The Spatial Economic Rationale for Optimum Rent, Area and Positioning of Spaces in Planned Shopping Centres

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Human activity in general and retail consumer behavior in particular is profoundly influenced by built environment. This has necessitated the growth of research in this particular area. Most of the researches are on the influence of micro or molar atmospheric variables, though the space planning itself is a fertile opportunity for market differentiation. As it is true that, human movement has a positive relationship with spatial configuration, micro-economic foundation of shopping centre lease price discrimination and store space allocation should consider this aspect. The spatial influence should be measured in its degree and shaped through design interventions. Purpose of this study is to create a frame-work for understanding optimum store area and optimum rent of shops and to see the impact of allocation of anchor spaces to mitigate normal human movement. The intention is to cover the gap between researches in the field of marketing and studies in Architecture and environmental psychology, as studies in these two fields never meet.The paper develops a formal model of bid-rent, based on store location within shopping centers. The model is specified and solved with an objective function of profit maximization. It also considers integration value, which may be understood as a measure of the accessibility of a location, as an aid in explaining the spatial distribution of retail rents. Space Syntax, in this context,

Introduction

There are sufficient reasons to believe and ample evidences to support that, spatial configuration influences human behavior. Studying consumer behavior in shopping malls, therefore, is an interesting area of study. The underlying design philosophy of shopping centers is to influence consumer behavior for creating favorable shopping intentions. Environmental or atmospheric conditions in a shopping mall have an influence to such a degree that it can have an equally important effect on the consumer as the quality of product themselves. Apart from that, about 2/3rds of purchasing decisions are made in stores and are unplanned. Human movement density in a particular shopping area is, therefore, important.

In the context of socially connected people, the design strategies of a planned shopping centre must incorporate the idea of articulation, connectedness, engagement, influence and integration. Those properties cannot be achieved with atmospherics only, but with spatial configuration, which is paid very minimum attention in retail literature. Initial design of retail spaces is often conceived by personnel from outside the mainstream marketing functions. These consultants propose initial designs after consultation with the top management about how they want their brand to be. After the initial design direction is chosen, visual merchandising managers develop these designs and provide detailed store design. Finally top managers either approve or modify these plans depending upon how well they represent the brand. The tenanting decisions and rent determination is done at later phases of development and normally done on a rule of thumb basis.

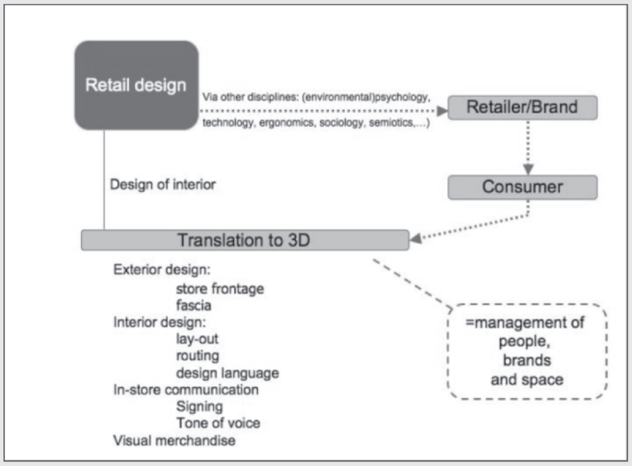

Figure 1: Complexity of the Shopping Mall Design

This area thus requires interdisciplinary approach from marketing, environmental psychology and architecture. Research results from a marketing viewpoint are an end in itself rather than a bridge to a next stage where possible

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methodologies for designing a good retail space could be suggested. The result is an increasing gap between marketers with their research outcomes and designers with their scepticisms towards that outcome. On the other hand, the architectural input, which is more familiar with the holistic view, remains insufficient: too few studies with architectural dimensions as independent variables are conducted in retail environments. Retail design research has the potential to offer a bridge to all three disciplines by focusing on a holistic understanding of retail environment and also has the potential to create a framework for strategic decision making.

Studies on retail have paid little attention to the micro-level spatial aspects of store location and rent within shopping centers. An understanding of such location behavior within the mall, though, can aid considerably in optimizing design, space allocation and tenanting decisions. Purpose of this study is to create a frame-work for understanding optimum store area and optimum rent of shops in a shopping mall and also to see the impact of allocation of anchor spaces to mitigate normal human movement with the help of spatial analysis.

