



Co-Design: Understanding User Needs in Customizing Apparel and Accessories Products

Zainuddin Talani ^{1✉}, Dwinita Larasati ²

^{1,2} Faculty of Fine Arts and Design, Bandung Institute of Technology Pembangunan Nasional "Veteran", Surabaya,
[✉]correspond_author_email: zai.talani@gmail.com

Abstract

Consumer involvement in product design through co-design strategies continues to evolve alongside advances in digital technology, particularly in the apparel and accessories industry. This process can be facilitated through digital platforms, specifically websites. This study aims to analyze and formulate web design strategies for co-design platforms that can accommodate consumer needs in the customization process of clothing and accessories. Using a descriptive qualitative method, this research examines consumer needs, which consist of clothing types, clothing parts, clothing details, and co-design tools within the co-design process. Additionally, it explores aspects of customer interface, visual elements, and usability in web interfaces. The findings from this analysis are then compiled to serve as a reference for the future development of co-design websites for apparel and accessories.

Keywords: Web *Co-Design* , Consumer Needs, *Customer Interface* , Visual Elements, Web *Usability* .

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1. Introduction

Involving consumers in product or service design has been widely done by several brands and businesses, especially in the fashion sector. The development of digital technology has not only transformed conventional patterns into digital in business operations, but also changed the way brands or businesses build relationships and create attachments with their consumers [7]. Digital media such as websites make this possible, this makes many businesses compete to optimize their digital assets so that they can connect directly to consumers. This is certainly not without reason, because in this way business owners can easily receive the information needed for their business to grow. For example, information about trends, positive or negative *brand image status* , to consumer needs for a solution that can be answered by the product or service itself. [1].

This consumer involvement is one of the strategies in the business process called mass customization . This strategy is a way for a business to provide products that can meet the needs and desires of consumers. [18], [16]. This process is personalized, for example a consumer can easily choose or determine the size or color of the product they want [20]. In mass customization, the activity of directly involving consumers to be able to design their own products is also called *co-design* . This [3]*co-design* process can be supported by the use of digital technology, one of which is website media. [11], . In order to support the process, it is considered important for a [17]*co-design* website to suit the needs of its users. Therefore, the purpose of this study is to

analyze and describe the formulation of a *co-design website* that suits the needs of consumers and users in designing products, especially clothing and accessories.

2. Research methodology

This study uses a descriptive qualitative method by analyzing aspects of consumer needs in the *co-design process* , as well as the *customer interface framework* as an approach to consumer interaction, visual elements and *usability* of the Converse.com, Freitag.ch and Stagwears.com website interfaces. The three websites were chosen because they are brands that sell clothing and accessories, and have *co-design features in them*. Then after that, from the analysis, a strategy was formulated that could later be a reference in designing a *co-design* website that can meet the needs of consumers and their users.

3. Results and Discussion

Co-design is a process that involves consumers in the product design stage. This process makes consumers not only end users, but also collaborators for *stakeholders* , and participates in making decisions about the products they buy [3]. [9]While web-based *co-design* refers to the use of digital technology, a web-based collaboration *platform* in the product design process carried out together with users . The [4]*co-design* website allows consumers to design and determine clothing details, such as materials, colors, and sizes, online through the website. This digital technology can help adjust the design and display the final appearance of the product that has been designed by the consumer before it is produced. In this process, consumers play an active role

as *co-designers* in adjusting and choosing clothing details according to their preferences. [6].



Figure 1. Selecting part of the *banner waste* as part of the bag material in the Freitag product *co-design* process on its website.

Some examples of brands or businesses that have adapted the *co-design strategy* are Converse Made by You, Freitag, and Stagwears. *The co-design* carried out by these three brands is facilitated by the website media and provides direct involvement for consumers to be able to design the products they sell. Converse with its popular product, namely shoes, gives its consumers the freedom to choose the shape, color, visual pattern, accessories, to adding text with embroidery as the final result so that the product is more personalized. Meanwhile, Freitag, which has a mission to reduce *banner waste*, offers consumers the freedom to choose certain parts of the *banner waste* (see Figure 1) to be used as material for its mainstay bag products. Meanwhile, Stagwears has several types of *outer products*, such as *varsity jackets*, *bomber jackets*, *hoodies*, and *track jackets* that can be customized by consumers with detailed choices.

