CHAPTER II

LITERATURE REVIEW

2.1 Graphic Design

Graphic Design is a form of communication utilizing visual objects in order to convey information to targeted audiences (Landa, 2014). Landa also stated that graphic design is a visual interpretation of an idea counting on steps such as creation, selection, and organization of visual elements. Graphic design also plays a role in problem-solving that has to be effective and able to persuade, inform, identify, motivate, enhance, organize, brand, rouse, locate, engage, and carry out many levels of meaning.

Meanwhile, design thinking can be interpreted as the universal balance and harmony of the human mind through rational, integrative manufacture (Hara, 2007). The essence of design is rooted from discovering problems shared by many people and trying to solve it.

2.1.1 Design Principles

Landa (2014) explains that there are six principles in design and they are interdependent.

1) Format

   Format is the established perimeter or the boundaries of a design. Format refers to the material, shape or subject being used for the graphic design project and graphic designers work with a plethora types of formats.

2) Balance

   Intuitively, the principle of the stability or equilibrium of an even distribution visual weight and among all the elements of the composition on each side of a central axis, is what Landa called balance. Balanced

design or composition simultaneously leaning towards harmony and conveying stability.

Figure 2. 1 Format

Source : https://www.interaction-design.org/literature/article/responsive-design-let-the-device-do-the-work

3) Visual Hierarchy

According to Landa (2014), visual hierarchy is used by graphic designers to guide the viewer and communicate and organize information. In visual hierarchy, emphasis is another method of stressing on the importance of some elements over others.

Dabner (2003) also explains hierarchy of text is deciding on the priorities within type as a graphic element, means establishing hierarchies to acknowledge various different levels of information to deal with. In certain aspect, illustrations or diagram possess a greater ability to be more dynamic and the to dramatize the subject, allowing for the emphasis of particular aspect. These are some ways to achieve emphasis:

a. Hierarchies of Text

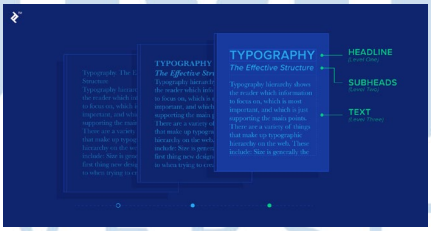

Figure 2. 2 Text Hierarchy

Source : https://www.toptal.com/designers/typography/typographic-hierarchy

There are levels of importance within a text. Starting from arrangement of a text that incorporates headings, typically have three distinct levels of significance: heading, subheading, and

body copy text. It is essential to categorize the text to ensure uniformity in style for each level of information. Differentiating various levels of information can be achieved by modifying attributes such as size, weight, or colour to generate visual interest.

b. Illustration and Diagram

In information design scope, utilizing illustration serves the purpose of simplifying intricate issues and conveying information effectively. There are various rationales for using illustrations, including assisting reader to comprehend instructions, demonstrating how task should be performed, and guiding individuals to destinations.

Figure 2. 3 Illustration and Diagram

Source : https://www.dailymail.co.uk/news/article-3148808/How-use-toilet-signs-erected-Swiss-railway-Asian-tourists-don-t-use-properly.html

4) Rhythm

In graphic design using repetition, a pattern of elements can set up a rhythm. Understanding the difference between repetition and variation in graphic design is the key to establishing design rhythm.

5) Unity

Unity is when all of the interdependent graphic elements are forming a greater whole and the elements look as though they belong together. This is because the human brain always tries to make connections and look for the big picture of things by grouping them, understanding

visual unity based on location, orientation, similarity, shape and colour of the elements they have.

6) Law of Perceptual Organization

According to Pinker (1990), the Gestalt's Law of Perceptual Organization to be highly vital in graphical representations are visually processed. Pinker argues that these Gestalt principles collectively influence individual graphical elements are united to create meaningful entities. The following are six examples of Gestalt principle:

a. Similarity

Similarity refers to the tendency of the elements that possess common characteristics to be perceived as part of the same group. Conversely, dissimilar typical appear separate from those with which they do not share such attributes.

b. Proximity

When elements are close to each other in physical proximity, they are seen as belong together.

c. Continuity

Elements that appear to continue from previous elements are viewed as interconnected, creating a sense of motion

d. Closure

This is the inclination of the mind to link individual elements to form a finished shape, unit, or pattern.

e. Common fate

Elements are more likely to be perceived as a unified whole if they all move in the same direction.

f. Continuing line

Lines are always perceived to follow the simplest path. If two

lines break, the viewer perceives the overall movement rather than the break, a concept also known as implied line.

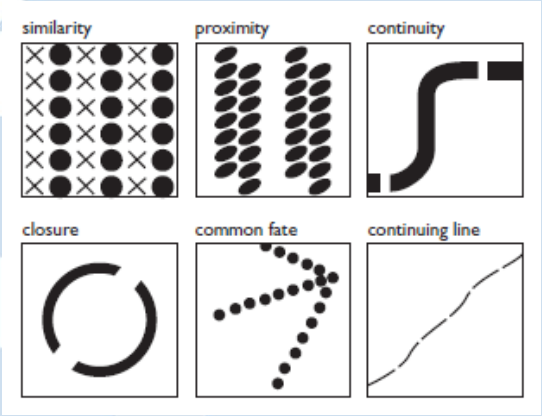

Figure 2. 4 Law of Perceptual Organization
Source : Landa (2014)

2.1.2 Design Elements

Understanding and possessing basic knowledge of basic graphic elements and principles are key in building visuals, communication, and expressions. There are four elements of two dimensions of the graphic elements, consisting of:

1) Line

   Landa (2014) explained a dot is the smallest unit of a line and usually recognized as round shaped. In digital scope, a dot refers to a pixel which seemingly appeared more squared than rounded.

