

# **Brentford Square**

## **Data Analysis**

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## **Executive Summary**

Shopping centres can be broadly segregated into two segments. Regional or shopping complexes and local or community centres. Shopping complexes are generally bigger and consist of a broader range of shops than community centres. Generally regional centres are individually owned while shopping complexes are collectively owned and managed as one unit.

Community shopping centres are still relevant to the population and serve a need for a close and convenient place to obtain everyday requisites. They are characterized by their patrons' perceptions of them as a convenient village like place where they can obtain friendly service from shop owners who really care.

Brentford Square is a community shopping centre located in the eastern suburbs of Melbourne. It has been established since the late 1950's and consists of a large supermarket two major banks liquor and food outlets and 30 specialty shops. Patronage of Brentford Square has declined over the last decade and the traders association wishes to address this situation.

Brentford Square has a high awareness profile in its catchment area. The catchment of Brentford Square could be termed as mature families and singles. There are certain segments of the demographic the Brentford Square needs to specifically target in a effort to increase patronage. Specifically these are women in the 35 – 44 year age group and males in the 64+ age group. In addition Brentford Square must position itself as a convenient village like centre that provides good service from friendly staff where you can obtain your everyday needs. Emphasis should be placed on the ease of parking and the village like atmosphere This will need to be addressed by the centres marketing communication program.

The traders association could increase the satisfaction of the patrons shopping experience by addressing the hours of operation of the supermarket by extending it at weekends and by the installation of traffic lights to aid access from Canterbury road. This should also lead to increased patronage.

## **Background**

### **Overview**

Brentford Square shopping centre is located in the eastern suburbs of Melbourne. It has been trading since the late 1950's and in 1963 the Brentford Square retailers association was established. Brentford Square is considered to be a community shopping centre and consists of a large supermarket, two major banks, liquor and food outlets and over 30 specialty shops.

Over the last decade the traders have been experiencing a slow decline in trade and numbers of customers. It is believed that a primary reason for this phenomenon is the expansion and promotion of the nearby regional shopping centres such as Forest Hills Chase, located a few kilometers to the north.

The Brentford Square Traders Association (BSTA) has commissioned this research for the purpose of providing information that can be used to prepare a marketing plan. The objective of the marketing plan is to provide a strategy (s) that once implemented, boosts patronage at the shopping centre.

The research objectives are to gather descriptive and attitudinal information about peoples' behavioral aspects that drive shopping decisions.

### **Issues Facing Brentford Square**

An important aspect of any marketing plan is to ensure that all possible issues are identified and all alternative courses of action are considered.<sup>1</sup> In reviewing issues it is wise to begin with macro issues and progress to more focused micro issues that may affect Brentford Square. These issues have been framed as statements and the purpose of the research is to determine if these statements are likely to be true or false.

1. Community shopping centres are like buggy whips, useful in their time but have now been replaced by regional centres that offer everything that a community centre does and more.
2. What is Brentford Square?
3. Brentford Square is exactly what I want from a community shopping centre and I use it regularly.
4. I occasionally visit Brentford Square but find it limiting in some way.

In addition investigation into the following issues that contribute to peoples decision-making processes is required.

- How do people decide where to shop?
- Are there patterns to shopping behavior?
- How do people perceive shopping centres and strip shopping centres?
- What barriers are there to using shopping centres?
- What features act as facilitators in the shopping experience?

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<sup>1</sup> For the purpose of this report it has not been possible to canvas all issue and decision scenarios. See limitations point 1.

## Decisions

There are a number of decisions that face Brentford Square. These decisions are contingent on the answers to the issues statements.

1. If in fact the population considers community shopping centres are like buggy whips and are relicts from another time, the association needs determine how long the community shopping centre concept is likely to last and how to manage the contraction of the market. On the other hand if this statement is not true the association needs to identify what differentiates a community from a regional shopping centre and ensure that it's target market is aware of what Brentford Square offers in this respect.
2. "What is Brentford Square?", points to an awareness problem. The association will need to review how they are currently promoting the centre and make adjustments to the marketing communication program to ensure that the target market is aware of Brentford Square and what it "stands for".
3. If in fact Brentford Square is fully catering for the target market in it's catchment area the association will need to consider how can the catchment area be made bigger. What can be changed about Brentford Square that will encourage patrons to come in from areas outside it's current catchment.
4. If Brentford Square is not maximizing patronage from it's catchment area, what reasons are contributing to this phenomenon.  
There are a vast number of possible decision alternatives once it has been established that points 1 – 3 have been resolved.  
These may include but are not limited to:
  - Are there particular segments of the market that should be the primary target for community centres?
  - Different opening hours.
  - A different mix of shops.
  - Increased parking etc.
  - Increased focus on the frequency of visit or on how much is spent during each visit.

