Short Paper

Can We Measure Consumption?

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Abstract
The purpose of the study is to examine the relation between "architectural layout", "consumer behavior", and "marketing strategies" in the in-store environment. The relation between consumptive space and perceptive space makes it essential to deal with both architectural design and marketing strategies. Therefore, the parameters described in the study require an interdisciplinary approach. A case study is done in an electronics store and the observation included 620 consumers, their moving patterns and their interactions with products in a two day period. According to layout configuration and space organization, the study tries to understand how characteristics of architectural space effect interaction between the shopper and the product, and tries to identify if that can be redefined as a part of the marketing strategy.

1. Introduction

As there are many contributions to the consumer spatial behavior in retail areas (Timmermans, 1982, Teklenburg et al., 1994); there are only a very few studies focusing on the relation between "architectural layout", "consumer behavior", and "marketing strategies" in the in-store environment. Consumer spatial models have the potential to enhance research on spatial environment and consumer behavior (O'Neill and Jasper, 1992). O'Neill and Jasper (1992) suggest that "approaches used by environment-behavior studies (EB) provides context of analyzing consumer spatial behavior models in structure of physical environment, behavior and person". Exploring the relation between these three main dimensions is important to understand the issues of architectural design performance of "consumption spaces". Thus, this research aims to explore how architectural layout effects the interaction between shoppers and the product; and how this interrelation is used as a marketing strategy in the in-store environment.

Electronic stores are dynamic interior spaces where shopper traffic and space organisation are strongly connected to each other. In electronics stores while shoppers are making desicions where to go, meanwhile they try to get information about the products they will purchase or examine. Therefore, they are in close relation not only with the physical environment, but also the product itself. To investigate the underlined issues and their relationships, the case study was conducted in an electronics store; architectural layout of the selected electronics store was analysed and behaviors of the shoppers were observed inside of the store.

2. In-Store Shopping Environment and Behavior

After the definition of in-store environment as a physical atmosphere (Kotler, 1973-1974, Danovan and Rossiter, 1982) an extensive amount of research has dealt with the social (Sommer, 1998, Sommer and Sommer, 1989, Sommer et al., 1981, Bitner, 1992), psychological (Danovan and Rossiter, 1982, Markin et al., 1976, FanNg, 2003, Uzzel, 1995) and cognitive (Sommer and Aitkens, 1982, Penn, 2005) effects on consumer in-store behavior. In definition of cognitive structure of shopping behavior Downs (1970) defined atmosphere as a part of the store image. In having different properties from image, the concept of store atmosphere (Golledge and Stimson, 1997) can also be defined as a particular component for satisfying shoppers' needs. To understand the relation between person and environment, in-store consumer behavior can be analysed to explore this transactional relationship (O'Neill and Jasper, 1992). Spatial layout is used for understanding the relation between consumer wayfinding and in-store navigational search strategies (Titus and Everett, 1996).

Spatial layout also has a direct effect on consumption from the view of consumer studies as well as the management and sale strategies. Penn (2005) defines trading as a spatial concept in three main respects: in terms of distribution of goods, network properties of space and cognitive aspects of space that allow people to coordinate their search for goods.

Consumer behavior and moving patterns can also help us to examine the spatial configuration. To understand the shopping behavior within the store, paths taken by individuals were analyzed by Larson et al. (2005) to explain the spatial patterns in a typical grocery store. Altough it is not examined in current study, facilitation effects (Sommer et al., 1992) and different gender tendecies of experiencing the close environment (Unlu and Cakir, 2002) should be studied in future studies to understand the relation between environmental perception and consumer behavior.

3. The Method

To explore the relation between the architectural layout, consumer behavior, and the arrangements of products, the electronics store "TEKNOSA" was chosen for the case study. "TEKNOSA-Istinye" (T-I) is one of 230 stores of this institutional brand which is located inside of the Istinye Shopping Mall in Istanbul.