2) Shape

   Shape is the overall contour of an object and can be described as a form or path that is enclosed or complete.

3) Texture

   Texture pertains t the tactile nature of a surface or emulations of such tactile characteristics. In visual arts, texture can be categorized into two groups: tactile textures and visual textures. Tactile texture possess touchable qualities, while visual textures are optical illusions

mimicking tactical textures. This can be achieved either crafted by hand, scanned from actual textures, or photographed.

4) Color

Color is a potent and highly evocative design element (Landa, 2014). Color represents the light energy and the perception of color arises from light. The hues that are visible to human eyes are the result s of reflected light or reflected color.

Landa (2014) divides color into three categories, which contains hue, value and saturation. Hue refers to the name of particular color and can be interpreted as warm or cool in temperature. Value refers to the intensity of the luminosity. Saturation is the level of intensity of vividness in color.

There are three primary colors consisting of red, green, and blue. These primary colors also called additive primaries because when they are combined in equal amounts, they will form white light. Application of primary colors used for screen-based media. Meanwhile, to add contrast, the mixture of yellow, magenta, and cyan are used for adding black in offset printing.

Figure 2. 5 Color Wheel

Source : Landa (2014)

Cited from the Logo Design Workbook by Sean Adams and Noreen Morioka, color can create mental and emotional experience. Following are some of the meanings of the colours :

a. Red shows love, angst, passion, stop, and blood.
b. Orange shows energy, creativity and uniqueness.

c. Yellow shows intellect, joy, youth, and caution.
d. Green shows fertility, money, growth, and healing
e. Blue shows peace, knowledge, and tranquility
f. Purple shows wisdom and royalty.
g. White shows purity, virtue, and cleanliness.
h. Grey shows uncertainty and neutrality.
i. Black shows secrecy and negativity.

2.1.3 Typography

Typography is a compilation of various letter characters organized to maintain a coherent visual identity. Typically, a character set contains letters, number, symbols, and punctuation marks. According to Gibson (2009) serif versus sans serif is the most basic differentiation of letterforms. there exist different classifications of letter character types as follows :

1) Serif

   Serif extensions appearing at the end of a strokes, trace their origins back to the chisel mark and swashes of calligraphic brushes. Some examples include Garamont and Caslon.

2) Slab Serif

   A subgroup of serif typefaces, distinguished by bold and geometric stroke endings. Some examples are Bookman and Clarendon.

3) Sans Serif

   The absence of serifs, characterized by the unembellished stroke endings, evolved during the early modern period as a response to traditional typographic styles. Some examples like Futura and Grotesque.

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4) Script

These fonts closely mimic handwriting, often featuring slanted and connected letters. Script typefaces able to emulate the appearance of writing created with tools like pointed pen, pencil or brush. Some examples are Snell Roundhand Script and Brush Script.

5) Decorative

Decorative letterform, are deliberately artistic and often eclectic in style.

Figure 2. 6 Various Typography Character
Source : Gibson (2009)

The author's final project will employ Sans Serif typography, as it offers enhanced visibility and readability for people with disabilities. This choice is based on the fact that sans serif fonts, characterized by their block-like appearance and minimal decorative elements, typically provide better readability than serif fonts.

2.1.4 Layout

Layout is an important factor in ensuring the success of a signage, so there are things that need to be considered when laying out signage, Calori (2015) explains several things that need to be considered, according to her, the size and graphic design are very important to determine clarity, unity and the style of the graphic system, because the layout of the sign can determine

its visual character. However, the most important thing in layout is determining the size of the letters on a signage, so it is explained as follows:

1) Sizing Typography for Viewing Distance

To ensure effective signage, it's crucial to include sufficiently large graphics to allow users ample time to read, comprehend, and safely act on sign's message before reaching a decision point. A key component of the graphic system for signage is the utilization of capital letter height as the standard measurement. Cap height standards employ non-rounded letters, usually represented by a capital "I," as they are easier to measure, where rounded letters like "C," "O," and "S" tend to be larger.

Figure 2. 7 Cap height on flat letters compared to rounded letters
Source : Calori (2015)

2) Positions of Graphic Elements

Just like how typography, symbols, and arrows have proportional relationships, there are various choices for their placement in relation to each other within a signage layout. These options include:

- Side by side positioning

Figure 2. 8 Side by Side Positioning
Source : Calori (2015)

- Stacked Positioning

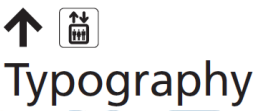

Figure 2. 9 Stacked Positioning
Source : Calori (2015)

3) Line Length and Type Size

The length of the lines of text can also impact the size of the typeface, as it determines how the text fits within the signs and where text may need to be shortened. This process helps determine the right lettering size for a specific sign or scale.

Figure 2. 10 Line Length
Source : Gibson (2009)

4) Letter Spacing or Tracking

Selecting the appropriate spacing between letters, known as tracking, is crucial for enhancing readability. Typically, letters and words are spaced further apart to ensure easy reading under challenging conditions or while in motion. In cases where light-colored text is set against a dark background, a looser spacing between letters is needed to maintain clarity.

