Ergonomics and anthropometry analysis from the Point-of-Purchase (POP) element in achievement of customer satisfaction in the retail space

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Abstract. Impulsive buying means consumer tendency to buy items off one’s product list. This conditions created by shop in order to influence customer behaviour, so the purpose of the research was to know the influence of interior display on impulsive buying behaviour. According to the marketer’s goals, impulse buying has positive effects on company income. The research aimed to measure the effectiveness of implementation of POP display strategy in retail spaces. It needs a set of works to achieve the best design, ergonomic is one of the qualifications to achieve qualified, certified design, and customer need. How far the extent of design fulfils the functional techniques, aesthetics quality, and economic, it needs evaluation by using some basic qualifications. Ergonomic is needed for post evaluation product examination. Beside functionality, good design should give safety, health, security and enjoyment for human when they use and operate the product of the design. The results of the research are in terms of POP elements which can be a solution for retail industry in their efforts to gain benefit and retain customers.

Keywords: ergonomic analysis, anthropometric analysis, point-of-purchase (POP), customer satisfaction, retail space

1. Introduction
The success of globalization of the world economy followed by advances in information technology has spurred the growth of the retail industry worldwide [1]. Large and small modern retail stores have penetrated throughout the world through a distribution network that acts as a wholesaler as well as a retailer in all developing countries including Indonesia. Today, customers are faced with so many choices of products found in modern retail stores such as minimarkets, supermarkets, and hypermarkets. In fact, the number of products sold can reach thousands. Manufacturers or store managers have an important task in this case, which must be able to seize the attention and convince customers to buy the products offered, through the point-of-purchase. Wells, Burnett, & Moriarty argue that point-of-purchase is a variety of displays that are placed in shopping or retail places with the aim of attracting customers' attention to the products that become the object of promotion [2]. Point-of-purchase is said to be important, because most customers make purchasing decisions while in the store. This phenomenon is reinforced by the Point-of-purchase Advertising Institute (POPAI) which states that in-
store marketing materials including Point-of-Purchase (POP), technologies that look like digital signage, and other types, are the heart and soul of marketing in the retail industry, and continue to prove effective in influencing decisions customers when they do shopping. Furthermore, the results of Point-of-purchase Advertising Institute (POPAI) and Grocery Marketing Association (GMA) research indicate that 75% of purchasing decisions made in the store are unplanned decisions.

The way POP media communicates with customers is quite unique because it is different from other promotional programs, by packaging the product in an attractive and exclusive display form, then there are signs or writing boards or pictures that inform the benefits, advantages, and location of a product. The products are neatly arranged, clean, and placed according to the type. This strategy is deemed necessary to apply, so that customers do not get bored with the usual promotional programs carried out so far, such as lucky draws, coupons, product samples, etc. As explained in the Supermarket News article, that with the introduction of new ways to reach customers, the POP is able to increase sales with variations in store displays that attract attention, connect with customers, provide information, and close sales.

An article in the Mars newsletter explains that customers are not only looking for functional benefits, but also emotional benefits. The functional benefits are in the form of low prices, while the emotional benefits in the form of outlet layouts and product display methods that facilitate and make customers comfortable. In addition, the display arrangement also provides the following benefits [3]:

- **Attract the customers attention**
  Display becomes very meaningful if it is able to attract the attention of customers. Through a good display by taking into account the factors of goods procurement, grouping of goods and arrangement of goods allows customers to more easily observe, research or even try the items on display. This can attract customers' attention to the goods provided by the company.

- **Desire to buy goods on display.**
  With a large selection of goods consisting of various brands, sizes and quality of groupings of goods that make it easy for customers to obtain goods, attractive arrangement of goods, neat and clean, adequate lighting, cool air, can lead to the desire to buy the goods offered.

- **Increase sales.**
  With the display allows the company to present most of its merchandise, which is presented at special places, shelves, or store front. This method is better because customers can directly see it. By looking at the store's interior display, buyers are stimulated to choose, research and even try the items provided by the company, and can even be persuaded to buy the items that are available. Thus the display can increase sales.

Based on the research, the arrangement of product display related to POP is focused on analyzing aspects of customer ergonomics and anthropometry. In an effort to meet customer needs and satisfaction, the first thing to do is to research the current market situation. It is expected that the application of point-of-purchase elements have to pay attention on the aspects of good and right ergonomics and anthropometry to achieve customer satisfaction in the retail space.

### 2. Methods

The research applies a qualitative method by conducting a literature study. The literature study is conducted to collect data in the form of photos or images from POP elements that are relevant to the research material. In addition, an observation was done by collecting data directly on the POP display and the customers in the retail space which focused on the user's ergonomics and anthropometry.

