A SYNTACTIC APPROACH TO THE ANALYSIS OF SPATIAL PATTERNS IN SPONTANEOUS RETAIL DEVELOPMENT IN DHAKA

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0 Abstract

This paper presents research into the spatial structure of 'spontaneous' retail development in Dhaka. It looks at the relationship between the location and pattern of retail clusters, observed patterns of shopper movement and the spatial configuration of a retail development in relation to its urban context. The post independence developing city of Dhaka has experienced tremendous growth of unplanned and uncontrolled shopping developments. These have emerged through a bit by bit natural process rather than through any formal planning process. This raises questions not only of the relationship between spatialisation and evolution of socio-economic structures during the process of rapid urban growth; but also of their spatial patterning in relation to the functional logic of retail.

By using 'Space Syntax' techniques along with a questionnaire and movement observation survey, the research allow us to investigate the following three issues: first, clustering patterns of retail types in terms of socio-economic variables and spatial accessibility within the development; second, the spatial configuration of the buildings as an independent and urban system, to investigate whether their internal spatial structure substantially derives or detracts from local and global urban patterns; and third, the effect of 'attractor' land uses and configuration properties of the shopping developments on the distribution of movement densities.

The research findings suggest that the configuration of the spatial layout strongly influences the functional distribution and the movement pattern and densities in the spontaneous retail developments. 'Generator' functions appear to cluster whilst 'suscipient' functions disperse. However this spatialisation appears to be a natural outcome of the socio economic behaviour amongst various retailer and consumer groups. Co-operation and competition are played out in a spatial context.

Keywords: Retail, Spontaneous, Attraction, Configuration, Movement, Urban

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1 Introduction:

Spatial patterns of retail development arise as a result of the dynamic interaction between the consumer and retailer, each following their own agenda. In the west, these interactive relationship depends largely on theory and practice. whereas in the developing countries , theory is possibly less of a factor. The conventional 'attraction' theory of pedestrian movement reefers to the trip generation potential of built forms (Pushkarev, and Zupan, 1975); which has been adopted by the retail planners in the internal design of retail centres. From their view points, stores attract consumers, channel travel patterns, and ultimately affect the location of other stores' (Simmons, and Jones, 1990: 121). In fact the logic of merchandising planning, with its mechanists terminology of 'magnets', 'generators', 'pull' and 'flow' led to the planning patterns of

shopping centres. Thus the generic type of spatial morphologies in North American and European context are based upon the number and siting of major magnets which attract and modulate movement pattern and densities within the shopping precinct (Maitland, 1985: 110).

On the contrary, spatialisation of retail activity is more critical in a developing context. Within a process of rapid urban growth, a varied socio-economic group of retail's and consumer's participation give rise to a large mix and variety of retail structures (Paddison, Findlay and Dowson, 1990: 8). Since Dhaka became the capital city of independent Bangladesh in 1971, the majority of the retail centres are developing spontaneously (Islam, 1996: 35), without any concern of surrounding land use pattern (Fig: 1), functional structure or any other concerns of the retail planning theories and regulations Moreover, an extensive growth of 'informal' hawking activities within the shopping precincts, has created a cluttered urban scene (Ahsan, 1991: 409), in their overall structuring in the larger urban grid. In this sense, this research selects "spontaneous' retail development in a rapidly urbanising city Dhaka, to study how space is implicated in a more complex socio-economic relation. Irrespective of any formal retail planning theories, what are the behavioural dynamics of the various retailer, hawker and consumer group in relation to space, becomes an imperative research question. From these notion, this study attempts to look over space - as a way of producing the interface between the spatial nature of retail attraction and their social meanings; thus, the spatial configuration of the various retail structures will be the main level to search through.

From the above perspective, two spontaneous retail developments with a very different spatial configuration, ie. Gausia Shopping Centre and New Elephant Ribbon Development, have been selected from the 'naturally grown' 'central retail area'1 (Fig: 1,2) of Dhaka. This study would provide a clear understanding of the socio economic dynamics of space implication and their variation in two distinct type of spatial structures.

Figure 1. Land use map of Dhaka city (1995) with the central retail area

Figure 2. A map of central retail area with Gausia Shopping Centre and New Elephant Ribbon Development

The notion of "spontaneous' growth, directs the research interest towards the study of the spatial properties in relation to the functional logic of retail. As these retail centres are developing spontaneously, it is believed that, their spatial structures have significant effect on the distribution pattern of various retail functions in space, and thereby, controlling the movement pattern and densities through configurational parameters along with their attraction effect2.

The aim of this paper, to put in simple words, is to study the socio-spatial logic of movement in a 'spontaneous' urban retailing system. Thus, 'Hillier's' theory of 'Natural Movement' (Hillier, 1996: 161), which reefers to the urban pedestrian movement determined by the grid configuration, would be applied here by using 'space syntax' techniques (Hillier, 1993; Hillier, 1989; Hillier and Hanson, 1984; Hillier, Burdett, Peponis, and Penn, 1987;) . This study is performed in four different sections: First, a questionnaire survey is performed to understand the socio-economic behaviour structuring different retail attractions; Second, a syntactic analysis is performed in order to understand the spatial properties of these attractions and space configuration of the systems; Third, a movement observation is done to identify the density and pattern of shoppers movement within the systems, and Fourth, the correlation between the syntactic properties, attraction and movement pattern are studied in order to understand the effects of the social and spatial properties on the movement pattern in the systems.

2 Spatial properties of the spontaneous retail developments in relation to socio economic variables

2.1 Physical form of spontaneous retail growth

Before entering into the main analytical part of the study, a brief description of the physical layouts of the systems are described here.

The retail business centre of Gausia area flourish in 1966 with the construction of an entire block of shops named 'Noor Mansion'. Since 1972 this retail centre expanded into several block of shops, namely : Nur Mansion (1966 -67), Gausia Market (1972-75), Chistia Market (1976 -80), Hussania Market (1976 -80) & Ismail Mansion (1980 -90). Thus the boundary line of the site has changed several times following an unplanned growth invading into the adjacent residential land use. Previously the buildings were separated and had different land owners (Sayeed, 1986). But gradually the land demarcation is no longer there and the resultant physical form represent a single complex character (fig: 3) . The centre is surrounded by MIrpur road on the west and Old Elephant Road on the north. However Old Elephant Road have maximum interface - providing seven entrance to the centre. Only a single entrance give access to Gausia Market from Mirpur Road. Though occupying five blocks with different configurational characteristics, the entire shopping development is familiar as 'Gausia shopping centre'.

The resultant physical character of Gausia Shopping Centre represents a complex physical form. It is a combination of five different markets with variant configurations. The resultant physical configuration is a combination of the following characteristics:

- Double loaded linear corridors (covered or open to sky) act as a common circula-

tion route between different markets. These corridors also provide entry to the markets in the deeper part of the site which are not directly accessible from the surrounding streets.

- Linear double loaded corridor with smaller length than the previous category, which serves individual market .
- Closely set double loaded corridors with smaller length forming a compact grid iron pattern of circulation system.
- The resultant physical form is an enclosed deformed grid structure, resulting from a rambling arrangement of five markets with different configurational characteristics.
- The layout of the internal movement system of the centre appears to be a product of haphazard but continuous connections between different markets. Thus, the overall configuration appears to be very compact. In fact it is very difficult to identify the individual markets visually. While walking through the centre one can hardly identify the presence of five markets.