Figure 2. 11 Letter Tracking
Source : Gibson (2009)

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5) Line Spacing or Leading

Line spacing is important for ensuring that a series of messages can be read and comprehended without wasting or compromising space. Grouping text, especially in a narrow stack of names where two-line names are closely spaced (A) and (B), is crucial to define the spaces between names.

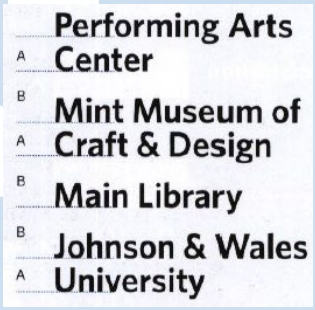

Figure 2. 12 Letter Leading
Source : Gibson (2009)

2.1.5 Grid

In every design project, there is a need to solve problems both in terms of visual aesthetics and organization. Elements like images, symbols, texts, and tabular data need to be seamlessly cohesive to convey a message. Utilizing grid is the only way to achieve cohesion, and gives systematic order to a layout, according to Samara (2023). A grid is a structural framework comprising both vertical and horizontal lines that partition a layout into columns and margins, according to Landa (2014).

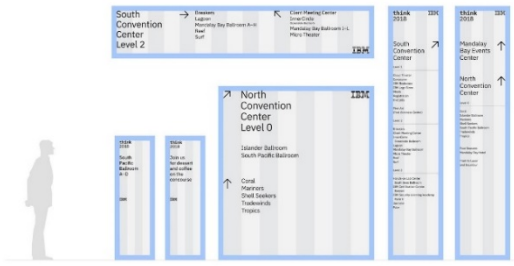

Figure 2. 13 Signage Grid
Source : https://www.ibm.com/design/event/architecture/signage-wayfinding/#grid

Grid also helpful in signage and wayfinding, using the grid as a foundation framework that offer structure, guidance, and direction, enabling on applying visual elements in a thoughtful and creative way. Grid also helpful in creating floor plan utilizing its recursive geometry nature with Golden Section, based on Samara (2023).

A grid refers to a framework consisting of vertical and horizontal lines that divide a layout into columns and margins, as described by Landa (2014). This structured grid serves as a guide for arranging text and images within a composition. It facilitates a systematic and organized presentation of content. In the context of a graphic standard manual book, this grid is specifically designed to ensure consistency and coherence in the visual elements and layout throughout the document. It establishes a visual hierarchy and aids in maintaining a standardized and professional appearance in the design of the manual book. Various grid structures include:

1) Single Column Grid

   This grid system also called as manuscript grid, gives the area of design without specific boundaries for the design content. Manuscript grids like this is suitable for long paragraph like in a book or an essay, and make the text is the center of attention of that page.

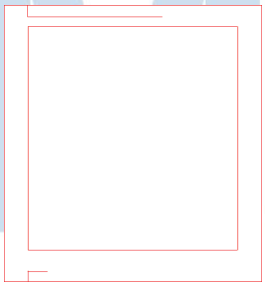

Figure 2. 14 Modular Grid
Source : https://vanseodesign.com/web-design/grid-types/

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2) Multi Column Grid

Columns can be used separately and show different content. Additionally, these columns can be used sequentially to create running text. Columns in this grid can also have different widths.

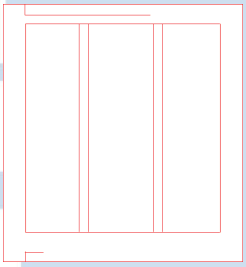

Figure 2. 15 Multicolumn Grid

Source : https://vanseodesign.com/web-design/grid-types/

3) Modular Grid

Essentially, this grid comprises both columns and rows, forming compact areas for content known as modules. These modules can connect both vertically and horizontally, providing designers with the flexibility to establish multiple spatial zones of varying dimensions. This grid is well-suited for projects with elements of differing sizes and significance, making it suitable for accommodating items like graphs, tables, and forms.

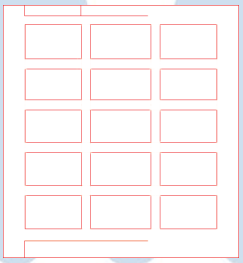

Figure 2. 16 Modular Grid

Source : https://vanseodesign.com/web-design/grid-types/

2.2 Signage and Wayfinding

According to SEGD (the Society for Experiential Graphic Design), signage is considered the primary element within wayfinding, placemaking, and identity and exhibition systems. SEGD's definition equates signage with labeling, but with a distinction: labeling serves to identify a product, whereas signage serves the

purpose of identifying a location, also known as Environment Graphic Design. Environmental Graphic Design or EGD is a multidisciplinary field of science that interacts with each other to communicate an enormous amount of information on signs and other objects in the built environment.

Berger (2005) emphasized the growing demand for environmental graphic design now caters to individuals with disabilities, which has developed along with increasing public awareness and the realization of laws concentrating on the wayfinding requirements of disabled individuals. This has encompassed a more comprehensive comprehension of diverse signage types to aid various disability conditions, encompassing aspects using various tools such as, floor treatments, Braille rails, and raised maps.

Wayfinding according to Kelly (2011) is an umbrella term refers to how people navigating, but also orient themselves, and finding their way in environments. Wayfinding serves as a tool to guide individuals from point A to point B. Navigation as to precise methods individual employ to orient themselves, using elements like route, distinctive landmark, and the use of maps. Effective wayfinding system incorporate variety of components designed to assists all type of navigators, be it those who rely on landmarks, routes, or maps. Gibson (2009) added in his book The Wayfinding System, that a wayfinding system connects diverse individuals within a shared space, regardless of whether they speak the same language or have the same destination. It achieves this by providing guidance through a unified communication system. This common language employed by the wayfinding system shapes a collective narrative about how people perceive, interpret, and navigate through a given space.

