20DSA201 CW1 Assessment

Critically evaluate the journal articles to determine the need for user research and the role designers can have on changing consumer behavior through product design.

Explore this prompt through the lens of sustainability

Student Number: F013049

Word Count: 1482

Concern for sustainability in designing products and systems dates to the 1960s following public criticism of unsustainable practices adopted to match booming markets (Bharma and Lofthouse, 2016). Three decades later, the environmental devastation of the first disposable plastic revolution (from 1930-1960) (Science History Institute) caused a second round a public outcry from designers and environmentalists (Bharma and Lofthouse, 2016). The subsequent adoption of international charters and treaties aimed at curtailing virgin resource use and implementing environmentally considerate practices among stakeholders ushered in the era of design for sustainability (Timmis, 2020). This essay explores the paradigmatic economic shift required to achieve sustainability, the role designers play in designing sustainable products, and the importance of understanding user behaviour and implementing user-centric philosophies to achieve market penetration and adoption of sustainable goods.

Global economies have long followed a linear model of consumption whereby products are designed to be disposed-of at the end of their useful life, with an estimated “80 per cent of products [being] discarded after a single use” (Bharma and Lofthouse, 2016, p.2). By accepting this take-make-waste cycle as the norm (Ellen MacArthur Foundation, 2017) humanity has consumed ≈30% of earth’s natural resources, requiring 1.77 earth-sized planets to store all the waste produced (The World Counts, 2020) (Ruz, 2011). In a bid to offset decades of environmental damage, designers have adopted new practices such as green and eco-design (Timmis, 2020) to reduce products’ environmental footprint through longevity**,** whilst easing recyclability, reparation, reuse, and refurbishment via design for disassembly (Leube and Walcher, 2017). Similar approaches like eco-innovation or eco-redesign transform and optimize the way in which existing products are designed, manufactured, distributed, and disposed-of, often resulting in product dematerialization and resource decoupling (Timmis, 2020). In 2014, Apple Inc. revealed their newest environmental initiative, transitioning to manufacturing “all of [their] products from recycled or renewable resources” (Vice News, 2017); a massive leap forward in the industry. Yet, whilst such solutions reduce virgin resource consumption, embodied energy, and the carbon footprint of novel products, Foresight Design Initiative director Peter Nicholson argues that these practices play only a minor role in achieving true sustainability (Nicholson, 2005). Rather than

incremental linear improvements, Leube and Walcher (2017) propose a radical shift to a circular economy. As opposed to a linear economy, a circular one seeks to "design-out waste, material, and resource problems from the get-go" (Sherwin, 2013) in a closed-loop system whereby the end-of-life of one product feeds into the design and production of another (fig. 1).