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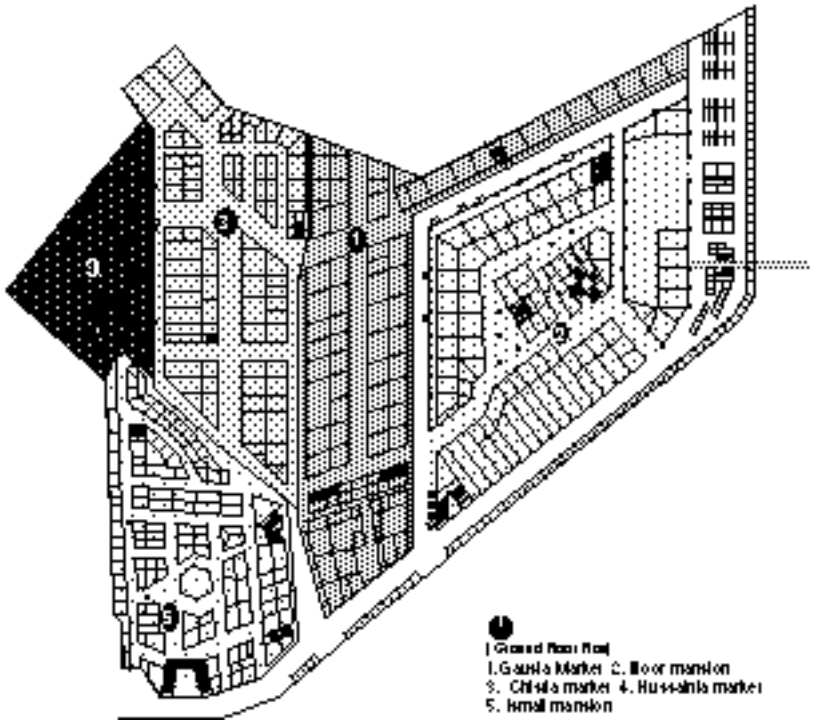


Figure 3. The resultant physical form of Gausia Shopping Centre with the five markets

New Elephant road shopping street is the largest and most popular shopping street in Dhaka. It started to grow in a scattered manner around 1965, with a few grocery shops to serve the local residential communities. Gradually these individual shop units formed a ribbon pattern following the entire length of the street. Here mostly the ground floors of the residential units were converted into shop units. The narrow residential lanes penetrating from New Elephant road also experienced shopping activities, following a gradual growth pattern.

With the growing importance of Gausia business area, New Elephant road expanded suddenly in 1980's. Here the residences were renovated into shopping centres along with the newly constructed ones. At present New Elephant road ribbon development occupies 18 small scale Shopping centres with a very few number of shops. Majority of these shopping centres are characterised by double loaded corridors representing a grid iron circulation pattern, developed between 1979 to 1995.

The resultant physical configuration of New Elephant Shopping Street (Fig:4) is a combination of the following characters:
- Linear arrangement of individual shop units along both side of the street forming the main shopping corridor .
- Individual shopping centres developed in grid pattern with double loaded circulation corridors are directly accessible from the main shopping corridor.

2.2 Socio-spatial nature of attraction

This part of the study attempts to identify the recurrent pattern of socio-spatial behaviour, ie. the profit motivated attitude of the retailers and consumers in the spatialisation process and pattern of different retail facilities. The pattern of retail clusters in the retail centres under study, has been identified from a direct land use observation (fig: 4) within the developments.. The functional structure of the centres has been classified according to 'Nelson's'(Nelson, 1958) three profit motivated business locations ie. the generative, shared and suscipient business types3. On the basis of an elaborate and extensive questionnaire survey and interviews with the various retailer and consumer group, preferable location and spatial patterning of these three business types were identified later.

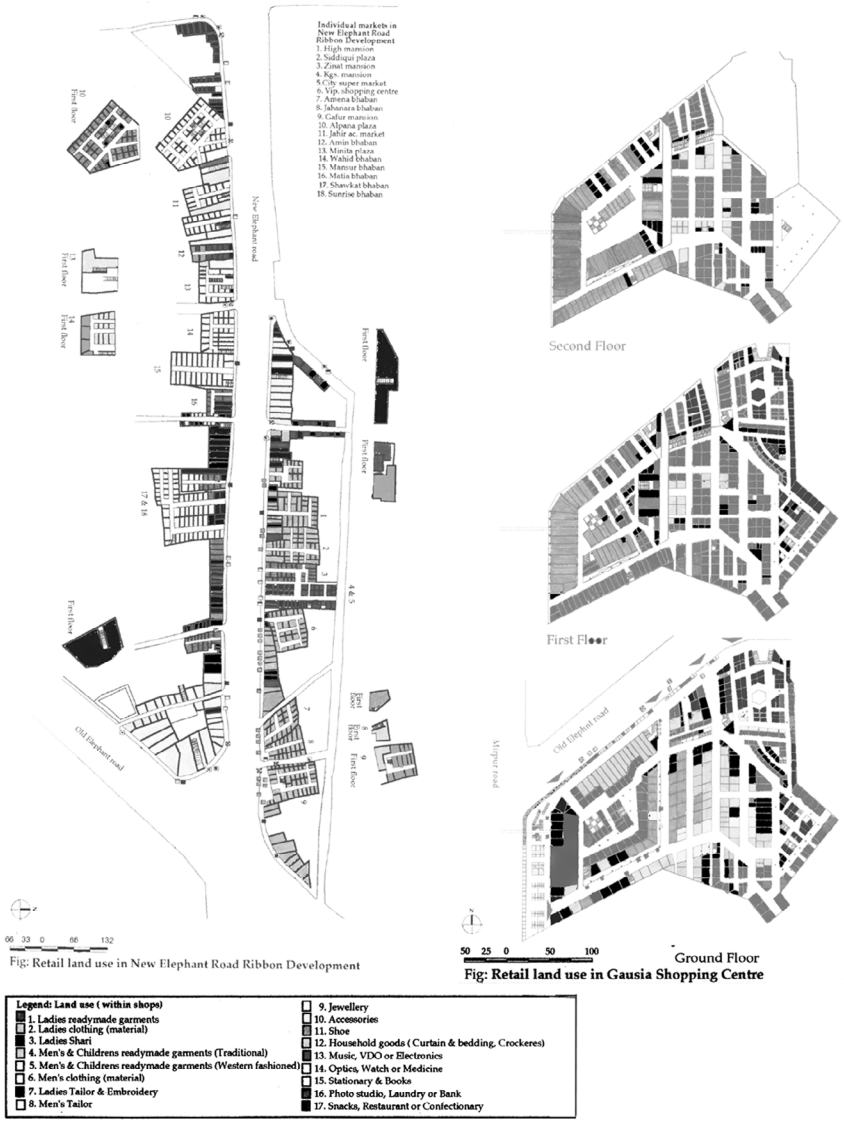


Figure 4. Retail land use in Gausia Shopping Centre and New Elephant Ribbon Development

2.2.1 Consumer behaviour and retail cluster

From consumers view point, questions related to preplanned shops visited, other shops visited and shops planning to visit next respectively determines the generative, suscipient and shared business categories (Simmons.J, 'et al' 1990: p-121). Based on these findings, the functional structure in the retail developments have been categorised as follows:

Functional Structure in Gausia Shopping Centre	**Functional Structure in New Elephant Ribbon Development**
Generative business: - Ladies ready made garments, (traditional clothing) - Ladies clothing (material) - Men's and children's ready made garments (local made)	*Generative business:* -Men's and children's ready made -Ladies Shari , garments (traditional) - Men's and children's ready made garments (western fashioned) - Footwear -Household Goods- Carpets, Furniture, Curtain etc.
Shared Business: - Footwear -Ladies Tailor and Embroidery	*Shared Business:* - Ladies ready made garments, - Electronics - Restaurants
Suscipient business: - Accessories - Music - Snacks - Household goods - crockeries, curtain etc.	*Suscipient busi*ness: - Accessories - Music - Photo studio - Snacks

Questions related to the demographic mix show the dominance of 75% of the female customers with a majority of house wives and students in Gausia Shopping Centre. This, might be the effect of the locational importance of the residential and institutional set up of the catchment area. Though located in the similar urban context, a reverse case is found in New Elephant Ribbon Development. It show a strong dominance of 68% male shoppers, but the locational influence is still prominent with 43% students category The difference in age, sex and occupation. refers to the fact that, the spatial pattern of retail cluster in these two retail developments are affected by different shopping behaviour and preference levels.