The importance of signage and wayfinding according to Calori (2015), helps to humanize and demystify the complexities of the built environment. Thoughtfully crafted environmental graphic systems and signage not only meet their primary role of providing information, warning, guidance, and identification but also contribute to elevating the visual and psychological aspects of an area (p.11).

2.2.1 Categories of Signs

A diverse array of signs plays a crucial role in wayfinding design and contributes to shaping one's perception of a location, whether it's indoors or outdoors. Gibson (2009) categorizes wayfinding systems into several types of signs, including :

1) Identification Signs

   Identification signs are the primary elements of wayfinding, often serving as the initial impression of a destination. These signs serve as visual markers, displaying the name and purpose of a location or area. They can be found at the start and end of pathways, as well as at entrances and exits leading to primary and secondary destinations.

Figure 2. 17 Identification Signage

Source : http://www.poulinmorris.com/projects/environmental/Abraham_Joshua_Heschel_School.html

2) Directional Signs

   Directional signs act as the circulatory system within a wayfinding program, providing essential cues to guide users once they have entered a space. This sign category employs visual cues like typography, symbols, and arrows. Directional signs should be clear, easily recognizable, and harmonious with their surroundings. Message content should be straightforward and well-coordinated to facilitate seamless navigation

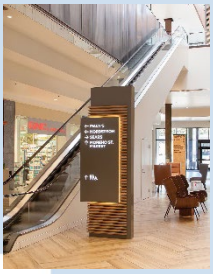

Figure 2. 18 Directory Signage
Source: https://rsmdesign.com/work/montclair-place

3) Orientation Signs

Orientation signs provide visitors with an overall view of their surroundings, often presented through comprehensive site maps and directories. These signs are typically sizable and visible to multiple people at once.

Figure 2. 19 Orientation Signage
Source: https://www.meng.de/media/3cflfonj/uni-leipzig_1.jpg

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4) Regulatory Signs.

Regulatory signs outline the rules and guidelines for a location. They should be inconspicuous enough not to disrupt the environment's ambiance but clear enough to immediately communicate instructions or warnings.

Figure 2. 20 Regulatory Signage

Source: https://www.behance.net/gallery/21000443/El-Born-CC?utm_medium=email&utm_source=transactional&utm_campaign=project-published&

2.2.2 Design Process

The fundamental design process can be adapted to EGD situations, optimizing the effectiveness of EGD endeavors. Given that numerous EGD projects are closely linked with architectural design projects, the design stages in EGD process model commonly crossed with the field of architecture, Based on Calori (2015).

1) Data Collection

Based on Calori (2015), at this phase also known as the very important pre-design planning phase by gathering information and analysis of the preexisting data or information of the environment, then filtering that information into a plan of action.

Gibson (2009) added, in attempt to navigate a place, one must examine on the visitor pattern, find the existing landmarks or symbols, and later can be applied in planning phase, then wayfinding design process can commence.

2) Schematic Design

This phase is to explore and generating ideas, concept, design from various foundation of signage after the gathered information are laid. The visual aspects of a sign system entail with identifying the position and communication roles of essential signs, developing strategies to sign message, and hierarchy of sign messages.

3) Documentation

The goal of this phase is to connecting the dots on the problems of the existing signage and how to create better sign system with the documented location photos.

2.2.3 Sign Pyramid of Component

The Signage Pyramid composed of three distinct yet interconnected systems, which need to be harmonized during the deisgn process and the main goal of a sign system is to convey information utilizing graphical elements presented about an environment to it users. An essential design problem-solving revolves around establishing a coherent sense of unity, both in terms of conveying information and visual consistency, across all the diverse sign types in a comprehensive system (Calori, 2015).

Figure 2. 21 Sign Pyramid Component
Source: Calori (2015)

A comprenhensive signage program consists a wide range of signs, from large outdoor pylons to small indoor wall-mounted plaques, and still able to achieve the same unified visual communication also information across diverse sign types within the sign system. Essentially the Signage Pyramid of Component is deconstructing a complexity of signage design and

seemingly overwhelming signage to its individual components to be more manageable to solve.

2.2.4 Information Content System

1) Hierarchy of Content

In her book, Calori (2015) stated that in a signage program, not all information holds the same significance. There are varying degrees of importance associated with different sign messages and their locations. Therefore, it becomes crucial to establish a hierarchical order for these messages and locations based on their relative importance. Hence, this hierarchy determines the size of the graphics used to convey the information and, consequently, the size of the sign itself. A sign information hierarchy is essential for two fundamental and interconnected reasons :

- To save space on sign surfaces.
- To improve the effectiveness of communication.

2) Sign Locations

Calori (2015) also explained about sign placements are determined through an analysis of traffic routes and pivotal decision points within the project's environment. This process begins by outlining the signs on architectural drawings, marking each sign's intended location on the plan. Initially, this phase may involve primarily primary signs for simplicity and clarity, and they can be color-coded based on their communication function. There are some guidelines for determining sign locations:

- Ensure that signs are always positioned perpendicular to the viewer's line of movement and sight. Signs placed parallel to their line of movement or sight would require people to turn their heads to see them.