The evaluation of this electronics store was realised in four stages. Primarily, e-partition line analysis was applied to the plan layout. Information about e-partition lines was obtained by activating a space syntax software called "Spatialist" of Georgia Tech. USA, to find out the configurational properties of space. Secondarily, analysis of the architectural plan was used to explain the different locational values of the market in relation with store entrance and cashiers area. Cameras as recording device were used to understand the frequency of interaction between the shopper and product. Finally, data accessed from the archives of "Marketing Department" were used to reveal the quantity of sold products and to discover the "consuming value".

E-Partition Analyses:

E-partition analysis is implemented in plan layout of the TI electronic store in Istinye Park Shopping Mall. "Space Syntax" methods, especially e-partition analyses help us to understand the level of visual stimulation in the interior space (Unlu, 2000). Architectural layout can be used as a predictive tool of legibility and attainability of space (O'Neill, 1991a and 1991b). Analyzing the spatial configuration of space gives us the pattern of relationship between elements of space. In other words, analyses made over architectural plan would be descriptive to understand different physical characteristics and legibility of space. Every point in the "in-store market" has a specific character which is caused by "architectural configuration" and "syntactic value". Thus, e-partition analysis is applied mainly to the store area where products were displayed (Figure 1).

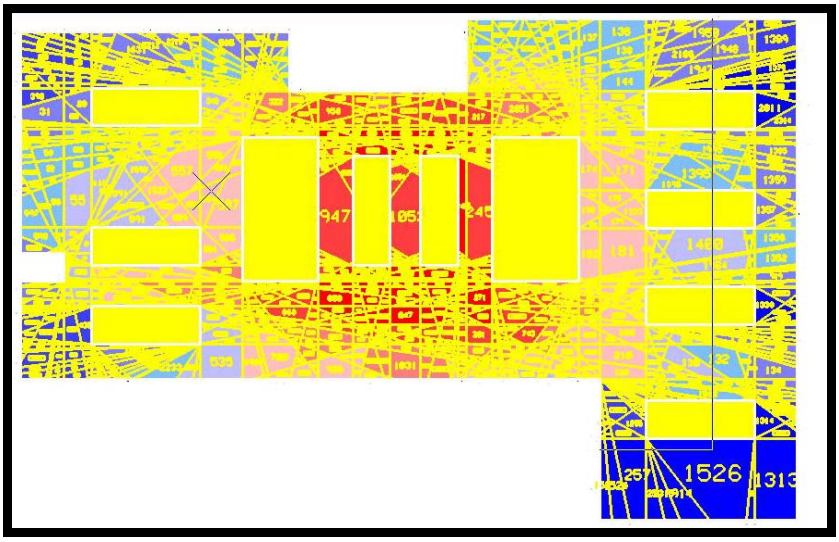

Figure 1
"E-Partition" analyses

Analysis of Architectural Plan:
Organization of plan layouts effects consumer response (Bitner, 1992), consumer tracking (Larson et al., 2005), wayfinding behavior (Titus and Everett, 1996) and mental image of the consumer (Sommer et al. 1981; Sommer and Aitkens, 1982) in the in-store environment. It is a general assumption that location of the entrance and cashiers is an important strategy of marketing while organising the plan layout of consumption places (Bowlby, 1997). Therefore, three general caharacteristics were significant to identify different zones in the store (Figure 2): location of product in relation with its distance from entrance, type of product in relation with its location in the store, location of product in relation with its distance from the cashiers. Three zones were named as "Loc 1" (where the entrance of the market is located); "Loc 2" (where the cashier is located) and "Loc 3" (the deeper zone). Locational value (LV) gives information about location of the product in the store.