The contrast in demographic mix in the shopping centre and ribbon development is an outcome of social norms of behaviour, which is also guided
by conservative Muslim norms. The custom of separating men from women, in public places4, attract more female shoppers in the enclosed shopping centres than in more open layout of the ribbon development. This variation in demographic structure has created a different demand pattern, consequently the generative business type varies in the Retail developments within the same vicinity.

A lower shopping expense with an extensive burgaining attitude of the 80% consumers in both retail centres, reflect their price consciousness rather than the quality of products. This phenomenon has increased the hawker accumulation and impulse purchase in and around the shopping centre. The impulse buying habit of the female shoppers has in turn enhanced the growth of more suscipient business types in dispersed locations of Gausia Shopping Centre. Where as, suscipient functions are scattered along the main shopping corridor in the ribbon development.

2.2.2 Retailers attitude and retail cluster

To begin with retailers location decision, both retail developments as a whole represent, a nucleated and linear cluster of generative and shared business types in contrast to a very disperse nature of distribution of suscipient functions. In the individual markets within Gausia shopping centre, the generative functions tend to cluster linearly along the corridors. This pattern is more prominent gradually in the upper floor levels, where selling is more dependent on demand purchase than impulse buying. The shared business types represent their dependency relationship between individual and different floor levels. At the ground floor level the entry points display a random and scattered distribution of three business type, to offer a good variety to the general consumers.

In both retail developments, the generative functions ie. the clothing shops tends to form a clustering pattern with higher shop numbers. This represent the profit motivated competitive attitude of the retailers group by ensuring comparison shopping of these items. This spatial patterning is further emphasised by the extensive bargaining offered by the various group of retailers within a cluster of similar shop type. In New Elephant Ribbon Development, the generative nature of shoe and household shops, have arranged them in spatial clusters. The carpet and furniture shops are located on the extreme end of both side shopping corridor to ensure better parking facility on the adjacent local street. In Gausia Shopping Centre, the interesting issue observed in the overall space use pattern is that, the common circulation corridors occupy similar retail types on either side serving two different market. This have functionally and visually united these five markets within a single complex character.

-In general, the demand growth of generative business types, such as, Ladies clothing in Gausia Shopping Centre and Men's clothing in New Elephant Ribbon Development, has influenced the rapid growth of embroidery and tailoring shops on the upper floor levels. This shared nature of retail cluster and their locational significance represent the attitude of the retailers to attract more customer flow in the upper floors, where general shoppers flow tend to be very low. In a female dominated shopping Centre, shoe shops are linearly clustered facing the main shopping street, to attract different group of consumers and general public passing the busy Old Elephant Road. As per retailers perception, in a female dominated market, the profit level of shoe shops are strongly dependent on the seasonal business5 of the neighbouring men's and children's ready-made garments in Ismail Mansion and Hussania Market.

- In Gausia Shopping Centre, Accessory shops in a small group are dispersely distributed in different locations of the entire building . To enhance impulse buying, majority of these shops tend to cluster near the entry points and staircases, to attract all type of shoppers moving in and around the market. Due to their suscipient character, the music and snack shops are always located near the entry points to attract shoppers and general people moving along the main street. In the ribbon development, the suscipient functions are mostly scattered along the entire length of the main shopping corridor, to take advantage of the moving people on the street.

- Based on employment type, three categories of hawkers were identified, they are; self employed hawkers, hawkers employed by the retailers, and the hawkers Employed by the factory owners. The static hawkers accommodate all the three categories mentioned above. These hawkers employed by the shop owners and local factory owners posses a larger and permanent area surrounding the Centre. Their selling strategy is based on a soudo competition. They cluster in a group of 10 to 20, selling clothing and shoe. Thus, by ensuring comparison buying of generative business type, they create a pseudo competition among their group, employed by a single employer. This profit motivated selling strategy have resulted in a nucleated and linear clustering pattern of the spatial layout within the hawker's zone facing the main street. Where as majority of the mobile hawkers, selling accessories, snacks and fruits, etc., dispersely locate themselves near the main street, entry points and common circulation corridors to increase impulse buying of these suscipient functions.

3 The spatial configuration of the spontaneous retail developments

In order to understand the configurational properties of the spontaneous retail developments, an analysis of the spatial layout is performed using various space syntax techniques. This part attempts to identify, whether these socially viable physical patterns have any spatial logic of space. The analysis has two parts; Spatial properties of space configurations and Spatial properties of retail clusters.

3.1 Spatial properties of space configurations

The syntactic structure of the retail developments are analysed in two levels, First, as an independent system, and Second, as an urban system.

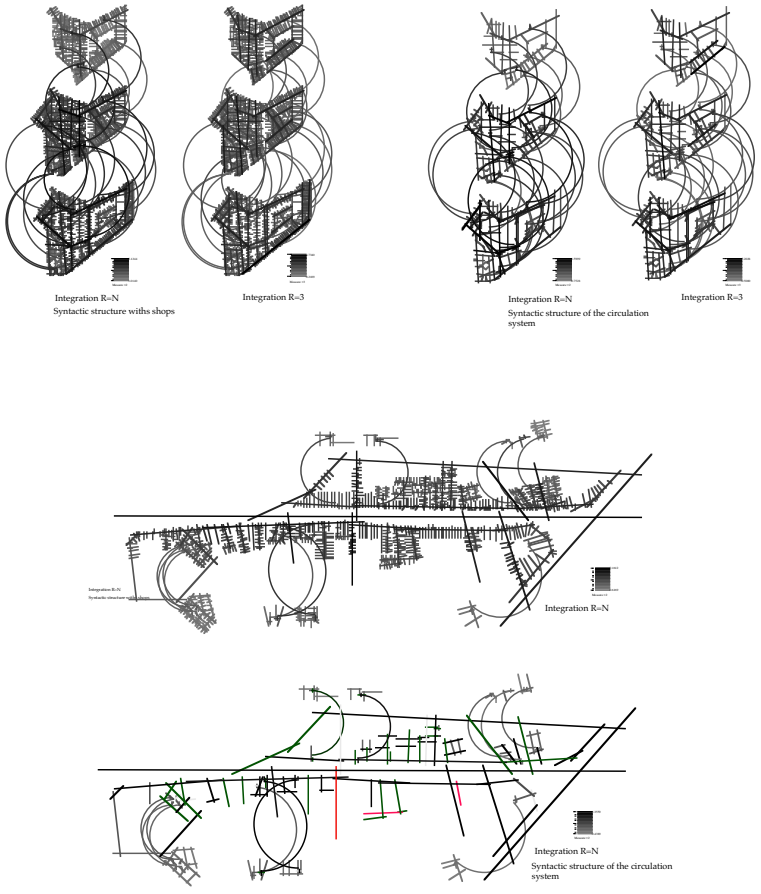


Figure 5. Integration pattern in the internal syntactic structure of Gausia Shopping Centre and New Elephant Ribbon Development

3.1.1 The internal syntactic order of the retail developments

This level of the analysis is performed at individual floor levels and all floors together. The analysis is also carried out with and without including the individual shop units and the hawkers, due to the fact that, extensive number of shop units may affect the integration pattern of the spatial layouts.

