Exploring the Purpose and Types of Home Glass Accessories: Sustainability, Transparency, Aesthetics, and Durability

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Received Date: **31.01.2024**; Accepted Date: **15.02.2024**; Available Online: **08.03.2024**

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ABSTRACT

Glass is omnipresent in applications from packaging to prosthetics, and building to telecommunications, resulting in significant glass waste. This study examines the purpose and various types of home glass accessories and aims to minimize waste through recycling and the development of sustainable products that meet market demands. The research employed interviews with glass designers and a systematic literature review as the primary exploration techniques. The findings provide valuable insights into the sustainability, transparency, aesthetics, and durability of home glass accessories. The literature review revealed that glass is extensively used due to its transparency, chemical inertness, environmental friendliness, availability, and affordability. Glass recycling offers benefits such as conserving natural resources, reducing waste, saving energy, and decreasing air and water pollution. However, certain glass products have a limited lifespan, contributing to waste generation. The interviews revealed that people choose glass products for their transparency, chemical stability, decorative appeal, ease of cleaning, and sustainability. Kitchenware, bottles, containers, lighting units, vases, antiques, and serving ware were identified as common types of home glass accessories. Lighting lamps and vases were found to be the most popular functions.

Keywords: *Glass, Home accessories, Recycling, Sustainability, Wastes.*

INTRODUCTION

Materials play a crucial role in the work of industrial designers, serving as the foundation for object design. Industrial designers create objects with the support of various materials, both existing and newly created to meet specific requirements (Manzini, 1989). The influence of materials extends beyond their structural contributions to permeate the design process and impact aesthetics, functionality, and emotional resonance within the designed object (Lu & Poon, 2019). Understanding the importance of materials is essential for industrial designers seeking to create visually appealing, functional, and emotionally engaging designs (Altin Karataş & Gökkaya, 2018). Designers sometimes work with materials that already exist, and other times they manufacture new materials to meet a specific requirement or product (Cramer et al., 2022).

In the early stages of human development, the search for materials was closely connected to the surrounding environment (Selvakumar, 2021). The emergence of glass as a material during this period serves as a testament to human ingenuity and the profound ability to manipulate materials for diverse purposes. Then, the use of glass in various forms has long been ingrained in human history and serves both functional and aesthetic purposes. Materials transcend their role as mere components; rather, they emerge as dynamic agents that exert a complex influence on the very essence of object design. Beyond their structural contributions, materials permeate the design process, influencing the aesthetics, functionality, and even emotional resonance embedded within the designed object (Lu & Poon, 2019). So, it's important for industrial designers to thoroughly investigate how materials are crucial. This is especially key for those designers who want to create designs that not only look good but also work well and connect with people emotionally (Altin Karataş & Gökkaya, 2018).

Glass is used in a wide range of products, primarily because it is affordable and has several attractive characteristics. Glass properties are unique to the chemical composition of the glass, and they can be changed and regulated by changing composition and/or manufacturing processes. The main concern of this research is that glass is a sustainable material that can be recycled and used several times in designing new products made by recycling. Glass recycling helps in saving energy as cullet melts at a lower temperature than raw materials. Consequently, less energy is required for the melting process. In today's world, the widespread fear of environmental issues hangs heavily over our shared awareness. Chief among these apprehensions is the ominous threat of climate change, an ever-present phenomenon that exacts a toll on our precious natural resources (Sanjay et al., 2015). The intricate interplay between climate change and the delicate balance of ecosystems accentuates the urgent need for proactive measures to mitigate its far-reaching effects (Lu & Poon, 2019).

