

A Designers Experiences and Embedment in Context for Innovation Toward Glocalisation: A case of SafariSeat Wheelchair Design

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Abstract

This paper explores a case study of how a designer's experiences and embedment in context influenced the innovative designing of a low cost, all-terrain and open source wheelchair particularly for use in developing countries. The desktop research reveals how experiences as a user, and his exposure as a designer through interaction, immobility and knowledge of the Kenyan environment influenced his actions and thoughts to innovation aimed at change. The research further makes reference to an alternate innovative concept design approach meant to achieve a suitable product for developing countries. The paper discusses the designer-user versus the parachute designer and their product success in terms of use and functionality of their product innovation. In conclusion this paper shows that the embedment in context, experience and open-source make a designer-user better placed than a parachute designer within the confines of Glocalisation.

Relevance to Innovation. The innovation is seen through the use of the designer-user method which was applied to inform design solutions. The product, an all-terrain SafariSeat wheelchair was influenced by the designer-user experiences informed by actions, experiences, thoughts and embedment. This case exemplars show of how the designer-user experience can prompt innovative thinking. Local experiences and understanding of the nature of needs as well as resources, knowledge and exposure from the global scene can achieve sustainable glocalized solutions.

Keywords. Design, Design-User, Experiences, Innovation, Parachute-Designer

7.1 Introduction

In today's world, human experiences both in the formal and informal learning environments impact on our actions, which subsequently shape learning. Reflecting on the thoughts of Richard Buchanan with regard to better design thinking; activities and

organized services contribute to achieving an organic flow of experience in concrete situations, making them more intelligent, meaningful and satisfying.

In discussion on Empathic Design research McDonagh writes that Design is becoming less about products and more about generating positive experiences for users. We need to understand needs beyond the functional in order to develop more appropriate design outcomes. What is emerging is the importance of shared understanding, empathy and emotion within the designing process.

Empathic design is a design research approach that is directed towards building creative understanding of users and their everyday lives for new product development (NPD). Creative understanding is the combination of a rich, cognitive and affective understanding, and the ability to translate this understanding into user-centered products and services (Wright & McCarthy, 2005).

It draws on information about the user and his/her everyday life, and it includes inspiration for design and empathy, or a feel for the user (Postma, Lauche, & Stappers, 2009). The empathic design approach is considered most valuable in the early stages of NPD, when product opportunities need to be identified and product concepts developed (Koskinen & Battarbee, 2003).

Experiences and embedment in context of a designer further ensures that they are able to have a shared understanding of the needs of a user. At the same time the designer who in this case is emotionally involved gains empathy being in the situation and becomes not only a designer but a user too. The designer-user is thus described as a local based designer who has the knowledge of the environment he lives in and has gained experience of user needs.

The designer-user who is now more empathic can relate to an actual real case known to him to further put forth his innovation. He considers criteria (informed by his experiences and embedment) that inform more towards a concrete solution.

Enzo Manzini discusses this as Design Orienting Scenarios that are based on real concrete cases that meet a set of criteria. The scenario building process is based on some concrete, real cases that meet a set of general criteria they are conceived as tools to be used in design processes.

How does a designer formulate a role as a change agent and determine a course of action? To do so means to consider both the past and the present, are embodied in concrete activities and artifacts. From the dialectic of past and present come the situations that determine the possibilities for the future. To plan effectively in the present requires a vision of what the future could and should be. The use of both the conditional could and the prescriptive should to suggest, in the first case, that the future is always based on the contingency of human choices and, in the second, to assert that these choices need to be driven by a consideration of what ought to be done.

The designer-user method explains how the specific Design Orienting Scenario brought out the needs from knowledge and experiences gathered in the past and these informed on what the solutions could be as well as choices on what ought to be done in regards to solutions for the future.

In context of the design processes and product development, the products made for users have always been informed by user needs to meet functionality. Research informs on the specific needs of a target user and probable solutions are then sought. This means

that a designer may understand needs from a general perspective, leading to designing for generalized solutions. Globally, the needs for specific users can be viewed as similar but in the local context, the solutions presented are never identical.