3.1 Consumer Needs in the Co-Design Process of Clothing and Accessories Products

Co-design, which is part of the mass customization process, aims to meet consumer needs for products from a brand or business. The personal needs of consumers for each individual are the key to the success of whether the *co-design process* goes well or not [19]. The [12]*co-design process* is based on three main principles that ensure an optimal consumer experience in customizing products according to their preferences [14]. First, consumers are given a variety of customizable product options, allowing each individual to determine certain aspects according to their wishes. Second, the use of illustration tools plays an important role in displaying visualizations of clothing products before the transaction is made, so that consumers can get a clearer picture of the final result of the product design they choose. Third, the specifications of the ordered product, including details of the material, size, and product components, are clearly displayed to ensure that the

final result of the product will truly match consumer expectations accurately.

the co-design process in the fashion industry are grouped into four main aspects, namely clothing types, clothing parts, clothing details, and *co-design tools*. These [14]four aspects play an important role in determining the extent to which users can contribute to the design process of a product. In the context of its application, these elements are also found in the *co-design system* implemented by the three brands, namely Converse, Freitag and Stagwears. These brands offer customization features that allow consumers to determine the type of clothing and accessories, select specific parts that can be customized, add certain details, and utilize various tools that support interaction and design exploration directly on their websites. Thus, the developed aspects can be used as indicators in understanding the implementation of *co-design* in this industry. The elements of consumer needs in the Converse, Freitag and Stagwears *co-design web* can be described as follows.

Table 1. Consumer needs elements in the web *co-design* of Converse, Freitag and Stagwears.

Consumer needs aspects	Elements in <i>co-design</i>		
	Converse	Freitag	Stagwear
Types of clothing & accessories	High top shoes	Messenger bag	Varsity Jacket Bomber Jacket
	Low top shoes		Hoodies
	Platform shoes		Track jacket
	Boots		
	Slip on shoes		
Clothing & accessories section	Shoe upper	Front of the bag	Body of clothing
	Shoe tongue		Hand clothes
	Shoe Heel	Back of the bag	Pocket
	Sewing thread	Side of the bag	Collar
	Shoe midsole	Inside the bag	Cuff
	Shoelace		Interior
	Shoe logo patch	Patch logo	Shoulder of clothing
Clothing & accessories details	Embroidery text	Bag material	Hand section shape
	Print pattern	Logo patch shape	Collar style

	Upper color		Pocket shape
	Tongue color		Clothing materials
	Heel color		Zipper shape
	Thread color		Button shape
	Midsole color		Inner material
	Shoelace color		Cuff shape
	Patch logo color		Hand part color
			Body part color
			Pocket color
			Button color
			Collar color
			Clothing sizes
Co-design tool functions	Illustrates a specific section that has been modified in <i>real-time</i> .	Illustrates a specific section that has been modified in <i>real-time</i> .	Add or remove available clothing type options.
	Zoom in on clothing details.	Selecting a specific area to use as product material.	Illustrates a specific section that has been modified in <i>real-time</i> .
	View products in 360 degree view.	Shows parts of clothing that can be changed or designed.	Shows parts of clothing that can be changed or designed.
	View the designed product in 3D view.	View the designed product in 3D view.	View the designed product in 2D view.
	Save and share design images.	Show the final design result before purchasing.	Show the final design result before purchasing.

3.2 Elements of Consumer Interaction with Web Co-Design Interface

Rayport and Jaworski in 2003, developed a conceptual framework known as the *7C framework* , which serves as a guide in designing an interface on a website to be able to interact with consumers [8]. This framework includes seven main elements, namely context *related* to the design and layout of the site. Content *that* refers to the information provided on the website. Community *that* allows interaction between users. Customization *that* provides flexibility in adjusting user preferences. Communication *that* includes the mechanism of information exchange between businesses and consumers. Connection *that* refers to the connection with other *platforms* or websites. As well as transaction activities (*commerce*), which relate to the function of the website as a medium for marketing and selling products [2].