In the broad and urgent context of environmental concerns, recycling takes on a crucial role in the collective effort to address climate change. Within the broader recycling framework, the specific domain of glass recycling emerges as a focal point, presenting itself as a potential solution to the overarching challenge of recycling efficacy (Guo et al., 2020). Delving into the intricacies and potentialities of glass recycling provides a nuanced perspective on its role as a viable and impactful solution within the larger context of environmental sustainability (Guo et al., 2020). As we navigate the intricate landscape of environmental conservation, understanding the unique contributions of glass recycling becomes crucial for shaping sustainable practices and fostering a resilient approach to resource management (Varberg et al., 2016). Glass accessories hold an intriguing allure for homeowners and decorators alike. They not only serve specific functions but also contribute to the overall aesthetic appeal of living spaces. Understanding the motives and intentions of individuals who opt for these accessories shed light on the underlying factors that drive their demand and popularity (Barr & Deusner, 2021). This study investigates the purpose and types of home glass accessories, with a focus on minimizing waste through recycling and developing sustainable products. Using interviews with glass designers and a systematic literature review, the research sheds light on sustainability, transparency, aesthetics, and durability of these accessories. The

findings contribute valuable insights into consumer preferences, sustainability considerations, and the overall market for glass accessories, benefiting both designers and consumers.

LITERATURE REVIEW

The purpose of acquiring home glass accessories

Glass was possibly one of the first products to be mass-produced in large quantities, and it can be used in a wide range of applications, from packaging to prosthetics, and from building to telecommunications. According to (Lefteri, 2001), Glass is utilized in practically every aspect of human existence, including architecture, food and drink, labs, equipment, instruments, the chemical, nuclear, and electrical industries, lighting, optics, and many more applications. Many qualities make glass attractive, such as it is transparent, chemically inert, environmentally friendly, sustainable, strong, easily available and relatively cheap (Achintha, 2016).

Home glass accessories serve multiple purposes including aesthetic enhancement, sustainability, and practicality. In interior design, glass accessories such as vases, decorative lamps, and mirrors can transform a space, adding style and warmth, and contributing to the overall design (Miller, 2021). Additionally, glass is a versatile material that can be used for various home applications, offering unobstructed views and imparting sophistication. Furthermore, glass bottles and storage jars not only serve practical purposes but also add an aesthetic look to the house interior, reflecting the care and attention of the homeowners (Rajak et al., 2021). When it comes to creating a study room, glass panels or magnetic glass boards can be used for partition purposes, providing a unique and accommodating space for study (Ramstedt, 2020).

The study of home glass accessories also aligns with the principles of sustainability and waste minimization. For instance, the use of frosted glass, textured glass, and stained glass not only serves decorative purposes but also contributes to privacy, allows light to pass through, and is suitable for various applications such as shower cubicles and bathroom windows (Ugwu et al., 2021). Moreover, the importance of using glass bottles at home lies in their reusability and multipurpose nature, allowing for the storage of various food items and serving as decorative pieces (Miller, 2021).

Sustainability and Recyclability

Glass is a highly recyclable and environmentally friendly material, making it attractive to consumers who prioritize sustainability. The ability to recycle glass and reduce waste is a key feature for environmentally conscious individuals. According to the Environmental Protection Agency (EPA), glass recycling enables total renewal and reuse in the raw materials recovery process, leading to energy savings and carbon reduction (Environmental Protection Administration, 2018). For instance, recycling glass can save 1.2 tons of silicon raw materials, prevent 175 kg of waste from being disposed of in landfills, lower the melting point of the furnace by 30%, and reduce air and water pollution (Del Rio et al., 2022). However, it is important to consider the different lifetimes of glass products. While glass is utilized for a variety of functions, products like bottles and food containers often have a brief lifespan before being discarded. Despite this, the European glass industry has established efficient recycling methods, such as bottle cleaning and refilling, as well as the use of broken glass in the creation of new glass containers (Metwally, 2019).

In addition to its recyclability, glass plays a significant role in eco-friendly home decor. It allows natural light into buildings, reducing the need for artificial lighting and contributing to energy savings. Such as Hand Blown glass which offers a wonderful opportunity to recycle glass from discarded bottles and give them a unique new life (Metwally, 2019). Furthermore, glass storage jars, drinking glasses, and decorative glassware not only serve functional purposes but also add an aesthetic look to homes (Del Rio et al. 2022). Several initiatives and businesses are focused on glass recycling and creative reuse. Remark Glass is a zero-waste certified, woman-owned business that is dedicated to innovative and creative glass reuse, offering a wide range of recycled glass products for home use. By incorporating recycled glass products into home decor, individuals can contribute to waste reduction and support sustainable practices (Christensen, 2011).