It has been argued that wherever globalization has effects, the form these effects take will depend on the particular setting or context. Some authors have called this convergence of global dynamics and local contexts glocalisation. Glocalisation expresses the way globalization dynamics are always reinterpreted locally, leading to an interpenetration of the local and global scales that creates context-dependent outcomes. It may be considered that glocalisation is the way that globalization really operates (Backhaus, 2003; Robertson, 1992, Swyngedouw, 1997; Swyngedouw, 2004).

Western based designers often use research to understand the needs of specific communities. The products that they design may however not be practical or efficient for the user on the ground due to various local dynamics. Global thinking methods, technology, materials and solutions are often incorporated in the design of the product.

The Parachute designer is one who introduces their product developed in the western world for use in the developing world but it is not sufficiently functional. It is assumed that the knowledge and research input the product will work well for the local user. However the designer is not informed from knowledge gained from user experience or from being embedded in context as a local.

In this paper an exemplar is discussed where a wheelchair is made in the USA for use developing countries. From research various criteria of the developing countries gathered were considered. These include; mobility needs of the user, rough terrain, materials availability and durability. The designer develops the prototype of the product and does the first test trial in the USA. The second test trial is done in a developing country and the results shows some criteria considered for the developing countries product was not practical but was useful for the western world users.

7.2 Mobility and Accessibility for Persons with Disabilities

A person's environment has a huge impact on the experiences and the extent of disability that one may. Inaccessible environments create disability by creating barriers to participation and inclusion for Persons with Disabilities (PwDs). Many wheelchairs are donated to the less-resourced countries by well-meaning organizations with little or no regard to prevailing local, environmental cultural and physical conditions and without ensuring appropriate knowledge tools and support are present. Arguably, wheelchair design and maintenance condition is known to impact the performance of wheelchair users and consequently their participation and ability to carry out the tasks of daily life (Gorce, 2012).

A global analysis of the role of disability in low income countries indicates that there has been a dependency upon donated or imported wheelchairs which have been designed for a developed environment. They are frequently distributed at shows which serves the interest of the donor rather than the wheelchair user. This reflects a commitment by the

donor to the charity model of disability, where the size and design of the wheelchair is decided by the product provider and not by the user.

Historically most wheelchair provision has focused on the product in isolation from the actual user; their specific impairment, size, lifestyle and living environment rarely taken into consideration, which often ends up in timeworn product conditions serious illness from infection owing to pressure sores. Majority of donated wheelchairs are totally unsuitable for the users needs and often provide them with greater dependence upon others and continued immobility. Many such wheelchairs are unable to withstand the harsh unpaved terrain and cannot be repaired locally.

The lack of suitability of use for the right mobility aids is a further impediment to PwDs in the local context. It thus brings in the need of developing the right wheelchair which is appropriate, affordable and accessible. This means that it will not only solve the mobility challenges experienced from the local terrain but it can be built from locally available materials, local workshops for the convenience of ease of repair and maintenance.

The International Labour Organization (ILO) reports that the unemployment rates of people with disabilities reach an estimated 80% or more in many developing countries. Government funding for the provision of a wheelchair is rarely available, leaving the majority of users unable to pay for a wheelchair themselves. Many users are poor and they live in small houses with inaccessible surroundings. They also live where road systems are poor, there is a lack of pavements, and the climate and physical terrain are often extreme. In many contexts, public and private buildings are difficult to access in a wheelchair. These physical barriers place additional requirements on the strength and durability of wheelchairs. They also require that users exercise a high degree of skill if they are to be mobile. Users face a range of challenges, which must be considered when developing approaches to wheelchair provision. 80% of the people with disabilities in the world live in low-income countries (WHO, 2008).