In its development, Yang et al. in 2008 updated this framework by adding collaboration aspects , so that the concept developed into the *8C framework*. [13]. The addition of this collaboration element highlights the importance of consumer involvement in the value co-creation process, especially in the context of co-creation of products supported by increasingly interactive digital technologies. This *8C framework* is also known as *customer interface* , which is a representation of a business's value proposition to consumers that is implemented on a website. Thus, *the customer interface* on a website not only functions as a means of business interaction with consumers, but also as a digital media that reflects the overall business identity and strategy. The eight elements of *the customer interface* can be further explained as follows.

A. Context (*context*)

Website design aimed at marketing products can be built with a design and layout that suits consumer needs. When visiting a website, consumers generally have a need to be able to access the catalog or collection of products sold by the brand. Therefore, an intuitive navigation structure, clear product display, and responsive search features are important elements in building an interface that can facilitate consumer interaction in exploring products. This is what Converse applies in the design of the website layout that emphasizes the product catalog feature that can be easily found by users. As seen in Figure 2, the brand includes a product filtering feature on the left side of the website that allows users to easily find the items they want. In addition, the systematic layout with clear product categories helps users explore the available collections without experiencing navigation difficulties.

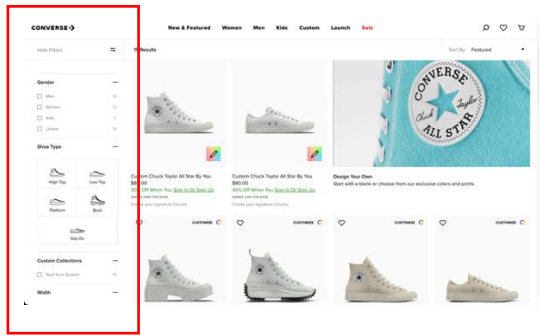


Figure 2. Product catalog view on the Converse website.

B. Content (content)

In designing a website, in addition to presenting information about the product, providing in-depth information about the business and brand is also a crucial aspect to build consumer trust. Information such as company profile, development history, track record, to business vision and mission provide a more comprehensive picture of the identity and values carried by a brand. By conveying a clear and transparent narrative about the business journey, it can build the brand's credibility towards consumers. This approach is applied by Freitag, where its website not only functions as a sales *platform* , but also as a communication medium that displays in-depth information about its business philosophy, sustainable production process, and the brand's commitment to the environment (as seen in figure 3).

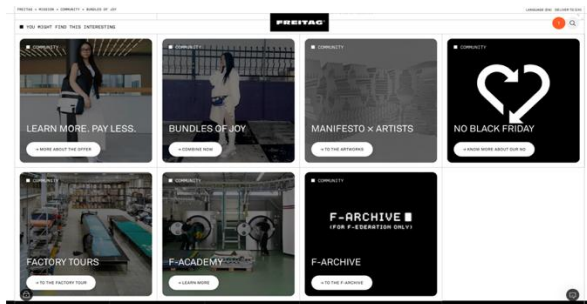


Figure 3. Information about brands on the Freitag website.

C. Community (community)

Like a business process, a website can also be a medium for building relationships between its communities. Consumers can easily interact with other consumers, listen to other consumers' opinions on the products sold, and discuss trends related to the brand. With this communication space, a brand can create deeper engagement with its consumers, thereby building loyalty and increasing trust in the products offered. This is what Converse implements by providing a review feature (see Figure 4) on each product page so that it can be seen by other potential consumers. This feature not only provides transparency regarding product quality,

but also encourages organic interaction between consumers.

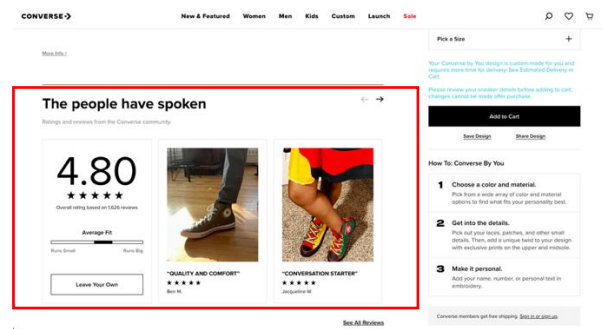


Figure 4. Consumer review feature on the Converse website.