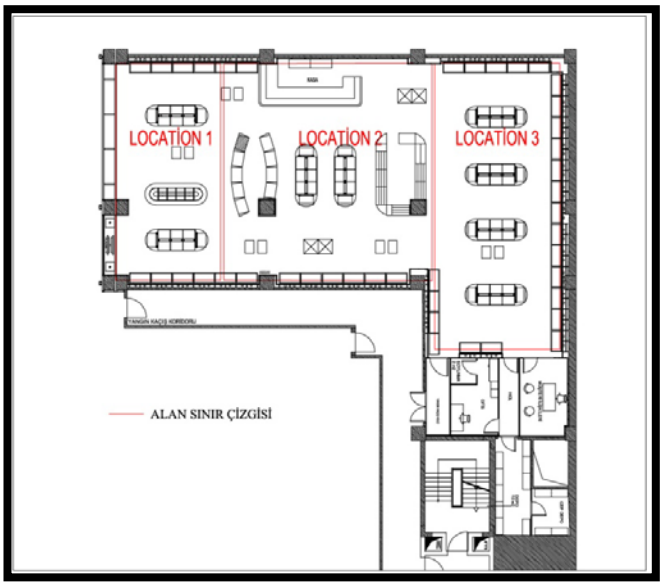

Figure 2
Different zones identified as "Location1-Location2-Location3"

Analysis of Camera Records:
Camera records were used to investigate the direct interaction between product and shopper; particularly to measure the frequency of the shoppers' touch on the products. In this study, underlined direct interaction is defined in two ways: "eye-contact" was defined as "sensory touch" and contact by using hands was defined as "tactile touch". Contacts that took up less than four seconds were eliminated in consideration of the weak interaction situation. Three camera devices were placed 270 centimeters high from the ground to observe the moving patterns of 620 shoppers and record the frequency of their contact with products inside the store. They were turned on at the same time to record the same periods for two days. The average of six hours was calculated to explore the frequency of interaction and the amount of time spent in close relation with products. Records were analyzed by four colleagues who used stop-watches. The results showed how much time was spent for interaction per each hour at each point. Every point in the store was evaluated with an actual value taken by the amount of interaction between the consumer and product. In this study, Interaction Frequency (IF) Value gives us information about this interaction.

Days for the observation were determined as one weekday (store was not crowded), and one weekend day (people prefered to shop in the enclosed spaces). It was observed that between 700 and 1700 shoppers entered into the store each day. The density graph analysis of people observed during the weekday, indicated a homogeneous character. On the other hand, the graph peaked around mid-day on the weekend (Table 1).

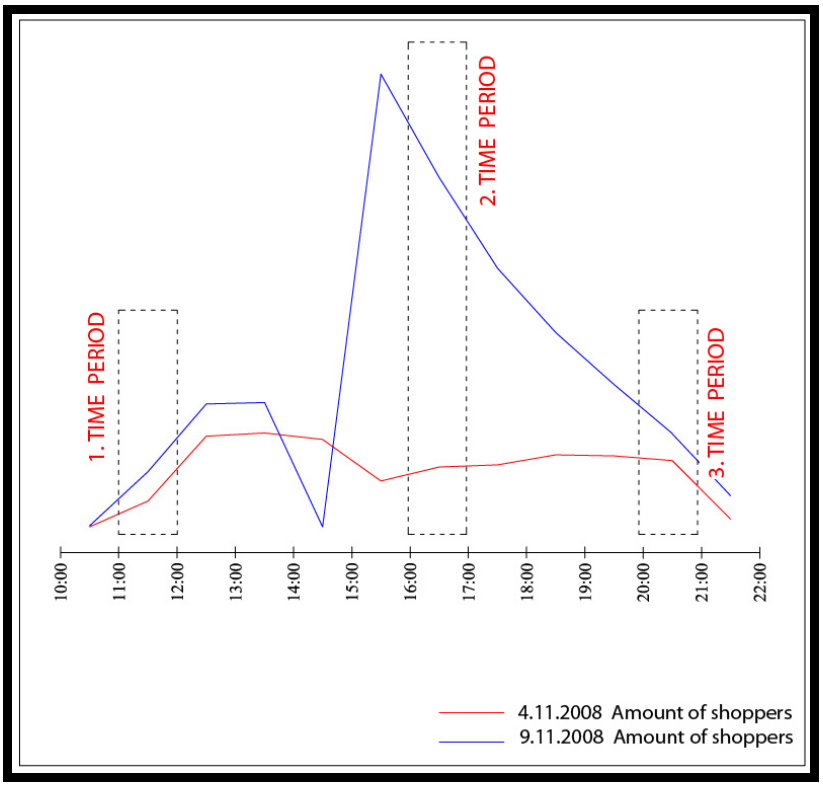

Table 1
The graph shows the number of shopper inside the market in different time periods

