

# **Local or Global? Approaches for New Product Development in Low Income Countries**

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Dr Timothy Whitehead is a Lecturer in Product Design with a research interest in developing tools and approaches to improve the design of products distributed in low income countries. Timothy has worked on a number of projects funded through the Global Challenges Research Fund which utilise design methods and new technology to improve the livelihood of those living on less than \$1 a day.

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Dr Mark Evans is a Reader in Industrial Design with research interests in design practice that support the development of tools/resources and explore its use during data collection. He has a background as a practitioner for clients that include British Airways, Unilever and Honda. A diverse range of funding sources has generated over 100 academic publications with appointments that include membership of the AHRC Peer Review College; visiting professor at Rhode Island School of Design; editorial board member for

two academic journals; and International Scholar at MIT. Recent outputs include the Design Practice Research Case Studies website for PhDs in which the researcher employed practice to support data collection (9500 views/downloads); the iD Cards design communication tool in collaboration with the IDSA (5000 fold-out cards distributed to members/13000 app downloads); a three month exhibition at the National Centre for Craft and Design for an EPSRC project to explore the commercial opportunities for 3D concrete printing (10159 visitors,98000 video views); and a design tool/video/website from an AHRC project in which industrial design was used to identify export product opportunities manufactured using indigenous materials/crafts in emerging economies. In 2016 he was the first international member to receive the IDSA Educator of the Year Award.

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# **Local or Global? Approaches for New Product Development in Low Income Countries**

To increase opportunity and quality of life for people living in poverty, governments and non-government organisations (NGOs) sell products to low income countries. These are typically products that have the capacity to make fundamental changes to quality of life such as; water filters and solar lighting. However, there has been limited research to support the new product development process for this distinctive category of products which has led to instances of sub-optimal solutions. This paper explores the nature of design and manufacture in these countries and the impact of local and global approaches has to product development. Empirical data was generated through interviews with 10 senior staff from NGOs; 10 product users, and observations of the NPD process in Myanmar. The findings identify that the development of products undertaken in developed countries could provide high quality solutions, but at the expense of user insight and local capacity building.

Keywords: designing for development; new product development; low income countries; industrial design.

## **Introduction**

The design and development of products with the capacity to make a fundamental contribution to the quality of life for people living in poverty has typically been advocated by engineering designers who seek to find practical solutions to meet the needs of users. These products typically include water filters, latrine pits and solar powered lighting. In the last few years industrial designers have become increasingly involved in this arena, bringing methods such as user centred design, participatory design and design for X into the design process (Castillo et al, 2012). This has been accompanied by the adoption of business models based on bottom of the pyramid economics (Prahalad, 2006) which advocate the selling products to users through micro-loans and grants. The combination of these factors has led to a change in the operating

environment for industrial designers and charities which has resulted in a need to more fully understand the requirements for New Product Development in Low Income Countries (LICs).

In this paper the process of New Product Development (NPD) for essential products is explored. This can be defined as the activity of developing physical products for a target market, which typically involves various stakeholders working together to create products which enhance human experience (Cagan and Vogel, 2002). These activities start with market perception and opportunity and end with the sale of a product (Oevermann 2008). In acknowledging a variety of approaches to NPD, this study has identified 'Global NPD' as a process in which the product is designed and manufactured outside of the country of distribution, whereas 'Local NPD' relates to this being undertaken inside of the country of distribution. Although, is it common practice in developed countries to rely on a global approach to NPD this study investigates the challenges and opportunities faced in low income countries, which have different approaches. To better understand the impact of these approaches, this study investigates the user perception of contrasting design types and uses this data to inform researchers, designers and the wider academic profession about the advantage and disadvantages of NPD location. This was achieved by answering the following research questions:

- (1) How are products designed and manufactured in/for low income countries?
- (2) Does the location of the NPD process have an effect on the industrial design?
- (3) What is the user perception of the products distributed?
- (4) What can industrial designers learn from this?

To fully contextualise the research, data collection was undertaken in Myanmar (formerly Burma). Myanmar is one of the least developed countries in Southeast Asia

and the worst performer in terms of economic and social progress. According to the World Bank, 32.1% of the population live in poverty, which equates to 15.8 million people. These poor households have few working age adults and a high number of dependents. Most of the poor are in the agriculture sector as casual labours or small hold farmers. (World Bank, 2017). In order to understand how products are designed manufactured and distributed, a design focused social enterprise in Myanmar was contacted. A social enterprise is a business that operates to tackle social problems or improve communities, making money from selling goods and services in the open market and reinvesting profit in the business or local community. The social enterprise had been operating in Myanmar since 2004 and distributes a range of household products that generate income for the rural poor, such as agriculture irrigation pumps, water storage and LED solar lights. They have built up a network of stakeholders to facilitate access to 80% of the population. When choosing the social enterprise, it was important they had a mix of locally designed products as well as globally designed and imported products.