- Place directional signs at decision points, and on lengthy pathways, reinforce the information with additional signs to assure individuals that they are on the correct path to their destination.
- In specific scenarios, particularly those involving vehicular signage where reaction time is critical, consider using advance directional signs.
- Place identification signs at the destinations to which people have been directed. This confirms their arrival at the sought-after destination.

3) Message Hierarchy and Proximity

Establishing a hierarchy for sign information begins with a thorough evaluation of all the different destinations within the project's environment. The initial step involves creating a list of these destinations and then arranging them in order of significance for the sign users.

In addition to hierarchy, sign information can also be structured and presented based on its proximity to the destination. The primary goal of proximity-based messaging is to include a destination on a sign when the sign's location is close to that particular destination.

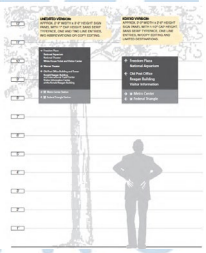

Figure 2. 22 Comparison lengthy destination names abbreviated and not abbreviated
Source: Calori (2015)

4) Signage and the Americans with Disabilities Act

The Americans with Disabilities Act (ADA) is a federal regulation enacted by Congress to protect the civil rights of disabled Americans, including ensuring their physical access to the built environment. As part of this effort, the ADA includes numerous provisions that impact the design of physical elements in buildings and transportation facilities, including signage. The ADA signage provisions encompass various aspects of a sign program's graphic and hardware system design, including factors like figure/ground contrast, symbol usage, dimensional limits, and finish.

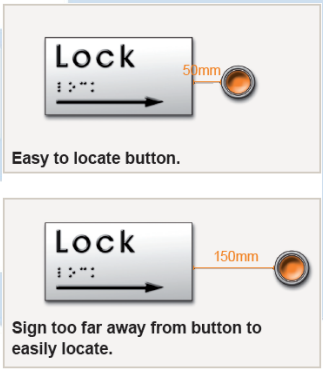

Figure 2. 23 Signage examples for people with visual impairment
Source:Royal New Zealand Foundation of the Blind (2013)

2.2.5 The Graphic System

Signs have a singular and fundamental role: to convey information to individuals about their surroundings. Landa (2014) emphasizes that signs are one of the genuinely interactive elements within the constructed environment. As people are required to actively read the information displayed on signs, signs also become some of the most closely examined objects within the built environment. And Gibson (2009) added, in order to effectively plan messages and their placements, once specific sign types have been established, the process involves creating a preliminary message and analyzing the flow of movement within, around, and through the site.

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1) Choosing a Typeface

In her book, Calori (2015) explains briefly about the history of typography, the term "typography" is derived from the Latin word "Typographia," which signifies printed characters (p. 127).

Selecting the right typography, is significant because not all typefaces are suitable for signage. This is crucial as signage intended for the general public and able to effectively communicate information without causing confusion. There are four factors in picking typefaces for signage system:

Figure 2. 24 Choosing Typeface
Source:Gibson (2009)

Selecting a versatile type family involves assessing the range of options it provides in terms if slant, width, and weight. This becomes crucial for wayfinding signage, as the messages frequently appear in various contexts and sizes.

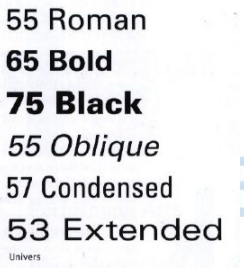

Figure 2. 25 Font with Versatile Type Family
Source:Gibson (2009)

2) Legibility

The choice of typeface for sign system is heavily influenced by the need for legibility, which is closely connected to both formal suitability and longevity. Legible typefaces display the following attributes

- The features are well defined, readily identifiable letter shapes.
- Possess a relatively generous “X-Height”.
- Maintain a moderate weight and stroke widths.
- Exhibit medium or normal character width.

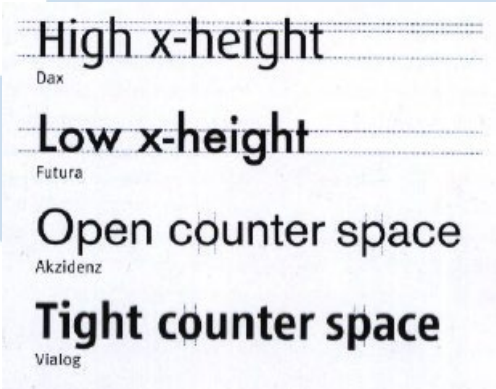

Figure 2. 26 Font Legibility

Source:Gibson (2009)

3) ADA/SAD Guidelines

The choice of typeface can be influenced by the typographic demands of the American Disability Act (ADA), particularly when it comes to the need for tactile or raised characters. Gibson (2009) also added the ADA establishes guidelines for choosing fonts to guarantee readability for people with visual impairments. ADA regulations specify that signs must feature letters and numbers with a width-to-height ratio ranging from 3:5 to 1:1, as well as a stroke width-to-height ratio between 1:10 and 1:5.

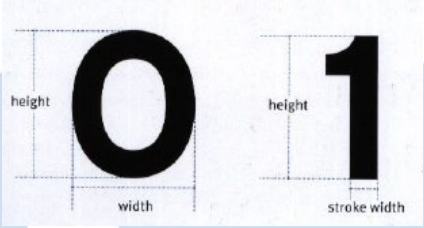

Figure 2. 27 ADA Font Regulations

Source:Gibson (2009)

4) Symbols

Based on Ambrose (2010), a visual element that conveys a concept, idea, or object without an inherent logical connection is referred to as a symbol. Letters can be categorized as symbol that stand for the sounds used to construct words (p. 88). Standardization for pictogram already established and recommended by AIGA (American Institute of Graphic Arts) to be utilized in public areas, such as ISO graphical symbols.

