Visibility, Shopper Characteristics and Navigation: An Integrated Approach in Tenanting Decision Making

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Abstract

The purpose of this paper is to establish a framework for understanding navigation behaviour in a shopping mall in terms of shopper characteristics and configurational factor (visibility). Navigation of customers within a shopping mall has been identified in retail management literature as a significant factor for achieving economic sustenance relying on the concept of urban spatial structure and explained through bid-rent analysis. Navigational behaviour, like other spatial behaviours, can be considered as a function of personal and environmental factors. Studies in the field of architecture identify the impact of higher visibility in generating higher accessibility for a particular space in a built environment. Visibility, therefore, has been selected as the environmental factor responsible for navigation in shopping malls along with signage as a significant navigational or marketing tool. Shopper characteristics have been studied in lieu of personal factors and consist of achievement orientation and shopping activities. Responses on those constructs are taken through a structured questionnaire employing mall intercept method of surveying. The influence of shopper characteristics on navigational preferences have been tested for respondents based on their pre and post signage predilection.

Keywords: Achievement orientation, Navigation, Signage, Shopping Mall, Shopping habitat, Visibility

Introduction

Navigation or way finding within a built environment has been attracting research attention for several decades. Lynch (1960), for example, suggested that the legibility of an environment influences way-finding. Environmental information can be broken down into spatial and graphic expression needed to solve navigational problems (Passini, et al., 1998).

The relationship between the environment (both, natural and man-made) and behaviour has been recognized for a long time in the field of architecture and urban design. In order to emphasize the significance, psychologist Kurt Lewin (1951) argued that, behaviours (B) are not only a function of personal factors (P) but also of the environment (E) where it takes place. Lewin (1951) expressed the relationship in a functional form as: B=f (P, E). Way-finding and navigation behaviours can be influenced by factors from both the environment and human individual differences (e.g. Montello, 2007, O' Neil, 1991; Peponis et al., 1990).

Navigation is significant for different categories of building, but in case of shopping malls it is the determining factor for achieving economic sustenance. The identification of an 'ultimate tenant mix' had always been the objective of retail management researchers. The configurational theories on shopping malls (e.g. Vandell and Lane, 1989; Brown, 1999, Carter & Vandell, 2005) were evolved from and relied on the theories of urban spatial structure for describing the relationship between customer movement and profitability of a tenant store. Understanding navigation pattern in a shopping mall, therefore, is of strategic importance.

Researches in the field of architecture suggest visibility as a significant factor behind navigational preferences. But knowledge of configuration can explain only a portion of navigational behaviour without knowledge of personal factors. Studies of shopper characteristics are confined to the marketing and retail enquiries and their findings are targeted at retail professionals. Studies on configuration on the other hand are limited to architectural researches. It is therefore an interesting area of study to explain navigational behaviour in a shopping mall with respect to shopper characteristics and configurational factors.

Background of The Research and Review of Literature

As it is already mentioned that, behaviour is a function of environmental and individual differences, the environmental and personal factors responsible for navigation in a shopping mall have been discussed separately for a proper understanding of the research variables.

Environmental Factors

Relationship between navigation and visibility

A rich body of literature from architecture indicate a significant role of visual fields in experiencing built structures and shaping patterns of use (e.g. Benedikt, 1979; Frankl, 1973; Gibson, 1979). Frankl (1973) mentioned that our visual perception of any built structure affect our cognitive interactions with that environment and not only the aesthetic appreciation of architecture, as the common wisdom suggests. Different literature advocate different kinds of behaviour influenced by visibility in a built environment: visibility of displays in museums to affect visitor's movement (e.g. Peponis et al., 2004; Psarra, 2009; Stavroulaki & Peponis, 2003; Tzortzi, 2004); influence of visibility on movement between workstations and on interactions between employees (e.g. Hilier & Penn, 1991; Markhede & Koch, 2007; Peponis et al., 2007) influence of visibility in way finding behaviour (e.g. Churchill et al., 2008; Lam et el., 2003; Omer & Goldblatt, 2007). Batty, et al. (1998), Turner and Penn (1999), Turner, et al. (2001) and Desyllas and Duxbury (2001) studied movement and suggested that, a space with higher visibility enjoys more accessibility. Ordway et al. (1988) found that, poorly visible strips in a shopping mall have higher vacancy level, while Simons (1992) found that accessibility and visibility accounted for about 5% of the first year's sales. Visibility has been identified as the environmental factor responsible for navigational preference in this research.