The analysis at all floor level represent significant difference while considering the system with and without shop units (Fig: 5). Including the shops, the first floor appears to be most integrated within the entire system. These is because of an abrupt location of a number of stairs ensuring physical connections between this floor and other floors. At this stage the common and long linear corridors represent an integrated system of circulation within the entire centre. While analysing the centre without shops, the ground floor becomes most integrated one, presenting a different integration pattern of circulation system. Here, the common corridor between Gausia and Chistia market is the most integrated space which connects other most integrated corridors of remaining four markets forming a centrifugal integrated pattern of circulation.

As opposed to these global properties, the local properties of the syntactic structure of the centre vary quite significantly. At local level axial analysis, each of the five markets posses an integrated line which is either a common circulation space or long linear corridors. Thus the local syntactic structure of the entire system represent the existence of individual markets, within a more discontinuous organisation integrated spaces. But globally the internal spatial structure of Gausia Shopping Centre represent, a well connected and continuous ring, forming the integration core of the centre.

The intelligibility of Gausia Shopping Centre is significantly different between all floors (.269) and ground floor (.569) level. However, poor intelligibility at all floor level, may be due to the fact that, the centre comprises five markets with different kinds of spatial layout. At ground floor level, the organisation of the most integrated spaces of common circulation corridors, form a continuous ring around each market. But a more discontinuous organisation of axial spaces and an abrupt connection of too many vertical connectors, failed to ensure physical and visual continuity between different floors and individual markets in upper floor levels; resulting in a poor intelligibility of the centre at all floor level.

The fact that the five markets are well connected within a continuous ring of common circulation spaces, has also been proven by the strong local global relationship of the internal system (Table: 1) at ground floor level. Therefore from an individual market, a consumer can identify himself within the global circulation system to a reasonable extent.

The interesting issue is that, the syntactic analysis including the hawker's zone, represent an increasing intelligibility and local global relationship (Table: 1) of the internal spatial system. This is perhaps due to the configurational similarities between the hawkers space organisation and a similar compact grid morphology of Hussania market and Ismail mansion, on the periphery of the other markets with more loosely spaced linear and grid morphology.

Table 1

Retail Development	R^R=n -CN	R^R=n -R=3	R^R=n -CN	R^R=n -R=3	R^R=n -CN	R^R=n -R=3
Gausia Shopping center						
Ground Floor	.569	.604	508	608	.1289	.3031
Ground Floor + Hawker 613	.6596	653	653	.167	.355	
All Floor	.269	.306	.306	449	.131	269
All Floor + Hawker	.245	.322	359	449	141	256
New Elephant Road Ribbon						
Ground Floor	.329	.561	.408	.845	314	.797
All Floor	.205	.407	.239	.680	.188	6099

Table 1. Intelligibility and Local - Global relationship in the syntactic structure of the retail developments

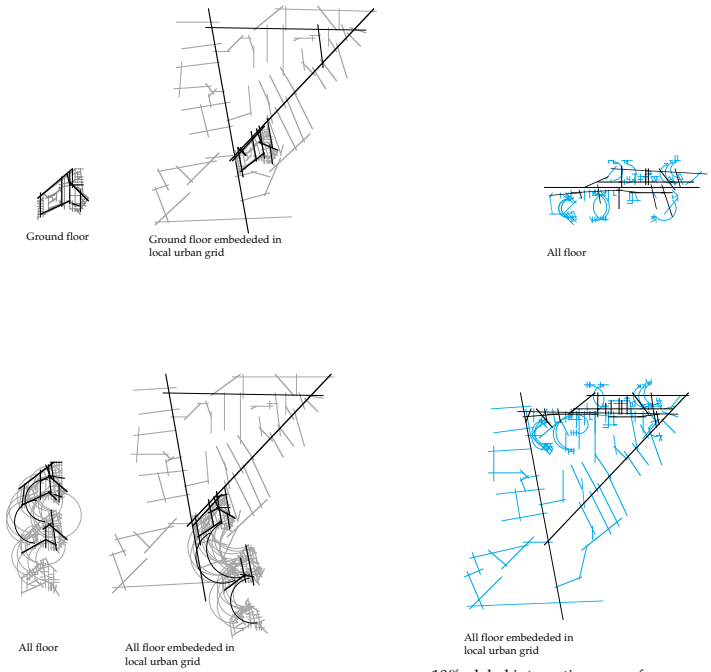
The integration core of New Elephant ribbon follow a gradual decline from the main shopping street towards the deeper parts of the individual shopping centres (fig: 5). Both side shopping corridors with and without shops, represent strong division of integrated lines along their length, each strongly coincide with the functional zoning of this ribbon development. In northern shopping corridor, the middle part accommodating the shoe shops and in southern shopping corridor the west part with men's clothing remain the integration core of the whole system.

In all level of the syntactic analysis, the spatial layout of New Elephant Ribbon Development show quite strong local global relationship within a poor intelligibility of the system (Table: 1).This indicates, a high level of social investment in maintaining a spatial interface between consumers within a very unintelligible spatial structure of the northern corridor.

3.1.2 The spatial pattern of the retail centres as an urban system

Here the location and pattern of the integration cores in the retail centres are studied. In order to ensure an adequate context for these urban retail centres, and that calculations are not biased as a result of an arbitrary choice of the boundary of the systems under analysis, first, the centres are analysed within the local street grid; then, it is analysed within the global context of the catchment area6.

When embedded in the local street grid, the integration core of Gausia shopping centre coincides with the external urban grid, with a good local global relationship between the internal and external system(Fig:7). The integration core of the centre both at ground floor and all floor level, remain unchanged (Fig: 6), which is even strongly integrated with the external grid. The mean integration value of the syntactic structure of Gausia Shopping Centre increases from 1.21 to 1.43 when embedded in the local street grid. The syntactic analysis of the centre embedded in the catchment area that is the global urban context, also confirms its relatively integrated nature (Table: 1). It is perhaps due to the fact that, the most integrated axial spaces ie. the common circulation corridors are directly accessible from the surrounding streets, thus the syntactic structure is strongly connected from the surrounding street grid within which it is located. This integrated syntactic structure suggests that, as a retail centre the building is more definable in terms of physical continuity within an enclosed and highly congested grid morphology.



10% global integration core of Gausia shopping centre

10% global integration core of New Elephant ribbon development

Figure 6. 10% global integration cores of Gausia Shopping Centre and New Elephant Ribbon Development

In fact, within a spontaneous growth process, a part of the local urban grid has been transformed into shopping streets within an enclosed structure. Thus, the syntactic similarities between the integrated internal system and the external street grid can also be interpreted in terms of configurational similarities between the two along with a strong physical connections between the two.