Figure 2. 28 AIGA Symbols

Source: https://www.aiga.org/resources/symbol-signs)

5) Arrows

Calori (2015) explains, arrows serve as universally understood symbols for indicating direction, replacing lengthy verbal instructions. For instance, a left-pointing arrow universally signifies "turn left," rendering the need for the phrase "turn left" redundant in signage. This principle applies to arrows in other directions as well.

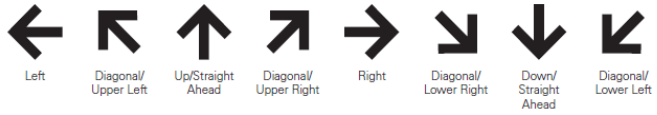

Figure 2. 29 Arrow Direction
Source: Calori (2015)

6) Icons

Ambrose (2010) explains, a graphic element that represents an entity, individual, or another entity is known as an icon. An icon can take the form of a photograph, or it can be diagrammatic or illustrative in nature. An effective diagrammatic or illustrative icon simplifies the subject into easily recognizable features, often adhering to the principle of parsimony, or Occam's razor, which suggests not including unnecessary details (p. 88)

Figure 2. 30 Different Format Icon
Source: Calori (2015)

7) Color

Gibson (2009) stated that colors are significant also influential about our endeavors of the world in everyday life. People are intimately associated themselves with colors, and often help people identifying, navigating through, and sometimes rekindle emotionally to an environment. Colors also able to mark the passage of time by using different colors associated with a certain day/object. Color helps the users to guide themselves and simplify perception of a place.

8) Layout

As outlined by Calori (2015), the arrangement of elements plays a pivotal role in the effectiveness of signage. There are things must be taken into account while creating signage layouts, the size and placement of graphics are significant to influence clarity, cohesiveness, and the overall style of the graphic system. The layout of a sign can ultimately define its visual identity. Calori (2015) also explains there are various other factors play a role in the final design and proportion of layouts. These factors encompass: (p. 169)

- The proportion of symbols and arrows to typography
- The placement of symbols and arrows to typography
- The spacing around and between graphic elements
- Layout format proportions
- Guidelines established by ADA/SAD

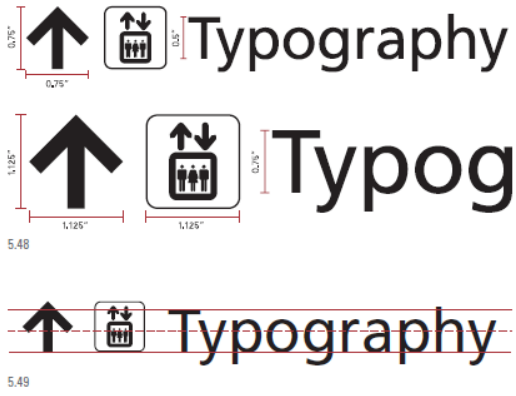

Figure 2. 31 Typography and Icon Layout

Source: Calori (2015)

2.2.6 Shapes

The physical form or shape represents the most apparent expression of a sign hardware system. The shapes of a sign system also able to represent cohesion and distinctive appearance when viewed in three dimensional space. This results in four fundamental mounting methods:

1) Freestanding or ground-mounted signs

These signs may be single or double post assemblies, in which the bottom of the sign is mounted to ground or other horizontal mounting surfaces.

2) Suspended or ceiling-hung signs

These signs are common for large scale overhead directional signs and hangs down, in which at the top part of the sign is mounted to ceiling or other horizontal mounting surfaces.

3) Flag-mounted signs

These signs resemble a flag, located above head levels and fixed perpendicular to a wall or other vertical mounting surfaces.

4) Wall-mounted signs

These signs are generally smaller compared to other signs, usually help to identify places, provide directions or state rules established in said environment. At the back of the sign is mounted parallel to a wall or other vertical mounting surface.

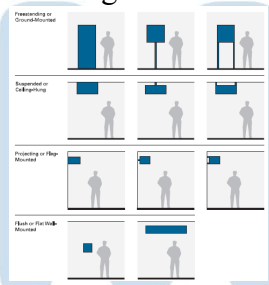

Figure 2. 32 Sign Form Variation
Source: Calori (2015)

2.2.7 Material Signage

Materials according to Calori (2015) are the essence of a sign system hardware and have a significant bearing on the visual appearance of the sign system hardware. There are sign materials uses solely for structural

components, some are used only for finish of the sign. Gibson (2009) divides materials into three categories:

1) The Basics

These materials are the basic materials commonly used for signage, includes:

a. Metals

Metals are durable and flexible, able to be used for framing, visible surfaces, and dimensional elements. Metals can be used for signage are; stainless steel, aluminum, bronze, and brass.

b. Glass

Glass become more common for signage material, can be backlit, edge lit, and dimensional forms. Types of glass to use are; float, borosilicate, low-emissivity, tempered, fritted, and laminated.

c. Wood

One disadvantage of using wood for signage is minimum durability and can darken by time, whether for indoor or outdoor usage. Wood types that can be used for signage are; mahogany, oak, cedar, pine, cherry, and poplar.

d. Stone

Stone provides stability and integrity for sign panels or bases with landscapes or architectural settings. Stone types that are useful for signage are; marble, sandstone, granite, limestone, and slate.