Signage and visual cues

In store signage has been identified as an important factor in retail studies (Bitner, 1992) and results in impulse buying and increased average spending (Mc Kinnon, et al., 1981). Signage and visual cues have impact on indoor navigation (Hölscher, et al., 2006; O'Neil, 1991; Passini, 1984; Titus and Everett, 1995). Sorensen, 2009 found that the navigation and decision making are influenced by signages and a shopper on an average spends 80 % of the time in navigation and 20% of the time in purchase.

Personal Factors: Shopper Characteristics

Achievement shopping orientation

Retail literatures have focused on consumer perception and motivations rather than objective reality to describe shopping behaviour. Shopping Orientations (motives) vary from consumer to consumer (e.g. Luomala, 2003) and they represent "enduring characteristics of individuals" (Westbrook & Black, 1985: p. 87). Dawson et al. (1990) showed that shopping orientation play a significant role in store choice and preference of individuals. it indicates how an individual reacts to an environmental stimulus (Büttner et al., 2014). The different goals for shopping can be narrowed down to shopping orientations: task or achievement orientation and experiential (Babin et al., 1994; Büttner et al., 2014; Kaltcheva & Weitz, 2006). Under achievement orientation, consumers see shopping as an enjoyable task. Achievement orientation can be considered as a significant construct in determining attitude towards visibility in navigational preference (e.g. Patel & Sharma, 2009).

Shopping Activities

Bloch et al. (1994) identified six distinct patterns of mall habitat to signify spaces where shoppers visit and hang around for various hedonic and utilitarian motives. Satisfaction of a shopper need not necessarily derive from mere acquisition of products. The physical space of shopping, thus play a significant role in overall shopping experience of the shoppers. Shopping achievements and activities, or habitats are related constructs. The shopping activities are manifestations of shopping values. The activities as identified by Bloch et al. (1994) are as follows:

- Mall enthusiasts (high level of purchase, enjoyment of mall aesthetics)
- Escape (relief from boredom and routine life)

- Exploration (desire for variety of novelty and enjoyment of exploring new products)
- Flow (losing track of time)
- Knowledge or Epistemic (obtaining information about new stores and new products)
- Social affiliation (enjoyment of communicating and socializing with others)

These two variables describe individual shopper characteristic.

Methodology

The navigation behaviour within a shopping mall is difficult to measure in real situations as most of the movement decisions are guided by prior experiences. So, for any investigation on navigation in a shopping mall, it is a challenge to segregate the movement decisions influenced by spatial factors and by prior experiences. An indirect methodology has to be adopted for measuring navigational preferences. Authors like Franz & Weiner (2008); Weiner et al., (2007) as well as Dalton (2003) have shown that abstracted computer generated stimuli, approximating real spaces, can be used, instead, as viable tools for capturing behavioural tendencies in built environments.

A survey was conducted to measure navigational preferences using representative computer generated pictures (as shown in Figure 1) of junctions in shopping malls with two directional choices. Among the two pictures shown to the respondents, the picture in the left shows a foreground with a blank wall at one end. Visibility to the left beyond this wall is more than the visibility to the right, where another wall at right angle to the first narrows the gap and blocks vision. The second one, at the right, is same as the first situation except a logo of 'McDonalds' placed to the right side of the blank wall. It was explained in the first case that there are no perceivable brand differences among shops on both directions. In the second case the purpose of putting the logo is to show a navigational cue to the respondents. The responses were recorded for every individual participant.

Figure 1 : Scenes of the computer generated shopping mall junctions shown to the respondents for recording navigational preferences

Apart from recording directional preference, a structured questionnaire was administered to the respondents for recording their shopper characteristics as identified earlier (achievement shopping and shopping habitat) along with their demographic profile. At the beginning of the survey, a short description was provided to ensure the clarity of the content when answering the questions. As English is most commonly spoken and written language in urban India (e.g. Kothari, 2006; Rai, 2012) the survey instrument was written and the interviews were conducted in English.

Sample

Data were collected from 10th September, 2016 to 16th December, 2016 using mall intercept survey technique which involves face-to-face interviewing (e.g Bush & Hair, 1985; Gates & Solomon, 1982). The interviews were taken at three shopping malls in Kolkata, intercepting a sample of passing by consumers whether they would be willing to participate in a research study (e.g. Rice & Hanock, 2005). The target population consisted of active mall shoppers, who visit a shopping mall more than four times a year.