Aesthetics and Visual Appeal

Glass products are renowned for their sleek and visually appealing appearance, introducing an element of elegance to their surroundings. This aesthetic quality makes glass accessories highly desirable, especially for decorative objects, vases, and lighting fixtures. Accessories serve an authentic function in enhancing the overall aesthetic properties, contributing to the architectural elements' shape. This emphasis on aesthetics is acknowledged by Hosny (2019), who highlights that, for certain accessories, enhancing visual appeal may be their primary function. As Ritchie (2004) notes, glass stands out as a captivating and versatile material that not only showcases the creativity of mankind but also underscores its adaptability. The widespread use of glass in various forms is a testament to its aesthetic appeal, allowing it to be shaped into diverse and visually striking forms.

Durability and Longevity

Glass is widely recognized for its durability, capable of withstanding both physical and chemical stresses. Customers often choose glass products for their longevity and resistance to scratches, corrosion, and fading. Macfarlane (2002) emphasizes that glass's durability makes it an ideal material for physical and chemical experiments, offering ease of cleaning, sealing, and shaping to meet experiment requirements. Its robust nature allows the manufacturing of thin apparatus, enduring atmospheric pressure variations, and exhibiting high heat resistance, making it suitable as an insulator.

In addition, glass maintains a non-reactive nature, as highlighted by Shakhgildyan (2020), meaning it doesn't interact with or alter the taste, smell, or composition of the substances it contains. This non-reactivity is particularly advantageous for glass containers used in storing food, beverages, and pharmaceutical products. The property ensures the integrity and purity of the stored items, making glass a preferred choice for applications where maintaining the original properties of the contents is crucial.

Regarding the term "Periodic Table," this refers to the tabular arrangement of chemical elements based on their atomic number, electron configuration, and recurring chemical properties. In the context of Shakhgildyan's statement, the ability of glass to encompass a wide range of elements from the Periodic Table within its structure highlights the material's unique capability to incorporate diverse chemical components. This characteristic showcases the impact of the Periodic Law, which governs the arrangement of elements based on their atomic structure, on the properties exhibited by glass (Shelby, 2020).

METHODOLOGY

This study's primary exploration technique is a literature survey. In addition to the narrative literature review, interviews were conducted with experts and professionals knowledgeable about home glass accessories. The data collected through the literature review and interviews were carefully analyzed to identify common themes, patterns, and relationships. The findings from these data sources were synthesized to address the objectives of the study and provide a comprehensive understanding of the purpose and types of home glass accessories.

These methods were chosen to provide a comprehensive understanding of the purpose and types of home glass accessories by synthesizing information from both existing literature and expert insights. The collected data were rigorously analyzed to identify common themes, patterns, and relationships, contributing to the study's overall objectives.

Literature Review

It involved an extensive examination of relevant academic papers and books. This approach enabled the identification and synthesis of existing knowledge and perspectives on the subject matter. The literature review served as a foundation for understanding the multifaceted aspects of home glass accessories, including their sustainability, transparency, aesthetics, and durability.

Interviews

The primary exploration technique involved interviews with experts and professionals well-versed in home glass accessories. The selection of interviewees was based on their expertise in the field, ensuring a diverse range of perspectives.

Interviewees

The selection of interviewees was based on their expertise, ensuring a diverse range of perspectives. The interviewees included a glass designer, and a customer interested in home accessories.

Interviews questions

- What is the characteristic that people would like to purchase glass products for?
- What are the types of home glass accessories?
- What is the most famous function for home glass accessories?

