The Role of Product Attachment in Reducing Early Replacement

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Abstract:

Things do not last forever; they lose their value over time until they are disposed of. Sustainability aims to preserve life span of products; there are numerous types of research and studies in this regard. Yet, with the prompt progression of technology, developing countries are using the latest innovations without realizing the fate of those products. Therefore, methodologies, such as product attachment, are being researched and applied as input for consumer requirements. Hence, working on the emotional connection between the product and consumer by understanding factors of that association to facilitate the design of sustainable products.

This leads to some effects on both the producer and the consumer; through the user's attachment to the product as an outcome of the desire to keep it for a longer period as a consequence of following attachment factors. Thus, optimizing product lifespan and the opportunity to remain for a longer period.

So, some reviews show the importance of user attachment to the product to design products with a longer life and accordingly attain sustainable development. Along with alignment with product design to form confidence between products and consumers by customizing to suit their needs; what produces this emotional connection.

Therefore, the study through reviewing known previous approaches of sustainability during design and strategies to progress product lifetime to reduce replacement. With reference, successively, to the influence of the concept of emotional attachment on the consumer and his product; through some determinants and factors of attachment to the product. Which results in an acceptance of the concept of building a strong relationship between the two parties to reduce product exchange. Hence, it leads to the aspiration to reach novelty through the product without the need to purchase a newer product; that has new technology available, even though the product is still working.

For that reason, this research tries to highlight a new approach to work on achieving the consumer's desires, fulfil his/her requirements, to feel satisfied with the product.

Keywords:
sustainability; product attachment; product lifetime optimization; replacement; sustainable consumption.

الملخص:
الأشياء لا تدوم إلى الأبد. تفقد قيمتها بمرور الوقت حتى يتم التخلص منها. لذا تهدف الاستدامة إلى الحفاظ على عمر المنتجات؛ وهناك أنواع عديدة من البحوث والدراسات في هذا الصدد. ومع ذلك، ومع التقدم السريع للتكنولوجيا واستخدامها كطريقة للاستهلاكية، حيث تستخدم البلدان النامية أحدث الابتكارات دون أن تدرك مصير تلك المنتجات دون وعي. لذلك يهتم البحث بدراسة سبل ومنهجيات التعلق بالمنتج، وتطبيقها كمدخلات لمتطلبات المستهلك واحتياجاته. ومن ثم، العمل على توطيد الارتباط العاطفي بين المنتج والمستهلك من خلال فهم عوامل تلك الرابطة للتحسين من جودة مخرجات عملية تصميم المنتجات المستدامة. ما قد يؤدي الي إحداث بعض التأثيرات على تلك الرابطة؛ من خلال توطيدها وزيادة الرغبة في الاحتفاظ به لفترة اطول نتيجة لتحقيق عوامل التعلق وبالتالي تحسين عمر المنتج وفرصة لبقائه فترة اطول.
وقد أكد عدد من الدراسات السابقة على أهمية تعلق المستخدم بالمنتج لتصميم منتجات ذات عمر أطول، وبالتالي تحقيق التنمية المستدامة. وجنبا الي جنب يتم التوافق مع تصميم المنتج لبناء الثقة بين المنتجات والمستهلكين من خلال تخصيصها لتناسب احتياجاتهم؛ ما ينتج عنه هذا الارتباط العاطفي.
لذا تقوم الدراسة على مراجعة تلك منهجيات تحقيق للاستدامة خلال التصميم وكذلك الاستراتيجيات المختلفة لتحسين عمر المنتج وتقليل الاستبدال. دون إغفال تأثير التعلق العاطفي بين المستهلك ومنتجه من خلال بعض المحددات وعوامل التعلق بالمنتج. ما قد يؤدي الي إدراك أعمق لسبل تحقيق علاقة قوية بين الطرفين لتقليل استبدال المنتج. مع الحفاظ على قدرة تجديد وتحديث المنتج وفقا أحدث التكنولوجيات دون الحاجة الي شراء منتج أحدث.
لذا فأن البحث يحاول تسليط الضوء على مدخل جديد لتحقيق الرغبات المستهلك وتحقيق متطلباته والشعور بالرضي اتجاه المنتج.

الكلمات المفتاحية:
الاستدامة ; التعلق بالمنتج ; تحسين عمر المنتج ; الاستبدال ; الاستهلاك المستدام.