Literature Review:

Importance of Spatial Design in Retail

Space influences behaviour is essentially a truism. Studies show that shop environments create 'retail experiences' that strongly influences consumers' purchase behaviour (Chebat & Michon, 2003, Mehrabian and Russel, 1974, Dennis et al. 2002, Newman and Patel, 2004, Stoel, Wickliffe and Lee, 2004). It also influences the consumer's judgements of the quality of the store (Babin and Darden, 1996). Moreover, keeping shoppers longer in stores is likely to result in increased browsing behaviour (Moye and Kincade, 2002, Babin and Attaway, 2000; Sherman et al. 1997), which in turn is likely to cause increased impulse purchasing (Beatty and Ferrel, 1998). Some research even suggests that up to two third of purchase decisions are made in stores (POPAI, 1998, Inman and Winner, 1998).

Retail agglomeration and Inter-store externalities

Implicit in shopping center design is the concept of retail agglomeration and inter-store externalities. The concept of agglomeration economics is the belief of generating value from clustering of economic activities. Retail stores, in this perspective, should reduce consumer search and uncertainty costs (Des Rosiers et. al., 2009). Besides the agglomeration of a large number of stores together under one roof will provide higher competition and easier price comparison (Yiu, 2007). Eventually retailers enjoy higher customer density and higher sales volume (Brueckner, 1993). This agglomeration results in a complicated web of inter-store externalities, traffic and sales of each store depends in part on how many customers the other store attract (Gould et al. 2005).

Several researches suggest that, stores within shopping centers generate sales and business traffic externalities among themselves. (Gould et al. 2005; Wheaton, 2000). The purpose is to find out how efficiently mall space can be allocated to increase center turnover and retailers profit. Charging same level of rent and designing same level of incentives for each store seems to be highly inefficient. Stores which generate more positive externalities by their presence should pay lower rents per unit area and have larger incentives to exert effort (Pashigian et al. 1998). Furthermore, stores that confer large external benefits on other stores should also receive more spaces within the center (Miceli et al. 1998).Optimizing tenant mix thus includes choosing the right tenant, with right size, at the right spot.

Bid-rent and retail planning

Studies on retail have paid little attention to the micro-level spatial aspects of store location and rent within shopping centers. An understanding of such location behavior within the mall, though, can aid considerably in optimizing design, space allocation and tenanting decisions.

Studies conducted on shopping centers have explored the micro-economic foundations of the lease-price discrimination and allocation of a particular store in the overall spatial arrangement (Benjamin, Boyle and Sirmans (1992); Brucckner (1993); Eppli and Shilling (1995); Pashigan and Gould (1998)). The studies were non-locational and based on inter-store externalities. It can be concluded that, locational aspect of a particular store, which is necessarily based on agglomeration economics of their spatial properties, will be a possible extension of the studies done so far.

Brown (1991), Sim and Way (1989) suggested that, bid-rent theory should describe customer circulation and movement in regional or super-regional shopping centers and explain location characteristics of stores.

Like other areas of economics, spatial arrangement of shopping centers has a lot of externalities and those have to be internalized through rational rent discrimination and mall space allocation. The success of each store depends on the presence and performance of other stores, and also on the effort of the developer to maintain the mall. The success of a mall is to internalize efficiently the positive externalities and eliminates the sources of negative ones.

Space Morphological analysis

When spatial influence is incorporated in the strategic decision making process of optimal area, rent and space allocation decision, spatial configuration has to be properly explained. Space is normally described in qualitative terms making it difficult for comparisons and relating with other variables that can be measured. For quantitative and unbiased description of spatial properties, space morphological variables are used in the analysis of design geometry. Space syntax analysis can be considered as an important tool in this regard. It analyses built environment from a spatial perspective with some quantitative tools. The underlying concept is that, 'form' and 'function' are closely related. As it was previously mentioned, design considerations must incorporate articulation, connectedness, engagement, influence and integration, the corresponding spatial characteristics are movement and accessibility (both physical and visual).

There are various methods of space syntax analysis. With reference to the works of Hillier (1996) and Hillier and Hanson (1984), the method is the graph-mathematical approach (Justified Access Graph [JAG] analysis) and using that, the integration value can be calculated. The integration value refers to how well the subspace is integrated. Integration value may be understood as accessibility of a certain location within spatial network pattern. So, it is a measure of accessibility of a location.