D. Customization

In website design, the ability to adapt the interface to the user's needs is a very important aspect, especially in ensuring an optimal user experience across devices. One crucial form of adjustment is responsive design, which allows the website display to automatically adapt to the screen size of the device being used, be it *desktop*, *mobile* , or *tablet* . With this principle, interface elements, such as layout, navigation, and text size, can adjust themselves to provide visual comfort and ease of interaction for users. Stagwears implements this principle in its website, which is designed to be accessible from various devices with dynamic adjustments to the interface display, both in vertical and horizontal orientations. For example, in Figure 5, the *mobile view* of the Stagwears site will open when accessed via a smartphone.

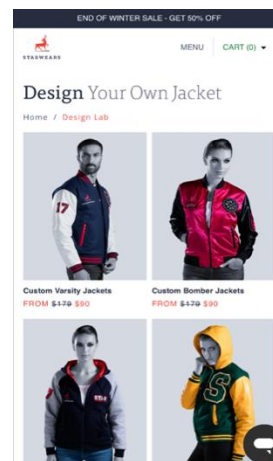
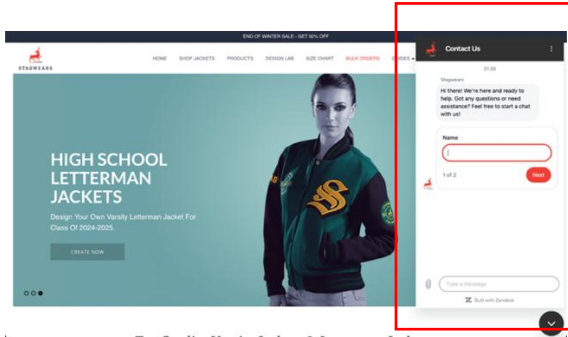


Figure 5. Responsive Stagwears website design when opened on *mobile view*.

E. Communication

In addition to functioning as a medium for conveying information, a brand or business website is also expected to be a means of direct interaction between consumers and brand managers. One common strategy

implemented to meet this need is the live chat feature, which allows users to get *real-time responses* to questions or problems they face. With this feature, communication becomes faster, more efficient, and more personal, thereby increasing consumer satisfaction. As seen in Figure 6, Stagwears as a brand that is oriented towards the needs of its consumers also adopts this strategy by providing a *customer service chat feature* on its website. This feature makes it easy for users to communicate directly with the customer service team.



Customer service features for communicating on the Stagwears website.

F. Connection

One important strategy in website design is to ensure systematic interconnection between pages so that users can access information in a more structured manner and in accordance with the context being displayed. In addition, integration with external *platforms* is also a crucial aspect in strengthening the website's relationship with the wider digital ecosystem. Links to other websites such as social media play a role in increasing brand credibility. Freitag implements this strategy by providing direct links to its various social media *platforms* (see Figure 7), allowing consumers to see the brand's activities. In this way, Freitag can enhance the brand's human side through more authentic and organic interactions across various digital channels.

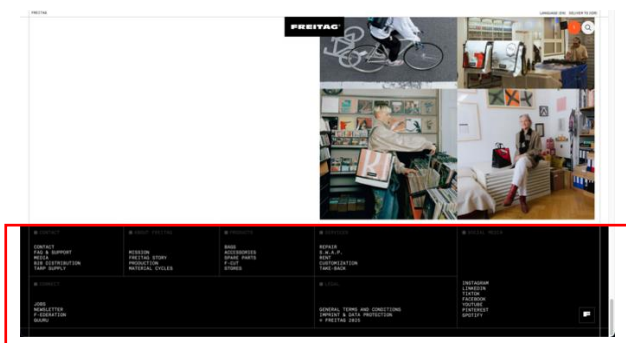


Figure 7. Links on the Freitag website that can lead to other sites such as social media.

G. Transaction activities (commerce)

As a means for businesses and brands to promote their products, websites are also supported by product purchase features so that transaction activities can occur. This is of course adjusted to the principle of consumer interaction with the website in order to create transaction activities that not only facilitate but also satisfy consumers. On the Converse website, the purchase process to payment is designed so that consumers can easily process transactions themselves. Features such as easy input of information, clear product specification information, to support for payment types that have many choices on the website as seen in Figure 8, make this brand implement the principle of *commerce* well.