1. Introduction:

Things do not last forever; they lose value over time until they are eliminated. Sustainability aims at maintaining lifespan of products; there are many types of research and studies in that regard. But in the following section there will be a kind of highlighting on the related aspects to obsolescence.

1.1Sustainability in design

Sustainability is one of the most important topics in relation to obsolescence. Regarding all these issues such as climate change and lack of resources, it is on everyone to look to preserve the surrounding environment in various ways. It is the most controversial topic in recent times (Bhamra & Lofthouse, 2007; Chick & Micklethwaite, 2011). And so, the design for sustainable behaviour is one of the most important topics discussed to reduce the impact of the increased

consumption of products. Hence, product designers play a pivotal role in understanding consumer behaviour and designing sustainable products.

This is confirmed by Bhamra & Lofthouse (2007) to encourage working on product design from the ground up. This is done by focusing on the consumers' behaviours towards a product. This is about finding more sustainable solutions to consumers' daily issues rather than considering them as a sustainability concern. As Cooper (2005) explains, sustainable development is achieved through the role of consumers and their reactions to products, not only through designers.

Several strategies have been proposed by designers and academics to achieve sustainable development during changes in product design methodologies. In the beginning, the focus was on the product itself, the most popular of which was recycling. Then attention has shifted to the importance of working on lengthening the life of a product by improving the quality and increasing the reliability of the product; this in addition to the facilitating disassembly for ease of maintenance and adaptation flexibility (Ball & Tasaki, 1992; Van Hinte, 1997; Cooper, 2000; Sava, 2004; Mugge, Schifferstein, & Schoormans, 2004; Cooper, 2005; Mugge et al, 2005; Mugge, Schoormans, & Schifferstein, 2005; Mugge, Schoormans, & Schifferstein, 2008; Schifferstein & Zwartkruis-Pelgrim, 2008).

Likewise, Chapman (2005) demonstrates the importance of user attachment to the product to design products with a longer life span. It is a very interesting and researched topic for the effectiveness of sustainable consumption, hence, achieving sustainable development. This is consistent with Jokinen & Marwede (2017) and the five guidelines for designing a sustainable product. The most important aspect of product design is building trust between products and consumers by customizing them to fit their needs; this results in an emotional attachment (Figure .1).

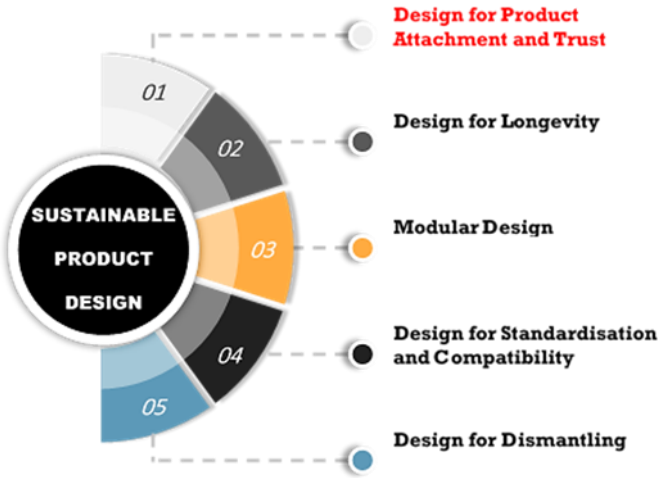

figure .1 - guidelines for the design of a sustainable product (by jokinen & marwede, 2017).

Thus, product attachment becomes an important element in extending the life of the product and the consumers' attitude towards replacing it; their relationship with their products helps delay the process (Mugge et al., 2005; Van Nes & Cramer, 2005). Grayson & Shulman (2000) and Mugge et al. (2005) show that the success of consumer attachment is an indication of the difficulty of abandoning it.

1.2. Strategies for Product Replacement

Product attachment is affected by several factors and several strategies suggested by a group of researchers and academics; Chapman (2018: p.5) illustrates a combination of them, as shown in Table.1.

These strategies focus on extending the life of the product, but most of them focus on product and service, but others focus on emotional durability and consumer experience.