For conducting the space syntax analysis, a plan diagram is covered with convex spaces- a convex space is a space where one can see every point in the space from every point in that space. A map containing convex spaces on a plan diagram is known as convex map. The convex space is converted into axial map by drawing axial lines. The axial lines are straight lines connecting each convex space in that map and the axial lines are as few as possible and may be interpreted as sight lines. Axial map may be viewed as a graph where the axial lines are represented as nodes.

Distance mentioned here are between nodes is the topological distance that one has to make and is different from metric depth and distance. As one moves from node i to node j, the depth is called d_{ij}. Depth is conceived as the minimum number of turns a pedestrian must make to walk from one node to another node.

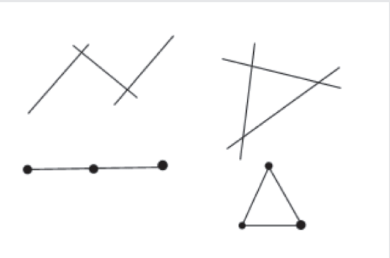

Figure 1: Enstrom and Netzell(2008): axial maps and corresponding nodes

Total depth (TD_n) of node i is the sum of all other nodes in the spatial arrangement,

$$d_i = \sum_{j=1;\, j\neq i}^{n-1} d_{ij}$$ [n=total number of nodes in the spatial system]

Mean depth (MD_n) $\vec{d}_i = \dfrac{d_i}{n-1}$

Mean depth measure is significant it denotes average number of turns one need to take from one spatial segment to other segments.

Enstrom and Netzell(2008) defined relative asymmetry as,

$$RA_i = \frac{2(\bar{d}_i - 1)}{n-2}$$

Relative asymmetry is the ratio between the difference between Mean depth and theoretical minimum mean depth and the difference between theoretical maximum mean depth and theoretical minimum mean depth.

Real relative asymmetry:

$$RRA_i = \frac{RA_i}{RA_D}$$

Where, RAD is the relative asymmetry of a root node of a diamond shaped graph of same size as node i's graph.

Finally the integration value can be expressed as:

$$i = \frac{1}{RRA_i}$$

Where, a higher integration value signifies that the space is highly integrated.

Another important space syntax analysis is visual analysis. Isovists are considered important in this regard. An isovist as defined by Benedict (1979) is a ***set of all points visible from a given vantage point in space and with respect to an environment.***

It provides description as, how users perceive it, interacts with it and moves through it. Isovists is considered as a polygon, constructed by the obstructions with respect to a particular point if 360^0 visibility from that vantage point is considered. It also has several numeric measures, such as:

Isovist area and perimeter: coverage and spread of ones visual and aural accessibility.

Isovist occlusivity measures, how far one could see as a proxy for how much one could see, and **isovist compactness** (average distance/ maximum distance), a compact place represent co presence.

From these quantifiable variables various spatial characteristics can be inferred, like, which place has better integration, which place enjoys better aural/ visual accessibility etc. Spatial layout provides the playground for interactions.

4.0 Analysis

If we consider a planned shopping center (n number of shops), where P_i= Total profit

p_i = Average price per unit of goods sold for a particular store i

α_i = Quantity of goods sold per purchasing customer visit for that store

A_i = Area of the store i

$u_i(A_i)$ = Proportion of customer traffic per unit of store area, that actually leads to purchase

d_i = density of customer traffic

Quantity of goods sold for store S_i:

$$q_i = \alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}} \quad (1)$$

d_{ij} is the cross store elasticity between shops i and j, stores and d_{ij} need not be same as d_{ji}. And β_i denotes natural density, total density for the store i is $\beta_i.\prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}$

Total sales for store i will be

$$p_i.q_i = p_i.\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}} \quad (2)$$

Total sales of the entire mall will be,

$$\sum_{i=1}^{n} p_i.q_i = \sum_{i=1}^{n} p_i.\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}} \quad (3)$$

Cost of store i is:

$$c_i = \varphi_i.q_i^{\tau_i} \quad (4)$$

Where, τ_i is the operating cost efficiency.