Analysis of Purchased Products:
The case study has an extent in which "consumer value" is defined as quantity of purchased products in each identified point. These points define a range where the consumer can visually and tactually interact with the product and get knowledge about it. They have their own properties that differ with their location, arrangements of the products and spatial specification (FIGURE 3). In

every distinct point, a different quantity of shopping is observed; so every point has a different potential of purchasing and purchasing behavior that takes place in different time periods during the day. At this point, "if there is a relation between quantity of shopping and design of interior environment," it is a problematic question worthy of discussion.

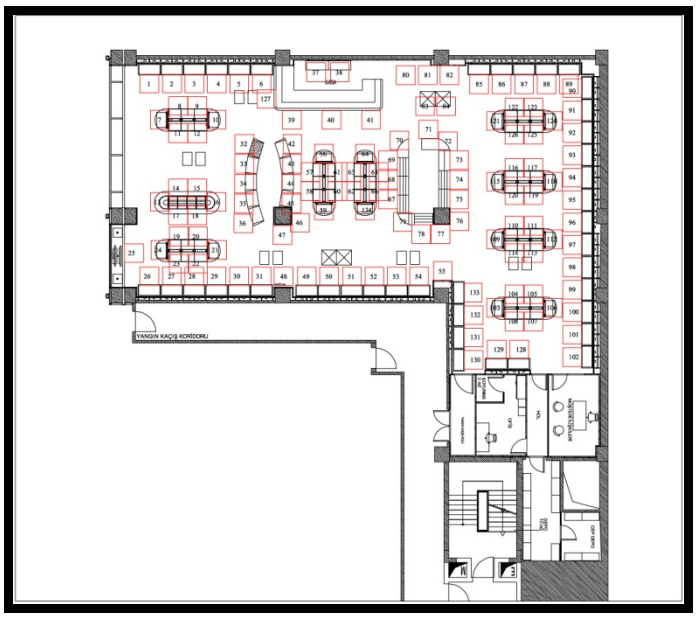

Figure 3
Described points in "Teknosa Electronic Store"

Every point in the store has its own selling potentiality which changes in relation with its location, legibility and arrangement of the products. In this study, it is defined as "consuming value" (CV) which can give information about the potentiality of purchasing. Daily reports including information about purchased products were taken from "Management Department" of TEKNOSA and were used to determine the amount of products that were sold during the choosen time scales. 61 products were purchased on Tuesday and 105 were purchased on Sunday. The data obtained from daily reports of TEKNOSA including purchased products and their locations inside the store, are listed in Table 2.

	Tuesday		Sunday	
Location	Number	%	Number	%
Location 1	6	10	7	7
Location 2	47	77	83	79
Location 3	8	13	15	14
Total	61	100	105	100

Table 2
Number and location of purchased products

4. Data Analysis

"E-Partition Analysis" was conducted to investigate the connectivity and legibility of the electronics store in order to understand how corridors and aisles are integrated. "Real Integration (RI) Datas"

were used to understand the connectivity and integration value of the store. This data provides an idea about attainability and accesibility of the place and predictibility about integrative spaces. In every determined point there is more than one integrational value (FIGURE 4). Therefore, the average of these values were calculated to put forward the real integrational value of each point (Unlu, 2000).