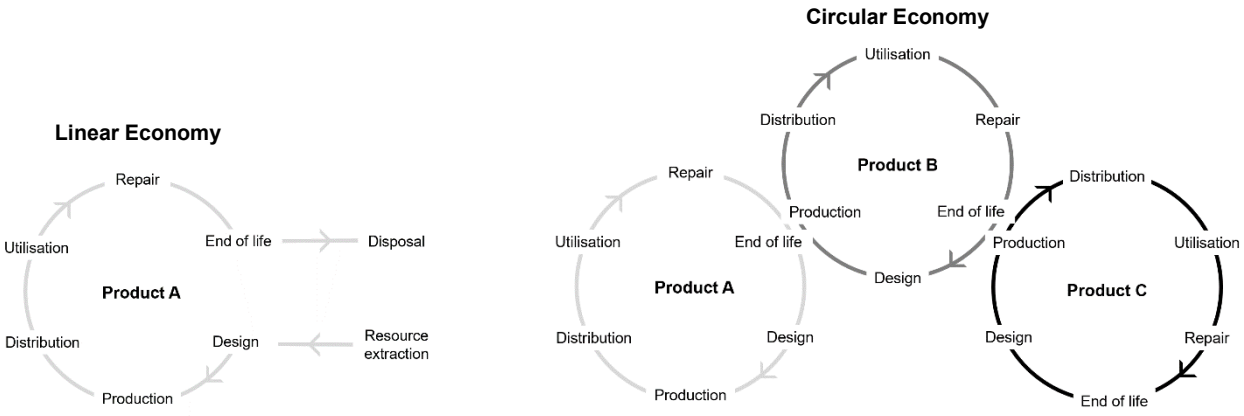

Fig. 1: Linear Economy (left) vs. Circular Economy (right)
Source: Author's own

By eliminating the pre-production and disposal phases of a linear economy, the Ellen MacArthur Foundation (2017) predicts savings of roughly 700 million USD in raw materials and a near halving of carbon dioxide emissions by 2030. As businesses naturally assume greater accountability for the lifecycle of their products and materials in a circular economy, designers' responsibilities and relationship with consumers must shift accordingly.

"There are professions more harmful than industrial design, but only a very few. By creating whole new species of […waste and pollution…], designers have become a dangerous breed" (Papanek, 1985 cited in Bharma and Lofthouse, 2016, p.1)**.** Leube and Walcher (2017) argue that "[i]f production, use and disposal of products need to change than consequently so does the design process" (2017, p.493) such that waste is viewed as a design flaw rather than an unavoidable by-product (Ellen MacArthur Foundation, 2017). Design teams cannot be content with simply "doing less harm" but must "aim to do good" (Ellen MacArthur Foundation, 2017) by championing sustainability in all steps of the design process. Their paper, *Designing for the next (Circular) Economy […]*, argues that carefully sourcing and selecting materials is vital to closing the virgin resource loop, pointing to the Fairphone 3+ as a prime example (Leube and Walcher, 2017). Focusing not on

material selection but rather on whole businesses, an overhaul of existing business practices may be required to reconcile performance-driven and circular economies. “The faster existing frameworks are done away with, the faster a paradigmatic change can take place” (Schumpeter, 1942 cited in Leube and Walcher, 2017, p.492). By encouraging sustainable practices and the cradle-to-cradle mentality from the top-down, like Swiss accessories manufacturer Freitag, resources are more likely “to be kept in closed technical and biological cycles” (Braungart and McDonough, 1942 cited in Leube and Walcher, 2017, p.495). However, system innovation at a corporate level, let alone an international one is likely to be an arduous and time-consuming process, the cost of which risks being transferred to consumers. As research suggests that “the major part of the environmental impacts [of a product] is caused during [use], in particular through energy consumption” (Wever et al., 2008, p.9), Kuijer and Bakker (2015), and Wever et al (2008) posit encouraging sustainable user behaviour as the ultimate goal of sustainable design practice. Teams of designers, engineers, and psychologists thus become “choice architects” (Leube and Walcher, 2017, p.494) responsible for defining and inducing sustainable behaviour without alienating or aggravating users.

"Studies [show] that sustainable technology does not automatically lead to sustainable user behaviour." (Wever et al., 2008, p.10). The theory of Design for Sustainable Behaviour (DfSB), pioneered in the late 2000s, provides a framework for designing products and services such that “unsustainable behaviour is made difficult or impossible, while sustainable behaviour is made easy, easier, or even automatic” (Kuijer and Bakker, 2015, p.220), through product-led interventions. Educational interventions, such as eco-feedback, eco-information, and eco-choice seek to inform users about the implications of their current behaviour, allowing for self-reflection and change, whilst strategies like eco-spurring encourage sustainable behaviour via positive and negative reinforcement, incentivisation, and guilt-tripping (Lilley et al., 2005 cited in Wever et al. 2008). A 2009 study presented at the *International Conference on Persuasive Technology* by Kappel and Grechenig (2009) found that a shower-cord with “eight LED lights that light up in sequence after every 5L” (cited in Kuijer and Bakker, 2015, p.221) resulted in a 10L-per-shower reduction in water consumption, as compared to users with traditional non-interventional showerheads. Unlike educational interventions, technological interventions force behaviour change

and are more likely to be employed with defiant users (Lilley et al., 2005 cited in Wever et al. 2008). Subtle and passive technological interventions include product scripting and eco-steering whereby users are guided to act sustainably via barriers to unsustainable behaviour. Forced functionality refers to designing products such that acting unsustainably is harder than acting favourably (Lilley et al., 2005 cited in Wever et al. 2008), like with Cudzic's stay-on tab which prevented the littering of four million tons of aluminium removable drinks' tabs between 1975 and 1991 alone (Vanderbilt, 2012). Most intrusive are intelligent products that actively override users' actions, making unsustainable behaviour impossible (Lilley et al., 2005 cited in Wever et al. 2008).

