Layout Design Model for Independent Grocery Stores in the Philippines

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Abstract

The study focuses on the establishments labeled as "Independent Grocery Stores" in the Philippines. These are retail stores, primary selling food, located in local districts and communities. According to study, one of the biggest concerns for store retailer that affects consumer behavior are the store layout and shelf design (Elbers, 2016). For this reason, the authors of the study aim to assess current layout or facility arrangement of the independent grocery stores in the Philippines, in order to determine the problems encountered with the use of existing layout. Afterwards, identify significant variables for layout model for independent grocery stores, and finally, recommend appropriate layout, facilities and product arrangement for grocery stores using house of quality and systematic layout planning. Statistical tools such as ANOVA and regression model were also employed in the study. Results of the study revealed that significant variables important for layout model are the following: (a) PHYSICAL LAYOUT: Shelf Organization, Height of Shelves, Aisle Space, Counter Aisle Space, Size of Labels, Package Counter Availability. (b) ENVIRONMENT: Lighting, Ambiance, Temperature, Security. (c) PRODUCT: Prices, Variety, Availability, Promotions. However, in the regression model developed in the study, only variables that affect the consumer behavior and satisfaction are the following: shelf organization, height of shelves, aisle space, temperature, size of labels, baggage counter availability and lighting. These variables served as the basis of the researchers in developing a new layout design model for independent grocery stores using House of Quality and Systematic Layout Planning tools.

Keywords
Independent grocery stores, layout design, systematic layout planning

1. Introduction

According to Chung and Myers (1999); Block and Kouba (2006); Powell et al., (2007), independent grocery stores, are establishments whose owners operate fewer than four outlets simultaneously. These stores play an important role in their local communities, helping to ensure food access for residents in areas that may not be served by dependent grocery stores. These includes low income areas and rural cities. They also provide employment opportunities and generate tax revenue for these areas.

The retail sector in the Philippines has been growing exponentially. Based from the article by IFEX Philippines Secretariat in the recent years, the rapid modernization and expansion of the Philippine food retail industry have led to the increase of grocery and supermarket chains throughout the country. These retail chains provide profitable opportunities for imported and high-value food items in the Philippines through their fast product turnover, growth and wide market base. Retail is expected to account for one-fifth of the Philippines' GDP by 2025, as the BPO industry helps boost the local economic growth.

In the National Capital Region (NCR) Ranks of Establishment Statistics, supermarket has the highest number. This is because NSO does not classify stores by their size but by how business owners name the store. It can be observed that here in Metro Manila, retail stores mainly are referred to as supermarkets despite the space and size it has. Therefore, in the Philippines, there is no specific standard for a retail store that primarily sells food. Grocery store, is a retail store

that primarily sells food. When food is concerned, there are many types: vegetables, fruits, rice, wheat, meat, snacks and bread. All of these can be seen in a grocery store. Food is just the common item in a grocery store, but in the same way, there are other types of non-food products being sold in grocery stores. The researchers focused on this kind of store, not necessarily named grocery store, but a store that mainly focus on selling variety of food products. CDFI, NACS and DTI indicated the different store classifications in Table 1.

Table 1. Different Store Classification

Type of Store	Size / Scale	Products	Operation
Supermarket	1,400-2,800 sqm	Wet, dry and frozen Food product, perishable items, produce and dairy products, gen merchandise, offerings with supplemental departments such as bakery, deli and pharmacy	Short business hours
Hypermarket	Ave. of 5,500 sqm	All that a supermarket has plus service providing centers such as banks, laundry, restaurants, etc.	Short business hours
Convenience	250-300 sqm	high-convenience items	Long business Hours
Grocery	300-1,400 sqm	Frozen and dry food products only, general merchandise, cleaning supplies, paper products, and health/beauty care products	Short business hours