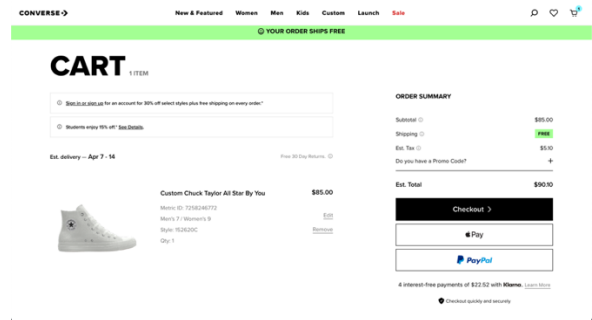


Figure 8. Payment page as a transaction feature on the Converse website.

H. Collaboration

As a medium that is not only a provider of information for brands or businesses, websites are also tools to facilitate collaboration between business managers and their consumers. This collaboration process can also be called *co-design*, where consumers can easily choose or design products offered by a brand according to their wishes and needs. With website media, brands like Stagwears can offer product customization features to consumers. Then, consumers can easily access any features offered so that the products they want and need can match their preferences (see Figure 9). This makes the Stagwears website implement the principle of collaboration in order to create consumer interaction with the brand.

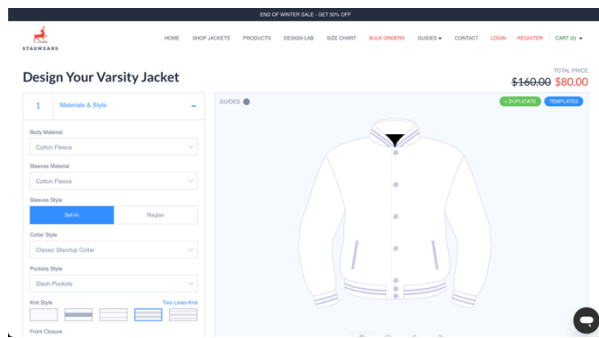


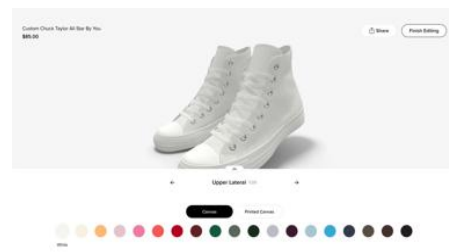
Figure 9. The *co-design* feature on the Stagwears website as a means of consumer collaboration with the brand.

3.3 Visual Elements in the Co-Design Web Interface

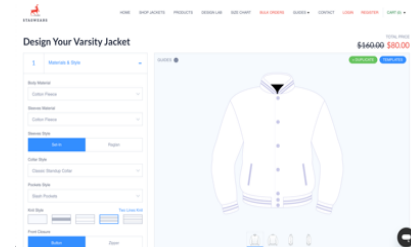
Visual aspects play an important role in creating the first impression when visiting a website. Elements such as layout, color, and typography, not only contribute to aesthetics, but also influence how users understand and interact with the content presented [15]. An intuitively arranged layout can improve ease of navigation, while the right color combination can build brand identity while triggering certain emotional responses. On the other hand, well-chosen typography plays a role in improving readability and user comfort when accessing information. In addition, the implementation of an effective visual hierarchy is also a crucial factor in directing user focus to important elements on a website. Users tend to prioritize information that is more visually prominent, so it is important for a *co-design website* to have the right visual hierarchy. Factors such as size, proximity, contrast, color, and spatial organization play a major role in creating an effective visual hierarchy [5]. More clearly, a review of visual elements on a *co-design website* can be explained as follows.

A. Layout

The difference in layout can be seen from each *co-design website* by Converse, Freitag and Stagwears. As seen in Figure 10, the layout of the product specification selection on the Converse *co-design display* is placed at the bottom. While on Stagwears, the layout of the product specification selection list is on the left. While on Freitag, the selection of materials and product details are placed at the bottom and right. Similar to the placement of the designed product illustration review, these three brands have different placements, namely Converse with a 3D display in the middle, Stagwears with a 2D display on the right side, while Freitag with a 2D and 3D product illustration display on the right. This shows that the placement of the product illustration review layout has a dominant portion, in order to help users see product changes in *real-time*.