Cost of entire center can be expressed as:

$$\sum_{i=1}^{n} c_i = \sum_{i=1}^{n} \varphi_i.q_i^{\tau_i} = \sum_{i=1}^{n} \varphi_i.\left[\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}\right]^{\tau_i} \quad (5)$$

There are a number of constraints in this model, and they are to be included in the problem formulation. First, there is a capacity constraint or physical constraint, where the area requirement for all n shops will not exceed total available area of S*. Second is the availability constraint, where quantity of goods sold for all the stores cannot exceed a specific level of Q* and total customer density cannot exceed D* depending on the locational characteristic of the shopping center. Then there are control constraints. The area ALi and AUi are the lower and upper bounds for space allocated to store i. Lower bounds may be set for retailers pre-conceived notion of "image", irrespective of immediate profitability, and upper bounds for sustenance and design obligations. Finally there are non –negativity constrains on Si to ensure reasonable solution values.

The profit of the center will be:

$$P = \sum_{i=1}^{n} p_i.\left[\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}\right] - \sum_{i=1}^{n} \varphi_i.\left[\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}\right]^{\tau_i} \quad (6)$$

As the objective is to maximize profit, the model will be:

$$\max \sum_{i=1}^{n} p_i.\left[\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}\right] - \sum_{i=1}^{n} \varphi_i.\left[\alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}}\right]^{\tau_i}$$

Subject to

$$\sum_{i=1}^{n} A_i \le S^*$$

$$\sum_{i=1}^{n} d_i \le D^*$$

$$\sum_{i=1}^{n} \alpha_i u_i(A_i).A_i.\beta_i \prod_{\substack{j=1 \\ j\neq i}}^{n} S_j^{\delta_{ij}} \le Q^* \qquad i=1,2,3\ldots\ldots n$$

$$A_i^L \le A_i \le A_i^U \qquad i=1,2,3\ldots\ldots n$$

$$A_i \ge 0 \qquad i=1,2,3\ldots\ldots n$$

Because of intrinsic non-convexity of the model, linear programming cannot be used because neither the objective function, nor the constraints are linear. For the purpose of simplicity and convenience, a linear, symmetric mall is considered. This describes the situation of non-anchor stores. There are 'n' different types of mall tenants, and for each type of mall tenant, a store ' i ' will have the following profit function:

$$P_i = p_i.\alpha_i u_i(A_i).d_i.A_i - C_{Fi} - C_{Mi}.A_i - C_{Li}.\alpha_i.u_i(A_i).d_i.A_i - C_{Oi}.\alpha_i.u_i(A_i).d_i.A - r.A_i \quad (7)$$

C_{Fi} =Fixed cost for the store i

C_{Mi} = Variable cost of the store i, (maintenance, utilities and tenant finish-out etc)

C_{Li}= Labour and operating cost of the store i

C_o = Cost of goods sold

r= rent

Normally, Stores have an incentive to limit the size to a level, where the relationship $u_i(A_i).A_i$ has decreasing returns to scale. $u(A).A=k_1.A^{k_2}$, where, $0<k_2<1$ considering decreasing returns to scale

If, for convenience, we ignore the subscripts, the relationship will become:

$$P = p.\alpha.u(A).d.A - C_F - C_M.A - C_L.\alpha.u(A).d.A - C_O.\alpha.u(A).d.A - r.A \quad (8)$$

Differentiating equation (8) with respect to A, we have:

$$\frac{dP}{dA} = p.\alpha.u(A).d[p - C_L - C_O] - C_M - r + A.\{\alpha.d.\tfrac{dU}{dA}.[p - C_L - C_O]\}$$

As the purpose of the store is to maximize profit,

$$\alpha.u(A).d[p-C_L-C_O]-C_M-r+A.\{\alpha.d.\frac{dU}{dA}[p-C_L-C_O]\}=0$$

$$\therefore \alpha.d.[p-C_L-C_O][u(A)+A.\frac{dU}{dA}]-C_M-r=0$$

$$\therefore \alpha.d.[p-C_L-C_O]\frac{d[u(A).A]}{dA}-C_M-r=0$$

$$\frac{d[u(A).A]}{dA}=\frac{C_M+r}{\alpha.d.(p-C_L-C_O)} \quad (9)$$

If u(A).A=k1.Ak2, where, 0<k2<1 considering decreasing returns to scale

$$k_1.k_2.A^{K_2-1}=\frac{C_M+r}{\alpha.d.(p-C_L-C_o)}$$

$$A=[\frac{C_M+r}{\alpha.d.(p-C_L-C_o).k_1.k_2}]^{\frac{1}{k_2-1}} \quad (10)$$

In a competitive market excess profits are bid away by increases in rates of lease, so that P=0, so the profit function in equation (2) becomes