Survey Instrument

The survey instrument consisted of items adapted from established scales with few exceptions to capture all the shopper characteristic variables as well as demographic information of the respondents. The instrument is divided into three sections:

Section 1: this section measures shopper characteristic dimensions, i.e., achievement orientation and shopping habitat

Section 2: this section measures behavioural intentions in computer generated situations of shopping mall junctions

Section 3: this section records demographic information of the respondents

A total of 119 respondents participated in the survey. A seven-point Likert Type scale with anchors of "Strongly Disagree" (1) to "Strongly Agree" (7) was used for all items except demographics. The constructs as adopted by Patel and Sharma, 2009 were used to measure achievement

orientation and the constructs as adopted by Bloch et. al. (1994) was used to measure shopping habitat (Table 1).

In order to determine the underlying dimensions in this study, Principal Component Analysis (PCA) with Varimax rotation was performed with SPSS 20.0 for all constructs in the analysis. Item loading above 0.50 was retained (e.g. George & Mallery, 2007). Reliability of the measurement scales were evaluated using Cronbach's Alpha value. A Cronbach's Alpha value of more than 0.7 is commonly acceptable (e.g. Churchill & Brown, 2006, George, 2003).

Table 1: Description of constructs and research variables

Constructs	References
Achievement Orientation:	Patel & Sharma(2009)
" Please indicate your opinion regarding the following statements from strongly disagree (1) to strongly agree (7)"	
1. I always plan my shopping trips	
2. It is important for me to accomplish what I had planned for a particular shopping trip	
3. I always have a list of products to buy when I go for shopping	
4. I already know which products I want to buy when I go for shopping	
Shopping Habitat:	Bloch et. al. (1994)
" Please indicate your opinion regarding the following statements from strongly disagree (1) to strongly agree (7)"	
Mall enthusiasts	
1. I visit malls only to buy something	
2. I love shopping	
3. I like the ambience /aesthetics of shopping malls	
Escape	
4. I visit malls to avoid boredom	
5. I visit malls to escape from the routine life	
Exploration	
6. I always look for new products launched when visiting a mall	
7. I look for product variety in shopping mall visits	
Flow	
8. I like to spend time in mall when I visit one	
9. I never plan my time of stay when visiting a mall	
Epistemic	
10. I like to obtain information about new products in a mall	
11. I like to see new things	
Social affiliation	
12. In a mall, I enjoy being with others	
13. I enjoy socialization with others.	

Analysis

Demographic characteristics

The demographic characteristics of the sample are shown in the Table 2. The sample consisted of 71.4 % of male and 28.6% of female respondents. Majority of respondents were between age group of 21-38 years (63.8%).

Table 2: Respondent Characteristics of the Survey

Variables		Frequency	Percentage
Gender	Male	85	71.4
	Female	34	28.6
Age	Less than 21 Years	5	4.2
	21 to 26 Years	30	25.2
	27 to 32 Years	23	19.3
	33-38 Years	23	19.3
	39-44 Years	16	13.4
	45-50 Years	14	11.8
	Over 50 Years	8	6.7
Mall Visit	Less than once a month but more than 4 times a year	53	44.5
	At least once a month	39	32.8
	More than once a month	27	22.7

Factor Analysis

The test of sample adequacy has to be performed to check whether the collected data is adequate for factor analysis (Anderson & Herbertson, 2003). For analysing the adequacy, Kaiser-Meyer-Olkin (KMO) test of sampling adequacy and Bartlett's test of Sphericity has been conducted. A minimum accepted value of 0.50 or KMO (Kaiser, 1974) has been considered. Based on the values of KMO, the sample adequacy is found to be acceptable (KMO- 0.843 Bartlett's – 0.000 for achievement orientation and KMO-0.978 Bartlett's- 0.000). The factor structure for all the variables is shown in Table 3.