2) Synthetics

These are the type of materials created from chemical process, includes:

a. Banners

Banners made out of plastic, fabric, or other flexible materials that are able to be mounted with mounting structures both top and bottom. Banner material examples are; nylon, vinyl, Tyvek (synthetic fabric brand), and Dacron (fine woven fabric brand).

b. Plastic

Plastic representing a wide range of synthetic materials, typically derived from cutting cast or extruded sheets with varying thicknesses.

c. Composites

This category consists expansive range of materials made out of two or more parts engineered. Composites materials can usually be cut into shapes, forms, and used in many areas of signage. Composites material examples are; Alucobond, fiberglass, and phenolic resin laminates.

3) Sustainable

Sustainable materials are the type that are recyclable and environmentally friendly.

a. Green/Recycled

The word green in this type of material not only refers to recyclable, also considering the manufacture, modularity,

and lifespan of the material. This type material can be used along with LED light (p. 114-115)

2.3 Anthropometry

Nowak (1996) explains, Anthropometry concentrates on rehabilitation needs is primarily concerns with individuals who have physical disabilities. Furthermore, ergonomic anthropometry, tailors the working environment to enhance efficiency and effectiveness, along with the primary objective of anthropometry for people with disabilities is to shape the surroundings to accommodate their specific disabilities. This ensure suitable living conditions.

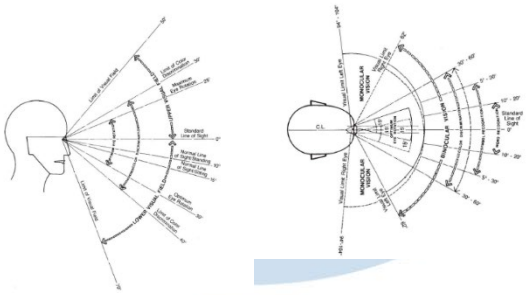

Figure 2. 33 Vertical and Horizontal Visibility Plane

Source: Panero (2013)

Anthropometry as defined by P. Julius and Z. Martin (2013) is the scientific study focused on measuring the human body to identify variations among individuals and groups. In public facilities like hospitals, transportation hubs, shopping malls, and the like, where there is a significant influx of people, it is crucial to ensure that displays are of an adequate and suitable size. This ensures that they are visible to everyone without obstruction and positioned at an appropriate height, neither too high nor too low, to accommodate various positions, whether people are sitting or standing. Therefore, precise measurements are essential, including:

1) Normal Line of Sight

The central vision field, also known as the binocular field, is the area where words and symbols are identified most clearly, with the sharpest

focus occurring approximately 1 degree off from the line of sight, depending on the color. It's important to mention that under normal conditions, when standing, the typical human field of vision extends about 10 degrees below the horizontal line, and when sitting, it's around 15 degrees. However, in a relaxed state, the viewing angle increases, expanding to approximately 30 degrees when standing and 38 degrees when sitting.

2) Distance of Display from the Eye

The range of distances to be taken into account between the display and the observer varies: the minimum distance falls within the range of 33 to 40.6 cm, the optimal distance spans from 45.7 to 55.9 cm, and the maximum distance ranges from 71.7 to 73.7 cm. It's important to note that the eye's focal point can alter with age. Consequently, a typical reading distance for printed materials is generally around 45.8 cm.

3) Viewing Angle

As a standard guideline for the best viewing experience, the sightline extending from the bottom of the display to the viewer's eye should create an angle no greater than 30° with the typical horizontal line of sight. In situations where a seated individual is expected to work at the workstation for an extended duration, they may naturally adopt a more relaxed posture over time, resulting in a slight downward tilt of their head. In such cases, the 30° angle can be adjusted to 33° for optimal comfort.

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4) Height and Angle of Display

For displays, the size is usually at the level of the observer's eye, supported by how large the display is. Basically, the difference in eye height when standing is 30.5 cm, while when sitting the difference is smaller, namely less than 15.2 cm. The display angle must be placed perpendicular to the normal line of sight.

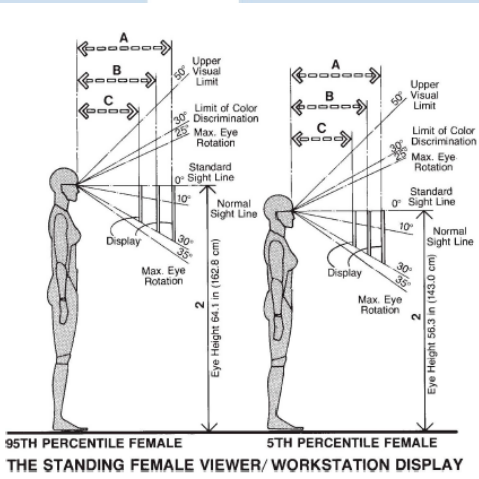

Figure 2. 34 Height and Angle of Display
Source: Panero (2013)

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2.3.1 Chairbound People

It is crucial to assess the appropriate dimensions for reach and clearance, taking into account both the individual and the wheelchair as a unified entity. This necessitates an understanding of the wheelchair's anatomy. When it comes to measuring the dimensions for men and women using wheelchairs, caution should be exercised as the reach dimensions are indicative of an average size and arm reach is determined with the assumption that the back is inclined at a 15-degree angle from the vertical position.

