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Application of Systematic Layout Planning in Hypermarkets

Rajshekhar S Inglay
Pantaloon Retail (India) Ltd
F-21, Opus Park, MIDC, Andheri (E)
Mumbai – 400093, India

Rizwan S Dhalla
Institute of Technology and Management
Vashi, Navi Mumbai, Maharashtra 400705, India

Abstract

Systematic Layout Planning (SLP) is widely used in manufacturing industry for facility layout planning. However, it has not found application in hypermarkets. Store layout is a very important part of the store atmospherics and plays a major role in the customer's store experience. The store experience decides the customers repeat visit to the store. From a retailer's perspective, the store layout determines the exposure to goods and thus affects the chances of customer buying the goods. There is a need for developing a systematic procedure of layout planning in retail stores which can provide a competitive advantage to the retailer. Store Planning is considered more of an art. Introducing a systematic procedure in the store layout planning can make the process holistic and bring-in objectivity. An attempt is being made to modify and customize the SLP for application in retail store/hypermarket planning. The modified SLP can then serve as a very useful planning tool for the store layout planner. The approach can be further extended by application of analytical methods to store layout planning.

Keywords
Systematic Layout Planning, Hypermarkets, Circulation Plan, Zoning Plan, Adjacency

1. Introduction
Retail store layout planning is a complex task. The fundamental objective is to maximize sales with customer satisfaction and minimize overall costs. Many factors affect the store layout planning like the arrival pattern of customers, building design, desired service level, merchandise-mix, adjacency requirements and many more. Store layout can affect consumer's perceptions of a retail environment and thus there is a likelihood of approaching or avoiding the product or store [1]. Creating superior customer experience seems to be one of the central objectives in today's retailing environments. The customer experience encompasses the total experience including the search, purchase, consumption, and after-sales phases of the experiences [2]. All these are closely related to the store layout planning and have significant impact on the customer experience management strategy of a retail firm.

Muther [3] developed the Systematic Layout Planning (SLP) which is an organized approach to facilities' layout planning. This technique utilizes graphic and schematic analysis for material flow. When the problem size increases, the method has its limitation. However, the basic steps of SLP: analysis, search and selection are relevant even today. The SLP needs to be reviewed in the light of developments in layout planning methods and requirements of hypermarkets.

2. Layout Planning – The Hypermarket Context
Hypermarkets are large stores and carry a wide range of merchandise. Hypermarkets have emerged as the biggest crowd pullers due to the fact that regular repeat purchases are a norm at such outlets. Hypermarkets not only offer consumers the most extensive merchandise mix, product and brand choices under one roof, but also create superior value for money advantages of hypermarket shopping. With product categories on offer ranging from fresh produce and Fast Moving Consumer Goods (FMCG) products to electronics, value apparels, house-ware, do it yourself (DIY) and outdoor products, the hypermarkets are becoming a popular format in India [4].

The basic elements in any layout planning are PQRST – Product, Quantity, Routing, Supporting Services and Time. All of these are relevant in hypermarket layout planning. However, the meanings of these elements need to be reviewed in terms of hypermarket layout requirements. Ticket size and customer traffic are comparable elements in hypermarket which reflect the consideration of product and quantity in SLP. Product in this case is the sales generated rather than the physical goods on shelves. It is also referred to as ticket size. The ticket size decides the quantity to be handled. In a retail store, the material handling is done by the customer himself and the layout planner has to consider providing ramps, elevators, travollators and escalators. Merchandise security is a very important consideration for any retailer as it affects the profitability of store. Differing levels of customer traffic are experienced by a hypermarket. It varies during the day, within a week, within a month as well as with seasons.

Consumer perception plays an important role in customer satisfaction. The factors that adversely influence the retail consumer perceptions of a retail store in order of importance are personnel related, product and pricing related, hygiene related, store ambience, parking convenience and shopping convenience [5]. Other than product and pricing related factors, all other factors are linked to store layout and hence store layout can be an important tool with which a retailer can improve customer satisfaction.

Retailers' surroundings' are continuously changing and evolving with the passage of time, both in terms of customer expectation and competition. Hence, the traditional objective function of reducing the material handling costs is inadequate for facilities layout planning. A retail store has to be flexible, modular and easily reconfigurable to address these changes.

3. Relevant Considerations for Hypermarket Layout Planning

In traditional approach to facilities layout problem, the measure of effectiveness of layout problems traditionally has been concerned with the flow of material. The criterion of minimization of material handling cost is not sufficient in case of hypermarkets. Each layout problem is made unique by its particular assumptions, constraints and limitations as well as intrinsic activity of the components. The facilities layout problem is inherently multi-valued and is not properly handled by a single criterion model. Problems cannot be forced into models; models must be adapted to problems [6].