Table 3: The factor structure for all the research variables

Factor Structure		Factor Loading	Cronbach's Alpha
Achievement Orientation	I always plan my shopping trips (Pln 1)	0.896	0.916
	It is important for me to accomplish what I had planned for a particular shopping trip (Pln 2)	0.899	
	I always have a list of products to buy when I go for shopping (Pln 3)	0.902	
	I already know which products I want to buy when I go for shopping (Pln 4)	0.884	
Shopping Habitat	I visit malls only to buy something (ME 1)	0.861	0.987
	I love shopping (ME 2)	0.906	
	I like the ambience /aesthetics of shopping malls (ME 3)	0.931	
	I visit malls to avoid boredom (ESC1)	0.949	
	I visit malls to escape from the routine life (ESC 2)	0.952	
	I always look for new products launched when visiting a mall (EXPLR 1)	0.952	
	I look for product variety in shopping mall visits (EXPLR 2)	0.950	
	I like to spend time in mall when I visit one (FLOW1)	0.918	
	I never plan my time of stay when visiting a mall (FLOW 2)	0.904	
	I like to obtain information about new products in a mall (EPST 1)	0.913	
	I like to see new things (EPST 2)	0.952	
	In a mall, I enjoy being with others (SA 1)	0.957	
	I enjoy socialization with others. (SA 2)	0.935	

The regression based factor scores for these two factors have been used for classifying shoppers.

Measuring Navigational behaviours

It is found from the recorded movement decisions that, for the first situation (Figure 1) 94 preferred to go to left and 25 to the right (out of 119). Participants have shown preference for a particular direction (left) ($\chi 2$ = 40.008, df= 1, p<0.0001). For the second situation, 60 preferred to go to left, 59 to the right. Here also participants showed no difference in preference ($\chi 2$ = 0.008, df= 1, p<0.9270). By conventional criteria, the first difference is considered to be extremely statistically significant whereas the second is not.

Relating Navigational preferences and shopper type

The first and second situations (Figure 1) are exactly the same spatial arrangement except for an inclusion of a 'navigational cue' (a sign for McDonalds in this case) in the later. In the first situation, the majority of respondents showed a preference for the left direction. The presence of a navigational cue changed the scenario. More people showed their willingness to move to right than the without cue situation, and as a result, there is no preferred direction. The cue acted as an 'equalizer'. Based on the pre and post signage predilection, the respondents can be classified into four distinct categories.

Category (A): Pre Left- Post Left

Category (B): Pre Left- Post Right

Category (C): Pre Right- Post Right

Category (D): Pre Right- Post Left

The four categories are compared in terms of their regression based factor scores of achievement orientation and shopping habitat to check the impact of shopper characteristics on navigational preferences. Descriptive statistics of the regression based factor scores of achievement orientation and shopping habitat for different categories are compared (Table 4 and Table 7). One-way ANOVA has been conducted (Table 5 and Table 8) to identify whether there is any significant difference between categories and a post-hoc Tukey-Kramer test is conducted (Table 6 and Table 9) to pin-point different categories.

Achievement orientation

Table 4: Descriptive statistics for regression based factor scores of achievement orientation for four categories

Categories	*A*	*B*	*C*	*D*	*Pooled Data*
Observations (N)	50	44	15	10	119
Sum $\sum x_i$	-28.2350	-16.0817	25.0723	19.2444	-0.0000
Mean $\bar{x}$	-0.5647	-0.3655	1.6715	1.9244	-0.0000
Sum of squares $\sum x_i^2$	25.1617	11.3220	43.8798	37.6366	118.0002
Sample variance s^2	0.1881	0.1266	0.1409	0.0669	1.0000
Sample Std. dev. Σ	0.4337	0.3558	0.3753	0.2586	1.0000
Std. dev of Mean $SE\bar{x}$	0.0613	0.0536	0.0969	0.0818	0.0917

Table 5: One-way ANOVA of the 4 independent categories in terms of achievement orientation

	Sum of squares (SS)	*Degrees of Freedom (v)*	*Mean Square (MS)*	*F Statistic*	*P value*
Treatment	110.7647	3	33.5882	224.1106	1.1102e-16
Error	17.2354	115	0.1499		
Total	118.0002	118			

The p- value corresponding to the F-statistic of one-way ANOVA is lower than 0.01, suggesting that the one or more treatments are significantly different. These critical values for Q, for a of 0.01 and 0.05 can be obtained as

$Q_{critical}^{\alpha=0.01,k=4,v=115} = 4.5012$ and $Q_{critical}^{\alpha=0.05,k=4,v=115} = 3.6871$

respectively.

The quantity of $\hat{\sigma}_e$ =0.3871 is the square root of the Mean Square error =0.1499 determined in the precursor one-way ANOVA procedure.

The algorithm used here to calculate the critical values of the studentized range distribution, as well as p-values corresponding to an observed value of Qi,j , is that of Gleason (1999) This is an improvement over the Copenhaver & Holland (1988) algorithm deployed in R statistical package.