Persons with different Physical Disabilities in Kenya use wheelchairs that provide mobility. This is more often seen in homes and for the few fortunate, at their work stations. The wheelchairs are able to enhance their abilities as workers and enable the PwDs to be a fully integrated member of the community. Four point six percent (4.6%) of Kenyans experience some form of disability with many of the disabled persons residing in rural areas. The accessibility of the immediate surroundings plays an important role in PwDs participation in various activities. In a survey, 65% of PwDs mentioned the environment as a major problem in their daily lives. It was also noted that nine in ten PwDs found disability without assistive devices a big problem (KNSPWD, 2008).

Lack of appropriate assistive devices hinders mobility and opportunity for integration in the community for PwDs given their daily activities. Function in a wheelchair is influenced by wheelchair design. Design features must be matched to the user's functional ability and posture support needs, and also to the environmental and durability requirements. Achieving an ideal match between user, wheelchair design and environment might be as difficult as it is important (Di Marco, Russel & Masters 2003).

7.2.1 Personal Experiences Influencing Design Decisions

As designers, we often think of simple, beautiful, and easy to use features of a product, that makes the user's life easier. Nikkel Blaase, a user experience (UX) designer argues that as a matter of fact, features are merely a small, fragile part of the product. They are only a few of many thinkable solutions for a user's problem the product tries to solve. He mentions that a product has a core user experience, which is basically the reason the product exists. It fulfills a need or solves a problem people have.

By that, it becomes meaningful and provides a certain value. If the problem is non-existent, or the solution doesn't fit to the problem, the product becomes meaningless and people won't use the product; which in turn leads to the downfall of the product. Wrong solutions can be fixed, but non-existent problems aren't adjustable at all. So, how can we be sure to tackle a real problem? We can't be 100% sure, but we can minimize the risk a lot by observing and talking to people. Hence, uncovering the problem and building solutions customers really want. Not only can the existing problems be solved by observing and talking to people but can be informed by experiences, further reducing the risk of wrong solutions.

The design process has often started with inspiration and is purpose driven to solve a certain problem. Blaase highlights the Problem-fit solution that sees products become meaningful when the provided solution fits the uncovered problem. This solution describes the way a problem will be solved. Thus, the problem-solution-fit defines the core user experience of a product. The concrete features extend this experience and support the core experience, but they cannot replace it. Interaction Design and Visual Design can make a product beautiful, easy-to-use, and delightful or make it stand out in the competition, though it can't make the product meaningful. This is why a proper problem-solution-fit is so critical for the success of a product.

Janna Deeble, a fit and active industrial design student in the UK suffered an injury when a broken leg left him dependent on a wheelchair. In 2013 he was immobilized for several months and got a first-hand experience of using a poorly designed wheelchair in San Francisco. He explains that even in a city designed for wheelchair use with kerb cutouts and ramps and lifts it was infuriating I got stuck the whole time and my wheelchair was just useless. The designer explains that his own experience led him to think well, if I'm experiencing these problems here, how bad must it be for Letu?" Frustrating experiences as a user led to redesign of the traditional wheelchair to the SafariSeat, an off-road hand-powered wheelchair.

Janna had grown up in Kenya and as a child he had interacted with Letu, a Samburu tribesman disabled by Polio living an isolated, traditional lifestyle. People such as Letu, who live in poverty at the same time having a disability, are caught in a vicious cycle; which is almost impossible to break out of. After receiving a donated wheelchair from a charitable organization, Letu thought he was lucky, but his hope was short-lived, as the wheelchair was not designed for the rough terrain where he lived and hence was non-functional. When it broke down, he discovered it could not be easily or affordably repaired locally, so the donated chair quickly became redundant. This meant that he was not able to perform some of the daily activities due to his mobility challenges.

7.3 Wheelchairs for developing countries

7.3.1 SafariSeat

Janna Deeble grew up in Kenya and interacted with a Person with Disability living an isolated lifestyle in a Samburu village. Having experienced similar challenges himself for a period of time due to an accident, he was determined to make a difference for disabled people in developing countries. Information from the online outreach program explains that SafariSeat is a wheelchair designed for people in developing countries. What makes the product unique is the fact that it's made from local materials and bike parts which means that anyone will be able to fix it.