$$P=0=\alpha.u(A).A.d(p-C_L-C_O)-C_F-C_M.A-r.A$$

$$r=\alpha.u(A).d.(p-C_L-C_O)-C_M-\frac{C_F}{A} \quad (11)$$

From equations (10) and (11):

$$k_1.k_2.A^{k_2-1}=\frac{C_M+\alpha.u(A).d.(p-C_L-C_O)-C_M-\frac{C_F}{A}}{\alpha.d.(p-C_L-C_O)}$$

$$=\frac{\alpha.u(A).A.d.(p-C_L-C_O)-C_F}{A.(p-C_L-C_O)\alpha.d}$$

$$k_1.k_2.A^{K_2}=\frac{\alpha.u(A).A.d.(p-C_L-C_O)-C_F}{\alpha.d.(p-C_L-C_O)}$$

$$=u(A).A-\frac{C_F}{\alpha.d.(p-C_L-C_o)}$$

$$\Rightarrow k_1.k_2.A^{k_2}=k_1.A^{K_2}-\frac{C_F}{\alpha.d.(p-C_L-C_O)}$$

$$\Rightarrow k_1.A^{k_2}(1-k_2)=\frac{C_F}{\alpha.d.(p-C_L-C_O)}$$

$$\Rightarrow A^*=[\frac{C_F}{\alpha.d.(p-C_L-C_O).k_1.(1-k_2)}]^{\frac{1}{k_2}} \quad (12)$$

d, $r^*=C_F.\frac{k_2}{1-k_2}.[\alpha.d.(p-C_L-C_O).k_1.(1-k_2)/C_F-C_M]^{\frac{1}{k_2}}$

$$=C_F[k_2/(1-k_2)]./A^*-C_M \quad (13)$$

Where, A* is the Optimal store area and r* is the optimal rent.

From equation (12) it can be concluded that, considering the assumption of ceteris Paribas or other things remaining constant, optimal area of the non-anchor stores decreases with increasing customer density and vice-versa and the optimal rent of the non-anchor stores increases with the increasing customer density and vice-versa.

Discussion

Customer Density and Metric Distance from the central position

As it was previously mentioned, consumers prefer stores that can be easily accessible. Vandell and Carter(1993); Drezner et al.(2002), Dellaert et al.(2008) and Popkowski Leszczyc et al.(2004) supported the concept that consumers prefer closest stores ceteris Paribas. So, shops that are most accessible than others in a particular arrangement will generate more customer density when all other factors remain unchanged. Assuming a higher number of footfalls lead to higher sales, competition for accessible locations should drive up rents for shops that are accessible.

Now, if it is considered that, the density is dependent upon distance from the center of the mall where the customer density is dependent on the depth from the center of the entire spatial arrangement ,density can be expressed as a function of depth,

i.e., d=d(t).

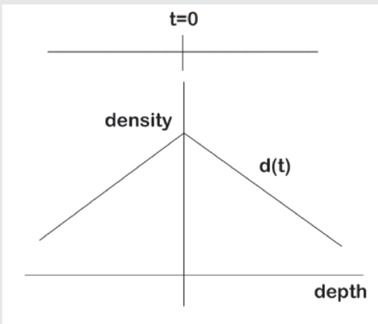

Figure 1: Depth density relationship

Considering the linear symmetric spatial arrangement, as mentioned at the time of describing the model, t=0 at the center and changes with increasing depth. There is a significant evidence that d(t) is downward sloping. The customer circulation study by Brown(1991), Sim and Way(1989) and from the general observations of Fisher and Yezer(1993) show highest concentration of shoppers at the center of the mall with decrease in density from the center.

The slope of d(t) can vary depending upon various other non-spatial factors but it will slope downward nevertheless. So, metric distance is one important factor for determining customer density and therefore retail rents.

But, the idealistic situation of symmetrical mall will not always hold and there can be difference of density at equal distances from the shopping mall center. So, some other variable for analyzing customer density is required.

Customer density and integration Value

The link between integration value and human movement has been investigated by Hillier et al.(1983), Hillier et al.(1987), Hillier et al.(1993), Hillier and Hanson(1984), Hillier (1988), Peponis et al.(1989), Marcus(2000).

Penn(2003) suggested that integration value captures how people cognitively perceive a space. His argument is that our understanding of space is not only metric but depends on non-metric factors also. It has a wide impact on movement in particular, as it can be considered as a standardized, unambiguous measure of how many turns to take.

