similar subjective choices to purchasing clothes: personal preferences regarding colour, fit and style are important in both cases. On the other hand, while the presence of a food court significantly increased a destination's attractiveness for clothes shopping, it significantly decreases a destination's attractiveness for household goods shopping.

Table4: Household Goods

Model 1		Model 2	
CHOSEN	Coefficient	CHOSEN	Coefficient
P_DIST	-.227***	P_WD_DIS	-.058**
P_C_CT	.518*	P_CARLIC	.016
P_REG	.754***	P_DIST	-.210***
P_SUP_REG	1.154***	P_RETAIL	.001***
P_BULKY_G	1.530***	P_MAJ_GLAR	.171e-04***
*show how significant the parameter is		P_FOOD_C_Y	-.848***
'Neighbourhood centre' is the dummy baseline for type of centre here			
Log likelihood function: -609.850		Log likelihood function: -589.763	
Base model: -1006.331			

Personal-Goods Shopping

Results from Model 1 reveal that none of the alternative shopping centre types are significantly preferred to bulky goods centres for personal goods shopping, leaving distance aversion as the only significant influence over destination choice.

Model 2 is somewhat more informative, indicating that destinations for personal goods shopping are considered more attractive if they contain a higher number of retail jobs and higher GLAR for major tenants. Distance aversion is again evident, but shows no significant variation between weekdays and weekends. As was the case for clothes shopping, distance aversion inexplicably increases for car licence holders compared with non-licence holders.

Table5: Personal Goods

Model 1		Model 2	
CHOSEN	Coefficient	CHOSEN	Coefficient
P_DIST	-.269***	P_WD_DIS	.031
P_C_CT	.388	P_CARLIC	-.111***
P_REG	.398	P_DIST	-.194***
P_SUP_REG	.204	P_RETAIL	.001**
P_NEIGH	.332	P_MAJ_GLAR	.151e-04**
*show how significant the parameter is		P_FOOD_C_Y	-.277
'Bulky goods' is the dummy baseline for type of centre here			
Log likelihood function: -389.615		Log likelihood function: -382.599	
Base model:- 856.837			

5. Discussion

The results confirm that while trip distance is, as recognised in the literature, a highly influential factor over shopping destination choice, other attributes of the destination and – in some instances – the trip-maker also have a role to play. The type of shopping centre, the GLAR of major tenants, the number of retail jobs and the presence of a food court were all found to significantly affect shoppers' destination preferences, depending on the type of products being purchased. These results suggest that shopping centres in Brisbane's CBD do not appear to be significantly preferred destinations for any of the shopping categories considered here, and are actively dis-preferred destinations for grocery shopping. Customers apparently do not find any reason to travel across the city to buy their products since major shopping malls all offer the same branded chain stores and franchises. Therefore, regional and sub-regional centres which contain large numbers of major tenants, supermarkets and specialty stores are the desired destinations for most shopping trips including 'grocery and food' and 'household goods'. For clothes shopping, sub-regional centres are distinctly dis-preferred, presumably because the variety and price of clothing on offer cannot compete with the larger regional centres. Neighbourhood centres, which might have been expected to be a preferred trip destination for grocery shopping, were in fact not found to be a preferred grocery destination. Again, this could be because

they do not provide the required level of variety and/or cannot satisfy price requirements for their customers.

Day of the week is not an important moderator of distance aversion in the trip preferences of personal goods shoppers and grocery shoppers, but is an important moderator of distance aversion for purchasers of clothes and household goods. Clothes and household goods shoppers are less averse to travelling longer distances to make their purchases at the weekends than they are on weekdays..

As the number of retail jobs and the GLAR for major tenants increase, the destination becomes more attractive to customers for any trip type. For the grocery and food trips the existence of a food court shows a large negative impact on the trip makers' decision while in terms of the clothes it indicates a large positive influence. The important factor that has to be considered here is that although food court can play an important part in trips destination choice of travellers since people mostly like to have eating choices while they are spending a few hours in a shopping centre. But it can also be related to other factors such as the number of shops in the centre, the floor area, etc because as the centre gets bigger there is more possibility for the centre to have a food-court.

While these initial results seems relevant for informing planners' understanding of retail destination choice, there is still a need to explore the role of other factors and to investigate whether Brisbane's shoppers display heterogeneous preferences for the attributes of shopping centres and shopping trips when making their destination choices. These issues can be explored by more sophisticated discrete choice models to better inform our understanding on those factors which affect the attractiveness of retail destinations.

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