Table (.1) - Strategies for Product Longevity: (By Chapman et.al, 2018)

Design for Attachment and Trust	(Mugge Schoormans & Schifferstein, 2005; Van Nes and Cramer, 2005; Bakker et.al, 2014).
Design for Adaptability and Upgradability	(Mugge Schoormans & Schifferstein, 2005; Van Nes & Cramer, 2005; Bakker et.al, 2014).
Design for Ease of Maintenance and Repair	(Mugge Schoormans & Schifferstein, 2005; Van Nes & Cramer, 2005; Bakker et.al, 2014).
Design for Durability and Longevity	(Mugge, Schoormans & Schifferstein, 2005; Van Nes & Cramer, 2005; Ljungberg, 2007; Great recovery project 2013; Ellen Macarthur Foundation, 2013; Bakker et.al, 2014).

2. Emotional Attachment:

Emotional attachment to the product is already there. Many people keep products even though they are old or no longer work as a result of their emotional attachment to them. Thus, it can be used in product design from the early stages; this is known as an emotional design. It is mentioned in previous literary research by authors like Norman (2004) and Patrick Jordan (2003) but was not for sustainability as a key element. Their re-searches were under the umbrella of interaction design and achieving an enjoyable experience for the consumer and how customer satisfaction is associated with the brand.

Excluding the reflection of consumer's personality on the product and its impact on its life, the analyses resulting from their studies are applied to product attributes to reinforce this relationship.

Norman (2004) mentions three basic levels of emotional determination that effectively influence the consumer, he expresses it with different reactions and feelings (Figure .2).

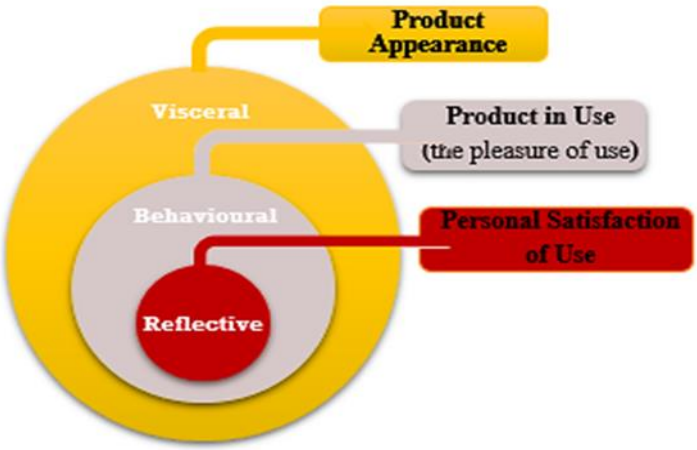

Figure .2 - Don Norman's 3 Levels of design appeal.

Thus, designing for emotional attachment aims to strengthen the relationship between the product and the consumer to give an enjoyable experience when using the product in proportion to their personal needs. Consumers need products that commensurate with the variables of their needs or their surrounding environment, not only do they need products that can do the required job well (Jensen, 1999; Van Nes & Cramer, 2005; Ward & Ramirez, 2011).

Similarly, Fenko, Schifferstein & Hekkert (2011) illustrate this interdependence with a model that results from the interaction of both product and consumer as evidence of the resulting relationship (Figure .3).

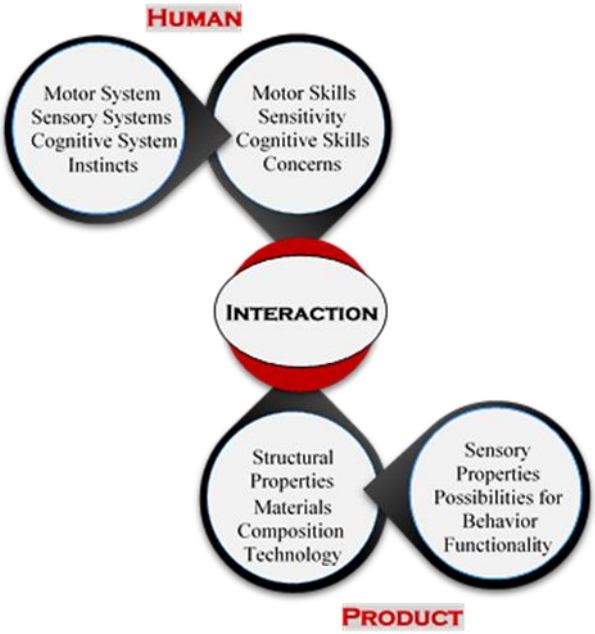

Figure .3 - Model of consumer and product interaction (By Nicole Van Nes, 2010).

Hence, emotion-centred approaches are more concerned with form. Functionality is developed through the enjoyable experience of the product. This approach differs from other strategies that focus on the product and its manufacturing methods (Van Nes et.al, 2003). Thus, it supports this methodology to enhance the user's connotation with his/her product.