Secondly the wheelchair is incredibly good off-road. It has a mechanism which mimics car suspension meaning that all wheels remain on the ground for maximum stability. Deeble says the patent pending design improves the biomechanical efficiency of wheelchairs, using two levers for power and speed, and will help more than just its user. SafariSeat benefits people by giving them independence through mobility and this allows them to take care of their kids, to get jobs, to become active members of society. And really mobility is far more than movement. It is the key that unlocks access to a life beyond the confines of your own home.

Currently in East Africa hand-powered tricycles, which are preferred if the user has adequate torso stability, are more efficient to propel than a wheelchair, but are difficult to maneuver through sand and up steep hills and are much too large to use within the home. Other challenges include difficulties in maneuvering at corners and bends, fitting into standard doorways and speed, which is ultimately dependent on user propelling ability. These are some of the problems the design of the SafariSeat is seen to have addressed.

Another most important aspect is that its open-source which means that anyone in the world will be able to take the designs and build SafariSeats for their community. This will work in two ways; helping people with disabilities and creating jobs for local people Janna's design team plan is to make SafariSeat blueprints 'open source' to make the biggest impact and help as many people as possible. "Open Source means that the designs will be totally free and we're doing this because we want SafariSeat to help as many people as possible.

A Kickstarter campaign has raised more than 90,000 pounds (\$115,000) with 70 percent of that money going on development and manufacture of SafariSeats and the open source toolkit. "We're raising funds on Kickstarter to do two things. The first is to make as many SafariSeats as possible and the second is to translate the blueprints into an easy to understand manual that will use diagrams to transcend language barriers meaning that anyone will be able to build it, no matter where they live, no matter what language they speak," Deeble explains.

7.3.2 Leveraged Freedom Chair (LCF)

Similarly, a concept for a wheelchair suitable for use in developing countries had been developed by Massachusetts Institute of Technology (MIT) in 2009 .Leveraged Freedom Chair (LFC), a wheelchair-based mobility aid capable of navigating virtually any terrain,