(a)



(b)



(c)

Figure 10. Differences in layout across the three brands (a: Converse, b: Stagwears, c: Freitag).

B. Color

In the *co-design web interface display* in the three brands, there is a similarity in the use of dominant neutral colors, namely white, black and gray. Only in the Stagwears *co-design web interface display* that uses blue and green for color accents on its buttons (see Figure 11), this is so that these components are more highlighted and can make it easier for users. While Converse and Freitag use black to highlight the buttons or menus on the *co-design web interface display*. The choice of color not only makes the interface display look minimalist aesthetically, but also makes it easier for users to explore the options available on the *co-design web interface display*.

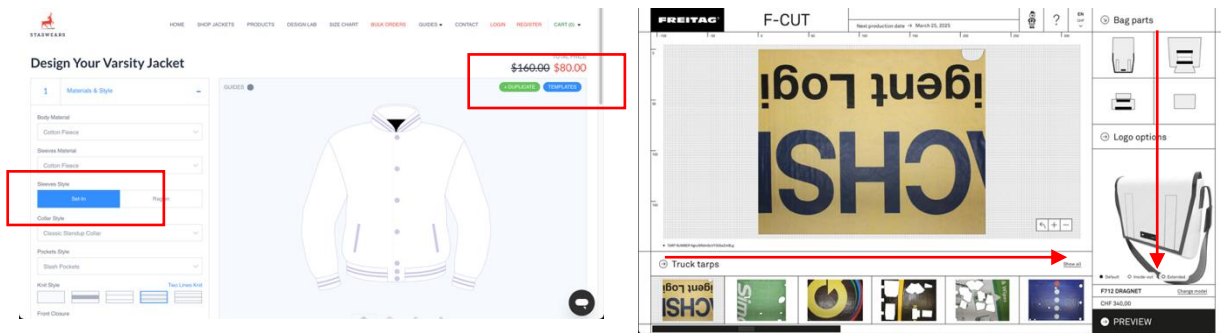


Figure 11. Buttons with striking colors to make it easier for users.

co-design website .

C. Typography

The use of consistent typography, clear readability, appropriate thickness, and responsiveness in every *co-design web interface display* on all devices can be an indicator of achieving good visual elements. In these three brands, the use of typography has the same type, namely sans serif typography. The use of text thickness on certain components can strengthen the context of the component, for example in the *co-design website* by Converse which emphasizes the price and title of the shoe section more than other text (see figure 12).

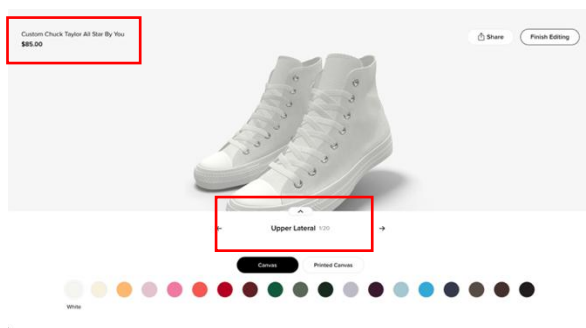


Figure 12. Different text thicknesses to strengthen context.

D. Visual Hierarchy

In a website, visual hierarchy is a basic principle that plays a role in organizing interface elements. By creating a priority order in conveying information and the flow related to the website system to users. For example, elements with larger sizes or contrasting colors will be more visually dominant than other elements, making them easier for users to recognize and access. In addition, the use of white space is also an important strategy in creating visual balance and increasing readability without burdening users with an overly dense display. In Freitag's web *co-design*, users are inadvertently directed to the final goal of reviewing the results of the product design by placing the material selection feature from left to right and product specifications from top to bottom (see Figure 13). Thus, the user's focus will finally go to one point at the bottom right, namely the "PREVIEW" button to be able to end the product design process on the website.