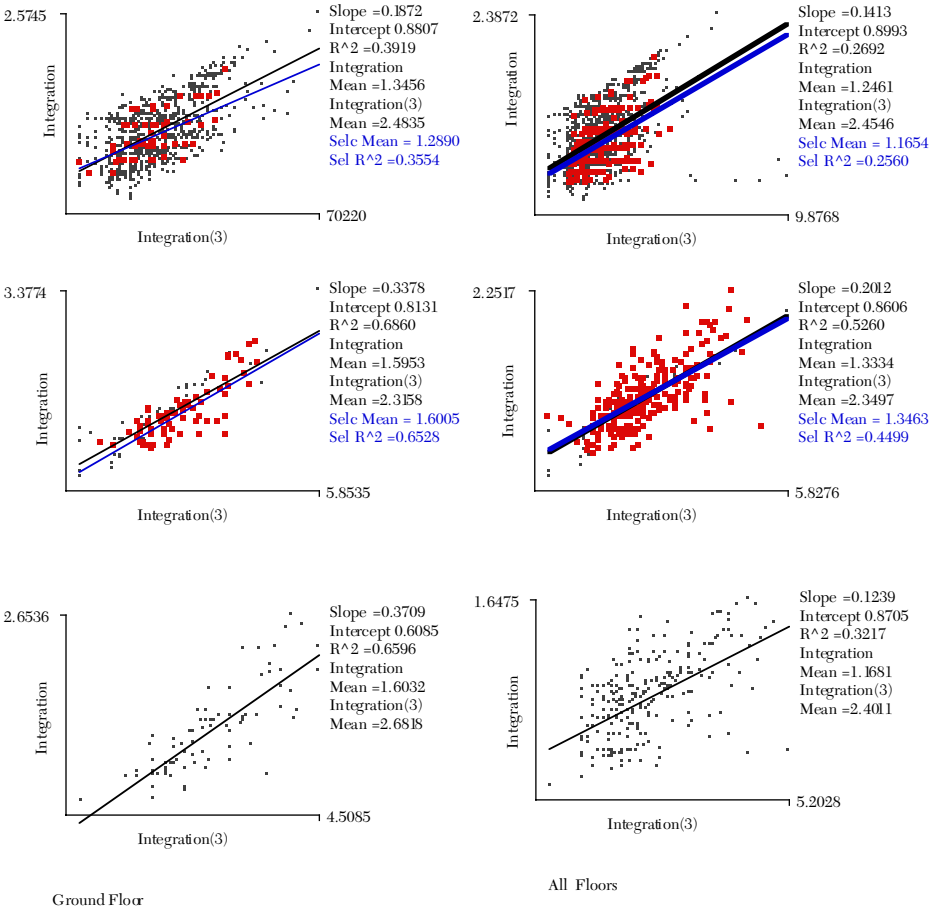


Figure 7. Scatter gram showing local-global relationship in the syntactic structures of Gausia Shopping Centre

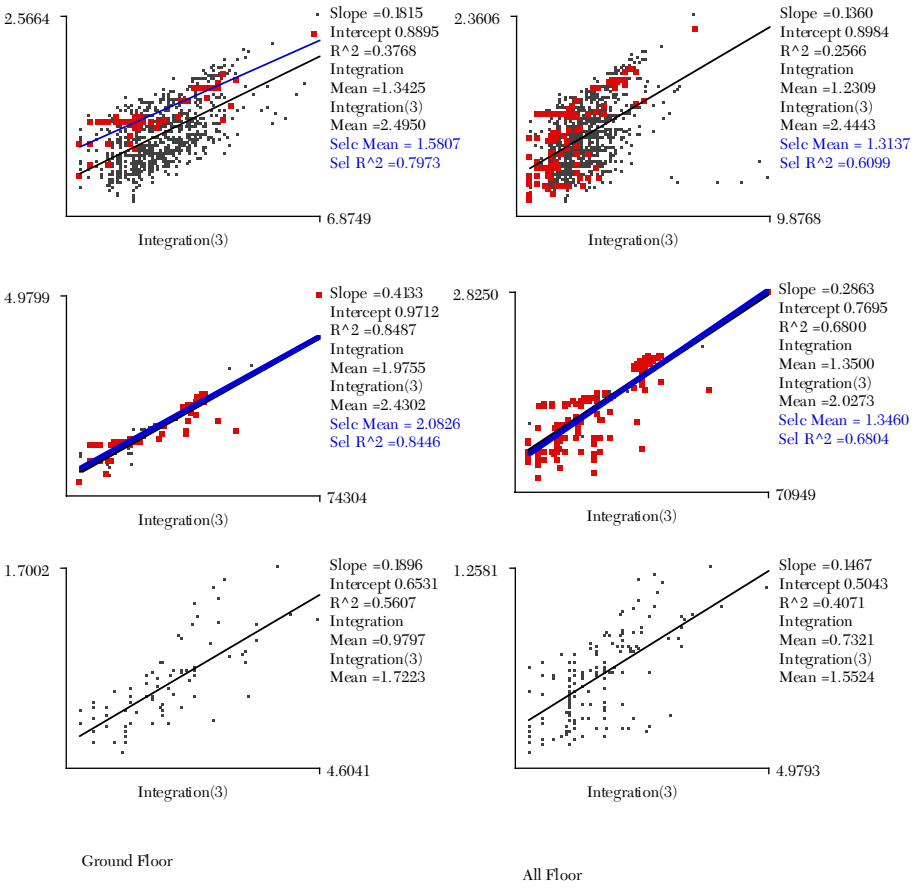


Figure 8. Scatter gram showing local-global relationship in the syntactic structures of New Elephant Ribbon Development

Irrespective of their very different spatial morphology, New Elephant Ribbon Development represents strong syntactical similarities with Gausia Shopping Centre. In both case, the mean integration value and the local global relationship increases (table: 1) when their internal spatial structure is embedded in the local urban grid (Fig:8). In all floor level analysis, New Elephant Ribbon show even better local global relationship in the global urban context than as an independent system.

This is possibly due to the fact that, the linear pattern of development results in a segregated spatial layout where individual shop units and shopping centres are only connected with the main shopping corridor parallel to the street. Consequently individual structures, such as, 18 shopping centres do not have any physical connections among themselves. Which results in a lower intelligibility and poor local global relationship (table: 1) of the syntactic structure. But again simplicity of the spatial layouts ie. linear and ring patterns of axial spaces of the individual markets, being directly connected with the external street grid; increases the local global relationship to a significant extent.

3.2 The spatial properties of attraction

It is clear from the questionnaire survey, that in absence of any retail planning theory, the generative, shared and suscipient retail locations in the spontaneous retail developments arise, as a result of the dynamic interaction between the profit motivated attitude of the various retailer and consumer group. This part attempts to explore the syntactic properties of these socio-economically viable retail locations. To identify the spatial accessibility of different retail type, the significance of the mean integration value for different retail type has been analysed through 'T-test' analysis.

The results of the T test analysis illustrates that, the Generative, shared and suscipient business in Gausia Shopping Centre syntactically represent the most profitable retail location in relation to these three business categories. The negative probability value for the generative business types (table:2) accommodating ladies garments within maximum number of shop units, represent the fact that, the growing demand of these business types do not require a spatially better accessible location to attract the consumers. But being a shared and seasonal business, the shoe shops posses a better integrated location to attract the male customers at the street front, where the Shopping Centre acquires 75% female consumers. A different locational game is followed in New Elephant Ribbon Development, where generative business types occupy a better accessible location to attract majority of the male customers; who do not spent more time in shopping, thus do not follow a routinised responsive behaviour7 like the more frequent female shoppers.

The shared business in Gausia Shopping Centre, ie. the tailoring and clothing shops also locate themselves in comparatively less integrated location (Table: 2), as they secure sales and profit by the neighbouring generative functions. In fact they act like a supportive function to the generative business types. For example, ladies shari shops in the lower floors of Gausia Shopping Centre has influenced the rapid growth of embroidery and tailoring shops on the less integrated second floor level; where general shoppers flow are considered to be much lower.