The researchers conducted a preliminary study in 8 stores in Manila using the factors described above to determine if they did conduct Layout Planning in their respective stores or if they did apply the factors listed above. Managers and employees were interviewed using a survey in these stores, using the rating sheet. It was discovered that the four factors listed above about "the importance of store layout design" were not really met by most of the grocery stores visited. Ten people per store were asked to answer the question on which of the factors are often the problems of grocery stores. The eight stores surveyed yielded the results in Table 2. In the Physical Layout, Shelf Organization is one of the factors that needs to be changed. Grocery stores should consider the eye level of each product. Companies usually pay for that specific shelf level in order for their products to be noticed. Another factor is the aisle space. Aisle space is important because this gives the grocery store assurance that they have optimized their space properly and that they will profit from it. The last factor is the labeling. Some complaints in labeling is that it is too small that customers can no longer read it. For the Environmental factor, the only problem of customers is the lighting. Grocery stores usually tend to put less lighting due to the expense of electricity. Little do they know; good lighting is usually the answer for them to attract customers. If one compares an independent grocery store to a dependent grocery store, the first thing one notices is the brightness of the place. Independent grocery stores usually tend to focus their lights in the front and middle of their stores. Franchise grocery stores like Savemore's lights are evenly distributed, while independent grocery stores corners are dark. For the products, promos are a good way to attract customers. Usually, in going to a dependent grocery store, a stack of products can be seen in the entrance or middle of the store, depending on what the season is. Independent grocery stores do not consider this due to the lack of space in their stores.

Table 2. Summary of Factors

Factors	Total Ratings				
	1	2	3	4	5
Physical Layout					
Shelf Organization	0	0	22	16	42
Aisle Space	12	11	13	20	24
Counter Aisle Space	8	17	24	15	16
Labels	10	7	12	18	33
Package Counter Availability	1	5	3	23	48
Environmental					
Lighting	5	6	8	21	40
Ambiance	5	8	14	15	38
Temperature	9	13	11	16	31
Security	0	0	2	32	46
Product					
Prices	9	12	13	16	30
Availability	2	6	18	22	32
Promos	16	10	16	15	23

For this reason, the study's objective is to assess current layout or facility arrangement of the independent grocery stores within the Manila area, to identify the problems encountered for the existing layouts, to determine the significant

variables for layout model specifically independent grocery stores in Manila, to recommend appropriate layout, facilities and product arrangement for grocery stores in Manila, and to simulate the design model for grocery stores.

2. Methodology

The first step was to study the current layout of the selected grocery stores and determine the significant factors and sub factors to be considered in a layout model of grocery stores. Phase two is to conduct surveys using the Importance Rating Sheet as shown in Table 3 to the different stores in the city of Manila. Then, the researchers determined the average score per factor within each store, then used ANOVA to determine if there is a significant difference between the stores. If there is no significant difference, then the researchers will continue to use Regression Analysis. Using the result of the survey using the Performance Rating Scores as the dependent variable and the Satisfaction Rating Scores as the independent variable, the researchers used Regression Analysis to determine the Regression equation. The Factors found in the regression equation will be used in the forming of the House of Quality. Then, the researchers determined the top Functional requirements, which in turn will be made into physical areas to be used in the SLP.

2.1. Setup and Procedures

The location will only be limited to Manila. The researchers took the total number of Grocery stores in Manila which is 38 and solved for the sample size using 95% confidence level and a 5% margin of error, resulting to a sample size of 31 which is the number of stores required to conduct the study.

The required number of respondents was also computed. The sample size is computed using the following formula:

$$SS = \frac{(Z - score)^2 (Standard\ Deviation)(1 - Standard\ Deviation)}{(Confidence\ Interval)^2}$$

$$SS = \frac{(1.96)^2 (0.5)(0.5)}{(0.05)^2}$$

$$SS = \frac{(3.8416)(0.25)}{(0.0025)}$$

$$SS = \frac{(0.9604)}{(0.0025)}$$

$$SS = 384.16$$

Then compute for the sample size with a given finite population:

$$SS_{pop} = \frac{SS}{1 + \left[\frac{(SS-1)}{population}\right]} \qquad (1)$$

2.2. Instruments to be Used

1. Surveys: to determine the factors that will affect store layout planning.
    - Satisfaction Rating Sheet
    - Performance Rating Sheet