FINDINGS

Literature review Results

According to our literature review, the classification of the most common glass accessories in homes according to the type of glass used, divided into three categories: Lighting Units, Kitchenware, and

Decorative Items. Figure 1 presents the findings of this section.

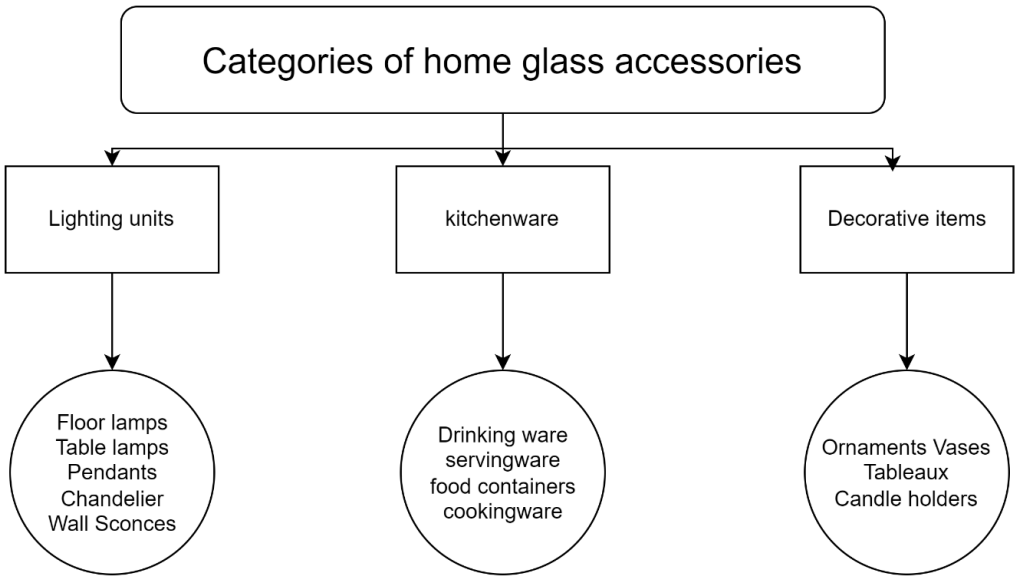

Figure 1. Classification of the most common glass accessories in homes regarding the function.

The image illustrates a chart representing three categories of home accessories based on their primary functions. The first category is Lighting Units, which includes various types of lighting fixtures such as floor lamps, table lamps, pendants, chandeliers, and wall sconces. These lighting units serve both functional and aesthetic purposes, enhancing the illumination and ambiance of living spaces. The second category is Kitchenware, encompassing a range of items used in the kitchen. This category includes drinking ware, serving ware, food containers, and cooking ware. These kitchen accessories are essential for food and beverage preparation, storage, and serving purposes. They play a crucial role in enhancing the functionality and convenience of the kitchen environment. The third category is Decorative Items, consisting of ornamental objects that add visual interest and aesthetic appeal to the home. Examples in this category include ornaments, vases, tableaux, and candle holders. These decorative items serve as artistic elements, contributing to the overall décor and creating a pleasant and inviting atmosphere in various areas of the house. The chart provides a visual representation of these three categories and their associated examples, highlighting the diverse range of home accessories available to homeowners.

Interview Results

According to Interview Results, the interviews indicated that consumers favor glass products due to their transparency, chemical stability, decorative appeal, ease of cleaning, and sustainability.

Table 1. Characteristics Influencing Consumer Choice of Glass Products according to Interviewer Answers.