3.4 Usability Aspects of Web-Based Co-Design Interfaces

Usability in a website interface is an aspect that determines the extent to which users can interact with the system effectively, efficiently, and satisfactorily. Nielsen identifies five main aspects of *usability*, namely *learnability*, *efficiency*, *memorability*, *errors*, and *satisfaction*. *Learnability* refers to the ease with which users can learn and understand how a website works from the first time they use it [10]. *Efficiency* relates to the speed and ease with which users can complete a specific task after understanding the interface. *Memorability* refers to the ability of users to recall how to use a website after not accessing it for a certain period of time. *Errors* relate to the level of errors made by users, and how the system can reduce or correct those errors. Finally, *satisfaction* measures the level of comfort and satisfaction of users in using the website. More clearly, these five aspects can be explained as follows.

A. Learnability

Learnability in a website interface refers to the extent to which users can quickly understand how a system works without the need for complex guidance. Websites with good *learnability* typically have *intuitive navigation*, *consistent layouts*, and *easily recognizable icons or visual elements*. For example, the use of illustrations of the front, back, and side of clothing products on the *Stagwears co-design website* to help new users understand the illustrations serve as a way for users to review the design results based on the selected section.

B. Efficiency

Efficiency refers to how quickly and easily a user can complete a specific task after understanding the website interface. Users can complete transactions in a short time with few steps. For example, on the *Freitag co-design website*, it is easy for users to drag certain parts of the *banner material* that they want to select in the design process of their bag product. This feature makes it easy for users to select which areas they want to take as part of the product.

C. Memorability

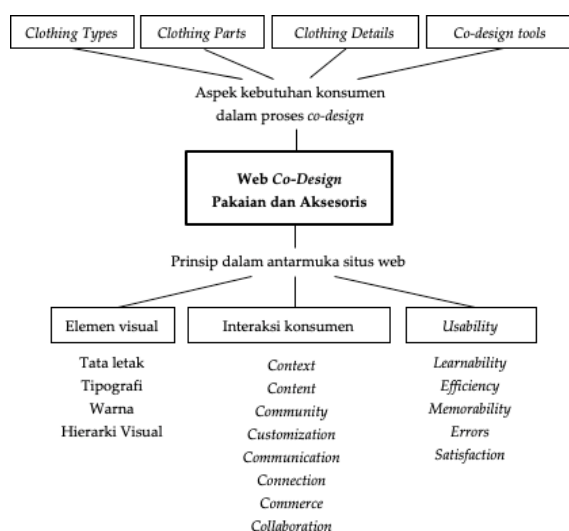
Memorability refers to the extent to which users can recall how to use a website after not visiting it for a certain period of time. Users do not have to relearn the navigation every time they return to the *co-designed website*. Factors such as familiar icons and clear menu structures can increase *memorability*. For example, the uniform layout when designing one product with another on the *Converse co-design* website is displayed uniformly across its pages to make it easier for users to remember.

D. Errors

errors aspect of *usability* relates to the level of errors made by users and the mechanisms available to prevent or correct these errors. For example, when a user has not selected something from the product specification options when designing a product on the *Stagwears co-design website*, the system will provide a *real-time warning* that an error has occurred or that there is no input result, so that it can be immediately corrected by the user.

E. Satisfaction

Satisfaction refers to the level of comfort and satisfaction of users in using a website. A positive user experience is influenced by attractive visual design, fast responsiveness, and pleasant interactions can be a benchmark for a website that has provided satisfaction to users when doing *co-design activities*. Websites that provide a good experience tend to make users feel at home and return to use them in the future.



4. Conclusion

There is a relationship between *co-design* in mass customization and the design principles of website media, which are both oriented to the needs of consumers and users. As seen in the chart in Figure 14, the purpose of designing web-based *co-design* for clothing and accessory products, ideally can meet aspects of consumer needs in the product design process. Components such as clothing types, clothing parts, clothing details, and co-design tools are *elements* that can be indicators for *co-design* of clothing and accessory products that have met consumer needs. Meanwhile, the principles of *customer interface* as the goal of creating consumer interaction with the website can be an indicator that the website has represented brand values to consumers. As well as visual design elements and *usability on the web interface* are also a concern so that the strategy in designing a *co-design* website is in accordance with its purpose, namely making it easier for users to access and operate it. The results of this review are expected to be a formulation in designing web-based *co-design media* that can prioritize the needs of consumers and users in carrying out *co-design activities* on a website.

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