2. ANOVA: a statistical tool used to test the significance of the factors of the survey done with the satisfaction rating sheet.
3. Regression Analysis: used on the result of the surveys using the Performance Rating sheet and the Satisfaction Rating Sheet.
4. House of Quality Tool: used to address the voice of the customers.
    - Customer Requirements (Voice of the Customer "What")
    - Customer Importance, Technical Requirements ("How")
    - Correlation Matrix
    - Relationship Matrix
    - The Absolute Score and Relative Score Rooms
    - Target Value and Technical Competitive Assessment

4. SLP or Systematic Layout Planning: done for the design of the store layout which will have Customer shopping flowcharts, ABC analysis and Queuing models

2.3. ANOVA

The researcher used the data analysis ANOVA to analyze the results of the conducted survey. In the ANOVA Single Factor Data Analysis, the researchers used two null hypotheses for each factor. The three factors (Physical Layout, Environmental Factors, and Product Factors) will be considered in the analysis and each will have its own sub factors. The Null Hypotheses were constructed through the variation of the sub factors and importance ratings from the grocery store owners and the customers.

First Null Hypothesis (Ho): There is no significant difference between the physical layout performances among stores.
Second Null Hypothesis (Ha): There is a significant difference between the physical layout performances among stores.

2.4. House of Quality (HOQ)

The results in the ANOVA computation listed the sub factors that were proven to have a contribution effect for the design of layout. This was used as a basis for the parameters in the next tool which is the House of Quality (HOQ). The researchers used it to incorporate the customers' perspectives and the store owners' considerations in layout. This method will be used mainly for the purpose of using the "voice of the customer" in the grocery layout design.

The following are the discussion of each part of the HOQ and how the researcher planned to input the necessary factors and weights:

1. *Customer Requirements* (Voice of the Customer "What"). To identify what customer wants, the researchers used this as a sub factor in the surveys.
2. *Customer Importance*. The researcher planned to base the customer importance to the mean of customers' survey result. The means of all the sub factors considered were used to determine each factors' contribution to the weight of importance.
3. *Technical or Functional Requirements* ("How")

The data came from the researchers of previous studies, the survey answered from the store owners, and the standards of the Philippines when it comes to layout and construction design. Some technical measures were based from the capacity of the grocery store that the study on.

2.5. Correlation Matrix

This is often based on experience, intuition and determination rather than on statistical analysis or Sample Correlation Coefficient Computation. The previous researchers' basis came from the interviews made to the store owners, the importance rating from the customers' survey and some from previous studies. The rate of strong relationship (9) was designated to the functional requirements proven and observed to have an effective or positive connection with the sub factor. The rate of moderate relationship (3) was designated to the functional requirements that need to be adjacent to one another. This is so the flow or direction of the layout would not be disorganized. Lastly, the rate of weak relationship (1) was designated to the functional requirements that were found to be in relation with the sub factor but of least priority compared to the other requirements.

2.6. Relationship Matrix

The researcher rated (9) as Strong Relationship, were each Customer Requirements has a specific Technical Measure and was rated a 9. Another rate was (3) as Moderate Relationship and (1) as Weak Relationship. These two rates were used for the Customer Requirements having an adjacent or connection with the other Technical Measures. The last two rates were based mostly from the direction and flow of facilities in the design of the layout.

2.7. The Absolute Score and Relative Score Rooms

Once the Relationships Matrix room has been completed, the researchers then moved on to the Absolute Score and Relative Score rooms. Here, the researchers created a model or hypothesis on how product performance contributed to customer satisfaction.

2.8. Target Value

These were the recommended/measured specifications for the layout technical requirements. Since the design of the study is not about the exact measurements, the researcher provided minimum target values, either in ratio, for the layout model purposes.

2.9. Technical Competitive Assessment

This is the room where the researchers tested the hypothesis created in the Relative Score room.