2.1. Product Attachment

According to Bowlby (1979), attachment theory (an application in the field of design) is the result of interpersonal relationships between two people; hence, comes the term product attachment. It is defined as the extent of a person's association with a specific product and the level of the strength of that positive emotional relationship resulting from the excitement of feelings (Figure. 4) (Schultz et al. 1989; Schifferstein et al. 2004; Schiffer-stein, Mugge & Hekkert 2004; Kleine & Baker 2004; Mugge 2008; Fayazi & Frankel, 2020).

Product attachment is affected throughout the life cycle of the product and its endogenous development (Schultz et al., 1989). For example, Mugge (2008) mentions the extent of her attachment to her Citron C3 Pluriel car since its purchase despite its malfunctions, battery problems, and the difficulty of using it. The attachment has been developed due to the car’s distinctive green colour and unique design.

Therefore, attachment to the product depends on arousing the person's feelings through a personal meaning for the consumer rather than the traditional utilitarian value of the product (Schifferstein et al. 2004).

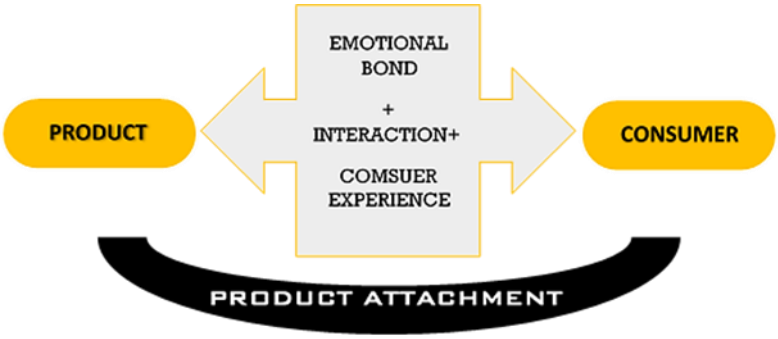

Figure .4 - Product Attachment.

Moreover, it constitutes an emphasis on the emotional responses of the owner, which is one of the most important factors on which the link to the product depends and its continuation for a longer period without disposing of it (Mugge et al., 2008). Hence, attachment depends on the commitment, ambition, and feelings of the consumer through maintaining the product for a longer period - during which emotional bonding is generated (Thomson et al., 2005) (Figure.5).

Figure .5 - Relationship of Product Attachment, Emotion, and Commitment.

Furthermore, this bonding is affected by the set of experiences and memories between the product and its owner in addition to achieving a sensual and aesthetic pleasure (Schifferstein et al., 2004). It depends on the types of products that help to achieve that relationship. Therefore, designers are looking for products that encourage attachment.

According to Schifferstein & Zwartkruis-Pelgrim (2008), some of the criteria used to enhance attachment when designing a product include:

- Enjoyment
- Self-identity
- Memories
- Life vision
- Utility
- Reliability
- Market value

This coincides with the set of determinants Mugge et al. (2005, 2008, and 2009) identify as an element for product attachment and even reinforcement for that interconnection, including (Table. 2).

Table (.2) - The Determinants of Product Attachment (Mugge et al. 2005, 2008, and 2009).

(1) Self-expression	Express unique personality of the consumer and distinguish him from others through product personalization.
(2) Group Affiliation	An expression of person's belonging to a group, and coding of his association with that distinct group, which leads to a sense of self.
(3) Memories	Recalling memories of the past or events related to the individual, the common factor between a person and memories is that product.
(4) Pleasure	Enjoyment when using, it causes either the product to be its primary function of entertainment or enjoyment or as a result of achieving superior benefits in the product and meeting desires of the consumer.

Thus, to achieve a long-term association for a longer period, a person's psychological need for pleasure and ease of use is met in proportion to his personality to achieve personalization and self-expression; this in addition to a meaningful product performing its function to the fullest and the consumers' awareness of the quality provided to establish confidence in the product (Desmet & Nijhuis 2013).

Likewise, Jordan (2000) encourages using the achievement of pleasure (classified into four types as illustrated in Figure (6) as an effective element in attracting the consumer to a product (both in function and appearance) to establish positive feedback on and satisfaction with the product.

Mugge et al. (2010) emphasized the importance of pleasure in stimulating a stronger relationship with the product (Page, 2014; Davis, 2002).