The collected data are analyzed using the Goal Grid method to clarify the goals of the POP display whether it is in accordance with the visual theory of POP merchandise. POP in the research is retail space with an emphasis on ergonomics and anthropometry. POP are analyzed using the Goal Grid method and using four components that explain the advantages and disadvantages, and what needs to
be improved and eliminated. It is expected to be a solution for retail space in its efforts to improve, gain benefit, and retain customers.

3. Results and discussion

3.1. Ergonomics

Ergonomics comes from the Greek word *ergo* which means *work*, and *nomos* which means *law*. The term of Ergonomics is more popular used by several Western European countries. In America this term is better known as Human Factor Engineering or Human Engineering. The purpose of the ergonomics discipline is to obtain a complete knowledge of the problems of human interaction with technology and its products, so that an optimal human-engineering system or technology is produced [4]. The main points regarding the discipline of ergonomics are:

- The focus of ergonomics;
- Ergonomics as a discipline concerned;
- The main aims and objectives of the ergonomics discipline approach are directed at efforts to improve human work performance such as increasing work speed, accuracy, work safety, and to reduce fatigue.
- The special approach to ergonomic discipline of ergonomics has a significant role in determining the success of a work system. Ergonomics is grouped into four fields of inquiry:
  - Inquiry into displays,
  - Investigation of the capabilities of human physical strength (biomechanics),
  - Investigation of the size of the workplace (anthropometry), and
  - Investigation of the work environment.

With regard to the fields of inquiry, a number of disciplines involved in ergonomics are:

- Anatomy and physiology, structure and function in humans;
- Anthropometry, body measurements;
- Physiology of psychology, conditions and brain systems;
- Experimental psychology, human behaviour.

3.2. Anthropometry

Anthropometry comes from the word *anthro* which means *human* and *metric* means *size*. So anthropometry is defined as science specifically related to the measurement of the human body that is used to determine differences in individuals or groups. Thus there are two ways of measurement.

- Static anthropometry
  The dimensions measured in static anthropometry are taken linearly or straight and carried out on the surface of the body. There are several factors that influence human body dimensions such as age, gender, ethnic & ethnic groups, and body position or gesture.

- Dynamic anthropometry
  Dynamic anthropometric measurements relate to the measurement of the state and physical characteristics of humans in a moving state or in conditions that might occur if someone is working on activities.

Furthermore, to clarify the anthropometric data to be applied in a variety of product designs or work facilities, these images provide information about various kinds of body parts that need to be measured, as shown in Figure 1 and Figure 2.
Figure 1. Anthropometric Data for Product or Facility Design  
(Source: Wignjosoebroto, 1995)

Figure 2. Human Motion Space When Standing  
(Source: Human Dimension, 1979)

Figure 1 and Figure 2 show the vertical and horizontal reach of humans - men and women. Where horizontally the maximum range of depth is 60 cm, left and right for men ±160 cm and women ±145 cm. vertically for the height of men ±180 cm can reach the highest ±200 cm and the lowest ±75 cm and for the height of women ±165 cm can reach the highest ±190 cm and the lowest ±70 cm [5].

Figure 3. Head and Eye Rotation  
(Source: Human Dimension, 1979)
Figure 3 explains that the range of human eye rotation: optimum left-right is 15° and maximum is 35°, up-down is optimum 15° and up to maximum is 40° and down is maximum 20°. For human head rotation: optimum 0° to the front, maximum left-right 60°, up to a maximum of 65° and down to a maximum of 35°. When combined the head and eye rotation range: optimum left-right is 15° and maximum is 95°, and for optimum up-down is 15° and maximum is 90°.

3.3. Point-of-purchase (POP)

Kamus Besar Bahasa Indonesia [6] states that the role is a device that expected to be owned by people who are domiciled in the community. Furthermore, a role is a set of behaviours expected from people who have a position in a social system. If it is associated with sales promotion activities, especially the POP that has an important position in a modern retail store, in general its role are[7].

- The role of informing: as an attraction for customers, attractors, and directors of customers on a particular brand, and presenter of information that is potentially useful to customers;
- Role of reminding: as a reminder of customers of the products or brands they have seen and heard as well as supporting advertising activities;
- The role of encouraging: to encourage customers to buy certain products or brands, highlighting specific product attributes when customers devote their attention to the decision making process, and stimulate unplanned purchases;
- The role of merchandising: providing effective product displays, helping stores optimize space, and increasing retail sales by facilitating or influencing customer and product decision making processes.

As the ability of POP in generating attraction to customers so as to be able to steal the attention of customers to make unplanned purchases, Kotler and Shimp describe the attractiveness of POP as the message and visual appeal. The appeal of a message concerns the technique of delivering a message, information on product benefits, motivation, and the reasons customers consume the product. Furthermore, Kotler [8] describes the appeal of messages to be

- Rational, related to economic value and product information that can be easily understood by customers so that awareness arises by the need or desire for a product;
- Emotional, related to the psychological needs of customers to buy a product.