2.10. Systematic Layout Planning

The first step in SLP is the Relationship Chart. These relationships will decide (add, "decide on what?) through the help of the House of Quality result and from the readings of previous studies.

The code of the Relationship Chart determined the strength of closeness, when it comes to layout, of the parameters included in the layout. These codes A-E-I-O-U-X were represented by 5-4-3-2-1 lines when it came to the part of Relationship Diagram.

The Relationship Diagram are figures (commonly circle) connected by lines. These lines were the strength of closeness said previously. By this diagram, the priority of closeness and arrangement of the parameters in given space can be easily seen figuratively. After the set of diagrams, it was then made into a Block Diagram. The Block Diagram was the closest figure in the layout because it showed the floor plan of the layout. In the Block Diagram, the measurement requirements were taken in consideration. The researchers made use of the data collected from the Occupational Safety and Health Administration (OSHA). The data were the safety measures that were considered in the retail stores in the Philippines. These measurements were used to have an actual measure for the design of the layout.

The layout obtained from SLP should be properly designed because it would be the basis for the final design layout. The tool was used to see an actual model of the layout to be designed. The data from the customer survey were used and correlated with the store owners' survey result by arranging the ranks of the product groups. The ranks were based from the survey "most important" result. After ranking the products, the researchers used ABC Analysis to arrange the group of products that were prioritized in the shelf allocation.

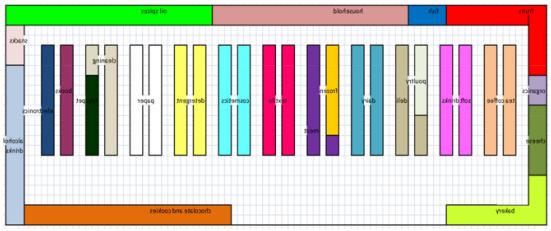

Figure 1. ABC Supermarket Store Layout

The result of the product arrangement was used as the basis in placing the products on the shelves that were arranged based on the HOQ result. The result is shown in Figure 1 above.

These methods were used as the basis for making the Layout Model output in the end, where all bases were from the computations and tools that were stated. The model was applicable only for the average size of the grocery stores that were part of the scope of the study.

The researchers applied the M/M/c queuing model to determine how many servers the store should have to be incorporated with the design layout. The researchers interviewed the owners and employees to determine the number

of customers per day and the number of customers served per day. Both would probably be just a rough estimate made by the interviewees. The following formulas were incorporated:

The number of customers in the service system,

$$L = \lambda W \text{ (using little's law)}$$
$$= \lambda W_q + \frac{\lambda}{\mu} \quad (2)$$

Service Time:

$$W = W_q + \frac{1}{\mu} \quad (3)$$

Waiting Time in the queue

$$W_q = \frac{L_q}{\lambda} \quad (4)$$

The number of customers in a queue:

$$L_q = \left(\frac{\rho^{c+1}}{(c-1)!(c-\rho)^2} \right) P_0 \quad (5)$$

The figure 2 below shows the current layout including the product arrangement. This is a good example of a layout that was not planned properly. It showed that some products are misplaced and are not in suggested strategic locations. The first mistake was the Ice Cream Freezer. It is too close to the Entrance / Exit. Ice cream is not usually the first thing that a customer would look for. Next, there is no barrier between the entrance / exit and bullpen. With no barrier, it is easy to steal from the store and get away with it. Another mistake is that Eggs and Rice should be on the back of the store. Sweets and snacks should be in front of the store, so that it can attract customers. Another problem was the Air Conditioning and ventilation. It does not ventilate well because it only focused on one side of the store due to its placement.