Table 6: Tukey HSD test results for achievement orientation

Treatments pair	*Tukey HSD Q Statistic*	*Tukey HSD p-value*	*Tukey HSD inference*
A vs B	3.5205	0.0670407	Insignificant
A vs C	27.7482	0.0010053	** p< 0.01
A vs D	26.2489	0.0010053	** p< 0.01
B vs C	24.8877	0.0010053	** p< 0.01
B vs D	23.8784	0.0010053	** p< 0.01
C vs D	2.2635	0.3834236	Insignificant

Shopping Habitat

Table 7 : Descriptive statistics for regression based factor scores of shopping habitat or the four categories

Categories	*A*	*B*	*C*	*D*	*Pooled Data*
Observations (N)	50	44	15	10	119
Sum $\sum x_i$	25.0429	22.7562	-28.9667	-18.8323	0.0000
Mean $\bar{x}$	0.5009	0.5172	-1.9311	-1.8832	0.0000
Sum of squares $\sum x_i^2$	13.5428	12.3860	56.5350	35.5363	118.0001
Sample variance s^2	0.0204	0.0143	0.0427	0.0078	1.0000
Sample Std. dev. Σ	0.1428	0.1198	0.2065	0.0886	1.0000
Std. dev of Mean $SE_{\bar{x}}$	0.0202	0.0181	0.0533	0.0280	0.0917

Table 8: One-way ANOVA for the four independent categories in terms of shopping habitat

	Sum of squares (SS)	***Degrees of Freedom (v)***	***Mean Square (MS)***	***F Statistic***	***P value***
Treatment	115.7156	3	38.5719	1941.6642	1.1102e-16
Error	2.2845	115	0.0199		
Total	118.0001	118			

The p- value corresponding to the F-statistic of one-way ANOVA is lower than 0.01, suggesting that the one or more treatments are significantly different. The quantity of $\hat{\sigma}_e$ = 0.1409 is the square root of the Mean Square error =0.0199 determined in the precursor one-way ANOVA procedure.

Table 9: Tukey HSD test results for Shopping Habitat

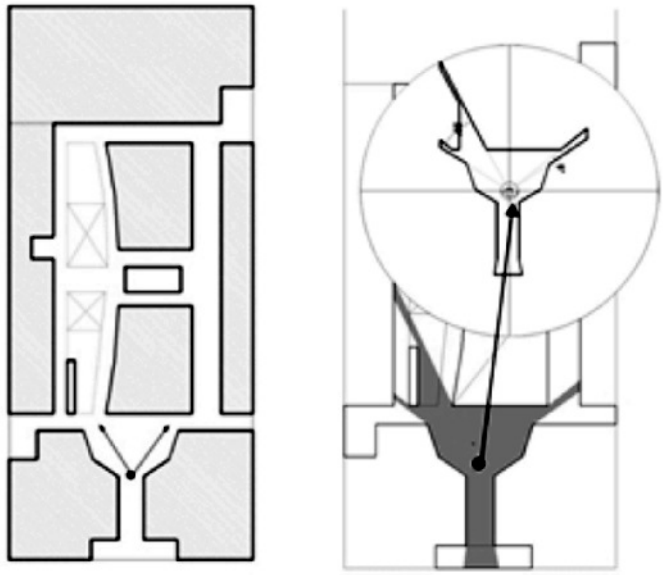
Treatments pair	*Tukey HSD Q Statistic*	*Tukey HSD p-value*	*Tukey HSD inference*
A vs B	0.7926	0.8999947	Insignificant
A vs C	82.8893	0.0010053	** p< 0.01
A vs D	69.0556	0.0010053	** p< 0.01
B vs C	82.1631	0.0010053	** p< 0.01
B vs D	68.7517	0.0010053	** p< 0.01
C vs D	1.1767	0.8185862	Insignificant

It is evident from the above analysis that there is no significant difference between pairs A and B and C and D.