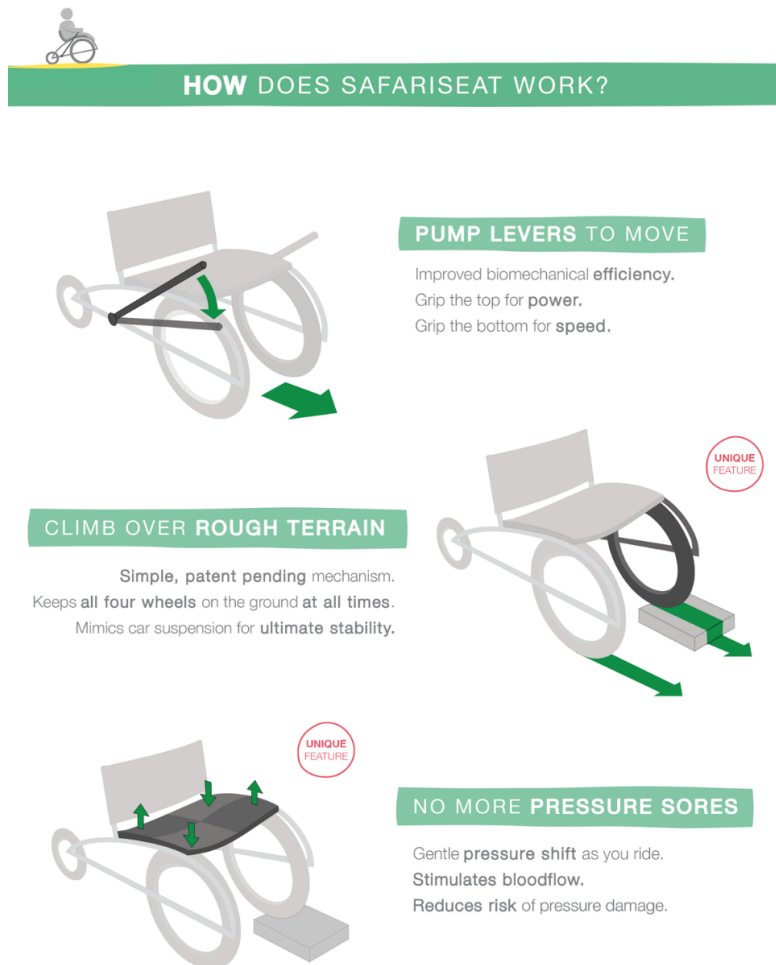


Figure 1. Features of the SafariSeat

from rural walking paths to within the home, by optimally utilizing upper body power for propulsion through a variable-speed lever drivetrain. Instead of using multiple gears to change speed, the user varies mechanical advantage by sliding his hands up and down the levers.

Changing user geometry instead of machine geometry enables the lever system to be made from a simple assembly of low-cost bicycle parts. This insures the LFC can be manufactured and repaired anywhere in the developing world. The motivation behind this project is to provide mobility to people with disabilities in developing countries no matter their location, travel requirements, or local environment.

The Leveraged Freedom Chair (LFC), shown in Figure 2a, is a wheelchair-based mobility aid that can be made anywhere in the world with off-the-shelf bicycle parts and cope with varied terrain ranging from steep hills to sandy roads to muddy walking paths. For indoor use, the LFC can operate as a regular push rim wheelchair by simply removing the levers.

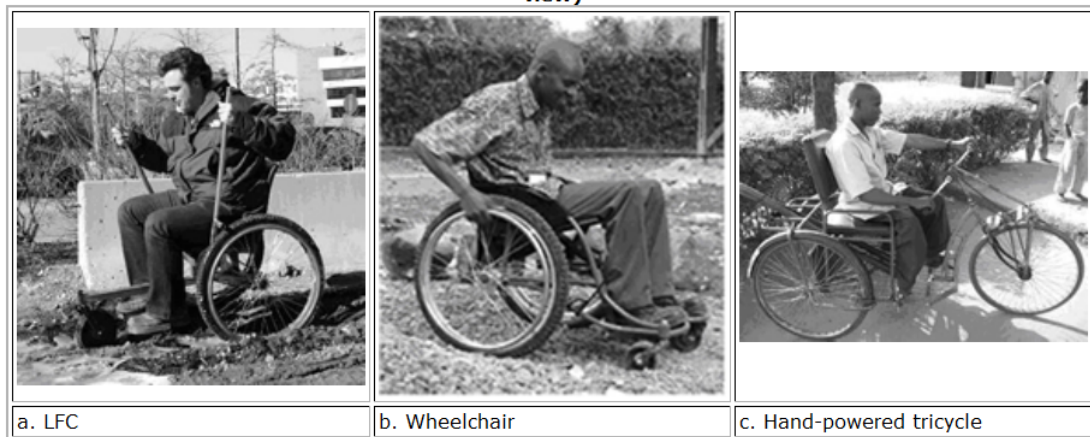


Figure 2. The LFC compared to mobility aids currently available in developing countries

A mobility aid that can meet these requirements is desperately needed, as 20 million people in the developing world require a wheelchair but only about five percent actually have one. Products that are currently available in developing countries cannot fulfill the wide usage needs of the disabled. In his 2010 conference proceedings, Winter discussed the conventional western-styled wheelchairs, as shown in Figure 2b, are inefficient to propel and are exhausting to use for long distances on rough roads.

It was noted that Hand-powered tricycles (Figure 2c), which are preferred if the user has adequate torso stability are more efficient to propel than a wheelchair and cost less due to the incorporation of standardized bicycle components. Unfortunately, tricycles are difficult to maneuver through sand and up steep hills, and are much too large to use within the home (Amos G. Winter, V, Mario A. et al. 2010).

The wheelchair was first tested at a course on the MIT grounds and later in 2010 in East Africa. What they learned is that although the LFC is more efficient than a regular wheelchair for plowing through mud and over big stones, it is still too wide and heavy. The chair required to be lighter in addition to reducing the width and weight. Winter alongside a team would focus on improving the LFC for indoor use so that it functions just as well as a normal wheelchair when the levers are removed.