## Method of Data Collection

Data was collected by formulating and administering two personal interview questionnaires. One questionnaire was administered within Brentford Square Shopping centre. (referred to as the in centre survey) and the other was administered within the catchment area of Brentford Square. (referred to as the catchment survey) Following is a brief description of each survey.

### In Centre Survey

The target of this survey is randomly selected shoppers at the Brentford Square Shopping centre. To ensure a balanced selection quotas were set for the number of interviews collected each day.<sup>2</sup> Questions consist of both nominal and interval structure designed to probe who, why, where, when and how attributes of shoppers at Brentford Square in relation to there attitudes about shopping, regional and local shopping centres and Brentford Square in particular.

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<sup>2</sup> See research limitations point 6.

The number of questionnaires completed totaled 68.<sup>3</sup> Data was edited coded and transcribed into the commercial statistical package of SPSS.<sup>4</sup>

### Catchment Survey

The targets for the catchment survey are shoppers in the last week drawn randomly from the Brentford Square catchment area. This random selection is obtained by first screening the respondents to ensure that they are in the target group and then selecting from the qualifying respondents by choosing the one who has the next birthday that is at home. Questions consist of both nominal and interval structure designed to probe who, why, where, when and how attitudes about shopping, regional and local shopping centres and Brentford Square in particular. A number of questions are designed to probe the awareness of Brentford Square as including such questions in the in centre questionnaire is redundant. The questionnaire suffers from similar limitations to that of the in centre survey.

### Information Required

It is necessary to gather information to answer the fundamental question about the relevance of community shopping centres. It will be necessary to poll the catchment area (assuming that a poll of shoppers in centre would be redundant) about their attitudes to community versus regional shopping centres.

An overwhelming response to either yes or no to this question would be clear-cut. If however the response were more balanced further analysis of who and why the responses were given would be required. It could be that the respondents that do not care about community shopping centres fall outside of the Brentford Square target market. This would require analysis of who and why.

Information will be required about whether the population is aware of, and how it perceives Brentford Square. Do they perceive it as a community or as a regional centre? In addition information will be required as to how Brentford Square is operating. Is it operating as a community or regional shopping centre?

Once these questions have been determined it will be necessary to collect information about what differentiates a regional from a community shopping centre?

The answers to these questions will be valuable for the Brentford Square Traders Association to ascertain whether their marketing communication is focussing on what the people perceive as important.

Further it will be necessary to understand what shopping centre attributes that they value and use to make decisions on where to shop. These attributes can be used to make decisions on what aspects of Brentford Square should be altered to attract increased patronage.

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<sup>3</sup> See research limitations point 7.

<sup>4</sup> See research limitations point 8.

## Results

To determine the relevance of community shopping centres we can look at the response to question 15 in the catchment area survey.

### Would it matter if local centres closed?

	Frequency	Percent	Cumulative Percent
Yes	174	80.2	80.2
No	43	19.8	100.0
Total	217	100.0	

It can be concluded that there is a significant proportion of the sample that consider community shopping centres important. A hypothesis was developed to test whether this result is significant and whether in fact the Brentford Square Traders Association should attempt to increase patronage to the centre. (See Statistical Appendix point 1) The degree of the yes vote precludes us from any further investigation at this stage. As the question of local shopping centres was answered in the affirmative this leads onto what are the factors that differentiate a local from a regional shopping centre. Prior to investigating these aspects it is more meaningful to try and ascertain information about the demographics of the Brentford Square catchment and the Brentford Square shopper. We can then cross-tabulate important demographic segments of the shoppers/catchment with the answers to the questions of the importance regarding shopping attitudes and behavior. These variables will be investigated in depth later in this report.

Another issue facing Brentford Square is awareness. If the surrounding population catchment is not aware of the centre then this will have an affect on patronage. Question 5 in the catchment survey specifically addresses the awareness of Brentford Square. From the responses to this question it is possible to develop a hypothesis to test. (See statistical appendix 2)

### Awareness of Brentford Square

	Frequency	Percent	Cumulative Percent
Yes	210	96.8	96.8
No	7	3.2	100.0
Total	217	100.0	

The results of this test indicate that Brentford Square does not have an awareness problem and the traders association does not have to implement actions to increase the awareness of the centre.