To differentiate their retail offerings, build customer loyalty, and develop sustainable competitive advantage, retailers can provide excellent customer service. Service Convenience, which is defined as a function of consumer's time and effort perceptions related to buying or using a service can serve as a important criterion in design of retail store facilities layout. These perceived time and effort expenditures encompass five defining type of convenience – decision, access, transaction, benefit and post-benefit – which mirror the activities consumers undergo to purchase or use a service [7]. Store layout and design influence consumer's efficient movement through a store [8] and affects there goals of getting in and out quickly and finding the desired merchandise easily [9]. A service convenience scale can be developed for hypermarkets and it can be deployed in improving the store layout.

Thus the relevant criterions for facilities planning in retail stores are to increase Net Profit per square foot of floor space and increase Service Convenience.

This paper attempts to address the customization of Systematic Layout Planning (SLP) for Retail Stores or Hypermarkets. The customized SLP can then serve as a very useful planning tool for the store layout planner. The approach can be further extended by application of analytical methods to store layout planning. Figure 1 shows the relevant considerations which are important for facilities layout planning for hypermarkets.

3.1 Space Characteristics and Catchment Analysis - A store layout planning exercise starts with catchment analysis. Catchment analysis consists of collecting information about the demography, competition and other aspects and has significant impact on the store layout.

Space characteristics like size of the floor-plate, levels, means of vertical transport and store frontage affect the store layout in many ways. In rare cases, a building is designed considering retail store requirements. In many layout problems, a ready building is used for making a retail store. The constraints imposed by the building have to be

overcome by facilities planning by incorporating elements which minimize the adverse effect of the particular constraint.

3.2 Customer Flow – The flow of material in case of hypermarket has to be viewed as flow of customer. In a factory setting, the endeavor is to minimize the material movement, whereas in a retail setting, the customer needs to be exposed to more and more merchandise. In a retail store the material is moved by the customer himself and this calls for providing means for minimizing the effort in carrying the shopping basket or trolley. Apart from money spent on purchase, customer wants to expend less of time and efforts. Customer flow through the store determines the space required for entry / exit, check-out area, amenities like parking, washrooms, lifts, escalators, ramps etc.

The customer flow through the store is not uniform during the day, week, month and year. These variations in flow have to be taken care in facilities planning.

3.3 Activity relationship - Examining the customer interaction with the store environment gives inputs on customer flow. In a hypermarket visit, a customer typically goes through a series of activities like parking, shopping, eating, washroom etc. The sequence of these activities plays a very important role in layout planning. A layout which meets these customer requirements in the right sequence shall lead to a higher customer satisfaction. Many-a-times this activity relationship is not taken into consideration which leads to wrong placement of sections causing inconvenience to the customer. Apart from the customer activities, goods and store personnel activities also need to be considered. With the understanding of activity relationship, a relationship diagram can be prepared. The relationship diagram is used in placement of various departments.

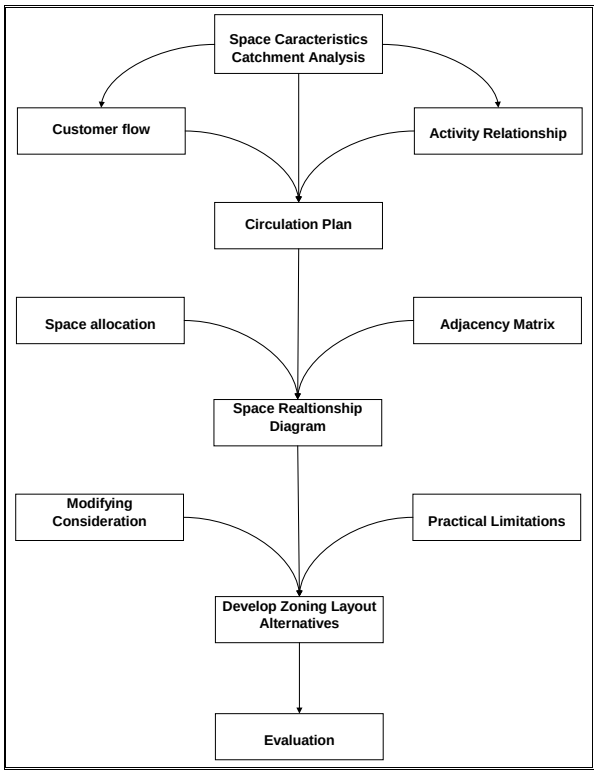

Figure 1: SLP Modified for Hypermarket Layout Planning

3.4 Circulation Plan – Circulation Plan gives the layout of aisle through which the customer moves. It also gives the means and location of vertical transportation in the store. The circulation plan should be such that the customer does not miss out on any section. Shopping trolleys are an essential part of hypermarket shopping and customers do not like backtracking, congestion and bottlenecks.