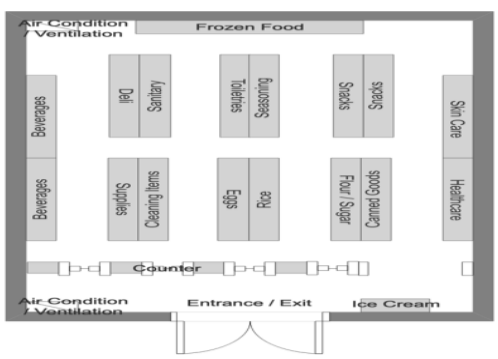

Figure 2. Current Layout and Product Arrangement

3. Results

Of the Manila area, there are only 8 grocery stores of sizes ranging from 300-1,400 square meters which are classified as independent non-franchise stores. The interview showed that the rate of customers per day are at around 610. The researchers conducted the survey on site. These 8 stores cannot be named due to safety reasons. The respondents were actual customers that come in and out of the stores. As presented above, the sample size for store owners were 8, which means 8 store owners needed to answer the survey along with interviews. The sample size for the customers was computed after the interviews with the store owners, because the researcher needed the permission from management. he data on the average customers per day was found out to be 610, then using a confidence interval of 5 and a confidence level of 95% the researcher got a sample size of 372.

Table 3. Result of Importance Rating

Factors	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	Store 7	Store 8
Shelf Organization	4.6	4.4	4	4.2	4.6	4.4	4.5	4.1
Height of Shelves	4	4	4.1	4.3	4.1	4	3.9	4.8
Aisle Space	4.3	4.2	4.4	4.2	4.4	3.7	4.1	4.3
Temperature	3.6	4.3	3.8	4.3	4.1	4	3.8	4.1
Size of Labels	3.8	4.5	4.4	4.5	4.4	4.2	4.4	4.1
Baggage Counter Availability	3.8	3.8	4.1	4.5	3.9	4.5	4.7	4.2
Lighting	4.1	4.3	4.4	4.2	4.4	4.3	4.5	4
Ambiance	4.1	4.1	3.9	4.1	4	4.5	4.2	3.5
Counter Aisle Space	2	1.8	2	2.1	2.1	1.8	2.1	2.5
Security	4.4	4.3	4.3	3.8	4.2	4.1	3.8	3.9
Prices	3.8	4	4.1	3.9	3.8	4.6	4.2	4.8
Variety	1.9	2	2.1	2	2	1.9	1.8	2.4
Availability	1.9	2.1	2	1.9	2.5	2	1.5	2
Promos	2	2.4	1.9	2.3	1.9	2.1	1.7	1.8

In the ANOVA, the results showed that there is no significant difference between the eight stores, meaning the null hypothesis is accepted. It showed that all stores have the same problem in relation to the factors given. This meant that the researchers can proceed with the regression analysis.

Table 4. Result of ANOVA

Groups	*Count*	*Sum*	*Average*	*Variance*		
Store 1	14	48.3	3.45	1.038077		
Store 2	14	50.2	3.585714	1.029011		
Store 3	14	49.5	3.535714	1.050165		
Store 4	14	50.3	3.592857	1.03456		
Store 5	14	50.4	3.6	0.998462		
Store 6	14	50.1	3.578571	1.201813		
Store 7	14	49.2	3.514286	1.385934		
Store 8	14	50.5	3.607143	1.01456		
ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	0.289196	7	0.041314	0.037761	0.99993	2.098871
Within Groups	113.7836	104	1.094073			
Total	114.0728	111				

The researchers also used the data to perform the regression analysis. Using the satisfaction rating of 80 respondents as Y and the importance rating of the same 80 respondents per factor, the researchers used "Minitab" software to perform the regression analysis and came up with the regression equation. The factors that came out in the equation were the factors that had the most effect on the satisfaction of the customers. In short, if the factors (X) increases, then the satisfaction of the customer increases, consequently. The result of the regression is shown in the equation below.

$$\textit{Satisfaction} = 4.21 + 0.224\ \textit{Shelf Organization} + 0.110\ \textit{Height of Shelves} + 0.423\ \textit{Aisle Space} + 0.255\ \textit{Temperature} + 0.128\ \textit{Size of Labels} + 0.038\ \textit{Baggage Counter Availability} + 0.772\ \textit{Lighting} \quad (6)$$

Using the regression equation above, the researchers then used the factor in the equation to form the House of Quality. As shown in the Demand Quality, the factors were listed in a way that it shows the factor needed to be achieved.