Table - 2

Retail Type	**Total shop** no.	**Sample Mean** (R=N)	**Pop. Mean** (R=N)	**t-value**	**probability** (1-tail)
Gausia Shopping Centre					
Ladies RG.	449	1.518		- 3.91	.0001
Ladies Cloth (material)	110	1.692		2.59	.0055
Ladies Shari	83	1.49	1.576	- 1.9	.0302
Mens & Childreans RG.(traditional)	138	1.66		3.107	.0012
Ladies Tailor & Embroidery	70	1.27		- 7.834	.0001
Accessories	207	1.63		.804	.2111
Shoe	13	2.49		-	.0001
Household goods	20	19.97		7.607	.0001
"Music, Vdo, Electronics"	1	2.22		-	-
Snacks or Reataurants	6	2.35		7.545	.0003
New Elephant Ribbon Development					
Ladies RG.	114	1.086		-3.977	0.0001
Mens & Childreans RG.(traditional)	48	1.356		5.431	0.0001
Mens & Childreans RG.(western)	209	1.282		3.704	0.0002
Mens Cloth (material)	23	0.957		-7.395	0.0001
Mens Tailor	22	0.797		-7.689	0.0001
Accessories	34	1.396	1.223	3.742	0.0003
Shoe	225	1.157		-4.969	0.0001
Household goods	47	1.372		7.475	0.0001
"Music, Vdo, Electronics"	43	1.355		7.065	0.0001
"Optics, Watch or Medicine"	33	1.431		7.982	0.0001
"Photo studio, Laundry or Bank"	3	1.086		-0.523	0.3266
Snacks or Reataurants	22	1.323		1.951	0.0323

Table 2. Spatial properties of various retail clusters in Gausia Shopping Centre and New Elephant Ribbon Development

A positive mean integration probability value of the suscipient business types (Table: 2) in both the retail developments, represent their locational games. By their disperse nature of distribution in different integrated locations such as near the stair cases, entry points etc., they secure increase impulse buying to a reasonable extent.

4 Consumer movement patterns in the spontaneous retail developments

This part attempts to find out the effect of 'attractor' land use and internal' configuration properties' of the shopping developments, on the distribution pattern of consumer movement densities within the developments. A survey of movement flow in the corridor spaces and within the shops were done. The survey was done following the standard space-syntax procedures; ie. 'gate observation' in the corridor spaces and 'snap shot' method inside the shops. A route covering a total of 90 axial spaces in Gausia Shopping Centre and 87 axial spaces in New Elephant Ribbon Development, was selected for the study. In each case, 100 gates or points were chosen on the selected route of axial spaces. Movement observation was done 10 times, each for 3 minutes time period; thus a total of 30 minutes count was done in each gate. The snap shot method to count shoppers density was followed five times a day in individual retail units

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In Gausia Shopping Centre, the movement pattern strongly follow a hierarchy of spaces from configurational view points. At ground floor level, the overall movement flow gradually decline from common circulation corridors to the long and smaller length corridors serving individual market (Table: 3). Similarly, New Elephant Ribbon Development also follow a movement pattern, which reasonably coincide with the hierarchy of space configuration as identified in Table 4.

Table: 3

Ground Floor

Axial Line No	*Space Category*	*Moving Men*	*Moving Women*	*Moving Student*	*Moving Hawker*	*All Movement*
1		214	224	156	35	629
2	Common	129	257	76	36	490
14	Circulation	179	363	162	31	735
9	Corridors	13	139	20	0	172
21		91	223	77	3	394
4		92	134	64	0	290
5		176	212	92	15	495
10	LinearCorridors	69	132	52	0	253
20	Serving Individual	16	27	11	0	54
23	Markets	36	121	67	0	224
25		37	26	18	0	81
29		26	245	3	7	281
6		26	78	9	0	113
7		21	99	39	0	159
8		31	118	37	0	186
9	Smaler length	78	132	53	0	262
11	corridors forming a	139	197	153	0	489
12	compact grid	149	184	114	0	447
13	circulation pattern	136	198	98	7	439
15	in individual	12	46	14	0	72
16	markets	12	41	11	0	64
17		15	29	7	0	51
18		12	20	5	0	37
22		17	45	9	0	71
24		25	34	17	0	76
26		13	47	6	0	66
27		10	128	2	0	140
28		7	107	3	0	117
30		37	165	4	3	209
31		19	177	18	0	214
32		38	193	43	0	274

Table 3. Movement pattern in Gausia Shopping Centre

3		297	291	260	53	901
33	Hawkers Zone	293	232	193	43	761
3.4		136	216	116	33	501
3.6		104	157	91	18	370
3.7		124	157	91	15	387

First Floor Level

Axial Line No	*Space Category*	*Moving Men*	*Moving Women*	*Moving Student*	*Moving Hawker*	*All Movement*	
39		98	290	63	0	451	
48		90	370	38	0	498	
50	Common	147	147	67	0	361	
58	Circulation	4	96	1	0	101	
60	Corridors	3	52	1	0	56	
67		119	129	39	0	287	
41		69	350	31	0	450	
43	Linear	11	57	3	0	71	
46	Corridors	97	313	29	0	439	
47	Serving	187	250	46	0	483	
49	Individual	93	361	39	0	493	
54	Markets	93	351	79	0	523	
56		17	97	3	0	117	
61		15	99	5	0	119	
40		67	280	29	0	376	
42		43	81	8	0	132	
44		40	300	21	0	361	
45		9	86	2	0	97	
51	Smaller length	14	103	4	0	121	
52	corridors forming a	19	350	11	0	380	
53	compact grid	3	37	27	0	67	
55	circulation pattern		2	53	1	0	56
57	in individual	24	179	7	0	210	
59	markets	7	36	2	0	45	
62		9	121	2	0	132	
63		37	137	13	0	187	
64		35	90	18	0	143	
65		8	23	5	0	36	
66		9	86	2	0	95	
68		39	28	1	0	68	
69		7	78	2	0	87	
70		69	151	11	0	231	
71		50	135	18	0	203	

Second Floor Level

Axial Line No	*Space Category*	*Moving Men*	*Moving Women*	*Moving Student*	*Moving Hawker*	*All Movement*
79		11	298	9	0	318
83	Common Circulation	10	23	7	0	40
85	Corridors	5	24	1	0	30
72		27	152	16	0	195
74	Linear Corridors31	357	31	0	419	
76	Serving Individual	11	52	3	0	66
80	Markets	23	29	7	0	59
84		2	24	1	0	27
73		21	190	14	0	225
75		10	27	21	0	58
77		15	48	5	0	68
78	Smaler length	7	178	25	0	217
81	corridors forming a	7	11	1	0	19
82	compact grid	6	11	2	0	19
86	circulation pattern	4	26	2	0	32
87	in individual	3	19	3	0	109
88	markets	10	16	5	0	31
89		13	34	8	0	55
90		5	19	2	0	26

Table 3. Movement pattern in Gausia Shopping Centre

34.16

Table: 4

Northern Shopping Corridor

Axial Line No	*Space Category*	*Moving Men*	*Moving Women*	*Moving Student*	*Moving Hawker*	*All Movement*
1	Main shopping	248	21	198	24	491
2	corridor parallel	334	67	224	23	648
3	to the street	237	83	217	21	558
4	(Hawker zone)	165	77	165	17	424
5	Local streets invading into	245	45	255	25	570
6	the shopping development	252	30	262	25	569
7		249	21	219	21	510
8		253	33	251	25	562
12		250	153	219	3	625
13		248	128	238	2	616
14	Linear corridors	248	139	248	3	638
17	providing access	225	155	215	2	597
20	to individual markets	249	51	267	3	570
22	from the main	169	227	149	2	549
25	shopping corridor	238	178	207	2	623
27		216	101	208	0	525
29		219	73	239	0	531
32		245	31	234	0	510
36		192	64	182	19	457
9		137	124	134	0	395
10		111	81	83	0	275
11		89	93	78	0	260
15	Compact grid circulation	164	89	164	0	417
16	corridores serving	113	63	93	0	269
18	individual markets	137	57	119	0	313
19		119	53	106	0	278
23		168	123	149	0	440
24		178	60	168	0	406
26		152	91	162	0	404
28		122	61	119	0	302
30		122	57	132	0	311
79		59	14	77	0	150
80		63	13	98	0	174
81	Upper floors 34	12	75	0	121	
82		25	9	76	0	110
83		17	8	84	0	109
84		45	9	75	0	129
85		51	6	52	0	109
86		59	3	56	0	118
87		49	7	57	0	113