### Last visit to Brentford Square

We can use the answers to question 7 in the catchment area survey to determine whether Brentford Square is maximizing it's patronage in the catchment area. To do this we can create a hypothesis about frequency of patronage of Brentford Square. (See statistical appendix 3)

### Last visit to Brentford Square

	Frequency	Percent	Cumulative Percent
Over two years ago	6	2.8	2.8
One-two years ago	1	.5	3.2
6 months to one year ago	4	1.8	5.1
3-6 months ago	7	3.2	8.3
1 month - 3mths ago	14	6.5	14.7
1-4 weeks ago	166	76.5	91.2
Never visited	19	8.8	100.0
Total	217	100.0	

The hypothesis developed indicates that there is scope for the Brentford Square Traders Association to focus on developing patronage from within the catchment area as the visitation rate for a community centre is not being maximized.

### Demographics

Following are comparisons between the demographic factors found in the Brentford Square shopper survey and the catchment area survey. The purpose of these comparisons is to identify the important demographics and to highlight any differences between the survey results. Once these differences have been highlighted tests need to be undertaken to determine if the differences are significant.

From the in centre survey we can see the distribution of the shoppers is predominantly from postcodes that are located close to the geographical placement of Brentford Square.

Postcode	Frequency	Percent	Cumulative Percent
3128	1	1.5	1.5
3130	2	2.9	4.4
3131	30	44.1	48.5
3132	7	10.3	58.8
3133	24	35.3	94.1
3136	1	1.5	95.6
3145	2	2.9	98.5
3158	1	1.5	100.0
Total	68	100.0	

In addition if we look at a cross tabulation between visits to Brentford Square and distance from the centre reported from the catchment survey:

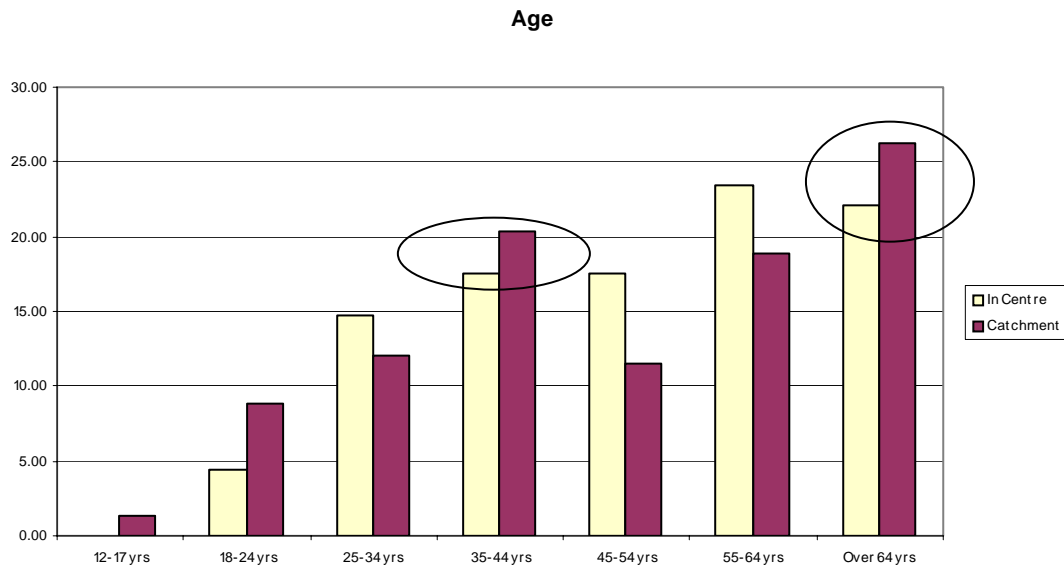
						Total
		0-.5 km	.5-1 km	1-1.5 km	1.5-2 km	
Ever visited Brentford Square	Yes	60	70	56	12	198
	No		1	3	15	19
Total		60	71	59	27	217

We find that as the distance from the centre increases the incidence of not having visited Brentford Square increases.

This can be tested using regression analysis. (See statistical appendix point 7.)



From this we can infer that Brentford Square is currently catering to the local community as opposed to people from areas remote to Brentford Square patronizing when passing by.