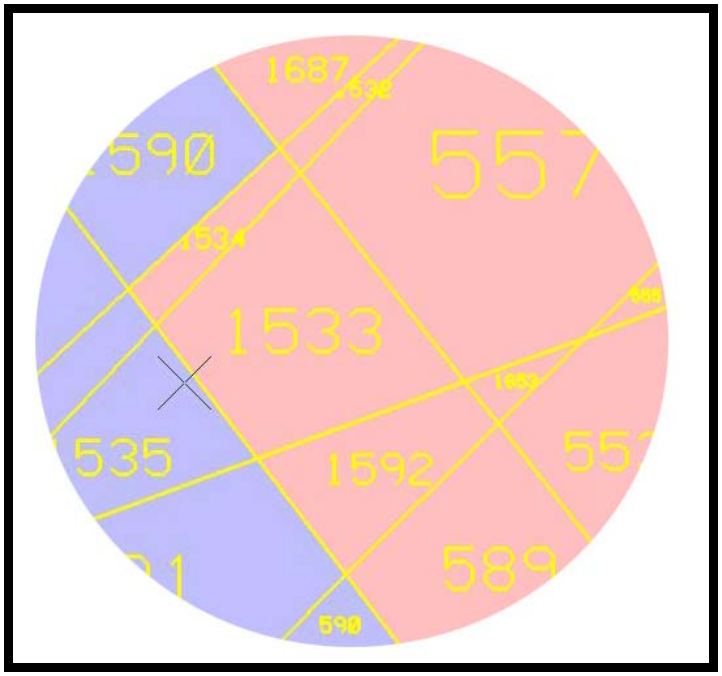

Figure 4
Different real integration values in one circle

Data obtained from the analysis of "interaction value" between shopper and product, utilized the observations recorded from the cameras. The frequency of time spent for touching the product (sensory or tactile) was also calculated as it was mentioned before.

Analysis shows the interaction between shopper and product in each designated point, and this relation is categorized in Table 3. There was a reduction in time spent at specific locations in the store specifically in the direction from the entrance to the deeper side of the store.

Location	Total Time Spend in One Hour	Number of "Points"	Average of Time Spend in Each Point in 1 Hour
Location 1	59,93 Min\Hour	27	**2,22** Min\Hour *****
Location 2	88,64 Min\Hour	50	**1,77** Min\Hour *****
Location 3	20,77 Min\Hour	27	**0,77** Min\Hour *****
Total	169,34 Min\Hour	104	**1,63** Min\Hour

Table 3
Time spent for interaction

All datas were interval except the datas of LV. The datas of RI, IF and CV were transformed to "nominal value" (Table 4) for the purpose of making evaluation about LV.

Interval Value **(IV)**	Nominal Value **(NV)**	Range of Interval Value	Definition of Nominal Value
RI	RI(N)	0.152 - 0.282	Low Integrated (1), Integrated (2), Very Integrated (3)
IF	IF(N)	0.11 - 11.01min\hour	Low Interacted(1), Interacted(2), High Interacted(3)
CV	CV(N)	0 - 5.5 product\day	NO Purchased (0), Purchased (1)
	LV		1,2,3

Table 4
Transformation of interval values to nominal values

The evaluation of the final datas was done in two steps described as below:

1. Correlation Analysis (Table 5) was used to understand the relation between Real Integration (RI), Interaction Frequency (IF) and Consuming Value (CV).

2. Chi-Square Analyze (Table 6) was used to understand the relation between Location Value, RI(N), IF(N) and CV(N). "SPSS Statistics (12)" software was used to evaluate the data. Basically, four exploratory parameters.

	RI	**IF**	**CV**
RI		r=0,065	r=0,280; p=0,02
IF	r=0,065		r=0,113; p=0,213
CV	r=0,280; p=0,02	r=0,113; p=0,213	

Table 5
Correlation analyze of case study parameters

	RI(N)	**IF(N)**	**CV(N)**
LV	x2=73,866; df=4, p=0,00<0,05	x2=4,190; df=4, p=0.381>0.05	x2=38,169;df=2, r=0,00<0,05

Table 6
Chi-Square analyze of case study parameters ("N" are nominal values transformed from interval values)

Evaluation of RI-CV Relation:
The correlation between RI and CV was found as r=0.280; p=0.02 (TABLE 5). The values indicated in Table 4 shows that in Loc 2, layout is most integrated and the percentage of purchased product is higher (77 and 79). The location of product is significant for marketing. For purchasing, the location of product in a connectivity manner is an important issue. Connectivity is an important component of architectural configuration. As a cue for legibility, configuration is an important tool for well-percievable environment.