Sadalla and Magel(1980) proved that changes in direction affects cognition of distance and the depth and makes people cognize the metric distance to be longer than it actually is.

Yun et al.(2007) showed that depth has a power of spatial cognition prediction of 72% and distance vis-à-vis has 53%. When two elements are highly important, with depth has a higher relationship.

So, importance is not only on metric distance but also on cognitive distance. Sadalla and Staplin(1980) explained that a change in direction is an important element in cognition of psychological distance. They argued that, the more a person have crossing points (or turns) in a path, the more they cognize them to be longer.

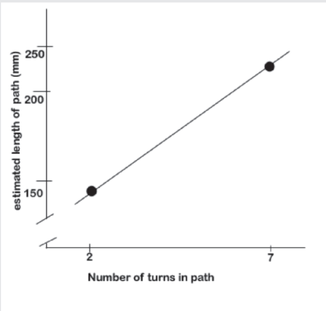

Figure 1: The rate of spatial cognition according to turn in path

The figure explains that more changes of direction a path has, the longer it seems to be. So, built environment makes people cognize the metric distance to be longer than it actually is.

Influence of Anchor Store

Central to the natural movement theory as propagated by Hiiier (1993, 1996), movement density is inherent in the structure. "natural movement on each line that is determined by the by the structure of the urban grid itself rather than by the presence of specific atractors or magnets". Hillier(1996). The common logic behind the spatial engineering is to oppose the hierarchy as it desires to equalize movement among the entire center. In a sense shopping mall layout seeks to maximize locales, through strategic placement of attractors throughout the attractors, an attempt to equalize "spatial potential". The shopping center negates the natural forces of configuration. From equation (6), dP/dA_i captures the marginal benefit of the store's own allocation of space and cross derivative $dP/dA_j (i \neq j)$ capture the external effect as a function of space. So, space should be allocated to a given store upto the point where its marginal sales are equal to the marginal cost of space minus the incremental sales that the store generates for all other stores in the center. Thus more space should be allocated to them, *ceteris paribus*.

Conclusions:

As, the density of customers depend both on metric and non metric property of a particular space and as the rent is dependent on density, it can be concluded that, when other things remain constant (without any interstore externality), rent decreases with increasing distance from the center and rent increases with increasing integration value. This considers customer density as natural customer density generated within a spatial arrangement.

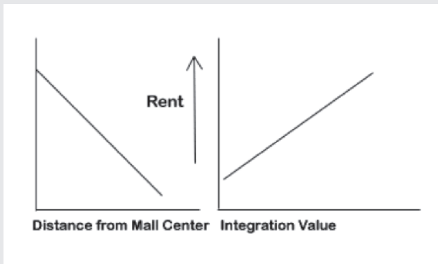

Figure 1: Relationship between distance from the mall centre and integration value and rents

So, the spatial bid-rent model can be shown in the following pattern of 2X2 grid. This model is applicable in a situation without inter store externalities. Here, integration value is shown in the vertical axis and distance from the center is shown in the horizontal axis.

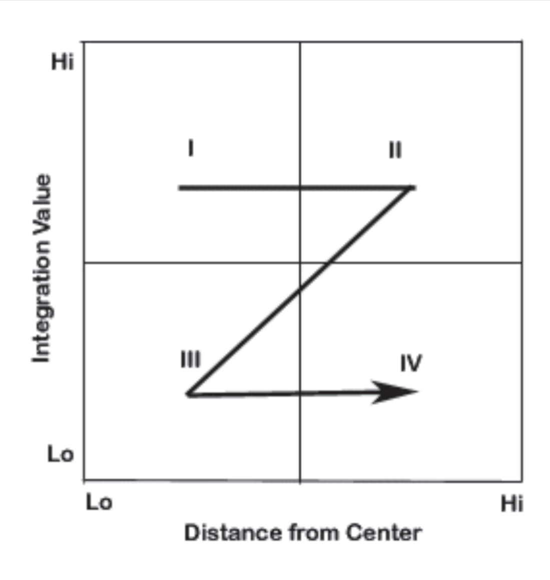

Figure 1: 4 cell retail rent model

In this 4 cell model, the first cell is high integration value and low distance from the center and it enjoys maximum rent. It is the area in the overall spatial arrangement that is most accessible and therefore enjoys maximum consumer density. The second cell is high integration value and high distance from the center, whereas, the third cell is low integration value and low distance from the central area in the spatial configuration. As, non-metric parameters are more influential than metric distance as mentioned above, the rent will be higher in cell number 2 than in cell number 3. The cell number four will have lowest rent as it has low integration value and high distance from the center, therefore least accessible with minimum consumer density.