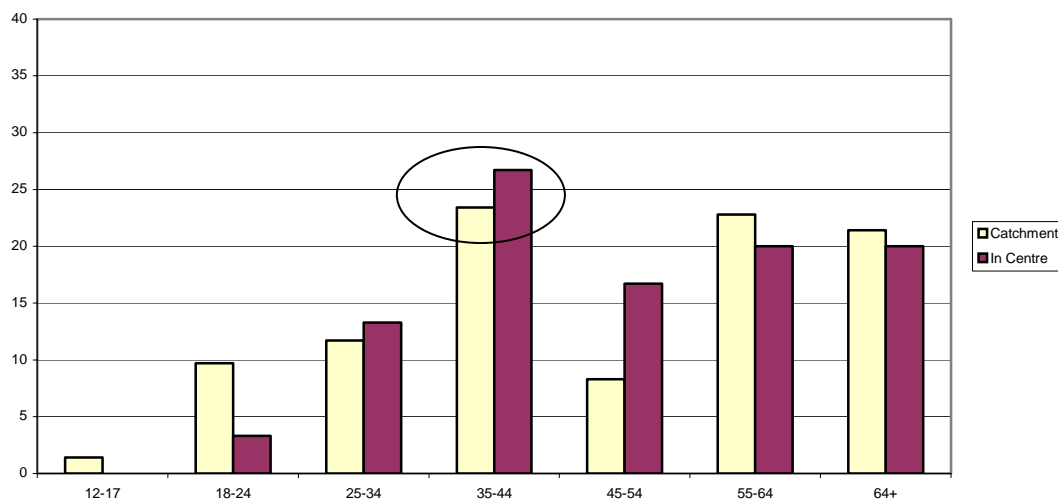
### Highlights

- 77% of the catchment population are 35 years of age or older.
- The 44 – 64 age group are over represented in the in centre survey compared to the catchment survey.
- The over 64 year old age group is under represented in the in centre survey compared to the catchment survey.

### Questions Raised

Is there potential to increase patronage from the 35-44 and 64+ age group segments?  
To investigate this question it is necessary to segment age by sex to see if there are differences between these variables.

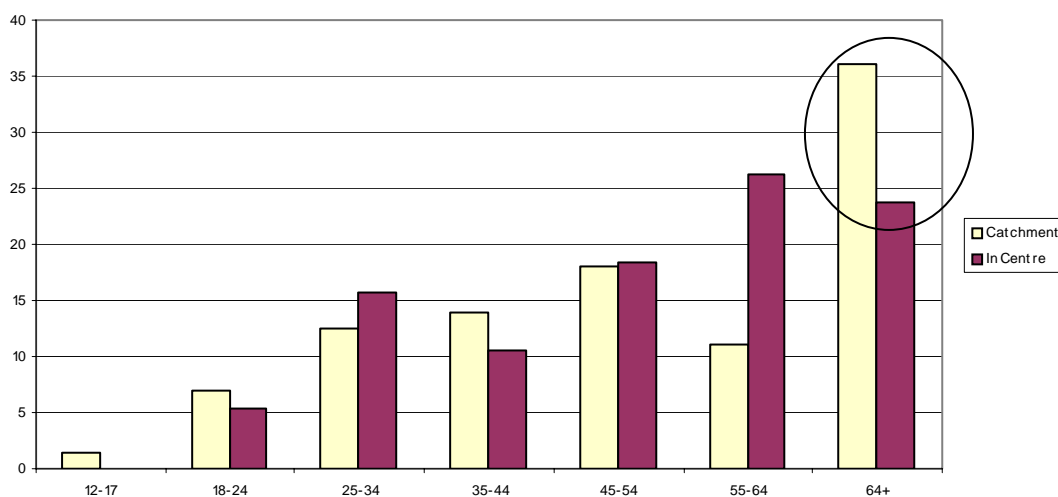
### Females by Age



### Highlights

- The largest segment of the female catchment sample is in the 35 - 44 age group.
- The 18 – 24 segment of the female catchment sample was under represented in the in centre sample.
- The 45 – 54 segment of the female catchment sample was over represented in the in centre sample.

### Males by Age



### Highlights

- The largest segment of the male catchment sample is in the 64 + age group. This segment was under represented in the in centre survey.
- The largest segment of the male in centre survey was in the 55 - 64 age group. This segment was under represented in the catchment survey.

Comparisons of age by sex statistics.

To increase the patronage of the 35-44 age demographic Brentford Square will need to attract more males in that age group as they are under represented in the catchment survey versus the in centre survey. Although the female 35 – 44 age group is a bigger overall segment they are currently over represented in the in centre survey.

Both female and males in the 64+ age group represent a significant proportion of the population in both the in centre and the catchment surveys. Both of these segments appear to be under represented in the in centre survey. However males 64+ which represent the major part of this age group are significantly under represented. To increase patronage the Brentford Square Traders Association will need to make changes that appeal to these segments.

A cross tabulation of age with question 7 of the in centre survey:

In your own words could you tell me what it is about Brentford Square Shopping Centre that really appeals to you?

Yields the two main reasons cited by the 64+ age group are:  
Small, compact and cute like a village.  
Friendly centre and service.

A cross tabulation of age with question 10 of the in centre survey:

If we could make some changes to Brentford Square shopping centre what would you suggest that we do?

