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Technological Innovation for Inclusivity

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Abstract

Society experiences multifaceted political, social, economic, and environmental challenges in the world that require us to explore design approaches that sufficiently address these complexities. Whether intentionally or unintentionally, mainstream systems appear to ignore the needs of the marginalized in society especially people with disabilities, due to systemic ableism. In many countries globally like Kenya, providing for the needs of persons with disabilities is still viewed as charity, instead of being treated as the provision of basic needs, security needs and dignity. This leaves persons with disabilities susceptible to human rights abuses and dangerous situations that could lead to harming their well-being or even death. Footwear is a basic need of clothing that provides protection and support to our feet during mobility. Non-disabled people have a variety of footwear types, styles, colours, price points and organizations to easily choose from due to systems that have been developed and improved over centuries. Unfortunately for persons with disabilities who require customized footwear, there are still major challenges in obtaining suitable footwear because there is often minimal investment in products and systems that suit their needs. This is especially so in societies which have largely informal, craft based and unorganized systems. We are living in the fourth industrial revolution that sees an immense amount of technological

developments occur daily. Technological innovation can be a great way to provide for persons with disabilities and in essence, reduce systemic ableism. In this paper we present insights and conclusions that explore the effects and benefits of design interventions that incorporate technology to provide for persons with disabilities, especially footwear, based on participant observation, extensive review of literature, as well as related research.

Key words: ***Footwear for Persons with Disabilities, Shoes, Inclusive Design, Inclusivity, Accessibility, Design for all, Mainstreaming design, Technological innovation***

Introduction

Disability is part of the human condition (WHO, 2010), almost everyone will temporarily or permanently be impaired at some point in life, and those who survive to old age will experience increasing difficulties in functioning. There is consensus in existing literature on disability that current systems and services exclude persons with disabilities, PWDs (Keates, 2018). Situations that seem extremely straightforward and simple to a majority of non-disabled people require an entire organized system of support for PWDs. For instance, to get footwear, non-disabled people can go to a variety of shoe shops, make selections from a variety of types, styles, colours, price points, carry out actual fittings and then leave the shop almost immediately with their desired shoes in the bag. In fact, technological innovations have made the process even easier; online shopping allows many non-disabled people to get whichever footwear they desire in the comfort of their homes and delivered to their doorsteps globally. This level of convenience is not yet

available to persons with disabilities and we need to make it easier. It appears that most footwear for PWDs globally are categorized as assistive devices (WHO, 2011); available as surgical boots or orthopaedic shoes, that require a visit to the orthopaedic shops, or sometimes a cobbler. A preliminary look at some first-hand PWD experiences shows a lack of easy access to customized shoes globally (Crippledscholar, 2015). The value chain is disjointed and whenever available, the footwear is costly, lacks variety, is aesthetically displeasing and most often does not fit correctly. Although mainstream organizations globally like Nike, Adidas and Bata provide footwear for PWDs, the systems used have flaws and gaps leading to marginalization of the same PWDs they aim to serve.

Towards Inclusion

PWDs have historically been provided for through solutions that predominantly segregate and exclude them such as residential institutions and special needs schools; attributed to ableist systems that are built without inclusivity in mind (Parmenter, 2008). Society often views provision for PWDs as altruistic ventures; treated as charity cases, special accommodations, or an afterthought. Individuals and organizations providing for PWDs lack coordinated efforts, working disjointedly instead of setting up systems that work in an organized, consistent manner. Disability caregivers, advocates, organizations and PWDs themselves recognise that their exclusion is probably unintended. They say this exclusion results from lack of awareness in the general public, unimplemented legislation, and insufficient enforcement of compliance to provide inclusivity for PWDs (Irungu, 2019 and Awino, 2022). For example, article 54 of the Kenyan Constitution 2010 outlines the right of access to facilities

for PWDs. All buildings and structures in Kenya should allow PWDs to access them without any strain and use them with comfort. However, most buildings still lack wheelchair access, provide only staircase access which is unusable for most PWDs, and have ablution facilities not optimized for PWDs use. As a matter of fact, the overall built environment in Kenya is hostile not only to PWDs, but also to the non-disabled. PWDs and their supporters posit it should be mandatory for all service providers to design structures and systems that increase inclusion of PWDs, with penalties for those who fail to meet requirements (Awino, 2022).