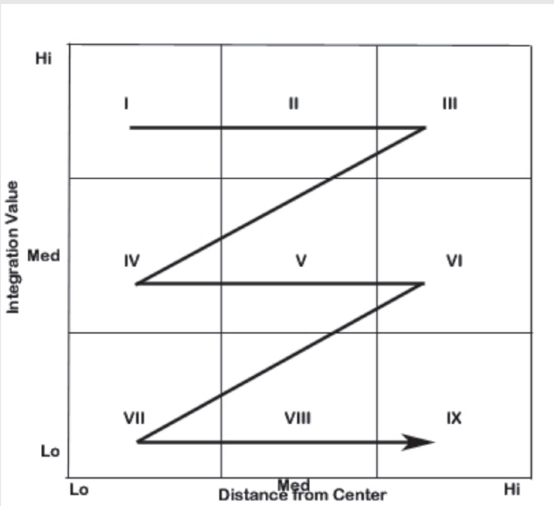

Figure 1: 9 cell retail rent model

Similarly, the concept can be extended to a 9 cell grid also. The changes in rents are shown in figure: 7. So, for same integration value, rent decreases with increasing distance and for same distant areas, rent increases with increasing integration value. The Integration value is more significant than metric distance.

So far we have not considered inter-store externalities. In the above Fig:7, cell VII, VII, IX will enjoy minimum rents as minimum human traffic is generated in those areas of any spatial arrangement. To enhance the overall profitability of the centre (i.e. increase rental values at those areas by generating impulse human movement), positive externalities are required at those points. That is why a strong anchor is required at those areas. If we consider that, the anchor store negates the externality of the low density areas as proposed in the incentive model (Figure:8). They enjoy more area and lower rent which they balance with increased traffic flow in low density areas.

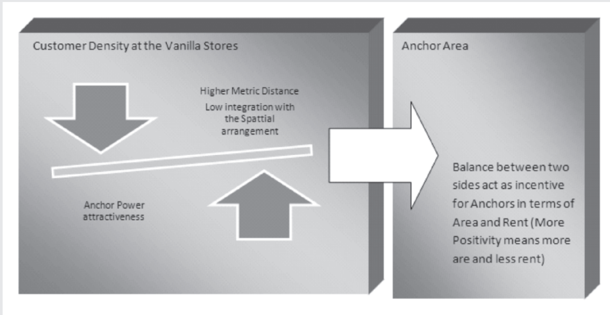

Figure 1: The incentive model for Anchor stores

So, space morphological analysis shows direction of positioning of anchor stores inside a shopping centre and creates a framework for scientific determination of lease rate and area.

Practical implications

Apart from developing a logical rent model for shops in a shopping mall, the study of space syntax is useful in following ways:

- § Influencing behaviour is one of the important retail strategies, and, as space influences behaviour, controlling spatial arrangements should be a strategic Retail function.
- § Space syntax analysis will provide theoretical perspective for understanding spatial arrangements and analysing alternative design choices.
- § It can be a useful evaluation tool. Normally the evaluation of alternatives is based on budget or aesthetics, but, as space syntax provides an unambiguous tool for analysing alternatives.
- § Another important use is the allocation of space and positioning of anchors. It will be a potential tool to decide on which shop to place where in the

arrangement.

- § It can also be used to align necessary functions and amenities in various areas. A highly segregated area will reduce the interaction with other areas in the spatial system and an integrated area will increase the same.

Research Limitations

- § Cultural aspects come into play in retail consumer behaviour but that is not taken into consideration.
- § The study is done on a flat spatial arrangement and multilevel work environment is not considered.
- § Mall Exterior, landscaping and locational factors are beyond the scope of the study.

Scope for future research

Despite the fact that the present paper provides a conceptual framework supported by mathematical evidence, it may guide mall management in developing a proper model of bid-rent based on locational characteristics. The approach is theoretical, but empirical verification of the concept can lead to proper development of a bid-rent model. Justification and analysis of rent is also possible and the rent, rather than based on a rule-of-thumb approach, can be calculated on a scientific basis.

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