Does not yield any more useful information. 7 of the 22 instances of the answer – None – fine the way it is!, came from the 64+ age group.

A cross tabulation with question 5 of the in centre survey:

Now thinking back over the last 6 months why did you come to Brentford Square?

Reveals that the main reasons why the 64+ age group come to Brentford Square are:

1. Buy groceries
2. Buy bread
3. To fill a prescription
4. Buy pastry
5. Buy liquor
6. Buy take away

We can also investigate whether there are relationships between the importance of local shopping centres as determined by question 15 in the catchment survey and the sex and age of the respondents. This can be calculated using Chi-square tests.(see Statistical appendix 4 & 5)

There appears to be no relationship between age and importance of local shopping

centres and only a slight relationship between sex and the importance of local shopping centres.

### Why Brentford Square and Local Shopping Centres

To discover the important variables about why people are patronizing Brentford Square or in fact local shopping centres in general we can study the results of questions 6, 7, 8,10 and 11 of the in centre survey and question 11 of the catchment survey. These questions probe respondent’s attitudes and weights them so decisions can be made on levels of importance.

#### Question 6

Compared to other centres in the local area how would you rate Brentford Square Shopping Centre? I’ll read out some things, please tell me if Brentford Square Shopping Centre is. Much better, a little better, the same or no better.  
1=Much better. 2=A little better. 3=The same. 4=No better.

	Mean	Std. Deviation
Convenience to your home	1.48	0.90
Ease of parking	1.53	0.90
Friendliness of the Shop owners	1.69	0.84
Ease of Access from the main roads	2.03	1.16
Cleanliness	2.03	0.99
Convenience to your work	2.13	1.25
Appearance of centre	2.26	1.04
Variety of goods and services	2.32	0.99
Days the centre is open	2.34	0.96
Prices of the goods	2.37	0.91
Range of services	2.39	0.91
Range of goods	2.44	0.95
Hours of opening	2.47	1.10
Range of shops	2.60	1.02

Question 7 deals with what aspect of Brentford Square appeals to the in centre shoppers.

In your own words could you tell me what it is about Brentford Square Shopping Centre that really appeals to you?

	Instances	%
Convenient	25	19.84
Locality/close to home/easy access	23	18.25
Small, compact, cute, like a village	19	15.08
Easy & good parking	14	11.11
Friendly Centre & Service	13	10.32
Variety/Everything needed	12	9.52
Know shop owners & people	5	3.97
Opportunity Shops/\$2 Shop	3	2.38
Not too busy	3	2.38
Good bread	2	1.59

Take-away food	2	1.59
Banking facilities	2	1.59
Open air	2	1.59
Cheap petrol	1	0.79

Question 8 deals with a number of statements that relate to peoples feeling about shopping.

I'll read out some things other people have said and get you to tell me if you agree or disagree with each.

1=strongly disagree 2=Disagree a lot 3=Disagree a little 4=Neither agree or disagree 5=Agree a little 6=Agree a lot 7=Strongly agree.

	Mean	Std. Deviation
It's the shop-keepers that make a shopping centre a good place to visit	5.90	1.38
Its good to shop at the big centres because you might come across a special.	3.84	2.23
Advertising from the shopping centres often encourages me to go and have a look.	3.60	2.27
Prices are always higher at small local shopping centres	3.59	2.03
I decide where to shop depending on the weather.	3.28	2.11

Question 10 deals with changes that could be made to Brentford Square to improve the shopping experience.

If we could make some changes to Brentford Square Shopping Centre what would you suggest we should do?

	Instances	%
None - fine the way it is!	22	25.88
Traffic & Safety issues	15	17.65
More variety in shops	6	7.06
Cleanliness improvements	5	5.88
More shade	5	5.88
Ladies clothing	3	3.53
Supermarket open on Sunday	3	3.53
Enlarge car park	2	2.35
More clothing stores	2	2.35
Better fruit shop	2	2.35
Sunday trading	2	2.35
Newsagent services could improve	2	2.35
More street life/entertainment	2	2.35
Take tree out	2	2.35
Haberdashery shop needed	2	2.35
Better lighting	2	2.35
Covered walkways in car park	2	2.35
Open Op Shops at 9am	1	1.18
Delicatessen needed	1	1.18

Coffee shop to extend hours	1	1.18
Liquor store needs more specials	1	1.18
Video games shop	1	1.18
More Saturday buses	1	1.18
Pedestrian crossing signage at Safeway	0	0.00
Seating/eating areas	0	0.00

Question 11 deals with improvements that can be made to Brentford Square.

Now here are some improvements that we could make to the centre?  
 Could you tell me which of these are important to you.