### **Poverty, International Development and Industrial Design**

Poverty, can be defined as “the pronounced deprivation in wellbeing, comprising many dimensions, including the inability to acquire basic goods and necessities for survival with dignity” (World Bank, 2011). Typically, the poor suffer from hunger, deprivation and powerlessness (Hamner, Narayan, & Donaldson, 2013). Currently, the World Bank estimates there are 1.4bn people living in poverty. Although the root causes are complex, one of the main causes is that for the last 42 years per capita growth rate in developing nations has remained close to zero, while developed countries experienced good levels of growth with newly industrialized countries seeing

a high level of growth (Easterly, 2007). As a result, poor countries can be caught in a trap as they do not have the ability, or resources, to increase growth and invest in a more secure future by themselves (Sachs 2005). Consequently, many large aid projects have been devised to increase growth which would, in turn, increase the quality of life for a significant percentage of a population (Easterly, 2007). Since 1960s, \$2.3 trillion has been spent on foreign aid which has resulted in limited impact (Sachs, 2005). This has led to charities and other non-government organisations donating products with the potential to make a fundamental increase in quality of life, typically these products include; water filters, solar lights and cook stoves. These products are generally lower cost and less sophisticated than highly capital-intensive products and technologies commonly seen in the developed world, being referred to as employing ‘intermediate’ or ‘appropriate technology’ approach (Schumacher, 1973). Historically, a number of organizations were established to deliver these intermediate and appropriate technologies to LIEs, including Practical Action (formally ITDG) ([practicalaction.org](http://practicalaction.org)), the German Appropriate Technology Exchange ([eldis.org](http://eldis.org)) and United States Appropriate Technology International ([ncat.org](http://ncat.org)). In recent years many of these organisations have declined in size and struggled to maintain financial support. For example, the United States Congress reduced its funding to Appropriate Technology International (now Enterprise Works Worldwide/VITA) due to lack of positive results (Polak & Warwick, 2013). The reduction in funding has led to a shift in thinking and the development of approaches built on business principles and market forces as opposed to philanthropic donation.

Changes to these approaches has also coincided with the maturing of the profession of industrial design, which once focused on the form and manufacture of physical products. Now industrial design is often seen to employ its methods to shape

strategy and re-frame complex problems and business direction see for example the work of consultancies such as; IDEO and Frog Design which describe themselves as ‘design innovation providers’, utilising tools and methods such as Design Thinking. This shift in focus and renewed awareness of challenges faced in international development has led a number of design consultancies to focus on projects and business strategy for LIC, examples include; IDEO.org ([ideo.org](http://ideo.org)) and ThinkPlace in Kenya ([thinkplaceglobal.com](http://thinkplaceglobal.com)). These design consultancies not only focus on the physical product, but also wider issues that involves a cyclical process of user engagement and prototyping, to address a broad range of design challenges, including those related to services and system design. These approaches have been identified as having the capacity to make a contribution to the resolution of significant global challenges, such as poverty and sustainability (Kandachar 2012). However, despite these changes which encourage designers to work on socially beneficial projects to date, few methods and case studies have been created to support the physical design activity and facilitate product development, which can directly improve quality of life for those living in poverty. The key resources that are currently available include Design for Micro-Enterprise (DfME) (Austin-Breneman & Yang, 2013); Design for Extreme affordability (MIT, 2013); and Designing for the base of the pyramid (Diehl & Christiaans, 2007; Castillo, Diehl, & Brezet, 2012). Each of these approaches provides a useful starting point for generating design insights but does little to help designer to understand approaches to NPD and if a local or global approach is most suitable. Therefore the aim of this study, is to generate knowledge and understanding of the issues arising in low income countries when design is carried out both locally and globally. The specific objectives for the study were to:

- (1) Identify both locally and globally design physical products which are distributed to people living on low income in Myanmar.
- (2) Interview industrial designers (n=3) to better understand the new product development approach taken for global new product development
- (3) Interview industrial designers (n=10) to better understand the new product development approach taken for local new product development
- (4) Interview Myanmar families who own both local and globally designed products for 5 years and understand their perceptions
- (5) Identify the impact this knowledge has on future industrial designers.

## **Method**

The study adopted a flexible, qualitative approach and was conducted in three phases consisting interviews and observations with those involved in Local and Global NPD. These results were then compared with interviews and observations from families who owned both a locally and globally produced product, for five years.