Southern Shopping Corridor

33		186	49	176	18	429
34	Main shopping	225	50	250	25	550
35	corridor parallel	184	88	184	18	474
37	to the street	188	57	128	19	392
38	(Hawker zone)	191	189	190	19	589
39		217	56	217	22	512
40		297	109	270	27	703
41		121	54	98	3	276
53	Local streets	108	35	236	0	418
59	invading into the	175	38	156	14	383
65	shopping	282	54	176	0	512
67	development	270	56	249	25	600
42		89	31	75	0	195
43		72	159	35	0	266
44		155	178	121	0	454
45		123	167	149	0	439
47	Linear corridors	189	56	265	0	510
48	providing access	129	78	252	0	459
49	to individual markets	144	65	245	0	454

Table 4. Movement Pattern in New Elephant Ribbon Development

50	from the main	159	56	256	0	471
51	shopping corridor	146	34	247	0	427
54		129	41	248	0	418
57		61	123	244	0	428
60		154	56	255	0	465
61		167	43	252	0	462
64		165	51	243	0	459
66		59	134	145	0	338

Southern Shopping Corridor (cont..)

Axial Line No	Space Category	Moving Men	Moving Women	Moving Student	Moving Hawker	All Movement
46		68	75	56	0	199
52	Compact grid	141	23	165	0	329
55	circulation corridores	65	39	163	0	267
56	serving individual	201	50	244	0	495
58	markets	25	67	34	0	126
62		134	21	160	0	315
63		54	19	76	0	149
68		21	20	80	0	121
69		29	11	87	0	127
70		19	7	101	0	127
71		48	19	83	0	150
72	Upper floors	39	18	79	0	136
73		10	35	9	0	54
74		11	39	6	0	56
75		4	27	3	0	34
76		4	37	4	0	45
77		5	23	6	0	34
78		14	26	2	0	42

The overall movement study within the individual retail units represents that, in both the retail centres, the suscipient business avail relatively low consumer orientation(Table: 5). But, their density is much higher than other business types, because of their limited shop no and dispersed growth pattern. The generative functions, perhaps because of too many shop units, show relatively low movement density as compared to the shared business categories. However, again, the consumer orientation remain higher in the demand oriented generative business categories.

Table - 5

New Elephant Ribbon Development

Retail Type	*Shop No.*	*Mean Shop Area*	*Men /m2*	*Women /m2*	*Student /m2*	*All /m2*
Ladies RG.	114	9.553	0.019	0.04	0.01	0.07
Men's RG.(traditional)	48	14.292	0.1	0.04	0.08	0.22
Western	209	13.437	0.06	0.01	0.08	0.15
Men's Cloth	23	19.41	0.1	0.04	0.06	0.19
Mens tailor	22	24.091	0.07	0.02	0.02	0.12
Accessories	34	18.441	0.11	0.21	0.14	0.45
Footwear	225	12.26	0.1	0.05	0.09	0.24
Household goods	47	44.468	0.06	0.03	0.01	0.1
"Music,Vdo"	43	14.837	0.09	0.06	0.19	0.34
Optics	33	16.606	0.12	0.08	0.07	0.27
Photostudio	3	58.667	0.21	0.11	0.3	0.62
Snacks/confectionary	22	63.25	0.17	0.12	0.18	0.5

Gausia Shopping Centre

Retail Type	*Shop No.*	*Mean Shop Area*	*Men /m2*	*Women /m2*	*Student /m2*	*All /m2*
Ladies RG.	449	8.287	0.018	0.102	0.067	0.187
Ladies cloth	110	8.209	0.068	0.29	0.286	0.645
Ladies Shari	83	17.29	0.029	0.176	0.146	0.353
Men's & Childrens RG.	138	4.1	0.256	0.159	0.139	0.553
Ladies Tailor & Embroidery	70	15.59	0.029	0.216	0.243	0.489
Accessories	207	7.64	0.118	0.149	0.161	0.439
Shoe	13	18.69	0.91	1.136	0.802	2.918
Household goods 20	6.5	0.269	1.369	0.685	2.323	
"Music, Vdo, Electronics"	1	18	2.38	5.389	6.8	14.6
Snacks or Restaurants	6	10.17	3.25	5.836	6.18	15.26

Table 5. Shoppers density in different retail types

5 Configuration, attraction and movement in the spontaneous retail developments

5.1 The effect of spatial configuration on movement pattern

In Gausia Shopping Centre, the spatial nature of movement show a close resemblance to the integration pattern of the internal system as described in the previous sections. But, this pattern of movement gradually fades out in the upper floor levels. Consequently the spatial properties of the internal system, as an independent system or embedded in the local and global urban grid, represent better correlation with the movement flow in ground floor level than considering all floors together (Table: 6). The striking issue is that, the hawkers zone comprises maximum consumer flow by being located in integrated location., This, undoubtedly indicates their space preference to attract varying group of customers within the shopping precincts.

Like Gausia Shopping Centre, New Elephant Ribbon Development also follow a movement pattern, which reasonably coincide with the integration core of the system (Table: 6). But, in the ribbon pattern of development, the all floor level movement represents better correlation with the spatial properties of the internal system than the ground floor level. This is perhaps due to the configurational simplicity of the upper floors and direct accessibility of the vertical connectors from the main street level. The analysis show a strong correlation between the configurational properties and movement densities, at global level of embedding.

This supports the previous claim, that, inspite of the configurational variations between a cluster and linear pattern of development, the spontaneous retail developments work better as a part of local and global urban framework than as an independent internal system.

Table - 6

Correlation between syntactic measures & observed movement	**Gausia Shopping Centre**						**New Elephant Ribbon**					
	1		*2*		*3*		*1*		*2*		*3*	
	g.fl	*all.fl*	*g.fl*	*all.fl*	*g.fl*	*all.fl*	*g.fl*	*all.fl*	*g.fl*	*all.fl*	*g.fl*	*all.fl*
R^R=n - obs. men	.232	.215	.476	.354	.614	.424	.352	.418	.239	.435	.084	.528
R^R=n - obs. women	.386	.263	.639	.165	.641	.148	.064	.214	.018	.187	.002	.252
R^R=n - obs. student	.279	.184	.449	.419	.558	.478	.132	.404	.432	.552	.244	.561
R^R=n - obs. hawker	196	.06	.494	.295	.592	.423	.04	.175	.033	.019	.006	.1
R^R=n - obs. all	.34	.288	.609	.352	.706	.381	.341	.518	.401	.58	.171	.659
R^R=3 - obs. men	.12	.119	.242	.109	.199	.065	.397	.157	.292	.273	.178	.354
R^R=3 - obs. women	.203	.201	.331	.073	.288	.061	.103	.145	.049	.136	.035	.257
R^R=3 - obs. student	.136	.154	.237	.124	.211	.081	±.181	.106	.402	.336	.26	.323
R^R=3 - obs. hawker	.158	.097	.293	.124	.274	.088	.162	.185	.116	.152	.065	.143
R^R=3 - obs. all	.179	.213	.318	.124	.274	.088	.454	.2	.479	.375	.307	.459

Table 6. Correlation between syntactic measures and observed movement flow in Gausia Shopping Centre and New Elephant Ribbon Development
1 - internal spatial system
2 - embedded in local urban grid
3 - embedded in global urban grid

5.2 The effect of attraction on movement pattern

The 'T-test' analysis in the previous section has proven that, there exist a strong syntactical significance among different attractor land use and their preferable location within the shopping precinct. In order to find out whether these syntactical properties of different attractor plays any role in determining the movement pattern within a retail centre, the relationship between their spatial accessibility ie. mean integration value and movement densities are studied here.