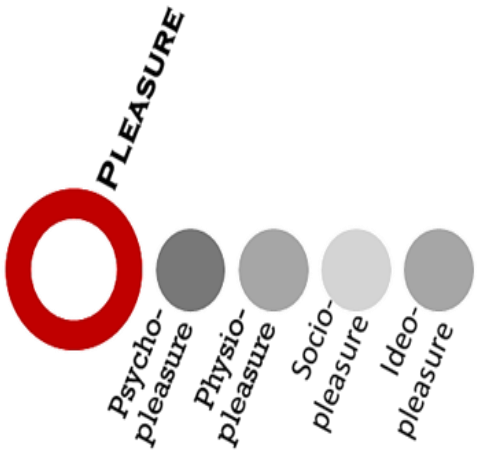

Figure .6 - Jordan's 4 types of pleasure.

Therefore, other causes of replacement, such as changes to the user's personality, lead to consumer product separation (and subsequently the product is being disposed of). Therefore, some studies explain the factors of separation from the product and its association with the consumer, based on Jordan's 4 types of pleasure (Table. 3). This helps designers understand and employ them in the design process (Ward & Ramirez, 2011).

Table (.3) -The factors in product attachment/detachment Jordan (2000).

Possible Attachment factors	Possible Detachment Factors
Physio attachment: Experiencing physical contact, aesthetic design, good feeling of touch and smell	*Physio detachment:* Product function failure, products' wear and tear
Socio attachment: Experiencing enjoyment with others in a social or cultural status	*Socio detachment:* Change of social and cultural status
Psycho attachment: Cognitive and emotional reactions, memories to person, place and event	*Psycho detachment:* Undesirable past self
Ideo attachment: Individual's value and ideology	*Ideo detachment:* Altered ideology, iconic transfer and extended self

Some experiments have been done on many consumer goods and products in many types of research, such as Ball & Tasaki, 1992; Mugge et al., 2005; Mugge, 2007; and Schifferstein & Zwartkruis Pelgrim, 2008, that emphasize the extent to which the product attachment is directly correlated with postponing product replacement.

For example, an online survey was conducted and some questions were asked to clarify the emotional connection to pieces of furniture in the house, such as chairs, and explain the reasons for their abandonment as well.

The extent of the role of emotional attachment and the preservation of a particular product was concluded due to psychological attachment of the owner and the difficulty of abandoning the product despite the loss of value, therefore, the product was placed in another corner in the house. It was also concluded that some of the reasons for replacement were the durability in addition to the loss of the elements of psychological connection. Therefore, it is necessary to exploit the psychological attachment theory in design practices.

3. Designs illustrating the Concept:

This section presents several ideas to use the attachment to the product using the conventional product design approach to clarify more about the preceding titles and their application in the design concepts that directly serve the products.

- **Modular Touch-Sensitive Lighting.**

it is possible to build any structure to fit your needs using hexagonal magnetic tiles, which can then be turned on and off by just touching them. it is tailored to a certain location, rapidly modular components result in a system that is easily adaptable to any situation, using the magnetic edges, connect the tiles to build a structure that best suits your interior.

it's a light-based swipe, the light source is the interior architecture, swipe the wall, illuminating your touch's path for a tactile and engaging experience. it has custom lighting levels that complement the mood by only lighting as many tiles as required. it can be installed on any flat surface, with a powerful magnetic mounting mechanism that allows freely changing and customising lighting configuration to match any mood or vibe, it is possible to create any shape.

it is to build up an endless number of tile packs to have touch-sensitive lighting for a fully dynamic lighting solution that is unique to each location. it is to use the magnetic edges to connect the tiles together to construct a structure that best matches an interior. a single power supply may power up to 100 panels.

the helios touch system, which won the new designers associate prize in 2016, is an innovative lighting system that was created at brighton university.

Figure .7 - Hellos Touch Sensitive Lighting.

- **Modular Phone-blocks**

Dave Hakkens' proposal for a mobile phone built of detachable bricks has gone viral, gaining over 16 million views on YouTube and nearly a million supporters online (+ movie + interview) during Dutch Design Week 2013.

Phonebloks is a concept for a phone made up of interchangeable components that fit together like Legos, each with its own function. This implies that parts of the phone can be updated or upgraded without having to toss them away.