	Mean	Std. Deviation
Cheaper prices	1.47	0.72
Supermarket open on the weekend	1.60	0.98
Traffic lights for access from Canterbury road	1.72	1.17
Cleaner sidewalk and parking area	1.90	1.02
Covered sidewalks for bad weather	1.91	1.12
An area outside to sit and have a coffee or snack	2.04	1.14
Shops open after 5.30pm	2.10	1.11
Sunday trading	2.19	1.24
Better lighting in the car park	2.25	1.18
More attractive shop fronts	2.26	1.05
Covered walkways to the car park	2.87	1.18
Shops open before 8am	2.94	1.17

1=Very important 2=Somewhat important 3=Not very important  
 4=Not important at all

Question 11 on the catchment survey deals with what attributes are important in making the decision where to shop.

For each of the features I read out could you tell me how important they are in choosing where you shop?

1=Not at all important 2=Not very important 3=Neither 4=Somewhat important  
 5=Very important

	Mean	Std. Deviation
Easier parking	4.36	1.02
Personal Service	4.23	1.06
Friendly sales people	4.21	1.00
Car parking near shops	4.20	1.22
Cheaper prices	4.09	1.20
Shop owners who really care	3.99	1.17
Specials	3.89	1.29
Range of shops	3.82	1.21
Wide variety of goods & services	3.78	1.21
Shopping environment	3.77	1.18
Open at hours to suit	3.72	1.27

Well known stores	3.47	1.32
Good advertising	2.73	1.37
Good to shop with children	2.65	1.56

A review of the answers to the in centre questions 10 and 11 can lead to the development of a number of hypothesis. We can see that 3 specific points are common to both questions, namely:

**Question 10**

- Traffic and Safety issues
- Cleanliness improvements
- Supermarket open on Sunday

**Question 11**

- Traffic light access from Canterbury road
- Cleaner sidewalk and parking area
- Supermarket open on weekend

As these aspects were rated in the top half of suggestions (question 10) and we have a level of importance (question 11) that patrons attach to these attributes it is likely that changes made in these attributes are likely to have an impact on centre patronage. (see statistical appendix 6)

Results indicate that the Brentford Square Traders Association should consider making changes to the Supermarket trading hours and traffic access from Canterbury road.

**Shopping Centre Differentiation**

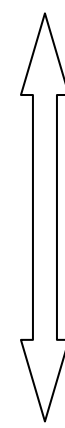
In point 1 of the decisions segment it was postulated that if the population did in fact consider local community shopping centres to be relevant, then the way in which the public differentiates one from the other may be of importance. This could have an impact on how Brentford Square is positioned.

Questions 10 of the catchment survey address these issues.

**Question 10**

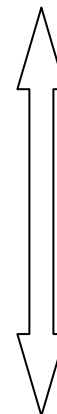
On the scale on this card could you tell me whether this characteristic is more like a local shopping centre or shopping complex?

	Mean	Std. Deviation	
Has all the well known stores	2.28	2.04	Most like a shopping complex.
Has a greater range of shops	2.41	2.20	
Has more expensive items	2.60	1.93	
Has good advertising	2.74	1.89	
Has wide variety of goods & services	2.83	2.14	
Have lots of specials	3.26	2.22	
Has cheaper prices	3.63	2.08	
Is good to shop with children	4.21	1.96	
Is open hours that suit customers	4.28	2.20	
Has a better shopping environment	4.52	2.32	
Has easier parking	5.15	2.21	
Has friendly sales people	5.18	1.82	
Has car parking near shops	5.25	2.19	
Has shop owners who really care	5.54	1.63	
Gives more personal service	5.78	1.67	Most like a local shopping centre



which of these words are would you associate with the local shopping centre or a shopping complex?

	Mean	Std. Deviation	
Hectic	2.54	1.91	Most like a shopping complex.
Variety	2.95	2.30	
Clean	4.18	2.08	
Cute	4.37	1.70	
Comfortable	4.68	2.11	
Confidence	4.80	2.08	
Safe	4.92	1.94	
Relaxing	4.96	2.04	
Welcome	5.21	1.97	
Easy	5.31	2.00	
Compact	5.42	2.01	
Trust	5.52	1.71	
Friendly	5.75	1.57	
Quiet	5.80	1.71	
Small	6.16	1.55	Most like a local shopping centre