The first phase was undertaken to identify the nature of local NPD and was achieved through interviews with the design team, manufacturing team and distribution team of the social enterprise. Ten interviews were conducted, with each lasting between 30 and 40 minutes. The nature of the organization meant that there was a mixture of nationalities and not all employees spoke English. As a result, a number of interviews were carried out with a translator and notes taken during the interview. Observations of the NPD process were conducted within the organization and recorded through note taking and photography. Particular attention was paid to the manufacturing and assembly of components and how the designers interacted during the NPD process. A

second set of interviews were conducted with global NPD teams which involved interviews with product designers and managers from NGOs in the USA. Three interviews were conducted which lasted between 40-50 minutes each. The nature of the location of Global NPD teams meant that these interviews were conducted in English via Skype. In both cases the interviews followed the same semi-structured approach.

The final part of the study involved interviews with ten local families, each of which owned both a global and local designed product sold by the social enterprise in Myanmar. Interviews were conducted at the family home with a similar semi-structured approach being adopted. Each interview lasted approximately one hour and included a tour of the household / farm and a demonstration of the product, which had typically been owned for five years. It was found that during this data collection translation played a significant factor. An independent translator was employed, as opposed to one from the social enterprise that arranged each of the meetings. The translation was conducted in situ and transcribed using detailed notes and photographs. The hospitable nature of the Burmese people meant that any form of social interaction in the home was typically followed by an invitation from the family to sit, drink tea and eat a selection of local food. It was evident that this hospitality was an important part of the data collection and helped to build a rapport with participants and put them at ease before beginning the formal interview (Hennink, 2007). The combination of these three data collection methods enabled triangulation of the results and allowed the researcher to compare the impact of Local and Global NPD on the creation of products, see Figure 1.

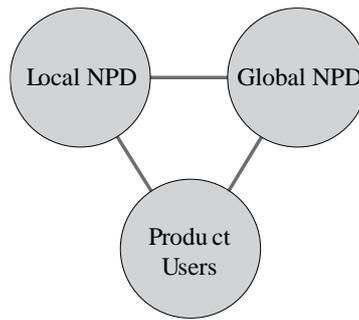


Figure 1. Approach to data collection

There were a number of challenges faced conducting this study, which are worth noting. Firstly, it was necessary that the participants did not perceive the researcher had links with the organisation that had arranged the interviews as this may have distorted the responses. Adopting an approach similar to that published in IDEOs Human Centred Design field manual (ref) provided useful in which the interviewer maintained eye contact with the participant and did not heavily focus on the translator (see figure 2). It was also observed that the translator enjoyed talking to the participants but sometimes failed to provide a comprehensive synopsis to the researcher. For example, during the beginning of the study, the translator would talk to the users for approximately five minutes and then provide a translation of “he said yes”. This was addressed after the first two instances to ensure that the data was accurately recorded.



Figure 2. Household interviews

Once the data had been collected, it was analyzed using thematic analysis with an open coding approach (Robson, 2011). This consists of identifying codes and grouping them together into themes which then form the basis for interpretation (Gibbs, 2008). The nature of the research meant that the codes were created entirely from the data through an exploratory process (Tesch, 1990).

## **Results**

The reporting of the results has been divided into three sections:

- (1) Local NPD – Design, Manufacture and Product Distribution
- (2) Global NPD - Design, Manufacture and Product Distribution
- (3) User perceptions of local and global designed products

### ***New Product Development Process***

A typical NPD process, consists of the following steps, (i) the design team generate a project brief formulated using a combination of market research and business planning. (ii) The team employ a user-centred design approach to problem solving, utilising design thinking methods and spending a large proportion of their time with users. (iii) Prototypes are designed, developed and tested with users to ensure they meet local needs. (vi) On completion of the design, the team prepare for local manufacture.

### ***Local Design and Manufacture***

Evidence from the interviews revealed that although supporting the local economy by designing and manufacturing locally was seen as positive, there were a number of design challenges that included limited access to skilled labour and the availability of high quality production equipment. In fact, it was noted that the design team often spent up to 50% of their time supporting manufacturers while attempting to

improve production quality. This was due to the fact that the local industrial zone consisted primarily of simple huts that accommodated injection moulders, press machine operators and welders (see Figure 3). Consequently, the level of quality and consistency of parts represents a continual challenge, with many of the manufacturers relying on manual processes, meaning that the quality of component could be dependent on which machine operator was working on a particular day.