What is the characteristic that people would like to purchase glass products for?	The glass transparency and bright colors makes people buy it as it adds an aesthetic touch to their home decorations, also glass is easy to reshape using temperature so there's many varieties in glass products, ex: table ware, lighting and home decoration.	It's easy to clean and doesn't react with materials and maintains its luster, tableware and decorative accessories are the most used glass products.	We make Plates made of bottles for serving food. There is a difference between recycled and reused or we call "up cycle", cups cutted by heat or without heat.
What are the types of home glass accessories?	Tableware, lighting and home decoration.	Tableware, accessories like earrings and necklaces, wall hangings.	Cups, plates, unique pieces like antiques, jewelry, lighting units, vases, home accessories, wall pendants and a lot of products with deferent shapes
What is the most famous function for home glass accessories?	Tableware and decorative accessories	Products for food serving.	Decorative and tableware

Table 1 provides insights into consumer preferences and the common types of home glass accessories based on interviews conducted in the study. The findings reveal that consumers are drawn to glass products due to several key attributes. These include transparency, which allows consumers to see the contents of the product. Chemical stability, which ensures the safety of storing food and beverages. Decorative appeal, which enhances the aesthetic of the home. Ease of cleaning, which adds convenience to maintenance. And sustainability, which aligns with eco-conscious consumer values.

DISCUSSION

The study aimed to explore the purpose and types of home glass accessories, with a focus on minimizing waste through recycling and developing sustainable products. The primary exploration techniques included a literature survey and interviews with experts in the field. The findings from these sources were synthesized to address the study's objectives comprehensively.

The literature review provided insights into the versatility of glass as a widely used material due to its transparency, chemical inertness, environmental friendliness, availability, and affordability (Lefteri, 2001; Achintha, 2016). Glass's sustainability and recyclability were highlighted, attracting environmentally conscious consumers with benefits like natural resource conservation, reduced garbage, energy savings, and pollution reduction (Environmental Protection Administration, 2018). However, certain glass products, such as bottles and food containers, were identified to contribute to waste generation due to their limited lifespan (Christensen, 2011).

Glass is a versatile material that can be used in various aspects of daily life, including home décor and smoking accessories. According to Hosny (2019), there are two types of glass accessories: functional and non-aesthetic. Functional accessories are those that are directly connected to the specific functions of the space in which they are used, while non-aesthetic accessories encompass a wide range of types and materials, including wood furniture ornaments, hearth structures, and various other accessories that possess both practical and aesthetic value. In terms of home décor, glass can be used for partitions, structural glazing, doors, and more.

Westbroek et al. (2021) conducted a global material flow analysis of glass, emphasizing the journey from raw materials to end-of-life. Their study sheds light on the global patterns of glass consumption and disposal, providing context to the lifecycle of glass products. In comparison, our study concentrates on the specific realm of home glass accessories, examining the intricacies of consumer choices and sustainability in this niche.

Harrison et al. (2020) explores the recycling of waste glass as an aggregate in cement-based materials, addressing the environmental impact and potential benefits of incorporating glass waste into construction materials. This study intersects with ours in the broader context of glass recycling and sustainability but diverges in its focus on construction materials. Our study zooms in on the consumer-centric domain of home glass accessories.

Da Silva et al. (2021) delves into the recycling of glass waste into foam glass boards, evaluating the life cycle impacts of different foaming agents. Their emphasis on environmentally friendly practices aligns with our study's focus on sustainability. However, their investigation spans a different application of glass waste, emphasizing the potential for foam glass boards in construction.

Transparency and visibility emerged as crucial attributes for glass accessories, particularly in containers used for packaging beverages and food (Harder, 2018; Simon, 2019). The exceptional transparency of glass to visible light makes it a preferred material for architectural applications (Haldimann, 2008). Aesthetics and visual appeal were significant factors in the use of glass accessories, enhancing the overall aesthetic properties of architectural elements (Hosny, 2019). The durability and longevity of glass, along with its resistance to physical and chemical stresses, ease of cleaning, and non-reactivity, make it suitable for various applications, including food, beverage, and pharmaceutical containers (Macfarlane, 2002; Shakhgildyan, 2020).

The interviews revealed that consumers often choose glass products for their transparency, chemical stability, decorative appeal, ease of cleaning, and sustainability. Kitchenware, bottles, containers, lighting units, vases, antiques, and serving ware were identified as the most common types of home glass accessories. Notably, lighting units and vases emerged as the most popular categories among consumers. While the study touched upon various characteristics attracting consumers to glass products, it didn't explicitly address consumer preferences. Further research could delve deeper into understanding the hierarchy of preferences among the identified characteristics to provide a nuanced understanding of what drives consumer choices in the realm of home glass accessories.