He uses the desk chair/mountain bike analogy to describe how the LFC is intended to be used all day. Although someone might spend many hours each day sitting in a desk chair, it would be horrible to use that chair to commute to work, especially if the commute involved dirt roads. Similarly, while the mountain bike would be great for the commute, it would be awkward and uncomfortable to sit on all day at the office. What we have now is an LFC that is great off-road and is comfortable to sit on, but is still too big to comfortably use indoors.

7.4 Discussions and Conclusions

Whirlwind wheelchair designer and expert Matt McCambridge commends the simplicity of the LFC design, but says he has been most impressed with the intentionally slow, methodical implementation of the LFC. He praised Winter for conducting user testing early, rather than inventing something in the lab, then using donor money to make thousands of them and forcing them on disabled people who really have no option but to smile and say, thank you. This approach amicably reminiscence of having parachute designers- foreign designers who provide global solutions unsuitable for the local setting. However the process continues slowly and is dependent on funding for testing of prototypes in the local setting and in research towards developing the manufacturing equipment that will be used to build the chairs for large-scale production. This are challenges that have been overcome by the SafariSeat Team through a glocalized approach.

Arguably feedback can be obtained from designer/user experiences in the local setting where the designer embedded in context influencing the solutions. This is best seen in the case setting of the SafariSeat where the designer becomes the user. He further incorporates these experiences, the challenges faced firsthand with the knowledge of the local terrain where he has lived. The designer as a professional has acquired global thinking in terms of knowledge and training as a design student at a foreign university.

Janna who a member of the Kenyan based social enterprise design team Uji considers higher level inclusion such as geography and economics to be just as important as the inclusion of specific individuals needs. Co-founder Cara O'Sullivan emphasizes that There is great power in being able to understand how one another feels and to have true empathy for those with backgrounds different to our own. Our beliefs, our habits, our unique abilities; diversity is life's greatest asset, which makes inclusion one of our greatest design challenges, At the same time Janna who conceived the idea of the SafariSeat having grown up in rural Kenya alongside local people best understands from experience the reality of being a physically challenged person.

The SafariSeat design team emphasizes getting to know people as people, not just as users. They practice Open design which is empowering, inclusive and ethically sound and argue that it creates a better product by building on ideas and experience as explained by Janna. Uji carries the ethos that product design should ideally result in a flexible solution: something intended to be adapted to its context to suit different cultures and environments accordingly, similar to nature's own design process. This philosophy stems from the organization's conscious effort to avoid fuelling a dependency culture. Having understood not only the geography but the economic situation most users are in in Kenya, the innovation for this wheelchair includes the practicability of materials, manufacture and maintenance options.

The innovation is seen to have considered the use of local bicycle parts that are available for use in the manufacture, local workshops have been selected to manufacture, repair and provide maintenance for the wheelchairs and the design blueprints have made open source to be freely shared. These APDK workshops have invaluable expertise in local manufacturing techniques, locally available materials and supply chain management. The expertise from such organizations is essential for making products suitable for sustained long-term use.

Innovations such as these go to show further how a designer-user has used the global thinking, knowledge and technology. It is combined with experiences and embedment in context to create a product that provides practical, functional and affordable solutions for the local user. Not only do the PWDs benefit from accessing a suitable and affordable wheelchair, as well as giving the local workshops an opportunity to create revenue through the manufacture of the wheelchairs with no hindrances to technology or materials. This can be argued as designer-user method further influencing the dynamics of Globalisation. The designer-user method ensures that the user needs to be addressed are best understood due to three facts. First, the designer has experienced by been in the same situation of need. Secondly, being embedded in context is a further advantage in knowing and thirdly, adopting an open-source option of thinking that works for wellbeing of the users and their communities. This brings forth the discussion of a designer-user being a better placed designer in the local context as opposed to the parachute-designer.

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