Figure 3. Industrial Zone in Yangon

This lack of manufacturing skill was primarily due to insufficient levels of education and long-term investment in the country which is typical of LICs. The effect of this had a direct impact on the capabilities of a local NPD process as a considerable amount of time was spent educating the local workforce or trying to obtain and specify materials used in production. An example of this was given by one of the industrial designers who stated that when asking a manufacturer which plastic he had used in an injection moulded component, he responded “battery covers”. This meant that the designers were unable to know the properties of the plastic component and if it would be suitable for their design. Figure 4, show a typical injection moulded shop with product sorting.



Figure 4. Injection Moulder in the Industrial Zone, Yangon

This presented a number of challenges for the Social Enterprise which delayed the development and deployment of new products, and can be summed up in the following quote;

*“Manufacturing in Myanmar is very basic and limited. When we started we used to show our drawings to the manufacturers and they would not understand them. They had never seen an engineering drawing before and didn’t know how to follow / read it. I think it is a both a blessing and a curse manufacturing here.” (Interview with S3-01)*

Once the components have been produced, the products were assembled using local labour. Western educated engineers worked alongside local operatives to provide a level of on-going education to support the process of product assembly. Simple jigs, mounts and a quality control had been implemented to ensure that products were manufactured to the correct size and tolerance. The designers reported the introduction of basic quality control was also a novel concept and one which local people needed educating in, Figure 5 shows the production line and product assembly.



Figure 5. Assembly line, Yangon

Once assembled products were sold throughout Myanmar using a network of approximately 130 sales agents who distributed both locally and globally designed products.

### ***Global – Design and Manufacture***

To attain a comprehensive understanding in the differences in approaches of local and global design and manufacture the d-light was analysed.

The design of the light was undertaken in the USA which adopted a user-centred approach thereby enabling the design team to spend a significant amount of time conducting field research. This involved visiting users and entering into discussions to more fully understand the context and environment that the product was to be designed for. According to the founder, this was because current products were not suitable for the environment and they wanted to design a product which “truly met user needs”. As a result, a number of field visits were carried out to establish design requirements where it was discovered that product users did not typically receive high quality products.

Therefore, the aim of this product development process was to create a product that users would be proud to own. Once these user needs had been established and the product prototyped in the USA, the design team were split up with some working in India to establish a market and the rest working with Chinese manufacturers to create

products which were “great value for money, excellent quality and low cost”.

According to the company, these demanding requirements would have been hard to achieve if the design, development and manufacture was carried out in a LIC. The consequences of this approach enabled the design and manufacture of a product that was of high quality, reduced cost and ensured that production standards were maintained. The result was that the LED light was manufactured to be robust and sealed to prevent dust or other substances getting to the electronics. These products were imported to Myanmar and distributed by the sales team alongside the locally designed products. Each of the LED lights (see Figure 6) was sold with a two year warranty, meaning that if the product failed it could be returned to the sales agent.



Figure 6. Globally manufactured solar powered lantern – d-light

For both local and global products agents sold the products into local communities. These sellers were typically farmers who bought the product, found it to be beneficial and subsequently become a product resellers. The agents worked on commission within a dedicated sales area and approximately 70% of all products were sold on finance, with repayment plans ranging from five months to two years.

### *User perceptions of local and global products*

To assess the impact and user perception of these contrasting approaches to NPD for LICs, ten interviews were undertaken with families who owned both a Local (water pump, see figure 7.) and Global (solar LED light, see figure 6) product for between one and five years. These were undertaken to identify features which were considered as being desirable/necessary/essential in a product. The results were compared and contrasted with those the designers and design teams.



Figure 7. Locally manufactured water pump

Seven out of ten participants described how time saving, ease of use, reduced manual labour were the most important elements. For example, one interviewee stated that before using a water pump they had to carry an engine pump across the road and connect it up which was a time-consuming task and the pump was expensive to run. Another stated that with the water pump they could now have “water when I need it” and a third responded that having these products “enables us to have more time for other activities so we can make more money”. It was therefore evident that users found considerable benefit from owning these essential products, but when considering ease of use and time saving, it did not seem to matter if the design was locally or globally produced.

However, the main problem participants did identify was the quality of components used in the locally produced products which often broke easily or wore out prematurely (see Figure 8). One interviewee commented that the locally manufactured pump had “lots of problems”, stating that the washers were breaking and leaking; burrs were left on the inside of a piston cylinder after manufacture; and the pump became significantly less efficient over time. As a result of these defects, the product was not used and left abandoned underneath the house. However, when talking about the globally made LED light, participants did not report any problems, with many users stating it was a good and robust design that was well-made. In fact, during the interviews it was observed that users liked to wrap the product in paper during the day, stating that this prevented the plastic getting scratched and “spoiling the product”. Five of the interviewees also commented that they did not worry about the durability of the light as if there was a problem they knew they could take it back to the local sales agent. The two year warranty gave them peace of mind as the product was sealed to prevent it being opened/ broken and was not designed for repair without the use of specialist tools.