Evaluation of RI-IF Relation:
The correlation between RI and IF was found as r=0.065 (Table 5). On the other hand, in Loc2, which is the most integrated one, interaction between shopper and product is very high, almost double.

Evaluation of RI(N)-LV Relation:
There is correlation between RI(N) and LV (x2=73,866; df=4, p=0.00<0.05). Moreover, averages of RI show that Loc2 is the most integrated part of the market.

Evaluation of IF-CV Relation:
The relation was found between frequency of product interaction(IF) and the amount of purchased products(CV) as r=0,113; p=0,213.

Evaluation of IF-LV Relation:
Time spent in interaction with product is highest in Loc1 (TABLE 3), which is the closest one to entrance of the market. Loc1 is suitable for short trips because of its relation with the entrance. Shoppers spent least time in the deeper part (Loc3) of the market. Altough the attractiveness of big flat televisions displayed in Loc3 seemed to be effective, the results show that the interaction with product is the lowest.

Evaluation of LV-CV(N) Relation:
The relation between LV and CV(N) was found as x2=38,169; df=2, r=0,00<0.05 (TABLE 6). In addition, most of purchased products were sold from Loc2 which had most integrated configuration.

Evaluation of LV-IF(N) Relation:
While there was no strong relation between LV and IF(N) (p=0.381), we found that the average of time spent in each point is highest in Loc1; the nearest area to the entrance (TABLE 3). Lowest time was spent in each point in Loc3; the furthest location to the entrance.

5. Conclusion

The outcomes obtained from the four stages of analysis show that general spatial configuration of an inner shopping environment can affect consumer behavior. As a strong stimuli (FanNg, 2003), the product is effective on consumer tracking inside the store but on the other hand; the spatial layout is also a strong predictive tool for circulation and product-shopper interaction. The legibility and attainability of in-store environment affects the consumer behavior particularly in electronic stores which have dynamic interior concepts. Marketing strategies try to use this relation for increasing purchase and sales volumes.

As it was mentioned earlier, the aim of this study is to explain the relation between “spatial configuration”, “consumer in-store shopping behavior” and “marketing strategies”. The results of this case study provides clues about the relation between spatial configuration and inner-shopping behavior within the conceptual framework (TABLE7). Although “Consumer Behavior Studies” and “Spatial Configurational Studies” have a deep and wide range of research area; this study tried to create a framework which combined fields of architecture, consumer behavior studies, and marketing.

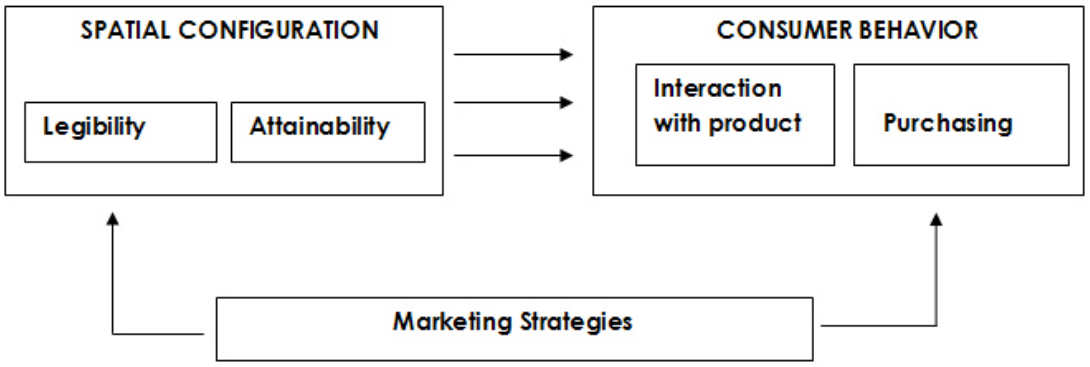

Figure 7
Relation between spatial configuration and consumer behavior

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