In Gausia Shopping Centre, the poor correlation value between mean global integration of different retail type and shoppers density within them (Table: 7) indicates

that, the shops accumulate shoppers irrespective of their syntactically better accessible location. This phenomenon is more acute in New Elephant Ribbon Development, which show even negative correlation value between spatial properties of shop units and movement density (Table: 7).

Table - 7

Retail Development	*R^R=n men/ m2*	*R^R=n women/ m2*	*R^R=n-student/ m2*	*R^R=n-all/ m2*	*R^R=3-men/ m2*	*R^R=3 women/ m2*	*R^R=3-student/ m2*	*R^R=3-all/ m2*
Gausia Shopping center	.55	.5	.413	.48	.24	114	.075	118
New Elephant Ribbon	0.012	0.137	0.032	0.058	0.01	0.239	0.01	0.07

Table 7. Correlation among mean value of the spatial properties and customer orientation

This unpredictability of consumer flow with respect to the spatial properties, prove the strong influence of attraction effect of different retail clusters. The generative functions clustered either in syntactically better or poor locations, posses higher shopper orientation due to their socio economic demand within the shopping area. Where as the dispersed suscipient functions accumulate high shopper density being located in better integrated locations, thus they are taking locational advantage rather than attraction effect.

5 Discussion

The study of retailing in developing countries to date has been shared amongst a number of disciplines and reflects its multifaceted nature (Paddison, et al 1990; 12). The architects and urban planners have tried to keep pace with the changing shopping patterns through modernising effect, which consequently influenced changes in retail centre design and planning of commercial areas in the developing countries; where the place specific socio-economic issues have most often been overlooked.

By contrast, this paper attempts identifes the order and structure inherent in the spatial configurations of the 'spontaneous' retail developments in a developing city ; in relation to their multifarious socio-economic variables and their spatial structuring in the larger urban grid. It is hoped that, this paper will bring about a clear understanding of the 'place specific' role of space in retailing in a rapidly developing context. This identifies, what could be learnt from the spontaneous shopping developments which is still in a developing stage, hence could be set against the modern planning practices imported from the western world, which is not necessarily directly related to the peoples shopping experience in a specific developing context.

This paper, on the basis of space syntax analysis of the spatial patterns of spontaneous retail developments, has raised two issues of fundamental importance of the systems: 1) The issue of the interface between the internal and external spatial orders, in the creation of a spatially predictable internal movement system, and 2) the issue of the spatial nature of attraction in the creation of a co-operative space mechanism.

In their present condition, continuity between the internal and external orders of the spontaneous retail developments is about the principles of continuous connections within different grid morphology along with the compact organisation of the systems. This spatial continuity of the integrated internal spaces to the exterior implies

that the retail centres form an integral part of the surrounding urban system, thus bears a significant local global relationship to them. This strong correspondence between the internal spatial system and the external urban grid has significant effect on the distribution of movement pattern and densities within the retail developments.

From the preceding analysis it is clear that, within a spontaneous retail growth process, different degrees of attraction are created by securing a specific location for a particular retail type. These spatial nature of attraction, based on location games are strongly guided by the retailers and consumers socio economic concerns of a specific developing context. These profit motivated location games are contributing towards a co-operative space mechanism by enhancing movement flow in the spatially segregated areas within the retail developments. It is conceivable that the configuration of a retail layout based on social logic would secure a condition where the systems of 'natural movement' and 'attraction' would complement each other.

6 Notes

1 The centrality assessment study through various indices by S.Sayed in 1986, has suggests that, the retail business of the modern hard core area (Gulistan area : Specialisation Index = 41.05) has been shifted to the naturally grown hard core i.e.. central retail area (Gausia area: Specialisation Index = 51.43) in Dhaka city around 1980's.

2 On the basis of the analysis of several naturally grown cities, Bill Hillier and others have argued that spatial configuration is the primary aspect of urban form which accounts for a preference for certain spaces over others as paths of through movement. This is opposed to existing urban theories which tend to explain the patterns of pedestrian and vehicular movement more in terms of flows to and from 'attractor' land uses.

3 The Selection of Retail Locations' by Nelson (1958) identifies different types of retail locations in terms of his two main categories of 'generative' and 'suscipient' locations. A further dimension was added by relating location and business types, as follows;
generative business - sales produced by the store itself;
shared business - sales secured by the store as the result of the generative power of neighbouring shops;
suscipient business - sales not generated by the store itself or by neighbouring shops but attracted coincidentally.

4 Greater Dhaka Metropolitan Area Integrated Transport Study; PRK Consultants Pty. Ltd., Australis in Association with Delcan International Corporation, Canada and Development Design Consultants Ltd., Bangladesh; February, 1994.

5 From retailers interview, there exist a seasonal business pattern of some retail types. These retail types secure better business during two Eid festivals of the Muslims.

6 The catchment area for these retail centres were identified from consumers point of view.. The residential area of individual consumer and their frequency of visit to the sample shopping area were identified from the questionnaire survey . This areas were then plotted on the city map. Next the areas which accumulate higher frequency of visit were identified on the city map and a line was drone through the edge boundary of this residential areas - which gives the physical boundary of the catchment area for the particular sample.

7 In a situation where the buyer knows both the product class and brand

7 Reference

Simmons, J., and Jones, K. (1990). 'The Retail Environment'. London, New York: Rout ledge.
Maitland, b. (1985). 'Shopping Malls: Planning and Design'. London: Construction Press.
Islam, N. (1996). 'Dhaka From City to Megacity'. Dhaka: Urban Studies Programme.
Ahsan, R.M. (1991). 'Changing Pattern of the Commercial Area of Dhaka City'. Dhaka Past, Present and Future; in Ahmed's, S.U.(ED.). Dhaka: Asiatic Society Bangladesh.
Pushkarev, and Zupan. (1975). 'Urban Space for Pedestrians'. Cambridge: Mit Press.
Paddison, R., Findlay, A.M., and Dawson, J.A. (Ed.). (1991). 'Retailing Environments In Developing Countries'. London: Rout ledge.
Hillier, B. (1996). 'Space is The Machine'. Cambridge: Cambridge University Press.
Sayeed, S. (1986). 'Retail Business Centre in and Around Gausia Area, In Dhaka City: Pattern and Process'. Dhaka: Unpublished Masters Dissertation.
Nelson, R.L. (1985). '"The Selection of Retail Location's'. New York: F.W. Dodge.
Hillier, B. (1993). 'Specially Architectural Theory': A Practical Account of the Ascent From Buildings as Cultural Transmission to Architecture as Theoritical Concretion, The Harverd Architecture Review, vol 9.
Hillier, B. (1989). 'The Architecture of the Urban Object'. Ekistics 334, Jan./Feb.
Hillier, B., and Hanson, J. (1984). 'The Social Logic of Space'. Cambridge: Cambridge University Press.
Hillier, B., Burdett, R., Peponis, J., and Penn, A. (1987) . Creating Life: or, Does Architecture Determine Anything. Architecture and Behaviour/ Architecture et Component, 3(3).