## Conclusions and Recommendations

1. From the research we can conclude that community shopping centres are still relevant to a large segment of the population it is therefore recommended that the Brentford Square Traders Association identify what differentiates a community from a regional centre in the populations mind and focus on the appropriate attributes that can affect patronage at Brentford Square.
2. It does not appear that Brentford Square has an awareness problem. The traders association will not have to take action to increase the awareness of the centre. The traders association may have to emphasize various aspects of the centre so that the target market know what Brentford Square “stands for.”
3. It is clear that Brentford Square is predominantly serving the local community. In addition the local community see Brentford Square as a community centre and not as a regional centre. To appeal to patrons outside of the catchment area Brentford Square would need to make changes that make it more like a regional centre than a community centre. These changes would need to consist of a change in the tenancy mix of the centre. It is unlikely that this is possible (or in fact desirable) due to the ownership structure of the centre.
4. There is scope for Brentford Square to improve patronage from the catchment area.  
 Brentford Square should target the frequent shopper who shops for everyday needs at least once or more every month.  
 Emphasis needs to be placed on the following attributes of Brentford Square.
  - Convenience
  - Ease of parking



- Village like atmosphere
- Good service and friendly staff.

The age demographic of the catchment area of Brentford Square is considered to be in the mature family and mature single category with 77% of the catchment being 35 years or older. Breaking this demographic down further it is revealed that there may be potential for the centre to increase patronage from the 35-44 and 64+ age groups. A further dissection reveals that the centre has the potential to attract more 35-44 year old females and 64+ year old males. Further research and analysis needs to be conducted to determine what are the motivating factors for these demographics.

5. While there was a strong response to a “no changes required” question within the questionnaire, the traders association should consider:

- Making changes to the supermarket trading hours, specifically having it trade the full weekend.
- Review traffic and safety issues particularly traffic light access from Canterbury road.

## **Limitations of the Research**

1. As the research was conducted prior to the authors SWOT analysis, there is no guarantee that information has been collected to cover all possible issues and decision possibilities that are critical to the success of the marketing plan. Focus group research would help to generate a list of pertinent issues.
2. More demographic data about the profile of the catchment area of Brentford Square would have been appropriate. There is no way of telling if the decline in trade at Brentford Square is related to some external factor associated with the catchment. (eg. Over the last 10 years population in the catchment has been declining due to increased industrial zoning by the council)
3. More geographical and traffic flow data is required as there is no way of telling if the decline in trade at Brentford Square is dependant on geographical changes such as the establishment of a ring road that isolates Brentford Square from passing by patronage. A longitudinal survey of traffic flows past the centre would be helpful in this regard. Also past postcode surveys of Brentford Square shoppers could help to isolate this aspect.
4. A greater use of secondary data could be used to develop the hypothesis used to test the survey statistics. For the purpose of this report hypothesis have been assumed.
5. The size of the samples used in the surveys limited the number of Chi-square tests that could be completed as many cells of the various cross tabulations had an expected frequency of less than 5, making the test unreliable.
6. Whilst there are daily quotas on how many interviews are collected there appears to be no guidelines as to the spread of interviews during the day. If all questionnaires were administered at a particular time rather than randomly interspersed during the day results may be skewed. Access to the interviewer guidelines may clarify this issue but this appears not to be available.
7. It is assumed that limitations imposed by the SPSS program has limited the number to 68. A broader sample would normally be used.

8. It is assumed that the questionnaires have been checked, edited and unsatisfactory responses dealt with prior to the coding and transcribing process.

## Statistical Appendix

1. To determine whether Brentford Square should in fact do something to encourage patronage the following hypothesis was put.

If the probability that < 30% of the population do not care if community centres close is higher than 80% then the Brentford Square Traders Association should attempt to increase patronage to the centre.

Using the responses to question 15 in the catchment survey we can test this hypothesis using a Z statistic.

$$\pi = 0.198$$

$$\begin{aligned}\text{Standard Error} &= \sqrt{P * (1 - P) / n} \\ &= \sqrt{0.198 * (1 - 0.198) / 217} \\ &= 0.027\end{aligned}$$

$$\begin{aligned}Z &= (p - \pi) / S.E \\ &= (0.30 - 0.198) / 0.027 \\ &= 3.78\end{aligned}$$

A Z statistic of 3.78 returns a value of 0.9992.

As 99.92 is greater than 80 it can be concluded that the Brentford Square Traders Association should attempt to increase patronage to the centre.

2. The following hypothesis was developed to gauge the awareness of Brentford Square.

If the probability that 95 percent of the catchment population is not aware of Brentford Square is greater than 80% then the Traders Association needs do nothing to increase awareness.