"Typically, a phone is constructed as one solid block, and if one half breaks, you need to discard the complete phone," Hakkens explained. "However, because this contains separate components, you can replace the battery if it is broken, or upgrade the camera component if you need a better camera. So you save the nice stuff and don't toss away the rest of the phone."

Electronic blocks snap into a baseboard, which connects all of the components in the Phonebloks idea. Everything is held together by two tiny screws. Users can build their own modules or use components from their favourite brands.

"You may customize your phone by replacing the storage block with a larger battery if you save everything in the cloud," says the video presenting the concept. "You can even replace complex components you don't need with basic blocks like a bigger speaker."

Hakkens expects that Phonebloks will result in fewer phones being discarded, reducing waste. The video states, "Electronic equipment is not built to last." "As a result, electronic waste is one of the world's fastest-growing waste streams, and our phone is one of the leading contributors."

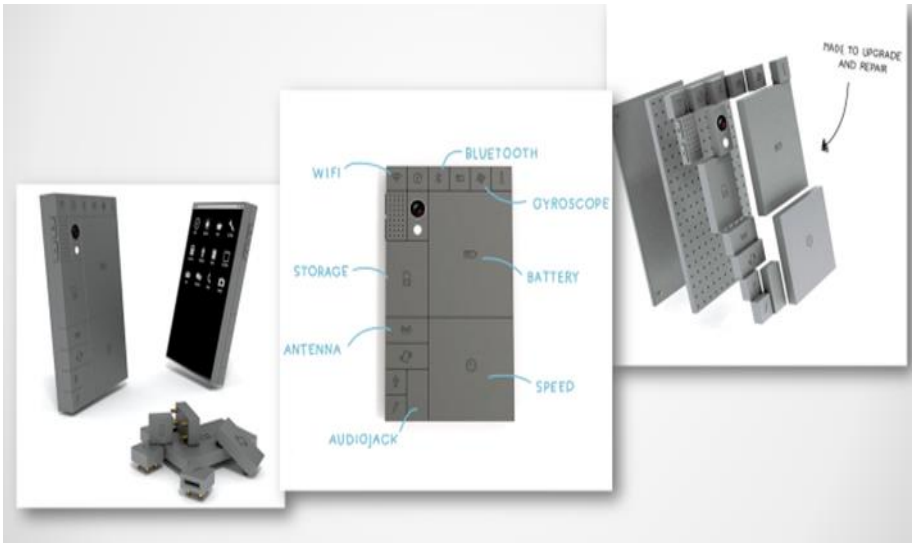

Figure. 8 - Phonebloks Mobile Phone Concept by Dave Hackens.

- **Modular Concept Camera**

Most high-end digital cameras (with the exception of Ricoh) are not intended to be standard. Therefore, a new camera must be purchased unless a new sensor is needed in the camera. It is therefore difficult to experiment with a different lens system.

What if there was a world where all the major camera manufacturers collaborated to create a versatile, modular digital camera with the Equinox conceptual camera, Korean designers Dae jin Ahn and Chun Hyun Park aim to address that question.

Equinox is a camera system that separates the sensor and lens mount from the "body" of the camera. It has a square "core" with a specific sensor and mounting assembly.

The core is placed in at least three separate shells to make a suitable camera, the first is a simple grip that adds the shutter trigger function to the sensor unit, with viewfinder accessory.

Thus, when more features are required, they can be housed in a larger chassis using small camera controls. Nikon Speedlight’s mount to a standard hot shoe mount on the same chassis.

Finally, there's a larger body with all the buttons and wheels you'll need if manual settings need to be fiddled with actual controls. If a portable object is not needed at all - for example, in a studio setup - you can hook the sensor unit to a computer.

Figure .9 - Equinox: A Modular Concept Camera That Can Take on Various Form Factors.

- **Modular Drone**

Make-block, a robotics business located in Shenzhen, has introduced the new Air-block, a modular six-axis drone that can morph into a hex-copter or hovercraft. To make each flying experience unique, Air-block blends the best of building blocks with flight physics and engineering.

Air-block is made up of magnetic, modular elements that may be assembled and disassembled without the use of any tools. A control core, a hovercraft base, six-blade modules, six spare blades, ten blade shields, a wall charger, one lithium-ion rechargeable battery, and a USB cable are all included in each set.

The central CPU, motors, and rotors are all protected by a sturdy and durable soft foam frame. It's made up of magnetic connectors that click together. The huge Styrofoam base can be combined with the other components to create a hovercraft that can go over water or over smooth ground.