Furthermore, Shimp suggests that in addition to the attractiveness of the message, POP also has another strength namely visual appeal which consists of [7]:

- Form, related to which will attract the attention of customers, has enough differences with other forms of products, easy to remember, easy to catch eyes making it easier for customers to find products;
- Size, related to the size displayed in such a way, is adjusted to the product being promoted;
- Colour, related to the identity of a product that has characteristics in terms of the colour of the product;
- Illustration, related to efforts to attract attention, highlight the features of the product, dramatize the message, stimulate interest in reading as a whole and explain a question;
- Layout, relating to the location where the point-of-purchase will be placed, as well as attention to the visual image of the product.

3.4. Customer behaviour

As stated by Kotler regarding the process of making a purchase decision for a product includes a number of stages that customers usually go through when making a purchase, identifying needs, information seeking, alternative evaluations, buying decisions, and post-purchase behaviour [9]. However, in more routine purchases, customers often skip some of these stages, such as customers who buy toothpaste brands that are used to recognizing their needs and go directly to buying decisions, skip the stage of information seeking and evaluation [8]. Likewise with unplanned purchases, which are usually
customers do. Customers will recognize the needs or desires due to visual stimulation in the store that is the point-of-purchase, then directly to the purchase decision, because customers are motivated and motivated to immediately have and try the products offered through the point-of-purchase.

3.5. Retail space
The word retail or retail literally means retail or retail trade, and retailers are defined as retailers or retail trade entrepreneurs. According to the dictionary, the word retail is interpreted as, "Selling goods and services to the publics” or selling goods and or services to the public [10]. Berman & Evans defines the word retail in terms of retail management as, "Those business activities involved in the sale of goods and services to customers for their personal, family, or household use” or overall business activities involving the sale of goods and services to customers for use by themselves, their families, or households [10]. While Davidson, gives an overview of retail business as an institution or business activity that more than 50% of total sales are sales to end customers whose motivation to shop is for personal gain [10]. The common threads of the two definitions of retail business that should be underlined are, among others; sales to end users (end customers) and customer purchase motivation is for their own interests (including their families), not for resale.

Retail business is the overall business activity associated with the sale and provision of services to customers for the use of individual nature as individuals or families [11]. Success in the competitive retail market, retailers must be able to offer the right product, at the right price, time and place. So it can be said that understanding of retailers about the characteristics of the target market or customers to be served is very important. Retail business can be understood as all activities involved in selling goods or services directly to end customers for personal use and not business use. The retail business is divided into 2 (two): traditional and modern, but in accordance with the development of an increasingly modern time, slowly the traditional retail business is starting to be displaced by modern businesses that enable customers to choose the various retail stores they want.

The current retail environment is changing faster than ever before. There is general agreement that the basic retail strategy in creating competitive advantage is the delivery of high quality services. This also shows that the value of customer shopping comfort that has physical aspects such as offering store layout [12].

3.6. Analysis with Goal Grid method
POP is analysed with Goal Grid method using four components of analysis, those are achieve, avoid, preserve and eliminate. These four components determine the advantage and disadvantage, and what to be improved and what to be avoided. It helps the designer or company to improve the POP to achieve customers’ satisfaction at the retail space.

The research takes 3 snacks (cereal) named Koko Krunch, Kellogg’s Corn Flakes, and Kellogg’s Froot Loops which are packed in a box. These food packages have several size variations with height ± 23-35 cm, width ± 15-25 cm, and thickness ± 5-7 cm.

Figure 4. Picture of Snack Product Packaging
(Source: Hartanti, 2020)
Here is some POP which will be analysed using the Goal Grid method:

3.6.1. POP - Koko Krunch

![Figure 5. POP - Koko Krunch](image)

(Source: Interior Design Binus University, 2020)

- **Achieve**
  - Design is in line with the brand being marketed and enough to attract the attention of customers;
  - The slope of product has the appropriate degree when viewed from the customers eye level (eye level);
  - Products are easy to reach;
  - Logos & taglines positioning and size are visible to customers eye level;
  - Display POP has a lot of capacity/storage;
  - The ergonomics suit all ages of customers (from children to adult) in accordance with the product target market;
  - Adequate inventory / stock storage.

- **Avoid**
  - Logos & taglines positioning are not visible from eye level (at the right & left side of the POP);
  - Product position which is a food product is placed too low with consideration, such as: not effective because it is not visible, hard to reach and product quality, e.g.: packaging and product damage, cleanliness, etc.

- **Preserve**
  - More spaces for storage / inventory: open & closed storage;
  - Maximize display design (access from 2-3 direction);
  - Display positioning adjusted to product variations.

- **Eliminate**
  - Product displayed at the bottom which are not visible and unreachable;
  - Logos & taglines positioning are not visible to customers.