Findings

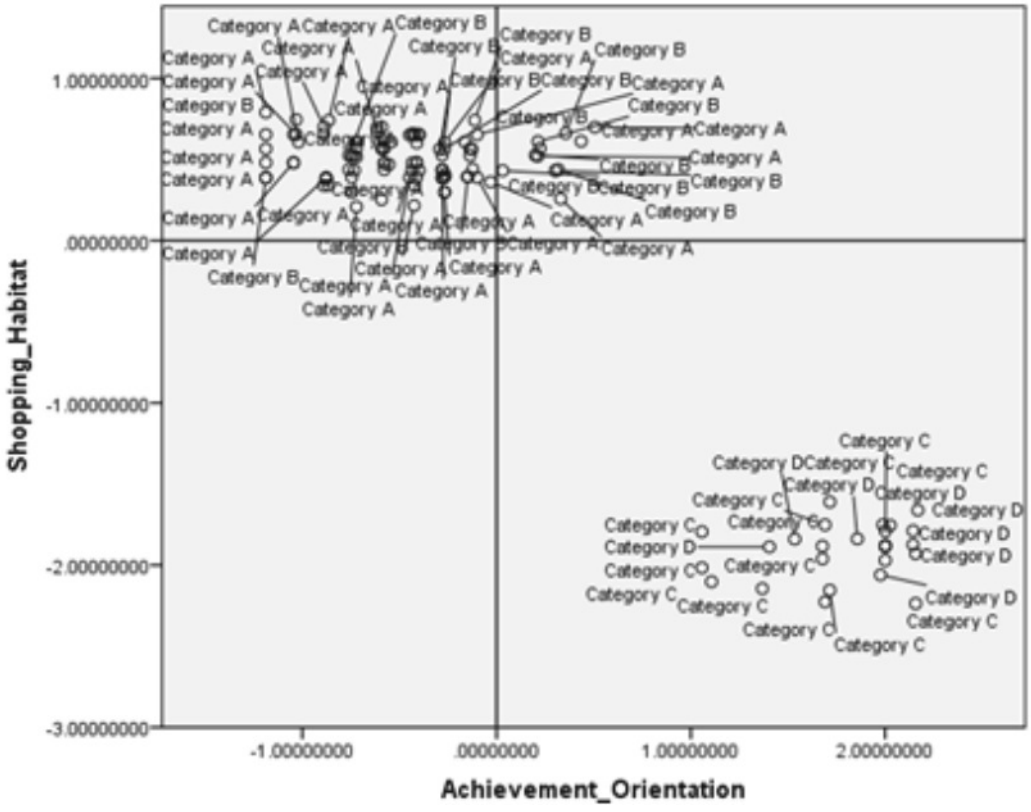
The purpose of this investigation is to study the impact of shopper characteristics and configurational factors behind the navigation. As we have already discussed the significance of visibility in shaping the navigational pattern, visibility analysis will be the proper tool for analysing the spatial configuration of the mall junctions. Figure 2 shows the representative layout of the hypothetical shopping mall junction shown to the respondents. Location of the observer is marked by a dot and the respective directional options are shown by arrows.

Figure 2 : (Left) Layout of the shopping mall junction shown to the respondents. The dot denotes the location of the observer and (Right) the isovist from the vantage point



From the above visibility analysis it is clear that, the left direction enjoys more visibility compared to the right. Again from the analysis of the navigation behaviour with respect to shopper type it is evident that there is no significant difference between Category A and B and between category C and D. For both the pairs, the initial navigational preference is same, Left for the first pair (Category A and B; high visibility) and Right for the second (Category C and D; low visibility). The following diagram (Figure 3) explains it.

Figure 3: Plotting regression based factor scores for achievement orientation and shopping habitat for all the respondents



Conclusion

It is clear from Figure 3 that, the scatter plot of the regression based factor scores for achievement orientation and shopping habitat shows two distinct clusters. One with high achievement orientation and low shopping habitat score and another with low achievement orientation and high shopping habitat score. Their inverse relationship is evident from the correlation coefficient of the two shopper characteristic variable (-0.909).

High achievement orientation is related to high utilitarian motive and high score of shopping habitat variable is related to high hedonic motive. The cluster with high achievement orientation and low shopping habitat score represents shoppers with high planned purchase orientation and less focus on 'exploration'. The other cluster on the other hand, represents explorers with low planned purchase intentions.

High shopping habitat and low achievement orientation shoppers explores a built environment based on high visibility and vice versa. So, shopper characteristics play a significant role in exploring a space based on visibility, it differs across different categoies. Signage, though extremely significant for navigation, functions similarly across categories.

Shopper characteristics and exploring a space through high visible areas are strongly related. It is therefore important to consider visibility in allocating stores in a shopping mall. The high visible paths will accommodate stores who rely more on impulse purchase and provide experience for exploration. Signage are used as an aid in exploration and taken equally by all categories of shoppers. A visibility analysis will help in locating stores of different categories to maximize footfall and achieve better economic function of the shopping mall.

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