Since the 1950s, to cater for injured veterans after the second world war, governments globally established legislation on the implementation of universal design (Keates, 2018). Increasing global aging made universal design further popular in countries like the United Kingdom and Japan in the 1970s, who developed "specialized solutions for special people" in accessible transportation, housing design, et cetera. Universal design however tended to segregate PWDs making most countries shift towards inclusive design over time (Papanek, 2005). There are organizations like the International Organization for Standardization, ISO, that develop consensus-based procedures for designing products, services and systems for PWDs globally. In Kenya, the National Council for Persons with Disabilities, NCPWD, was established by the Persons with Disabilities Act in 2003 and its future amendments to provide guidelines on equality and human rights, social inclusion and disability rights (NCPWD, 2003). Other guidelines within this act comprise the deterrence of PWDs discrimination, education and health matters for PWDs, rights of PWDs like employment rights, and others.

The United Nations, UN, seems to be leading the push for inclusion of PWDs and global coordination via several initiatives, among them the Convention on the Rights of Persons with Disabilities Treaty (UN, 2008), Sustainable Development Goals SDGs which replaced the Millennium Development Goals (MDGs) from the 2000s, developed to tackle the indignity of poverty that especially affects PWDs (UNDP, 2015). These initiatives have been adopted and implemented by different countries in contextual ways, for example, the African Union, AU, has a charter between its member states that provides protocols for the rights of PWDs in Africa (AU, 2018) and the Agenda 2063 adopted in 2015 is currently under implementation to transform Africa into a global powerhouse through inclusive and sustainable development. In Kenya the Vision 2030 has provided the blueprint to improve the lives of Kenyans, especially the marginalized. Mainstreaming disability is one of the recent concepts proposed by the UN working with other organizations, to end exclusion of PWDs (WHO, 2011) where mainstream businesses provide assistive and universally designed products to the whole market without differentiation. Universal design calls for designing environments, products, programmes and services that can be used by everyone without the need for adaptation or specialized design. This may initially cost businesses more in production but in the long run, mass factor will reduce costs. However, while discrimination is not intended, mainstream systems indirectly exclude persons with disabilities by not taking their needs into account (WHO, 2011). To improve the mainstreaming of disability, it is therefore important for designers to develop user centric inclusive systems where PWDs are involved within the whole design process.

Disability is a (KNSPWD, 2018) physical, mental, emotional or other health condition or limitation that lasts six or more months and limits individuals' participation in their day-to-day life activities. According to the World Health Organization (WHO, 2010) more than a billion people are estimated to live with some form of disability, or about 15% of the world's population, based on 2010 global population estimates. In Kenya, according to the 2019 census (Development Initiatives, 2010) 0.9 million people or 2.2% of Kenyans live with some form of disability. Mobility is the most reported difficulty in disability, experienced by 0.4 million Kenyans and representing 42% of people with disabilities. The other domains of disability; seeing, hearing, cognition, self-care and communication, are experienced by between 36% and 12% of people with disabilities in Kenya (Development Initiatives, 2010). The onset of disability may lead to the worsening of social and economic well-being and poverty (Figure 1) through a multitude of channels including the adverse impact on education, employment, earnings, and increased expenditures related to disability (Jenkins and Rigg, 2003). Disability is a development issue, because of its bidirectional link to poverty (Figure 1); disability may increase the risk of poverty, and poverty may increase the risk of disability (Sen, 2009). Providing good quality, affordable shoes to PWDs therefore becomes a social responsibility. Disability activist Edward Ndopu from South Africa, a PWD diagnosed with spinal muscular atrophy at the age of two, advocates for the need to think beyond enforcing legislation and compliance; like installing ramps, braille and sign language assistance, and more towards ensuring PWDs fully participate in society and feel as productive, valuable members of the world (Mlaba, 2020). This is achieved by Inclusive Design, ID, as

it aims to eliminate barriers that create unnecessary effort and separation of the marginalized leading to the enabling of every person to participate equally, confidently and independently in day-to-day activities.