3.5 Adjacency Matrix – Adjacency is very important in hypermarket store design. Placing of certain categories in proximity / away from each other can lead to increase / decrease in sale. Certain categories have to be located near or away from the entrance or exits to facilitate the picking and carting of the merchandise. For example, fruits and vegetables should be placed closer to exit to avoid loading other items over it. This prevents likely damage to these items. Considering these aspects an adjacency matrix is prepared. The adjacency matrix can then be used for developing space relationship diagram for the store.

3.6 Space allocation - Space available and space requirement decide the space allocation for each category. Every store has an annual business plan and to achieve the annual business plan for the store, space is allocated to each category considering its sales revenue potential.

Merchandise type and merchandise density affects the space allocated for various categories. Use of vertical heights and better design of furniture & fixture can improve the allocated space.

3.7 Space Relationship Diagram – with Adjacency matrix and space allocation, a Space Relationship Diagram can be developed. It gives the location of various categories and the space allocated to each of the category. In a multi-level store administering the Space Relationship Diagram without compromising the adjacencies is a very challenging exercise.

3.8 Modifying considerations - There can be many modifying considerations which will have to be dealt with in layout planning. Retail space is very expensive and hence prime areas like entrance area and high visibility area should be used for display and selling and other activities like storage, utilities should be located in the back areas. The material handling has to be goods movement for replenishment as well as customer trolley movement. The movement of store personnel and the amenities are planned independent of customer amenities and customer movement. Shrinkage is major area of concern in retail and merchandise security aspects need to be given due consideration in deciding the entry/ exits in a store.

3.9 Practical limitations – The practical limitations could largely arise out of the space characteristics. If adequate number of elevators or a travollator cannot be installed, a simple ramp has to be built to take care of customer movement across levels. The ramp may put a constraint on the flow of customers, which calls for provision of larger aisles and an easy gradient. Lack of store frontage can put a limitation on entry/exit space itself, which has a direct impact on customer queuing at check-out counters. This can be partly taken care of by introducing check-outs on multiple levels.

3.10 Develop Zoning Layout Alternatives – Alternative zoning layout are developed to increase the adjacency score, space efficiency or other such criteria subject to the modifying considerations and practical limitations. Layout options may also be developed based on intuition of the operation managers and lot of subjectivity can creep into the layout planning process. Large number of layout options makes the task of comparison difficult. To bring in objectivity methods mentioned can come to the rescue of a layout planner.

3.11 Evaluation – Over the years many analytical methods have been proposed to solve the facilities layout problem and the same can be applied to hypermarket layout planning as given below -

- Mathematical Programming Models – Mathematical programming models can be formulated to optimize an objective function. The objective function can be single or multiple. In a hypermarket context, the objective function can include space efficiency, distance traveled, measure of service convenience etc.

- Queuing Models - A hypermarket will have many queuing situations. Queuing can happen at the checkouts, customer service desk, parking, baggage counter, elevators and many more. Analysis of the system using queuing theory can provide estimates for system variables which can help layout planner to choose between alternatives.

- Simulation Models – Simulation methods allow the layout planner to conduct experiments under various conditions to understand and predict the behavior of the system. By conducting many such experiments, a layout which meets some pre-determined criteria can be selected.

Evaluation of layout alternatives will lead to an ideal solution. It may not be possible to include all the qualitative as well as quantitative factors due to limitations of evaluating method. The solution obtained will have to be modified for the considerations not accounted by the model. The SLP procedure can be used to first develop a zoning plan and then a detailed layout for each section can be developed.

4. Further Research

This article provides a conceptual framework to modify and customize Systematic Layout Planning in hypermarket context to incorporate the developments in the areas of service convenience and quantitative methods. Development and empirical testing of the concept can be taken up for further research.

5. Conclusion

Layout planning is considered more as an art than science. Even though facilities' planning is not an exact science, it can be approached in an organized and systematic way. The use of SLP can make the layout planning in hypermarkets inclusive to a very large extent. The inclusion of un-conventional criterion like net profit per square foot and service convenience can make this tool very useful for retail layout design. The developments that have taken place in quantitative methods can be integrated with it to improve the procedure and the results. The solution obtained by quantitative methods serves as a benchmark against which the layout planner can evaluate the proposed solution. The analytical solution can be subsequently modified based on qualitative considerations.

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