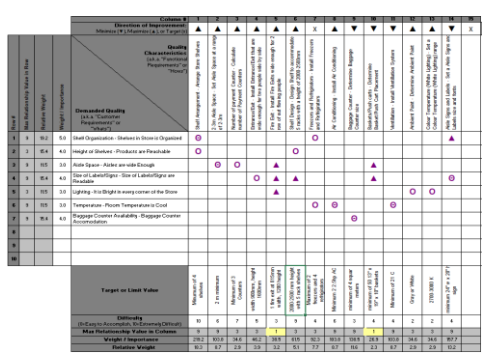

Figure 3. House of Quality

Table 5. Weights of Importance

	Rating %					
	5	**4**	**3**	**2**	**1**	Weight of Importance
Shelf Organization	39.875	15.25	16.375	3	1.75	5
Height of Shelves	18.5	37.75	16.625	2.375	1	4
Aisle Space	2.875	27.125	37.625	5.375	3.25	3
Size of Labels/Signs	0.25	38.375	33.375	3.125	1.125	4
Lighting	3.25	6	38	23.5	5.5	3
Temperature	0.25	34.875	22.25	18.375	0.5	4
Baggage Counter Availability	0.375	4.25	39.125	16.125	16.375	3

This weight of importance showed the average scores made by customers in each factor. For example, 39.875% of customers gave the rating of five in Shelf Organization, therefore 5 is the factor's weight of importance.

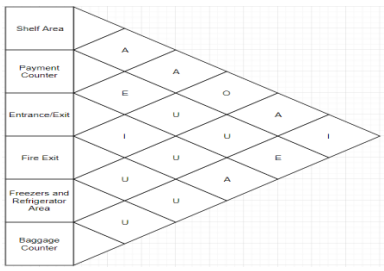

Figure 4. Relationship Chart

In this figure, the researchers took the functional requirements that had effects on the physical layout of the store and showed the adjacency rate. These factors had physical involvement in making the floor layout of the grocery store. The scores are: A = Absolutely Necessary, E = Especially Important, I = Important, O = Ordinary Closeness, U = Unnecessary and X = Not Desirable.

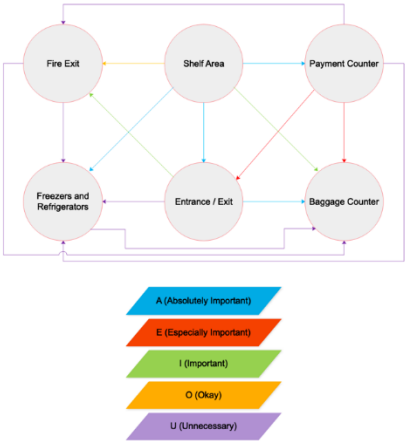

Figure 5. Relationship Diagram

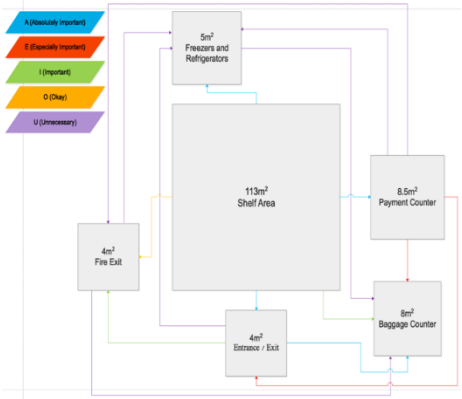

Figure 6. Space Diagram

The relationship diagram showed the strength of flow of each functional requirement with one another. Each function needs to be near each other depending on the line connecting them to each other. The blue lines mean they have to be near each other because the relationship of the two functions requires a small amount of distance. In this case, ventilation and air conditioning had been separated because in this design, each corner needs them both, which is why in each position, both ventilation and air conditioning will be placed there. The red lines are especially important and they need to be near each other. In the case of the fire exit and entrance/exit, it is protocol that these exits are at different corners of the building. The green lines connect the functions that need to be at least near each other enough

to function properly. The yellow and violet lines are the functions that can be placed anywhere on the floor. Using this, the block diagram can now be formed, taking in consideration, the aisle and facility arrangements.