The Air-block may be operated via the Make-block app (available for iOS and Android), which acts as a command centre for the Air-block. It has a one-touch take-off and aerial stunts feature; press one key to take off and another key to conducting aerial antics. The app can also programme aerial routines and unique stunts using a drag-and-drop scripting language. To make a continuous stunt, simply drag and drop different blocks of commands — such as forward, right, up, and roll — and join them together, if you don't want to code, you may just use the joystick controllers to command Air-block.

The Air-block is only restricted by the user's imagination, thanks to magnetic attachments, modularity, and visual programming. To function, requires fundamental engineering, coding, and flight physics. Make-block is a firm that focuses on robotics and STEM (science, technology, engineering, and math) ideas, and the Air-block is a beginner drone that fits that objective.

A single charge will give you about six minutes of flight time. The Air-block may reach a vertical height of 16 feet and a horizontal distance of 50 feet in an open space. The unit's dimensions as an aeroplane are 235 mm x 54 mm. Its hovercraft dimensions are 335 mm x 208

mm x 126 mm. The Air-block hovers and automatically lands when the mobile device is turned off or the Bluetooth connection is lost.

Figure. 10 – Air-block, a Modular Drone that transforms into a Hovercraft.

- **Modular Dishwasher-for-One**

Dishwashers are increasingly standard household appliances, and while they have eliminated this time-consuming duty for many, they are inefficient for single-person families.

The One-Person Household Dishwasher is precisely that: a dishwasher for one person. Its small size allows it to sit nicely on the counter without taking up too much room. The dishwasher's design was carefully examined because it would be a permanent element in the kitchen; it has a streamlined form that was inspired by a Dumpling Steamer, and the polished stainless finish gives it a sense of quality.

Figure. 11- One-Person Household Dishwasher (Designer MJ O).

- **Modular Toaster**

Why not make toasters that can be expanded? Rather than getting up every minute or two from breakfast to remove two pieces of toast from a traditional toaster and replace it with new bread. As the family grows, more slots are added to the toaster, ensuring that no one ever has to wait for their own hot, crunchy slice. Each toaster unit can be utilised independently or in concert with the others.

One Modular Toaster piece, according to Gorelik, appears to be incomplete on its own. However, as more modules are added, the contraption begins to resemble a true toaster. As

children grow older and move out, they can take their pieces of the family toaster with them and form their own toaster families in their new homes.

Figure. 12 - Breakfast Made Simple: Toaster Grows with a Family.

4. Discussion:

These factors help to understand attachment and ease of use in design and to influence how attachments are developed. During the life of the product, consumers need pleasant and satisfying reactions. The consumer may associate with the product immediately after purchase, but maintaining that relationship throughout the entire ownership period is the most important. On the other hand, these factors support designers to recognize and categorize emotional attachment and ease of evaluation. Thus, enabling designers to explore attachment through the attributes of new products to enhance attachment to the product. It is beneficial to work to improve the life of the product and to postpone the replacement for a longer period.

Based on experimental studies by researchers, it is found that the product with emotional value that drives feelings of pleasure and memories with the product despite its functionality and ease of use positively affects the user's experience in the difficulty of giving up the product in a short time.

5. Conclusions:

Sustainable product design is critical, it invites designers and manufacturers to shed light on it more precisely and search for effective ways of sustainable consumption.

The consumer is the hub and the easiest way to achieve sustainability. Manufacturers should refrain from wasting raw materials and products that do not constitute a great benefit to consumers (which leads them to dispose of the product despite its functional performance). Therefore, the focus is on the psychological age of the product along with its material life (which is directly or indirectly related to the emotions of the consumer).

Designing a product that a consumer can be attached to, in order to build a strong bond between the consumer and the product. It works alongside other factors to design a sustainable product and it can even be part and parcel of the design.

Attachment plays an active role in delaying products replacement by understanding the consumers' needs and personalizing them to their needs.

In addition, this strategy is added actual, dissimilar attempts at other strategies, which oblige a consumer to pro-environmental behaviour in products and services that attain this. In contrast,

the objective of these techniques is to clinically encourage the user without feeling environmentally friendly. Because he is emotionally attached to the product and keeps it established on his desire for his individual benefit.

Consequently, the process befits smooth and satisfactory for all parties. Along with saving time, effort and money, and even increasing object reliability and physical and emotional durability.

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