Figure 1: Bidirectional link of disability to poverty. Source World Bank

Protection remains the primary reason for the development of footwear in Africa and other parts of the world (Kute and Pido, 2022). The first footwear is traced as far back as fifty thousand years ago (DeMello, 2009). Flat soled strappy sandals were made from plants and hides in hot and dry areas, while leather moccasins were wrapped around feet to keep them warm in areas with snow. People made shoes from various materials, including plants, leather, rawhide, wood, and metal (Shoes History Facts, 2020). Manufacturing has been the prime driver in the evolution of society from one that is agriculturally centered to one that is industrially centered (Boër and DulioMass, 2007).

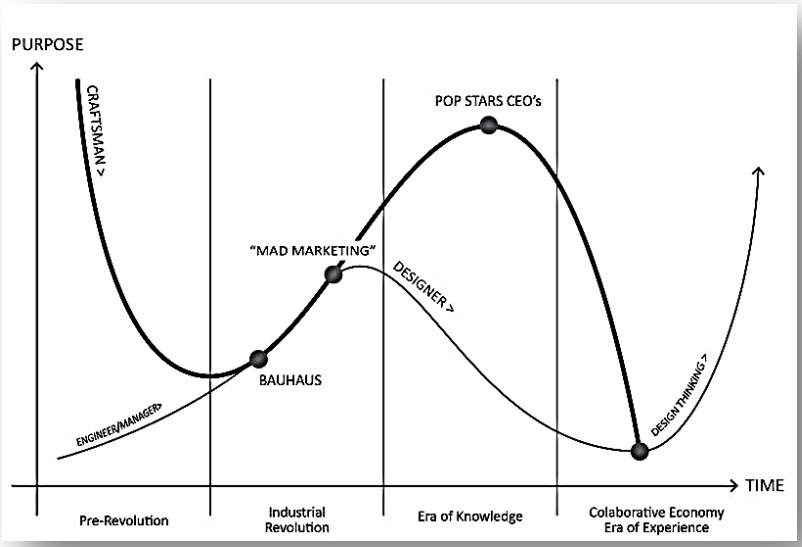

Figure 2: The return of the Design Essence. Adapted from Alt & Pinheiro (2011). Source Rocha, et al (2018)

Manufacturing technology started with an artisan at work making a single product for a single customer, and as such was well recognized as craft production during the first industrial revolution, 1iR. Mass manufacturing led to the rise of the product and industrial designer. The fourth industrial revolution, 4IR has seen technological innovations take place rapidly in all sectors of our lives. One of the main trends in today's market is that of 'mass customization' which represents a new market paradigm that is changing the way consumer products are designed, manufactured, delivered and recycled.

Figure 3: Nike self-lacing sneaker, Go FlyEase Shoe. Source Nike Inc.

Use of technologies and customization, in areas like 3D printing, mobile applications, and others, is increasing in the production of products and delivery of services. Global companies like Nike and Adidas use artificial intelligence and information technologies in their product development to customize footwear for athletes to increase their performance, as recently seen with long distance Kenyan runner Eliud Kipchoge setting a marathon world record in conjunction with INEOs and Nike. Experimental research has seen the launch of self-lacing sneakers (Figure 3) that have been hailed as an ode to PWDs who would no longer need to tie shoe laces which is cumbersome or impossible for some. Survivors of the Rwandan genocide have received printed replacement limbs, while organ printing of damaged soft tissues is also being developed through 3D printing. In Nigeria we have John Amanam, a former sculptor and movie special effects artist producing hyper lifelike customized prosthetics for PWDs of colour (Figure 4) since these were not easily available in the market, while in Kenya two innovators have built a robotic prosthetic arm that can be controlled using brain signals.

Figure 4: Hyper realistic Black hand prosthetic made by John Amanam. Source: Immortal Cosmetic Art and the Artist.

Conclusion

Despite increasing technological and customization developments currently ongoing in footwear for PWDs, one of the main challenges still remains the high cost of these products leading to lack of availability and accessibility. Since most of these products are made abroad, it is not easy for PWDs in Kenya and other places to get themselves the footwear needed. The other challenge is these products are still experimental to those producing them hence continued production and supply to PWDs who need them is not guaranteed. In countries like Kenya where the cost of acquiring and maintaining new technologies is exorbitant but with booming craft industries in the jua kali sector, the other challenge becomes how to incorporate technology into the production process of informal and craft-based industry players in order to empower them to produce suitable footwear for PWDs in a systematic and timely manner.

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