For the Space Diagram, the same as the Relationship Diagram, it also shows the strength of flow of each department with one another. It shows the amount of space required in the facility, including work specifications, department specification and other space requirements. This is perhaps the most difficult determination in facilities planning because it is the amount of space required in the facility.

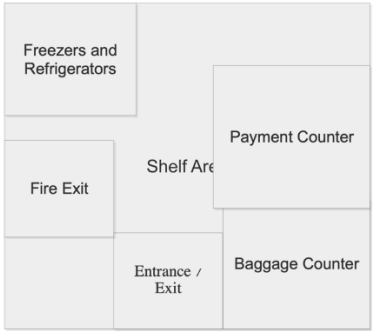

Figure 7. Block Diagram

The diagram showed a skeletal view of the layout model. Incorporated here were all the parameters analyzed and computed to have a significant importance to be included, which were all based from the customers and the store owners.

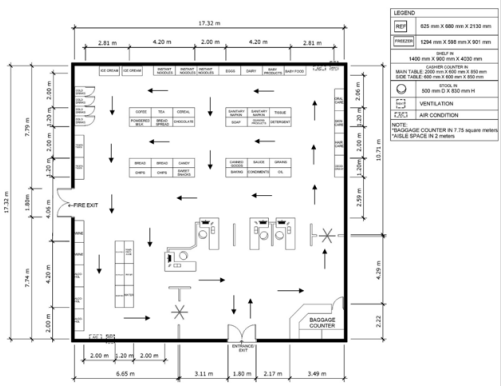

Figure 8. Final Layout Design with Product Placement

Here is the final layout with the product placement and the flow of the customers included. To avoid causing heavy traffic of customers in the store, the aisle was designed to give space for two side by side shoppers. 300 square meters is not that big for a grocery store but this design is expected to accumulate about 150 people with the 192 square meter of open space in it. If 1 person is equivalent to 1 square meter, then the store can accumulate more. There are two entrance/exits to the bullpen, which makes 2 options for customer flow. Having 4 payment counters also creates a fast flow of checkout of customers. According to the interviews, at peak hours from 2 to 7 PM, all four counters should be opened for full utilization; but in non-peak hours, two can stay open.

3.1. Shelf Design

The shelf design are as follows: the height according to the study was proposed to be in the average of about 4030 mm in height, and the length of row was 1400 mm length in average, and the row width average of 900 mm width. The first products to be prioritized based from the result of ABC Analysis were the detergent, Sanitary, Seasoning, Snack, Toiletries, Cleaner, Frozen food, Instant food, Baby Products, Rice-flour-sugar, Healthcare and Houseware.

Based from other grocery stores that the researcher visited to evaluate the specific type of products supermarkets display in which shelf and in which part of the shelf. The three types of packaging were; Sachet, Bottle and Box. These were the three common packages that were seen in the grocery stores visited by the researchers.

Figure 9. Shelf Arrangement Illustration

The *top shelves* of the grocery store storage racks are reserved for items that are either costly or do not sell a lot. It is a part of the shelf where customers reach less, and hence you can store products that are in-house, limited editions, etc. in those areas. Sample product for top shelf are: bags of tissue rolls, powdered milk bags, baby products, mattresses, plastic cups and the like. The *reach shelves* or eye-level shelves are for the best-selling and leading products. Since most of the shoppers look at this part of the supermarket for buying stuff, it is considered as a premium area. Sample products to put on the reach shelf are chips, bread sweets, snacks, small jars and cans, small size bags, etc. There is also the so called "*reach shelves for kids*". These products cater to kids and should have designs that look attractive to children. Most products placed on this shelf are sweets, toys, cereal, chocolate, cookies, etc. The *bottom shelves* are for items that are large and heavy. Also, it is more convenient for the customers to lift and carry them from the shelf to the cash register. Some examples are milk cans, liters of water or juices, big bottles of oil, big boxes of juice- mostly boxes, big jars and bottles are better placed at the bottom shelf. Shelf arrangement would not be considered in shelves that have one category; for example, a shelf for juices will have the whole shelf from top to bottom filled with different brands of juices; same goes for chips, snacks and bread as shown in figure 10.