Essentially, DfSB allows users to achieve moral satisfaction by heavily motivating desirable behaviour under the guise of free choice, thus re-defining how users interact with products as once motivated behaviour gradually becomes the norm. However, DfSB tends to view "behaviour as predictable" (Kuijer and Bakker, 2015, p.225) as "DfSB approaches […] assume specific use scenarios" (Kuijer and Bakker, 2015, p.222) and allow for little lateral movement to accommodate a range of use-cases. The inherently individual nature of DfSB also makes excessive "resource consumption a problem of the consumer" (Kuijer and Bakker, 2015, p.224) rather than a societal one, thus alienating users who proceed to sabotage or ignore product-led interventions in retaliation (Kuijer and Bakker, 2015). Implementing user-centred design (UCD) strategies to explore user goals and user-product interactions is vital in understanding how products may encourage sustainability without costly assumptions about behaviour resulting in outright rejection. Contrarily, Rodriguez and Boks (2005, cited in Wever et al., 2008) propose functionality matching whereby user research guides product redesigns to match *existing* goals and behaviours, not vice versa. "Redundant functionalities have an unnecessary impact, while missing functionalities can trigger unwanted behaviour, with subsequent unsustainable effects." (Wever et al., 2008, p.14). Although functionality matching yields fewer long-term sustainability improvements, it is the least intrusive solution, easing user-adoption (Wever et al., 2008). Regardless of the design philosophy implemented, understanding users is vital to the successful adoption of sustainable goods.

As product success depends on favourable market penetration, and as user attitudes drive purchasing habits, understanding consumer desires, habits, and assumptions etc. is crucial to designing attractive solutions. Steenis et al.'s (2018) study of 643 consumers (including a range of ages, sexes, and education levels) found that product packaging deemed sustainable was more likely to be purchased, partly due to selfish moral satisfaction. However, this study, alongside that of 36 predominantly female consumers conducted by Lofthouse et al. (2017), found that sustainable alternatives also lead to perceptions of reduced functionality, limited convenience and increased behavioural cost, thereby jeopardising purchase intentions. Additionally, whilst implementing a single sustainable strategy increased moral satisfaction thus increasing product desirability, "additional sustainable design strategies beyond the first [did not] significantly improve consumers' purchase intentions" (Steenis et al., 2018, p.856), in some cases exacerbating sentiments of personal sacrifice. User research stipulates that: products should resemble existing solutions to positively influence perceptions of value for money, that sustainable benefits' must be clearly explained before sale, and that apprehensive consumers must be reassured of the long term availability of new sustainable products/systems prior to financial and emotional investment (Lofthouse et al., 2017), similar to how Tesla reassured early-adopters of electric vehicles of the dependability and availability of electric charging points.

As the impacts of linear economies increases, international legislation will likely seek a paradigmatic shift to a circular economy and true triple bottom line sustainability. With consumers forced to re-evaluate their patterns of consumption and businesses assuming greater responsibility for their product lifecycles in a closed loop system, designers will be expected to provide environmentally considerate and attractive sustainable alternatives. Although optimizing and dematerializing products to reduce virgin resource extraction is feasible, literature analysed suggests rethinking, and by extension redesigning, user-product interactions. As such, in becoming "choice architects" (Leube and Walcher, 2017, p.494) and arbiters of good and bad behaviour, an in-depth understanding of varied use-cases, user desires, and user motivations is crucial in allowing design teams to anticipate and accommodate pinch-points, maximise sustainable potential through

product-led interventions, and motivate long-term sustainable behaviour as the norm for consumption in a circular economy.

Word count: 1482

Works Cited

BHARMA, T. and V. LOFTHOUSE, 2016. *Design for Sustainability: A Practical Approach*. [pdf] New York (NY): Routledge. [viewed 07 Nov. 2020] Available from: https://doi.org/10.4324/9781315576664

ELLEN MACARTHUR FOUNDATION, Copyright 2017. *What is the circular economy?* [online]. [viewed 07/11/2020]. Available from: https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy

KUIJER, L. and C. BAKKER, 2015. Of chalk and cheese: behaviour change and practice theory in sustainable design. *International Journal of Sustainable Engineering*, [online]. **8** (March), 219-230.