The analysis indicates that Koko Krunch’s POP design has been well achieved and there are several points that need to be maintained, such as having a good display and storage. But, there are also some points that need to be corrected and eliminated in order to get even more leverage, for example it is important to consider customer’s eye level limits and reach.
3.6.2. **POP - Kellogg’s Corn Flakes**

![Image of Kellogg’s Corn Flakes POP design](image)

**Figure 6.** POP (Point-of-Purchase) - Kellogg’s Corn Flakes  
(Source: Interior Design Binus University, 2020)

- **Achieve**  
  - Design is in line with the brand being marketed and enough to attract the attention of customers;  
  - Products are easy to reach;  
  - Logos & taglines positioning and size are visible to customers eye level;  
  - Display POP has a lot of capacity/storage;  
  - The ergonomics suit all ages of customers (from children to adult) in accordance with the product target market;  
  - Adequate inventory space in open storage;  
  - The island type display makes an easy access from 4 sides of the display.

- **Avoid**  
  - Product position which is a food product is placed too low with consideration, such as: not effective because it is not visible, hard to reach, product quality, e.g.: packaging and product damage, cleanliness, etc.;  
  - Difficult to do the maintenance.

- **Preserve**  
  - More spaces for storage / inventory: open & closed storage;  
  - Display positioning adjusted to product variations.

- **Eliminate**  
  - Product displayed at the bottom are not visible and unreachable.

The analysis shows that Kellogg’s Corn Flakes’s POP design has been well achieved and there are several points that need to be maintained, such as having a good display for all ages and display that also function as storage. But, there are also some points that need to be corrected and eliminated in order to get even more leverage, for example consider placing a display that is too low for cleanliness and customer’s eye level.
3.6.3. **POP - Kellogg’s Froot Loops**

![Figure 7. POP (Point-of-Purchase) - Kellogg’s Froot Loops](Image)

(Source: Interior Design Binus University, 2020)

- **Achieve**
  - Design is in line with the brand being marketed and enough to attract the attention of customers;
  - Products are easy to reach;
  - Logos positioning and size are visible to customers eye level;
  - Display POP has a lot of capacity/storage;
  - The ergonomics suit all ages of customers (from children to adult) in accordance with the product target market;
  - Adequate inventory space in open storage.

- **Avoid**
  - Product position which is a food product is placed too low with consideration, such as: not effective because it is not visible, hard to reach, product quality, e.g.: packaging and product damage, cleanliness, etc.;
  - Display position that cannot show the entire product.

- **Preserve**
  - More storage for inventory / stock, especially the closed storage;
  - Maximize display access (from all direction);
  - Display positioning adjusted to product variations;
  - Considering the logo and product identity sizing & positioning with overall design theme.

- **Eliminate**
  - The display position is made back and forth so that the product display does not look up to customers;
  - Products displayed at the bottom are not visible and unreachable.

The analysis indicates that Kellogg’s Froot Loops’ POP design has been well achieved and there are several points that need to be maintained, such as having a good display for all ages and adequate storage. But, there are also some points that need to be corrected and eliminated in order to get even more leverage, for example it is important to consider customer’s eye level limits and reach.

### 4. Conclusion

The research aims to measure the effectiveness of the implementation of the POP. Display strategy in the retail space in an effort to achieve customer satisfaction. In the research, the structuring of product
displays related to POP is focused on analysing aspects of customer ergonomics and anthropometry. Ergonomics and anthropometry are needed for product evaluation; in addition to functional, the design must also be able to provide safety, health, security, and comfort for humans when using and operating the results of the design products.

The case study in the research is three POP display designs for snack products (cereals) named Koko Krunch, Kellogg's Corn Flakes, and Kellogg's Froot Loops which are then analysed using the Goal Grid method consisting of four parts (achieve, avoid, preserve and eliminate). From the results of the analysis, it can be seen that the POP display design is in line with the brand that is being sold so that it can attract attention, be connected, and provide information to customers. POP display design is expected to pay attention to the eye level position of the customer. In addition, the reach is also an important concern so that it can provide safety, health, security and customer comfort.

In terms of POP improvement display design, it should be noted to several aspects both in terms of visual and technical. It is expected that the products displayed can look neat, clean, and are placed by type. The availability of open and closed storage is also an important concern in a POP display design so that needs can be met, where the storage area in a POP display design can be placed in areas that are difficult to reach by the hand and visible to the customer's eyes. In addition, the form of POP display design also needs to be adjusted to the location of the display so that the existence of the POP display can function optimally in attracting the customer's attention based on the message and visual appeal.

So that with a good example, this POP display design can be used as a benchmark for other similar POP display designs that have a positive impact and reduce negative impacts for users and increase their knowledge of POP display design. Finally, it can be concluded that POP elements can be a solution for retail industry to gain the maximum benefit and retain their customers.

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