Figure 10. Shelf Arrangement

4. Conclusion

With the study made, the researchers were able to achieve the objectives. The study began by assessing the current layouts of the grocery stores. This was made through the help of the survey and interview, both from the customers and store owners' point of view. The survey showed what the perspective of the store owners and customers have in common. The content of the survey showed concerns of both customers and store owners regarding their experience in the current store layout. Throughout the study, the problem in the existing layout has no standard or principle when it comes to the layout of the grocery store. It appeared that most of the store owners do not plan their layout. They only base their store layout on the availability and offered products. Most of the store owners have space limitation problems, other store owners have enormous number of products, leading to unavailability in capacity.

In the methodology, the researchers made use of the Analysis of Variance to determine each specified sub factors that have a significant difference, contrasting it with the other answers. The parameters that were given importance based on the result of ANOVA were: PHYSICAL LAYOUT: Shelf Organization, Height of Shelves, Aisle Space, Counter Aisle Space, Size of Labels, Package Counter Availability. ENVIRONMENT: Lighting, Ambiance, Temperature, Security. PRODUCT: Prices, Variety, Availability, Promotions. Another tool that was made use was the House of Quality. It is specified and detailed out in the functional requirements for each customer.

These Physical Layout sub factor's functional requirements were used to be the priority in the design of the layout. In making a new layout, a Systematic Layout Planning was used which resulted to the raw design, in the later part, the layout was then specified in the process. The standard measurements were followed and the safety measures were considered in the layout. In the HOQ, it resulted that shelf arrangement and product are the top priorities of customers inside a grocery store. Also, the mandatory and safety measures for aisle were applied.

The model attained by the study showed more space is allotted for the products. This is for both the customers and the store owner's perspectives. This made the researchers conclude that both parties are concerned about the space for the products in stock rather than any other parts of a grocery store. The proposed layout and product arrangement were not considered as standard layout for grocery stores, but a proposed layout that will definitely have a positive effect to the customers and the owners. Having a positive relationship with the customers is an indication of good sales.

Retail establishment is a broad topic. It could be possible that the study can be helpful to other types of retail stores such as convenience stores, supermarkets and other types. As recommendation, bigger establishments should consider the amount of time, this time layout will be broadened and parameters will be added. This can be a great part of the study, not just in limited space, but also the amount of increase in the profit when layout principles and studies are applied. The study could be further examined when compared between different store establishments. This can strengthen the study on its stand about layout principles and store arrangement.

There are surely more facilities to consider when the study gets to the bigger establishments. More parameters and facilities that are included in the survey form could be studied and researched to further know each detail in the grocery/retail industry. Sales of products and its market effectiveness is a good inclusion to the study, due to its retail industry where sales and profits are the most focused area.

Other statistical procedures can be done as well to strengthen the results obtained from Analysis of Variance. The result of ANOVA was surely reliable but the flaw about it is the fact that the conclusions were broad and the factors need to be form accurately. Statistical analysis that will answer the "how?" and "what specifically?" will be a great help to the future researchers. The use of Multiple Regression Analysis in the relative importance indicated in House of Quality will help the analysis to be specified and the relationship will have a relevant basis from a statistical method.

The part of the study about product arrangement can be further analyzed and evaluated through the use of different methods. The product placement or arrangement concluded should be applicable to different types and space of shelf. The arrangement of products in the shelf has variety of consideration, and studying about its variation will result to a more detailed and useful conclusion.

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