LEUBE, M. and D. WALCHER, 2017. Designing for the next (Circular) Economy. An appeal to renew the curricula of Design Schools. *The Design Journal*, [online]. (September), 492-501.

LOFTHOUSE, V., R. TRIMINGHAM and T. BHARMA, 2017. Reinventing refills: guidelines for design. *Packaging Technology and Science: An International Journal*, [online]. (July), 809-818.

NICHOLSON, P., 2005. *Green Design vs. Sustainable Design*, [online]. [viewed 01/11/2020]. Available from: https://www.dexigner.com/news/4166

RUZ, C., 2011. The six natural resources most drained by our 7 billion people. *The Guardian*, 31 Oct. [viewed 27 Oct. 2020]. Available from: https://www.theguardian.com/environment/blog/2011/oct/31/six-natural-resources-population

SCIENCE HISTORY INSTITUTE, (no date). *History and Future of Plastics*, [online]. [viewed 30/10/2020]. Available from: https://www.sciencehistory.org/the-history-and-future-of-plastics

SHERWIN, C., 2013. Design for circular economy must consider disruptive technologies. *The Guardian*, 12 Nov. [viewed 27 Oct. 2020]. Available from: https://www.theguardian.com/sustainable-business/design-circular-economy-disruptive-technology

STEENIS, N. D., I.A VAN DER LANS, E. VAN HERPEN and H. C. VAN TRIJP, 2018. Effects of sustainable design strategies on consumer preferences for redesigned packaging. *Journal of Cleaner Production*, [online]. (205/September), 854-865.

THE WORLD COUNTS, 2020. *The needs of 7 billion people….* [online]. [viewed 27/10/2020]. Available from: https://www.theworldcounts.com/stories/depletion-of-natural-resources

TIMMIS, C., 2020. Topic 8: Sustainability [lecture]. *IB Design Technology: Topic 8*. International School Basel.

VANDERBILT, T., 2012. *The brilliant redesign of the soda can tab.* [online]. [viewed 26/11/2020]. Available from: https://slate.com/human-interest/2012/09/can-tabs-how-aluminum-pop-tabs-were-redesigned-to-make-drinking-soda-safer-and-the-world-a-cleaner-place.html

VICE NEWS, 2017. *APPLE PROMISES TO STOP MINING MINERALS TO MAKE IPHONES — IT JUST ISN'T SURE HOW (HBO).* [video]. 19 April 2017. [viewed 26 November 2020]. Available from: https://www.youtube.com/watch?v=hogQnGyLZYI

WEVER, R., J. VAN KUIJK, and C. BOKS, 2008. User-centred design for sustainable behaviour. *International Journal of Sustainable Engineering*, [online]. **1** (June), 9-20.

Bibliography

ELLEN MACARTHUR FOUNDATION, 2019. *Martin Stuchtey - How Things Look Today,* [video]. Isle of Wight, United Kingdom: Ellen MacArthur Foundation. [viewed 07 Nov. 2020]. Available from: https://www.youtube.com/watch?v=SCs5BoZwcZk&feature=youtu.be

FAIRPHONE, 2020. *Fairphone 3*+, [online]. [viewed 04/11/2020]. Available from: https://shop.fairphone.com/gb_en/fairphone-3-plus

FERNANDO, J., S. GORDON, 2020. *Corporate Social Responsibility (CSR)*, [online]. [viewed 27/10/2020]. Available from: https://www.investopedia.com/terms/c/corp-social-responsibility.asp

RICHARDSON, J., 2015. *10 Triple Bottom Line Businesses.* [online]. [viewed 26/11/2020]. Available from: https://inspiredeconomist.com/2016/03/14/10-triple-bottom-line-businesses/

TANG, T., and T. A. BHARMA, ed., 2008. *Changing Energy Consumption Behaviour Through Sustainable Product Design.* International Design Conference. Dubrovnik, (May), 1359-1366.