Rajaramakrishna and Kaewkhao (2019) provide a broader perspective on glass materials and their advanced applications, summarizing the progress in glass science. While our study emphasizes a specific category of glass products, their overview complements our focus by highlighting the versatility and applications of glass in various technological fields.

Sinshaw and Palani (2022) contribute to the discussion by analyzing the mechanical properties of glass particulates reinforced Aluminum Matrix Composites. Their exploration of glass as a reinforcement

material aligns with the durability aspect of glass highlighted in our study, although their emphasis is on mechanical properties in a different context.

Shakhgildyan et al. (2020) take a unique angle, portraying glass as the home of the periodic table. Their exploration showcases the versatility of glass in encapsulating various chemical elements. While distinct in its focus, it adds a layer to the narrative of glass as a remarkable material with diverse applications, echoing the essence of our study.

The comprehensive analysis of literature and expert insights contributes to a better understanding of the purpose and types of home glass accessories. The study sheds light on consumer preferences, sustainability considerations, and the broader market for glass accessories, benefiting both designers and consumers. However, further research could enhance these findings by exploring the nuances of consumer preferences and their impact on the market dynamics.

CONCLUSION

In conclusion, our study delved into the purpose and types of home glass accessories, emphasizing waste reduction through recycling and the development of sustainable products. Through a combination of literature review and expert interviews, we gained comprehensive insights into the multifaceted aspects of glass materials.

The literature review illuminated the versatility of glass, highlighting its attributes such as transparency, chemical inertness, environmental friendliness, availability, and affordability. While glass's sustainability and recyclability were emphasized, certain products like bottles and food containers were identified as contributors to waste generation. Our study, focusing specifically on home glass accessories, added a nuanced layer to the broader understanding of glass applications, emphasizing the intricate dynamics within this niche.

The interviews with consumers revealed key factors driving the choice of glass products, including transparency, chemical stability, decorative appeal, ease of cleaning, and sustainability. Common types of home glass accessories were identified, with lighting units and vases emerging as particularly popular categories. However, the study acknowledged a gap in explicitly addressing consumer preferences, suggesting a potential avenue for further research to delve deeper into the hierarchy of preferences among these characteristics.

Moreover, our study highlighted the importance of transparency and visibility in glass accessories, emphasizing their role in packaging beverages and food. Aesthetics and visual appeal were identified as significant factors, contributing to the overall aesthetic properties of architectural elements. The durability, longevity, and resistance to physical and chemical stresses of glass make it suitable for various applications, including food, beverage, and pharmaceutical containers.

Further research should delve deeper into understanding the hierarchy of consumer preferences among the identified characteristics of glass products. Investigating the nuanced factors that influence consumers' choices in home glass accessories would provide valuable insights for designers and manufacturers. While the study touched upon the sustainability and recyclability of glass, future research could extend the lifecycle analysis to include a more detailed examination of the environmental impact of specific types of home glass accessories. This would contribute to a more comprehensive understanding of the ecological footprint associated with different glass products. Building on the environmental focus, exploring innovative recycling techniques for home glass accessories could be an area of interest.

Investigating methods that enhance the recyclability of glass products, especially those with a shorter lifespan, could contribute to minimizing waste and promoting sustainable practices.

ACKNOWLEDGMENT

First and foremost, my deepest gratitude goes out to my supervisors [Hema Zulaika Hashim] and [Mohd Shahril Rusman] for their constant mentoring and guidance. Their knowledge and expertise were very helpful in guiding this research and improving the content.I also want to express my gratitude to all the professionals and experts who kindly provided knowledge during the interviews. Their significant contributions increased my understanding of recycled home glass products by offering valuable information. My appreciation extends to the College of Creative Arts at Universiti Teknologi MARA for giving me the chance to conduct this research.

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