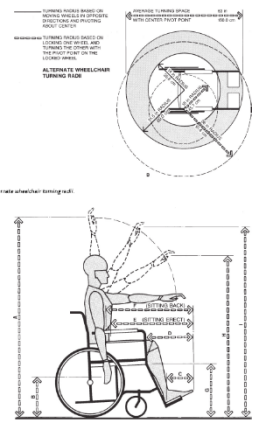

Figure 2. 35 Anthropometry of Chairbound People

Source: Panero (2013)

2.3.2 Ambulant Disable People

For individuals with mobility impairments who use assistive devices like crutches, walkers, canes, or seeing-eye dogs, it is essential to consider the interaction between the user and the aids. Therefore, designers should typically treat the user and their assistive device as a single unit. To create effective designs, it's beneficial to have knowledge not only of anthropometric measurements but also a comprehensive understanding of spatial considerations.

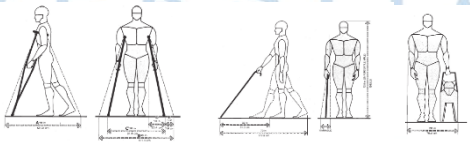

Figure 2. 36 Anthropometry of Ambulant Disable People

Source: Panero (2013)

2.4 Accessibility

Accessibility refers to how easily one location can be reached from another through transportation system. Measures of Affordability or accessibility encompass factors such as the convenience of travel in terms of time, expense, and effort when moving between places or regions.

Accessibility is also defined as the act of facilitating convenience for individuals with disabilities to access various activities, aiming to ensure equal opportunities and services that contribute to an equitable quality of life, according to Prajalani (2017).

2.4.1 Accessible Signage

Accessible signage or commonly known as ADA signage means that signage is designed to create easier way to navigate for people with disabilities, cited from ADA's official website. Davis and Weisbeck (2015) emphasized that thoughtfully crafted signage in guaranteeing accessibility for individuals with various disabilities through wayfinding.

2.5 People with Disabilities

Person with disabilities refers to an individual who faces physical, intellectual, mental and/or sensory over a long period of time, according to Indonesia's Law no.8 of 2016 concerning Persons with Disabilities. These prolonged challenges in interacting with the environment may result in hindrances and challenges, preventing them from fully and effectively engaging with fellow citizens on an equal rights basis.

2.5.1 Types of Disabilities

There are four main categories of disabilities: physical, intellectual, mental, and sensory disabilities. It is possible for an individual with disabilities to have more than one type of disabilities simultaneously, according to Indonesia's Ministry of Health (2017).

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1) Physical disabilities

This is type of disability characterized by movement impairments that may result from accidents, illness, or congenital conditions. People with physical disabilities often exhibit noticeable irregularities in their body structure.

2) Intellectual disabilities

This type of disability characterized by restricted cognitive abilities. People with intellectual disabilities face challenges in adapting which leads to limitations in their communication, self-care, education, socialization, and employment.

3) Mental disabilities

This type of disability which involving mental health, emotions, and behavior. This disability type divided into two main groups: psychosocial disorders like personality disorders and developmental disabilities that affect social interaction.

4) Sensory Disabilities

This type of disability involves the disruption in the functioning of the five senses.

2.5.2 Requirements for Various Types of Disabilities

Varying types of disabilities means there are varying needs that need to be accommodated in public spaces in order to create an inclusive and equal environment for all people especially people with disabilities. A one-size-fits-all approach inhibits the development of more targeted strategies to address the diverse needs of these groups with disabilities. Therefore, prioritizing inclusive design created to specific groups of people with physical, mental, and intellectual disabilities is essential.

A journal conducted by Gandhiko and Putranto (2020) on the needs of people with deaf disabilities in Jabodetabek towards public transportation facilities and infrastructure. Based on the survey they have conducted, there were six most needed variables by deaf people in urban transportation facilities, especially in train or bus. Information about the location and signage or wayfinding consistently hold the third position in terms of importance both in facility and infrastructure aspects, making it one of few significant variable contexts of public transportation for people with deaf disabilities.

Berger (2005) in his book, Wayfinding Designing and Implementing Graphic Navigational System added there are few signage options can be used to assists people with disabilities. In larger facilities, floor markings are used as they guide users along the path, similar to handrails that keep them close to wall surfaces. These floor markings consist of slightly elevated dots placed on the floor, which can be followed either visually or by foot, if tapped with a cane, these dots also produce a sound. Another method to create inclusive signage involves the use of sound, known as talking signs. These signs are essentially regular signs equipped with a button or sensor and when activated, provides spoken identification, directions, or other information.

According to Accessible Signage Guideline by Royal New Zealand Foundation of the Blind (2013), effective design benefits everyone, varying from blindness, low vision, deaf, and blindness. Hence, these individuals reply on tactile or high contrast to access crucial information conveyed by signage. While braille serves as means obtaining information for those who can read it, tactile or raised print aids people who don't read braille or new to braille. Therefore, including both braille and raised high-contrast print on signs will help tremendously. There are two type of readability in blind community:

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1) Readability by sight

Signs must be easily legible. This involves using simple sans-serif typeface with consistent stroke width, wide horizontal proportions, and distinct letter. Avoid using italicized, stylized fonts, underlining, block capitals, or placing text over pictures or patterns. Additionally, characters and background should not be reflective and put on top a pattern.

2) Readability by touch

Regarding tactile readability, raised letters should have softly rounded edges and be elevated at least 1mm above the surface of the sign plate. Avoid using engraved print letters, as they can be challenging to interpret by touch.

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