Using the responses to question 5 in the catchment survey we can test this hypothesis using a Z statistic.

$$\pi = 0.968$$

$$\begin{aligned} \text{Standard Error} &= \sqrt{P * (1 - P) / n} \\ &= \sqrt{0.968 * (1 - 0.968) / 217} \\ &= 0.012 \end{aligned}$$

$$\begin{aligned} Z &= (p - \pi) / S.E \\ &= (0.95 - 0.968) / 0.012 \\ &= -1.5 \end{aligned}$$

A Z statistic of -1.5 returns a value of 0.0668 As 6.68 is not greater than 80 it can be concluded that the Brentford Square Traders Association do not need to do anything to increase awareness.

3. We can develop a hypothesis to determine whether Brentford Square is in fact servicing the catchment area population fully and it will be necessary for the traders association to widen the catchment area to increase patronage.

If the probability of 80% of the catchment population visiting Brentford Square less than 1 months ago is greater than 90% then the Brentford Square traders Association will need to increase the catchment area of the centre.

Using the answers to question 7 in the catchment survey we can test this hypothesis. A distillation of the answers is shown in the following table.

	Frequency	Percent	Cumulative Percent
< 1 month	166	76.5	76.5
> 1 month	51	23.5	100.0
Total	217	100.0	

Using the responses to question 15 in the catchment survey we can test this hypothesis using a Z statistic.

$$\pi = 0.765$$

$$\begin{aligned} \text{Standard Error} &= \sqrt{P * (1 - P) / n} \\ &= \sqrt{0.765 * (1 - 0.765) / 217} \\ &= 0.029 \end{aligned}$$

$$\begin{aligned} Z &= (p - \pi) / S.E \\ &= (0.90 - 0.765) / 0.029 \\ &= 1.21 \end{aligned}$$

A Z statistic of 1.21 returns a value of 0.774 As 77.4 is not greater than 90 it can be concluded that the Brentford Square Traders Association should not attempt to increase the catchment area and they can focus on increasing patronage from within the catchment.

4. Is there an association between age and the whether it matters if there are no more local shopping centres?

<b>Observed</b>	Yes	No	Total
12-34	32	16	48
35 - 54	58	11	69
55-64	35	6	41
64+	47	10	57
<b>Total</b>	<b>172</b>	<b>43</b>	<b>215</b>

<b>Expected</b>		
12-34	38.4	9.6
35 - 54	55.2	13.8
55-64	32.8	8.2
64+	45.6	11.4

<b>Difference</b>		
12-34	1.066667	4.266667
35 - 54	0.142029	0.568116
55-64	0.147561	0.590244
64+	0.042982	0.17193

**Chi Square 6.996195**

The critical value of the chi-square statistic at 3 degrees of freedom and a 0.05 significance level is 7.815. As the calculation of Chi-square at 6.996 is not greater than 7.815 the null hypothesis is accepted that there is no relationship between the variables.

5. Sex of respondent versus would it matter if local centres closed.

		Would it matter if local centres closed		Total
		Yes	No	
Sex of respondent	Male	51	21	72
	Female	123	22	145
<b>Total</b>		<b>174</b>	<b>43</b>	<b>217</b>

Chi-square = 5.930

The critical value of the chi-square statistic at 1 degree of freedom and a 0.05 significance level is 3.841. As the calculation of Chi-square at 5.93 is greater than 3.841 the null hypothesis is rejected and it can be concluded that there is a relationship between the variables. Using a continuity correction factor due to using a 2 x 2 table yields a result of 5.08 which is still greater than 3.841.

The phi coefficient for the strength of association = 0.165.  
This indicates that the strength of association is not great.

6. The importance of improvements to Brentford Square dealt with in question 11 can be expressed in hypothesis that can be tested using a one sample T test.

The null hypothesis = If the mean value is equal to or greater than 1.5 do nothing.  
The alternate hypothesis = If the mean value is less than 1.5 consider improving.<sup>5</sup>

A critical value of T for 67 degrees of freedom and a significance level of 0.05 is 1.667.

	T Statistic
Supermarket open on weekends	0.867
Traffic light access from Canterbury road	1.555
Cleaner sidewalk and car park area	3.197

The null hypothesis is rejected for the supermarket and traffic questions as they are not greater than the T static critical value.  
However the null hypothesis cannot be rejected for the cleanliness question. This does not mean that the null hypothesis is accepted for this question just that it cannot be rejected.

7. It is proposed that there is a regressive relationship between how far you live from Brentford Square and the incidence of not visiting.

Distance from BS	Incidence of No Visit
0.5	0
1	1
1.5	3
2	15

Multiple R = 0.87352145      R<sup>2</sup> = 0.763039724

It can be concluded that there is a strong relationship between the greater the distance people live from Brentford Square and not visiting the centre.

<sup>5</sup> 1.5 is chosen arbitrarily see Limitations of research point 4.