Figure 8. Abandoned agriculture water pump due to burrs on piston

***Advantages and disadvantages of local and global NPD***

The examples of local and global design and manufacture resulted in a number of challenges and opportunities for industrial designers. These have been summarised in

Table 1:

|                      | <b>Local NPD</b>   | <b>Global NPD</b>  |
|----------------------|--|--|
| <i>Advantages</i>    | <ul style="list-style-type: none"> <li>• Supports local economy</li> <li>• Provides training and development in skills for local designers/ manufacturers</li> <li>• Products designed and made using local resources so easily repaired /replaced</li> <li>• Potential greater understanding of market needs through multinational and multidisciplinary teams</li> </ul> | <ul style="list-style-type: none"> <li>• Faster development process where designers do not have to spend so much time teaching and instructing manufacturers</li> <li>• Higher levels of quality control and availability of materials</li> <li>• Typically lower costs per unit based on larger manufacturing volumes</li> <li>• Ability to incorporate advanced functionality such as electronics</li> </ul> |
| <i>Disadvantages</i> | <ul style="list-style-type: none"> <li>• Limited skill level of local population means product development takes longer</li> <li>• Limited availability of parts and materials</li> <li>• Increased time to market as products typically designed for batch production</li> <li>• Quality control can be an issue.</li> </ul>  | <ul style="list-style-type: none"> <li>• Less direct access to market and understanding of user needs</li> <li>• Access and availability of spare/replacement parts can be problematic</li> <li>• Shipping and import tax implications</li> </ul>  |

Table 1. NPD approach – Advantages and Disadvantages

**Discussion**

This study highlighted the importance users placed on attributes to products. It was evident that users want to have well-made products with a contemporary appearance that were easy to use and affordable. There is also a demand for them to be fit for purpose and make a contribution to the social standing of the owner. These can be

considered as being broadly similar to those for users in developed countries and highlight that a similar NPD process needs to be employed.

The social enterprise and LED light manufacturer both believed in adopting a user-centred design process which ensured that products met the needs of customers. This appears to be particularly important when designing for an unfamiliar user group. However, the issue of global or local design and manufacture had implications for product output, the NGO, the design team and the product users. For example, if the NPD process was carried out within the country of distribution, the NGO could better support the local economy, increase skills within the local population and help them to become more sustainable, thereby moving away from an NGO donation model. However, this is a time consuming process, creating a longer development process and often resulting in less durable/reliable product outcomes due to the lack of manufacturing skills and equipment. Access to materials also means that designers are unable to perform all of the required quality checks or identify the durability of a product. The result of this was evident where users neglected the product and did not use it on a regular basis. Evidence of this was witnessed with the agricultural pump where a low quality manufacturing processes had resulted in it not being used and left to rust under the house. It is therefore important that products designed and manufactured are of an appropriate quality to promote increased uptake and use.

Global NPD is characterised by a time-efficient development process as designers are not generally required to spend time explaining to manufacturers how to build the product. This can result in higher quality outputs that can incorporate advanced features such as electronics and solar power technology. However, the appeal

of these products can be reduced by a lack of cultural understanding and limited availability of spare and replacement parts. The warranty scheme identified in this study appears to be an effective solution to this problem but is still dependent on the availability of sales agents and a mechanism for the return of products.

The study has highlighted that there is a significant opportunity for industrial designers to play a key role in assisting NGOs and manufacturers to create desirable, high quality, long-lasting products which support local communities in LIEs. Understating the implications and differences of local and global manufacturing means that industrial designers are more fully equipped to create “products and systems that optimize function, value and appearance for the mutual benefit of both user and manufacturer” (IDSA, 2011).

## **Conclusions**

Poverty and development are complex issues, with a significant number of initiatives failing to have the planned impact. The rise of design thinking, UCD and BoP economics has led to the support of industrial designers to create products for these environments. However, despite these approaches, product solutions continue to fail to have lasting impact. Methods to support designers are limited and there is a general lack of understanding of the NPD process for designing and developing products for LIEs. To overcome this and contribute new knowledge to the field of industrial design, this study identified that the design and development of products undertaken in developed countries could provide high quality robust product solutions although this could be at the expense of user insight and did not always provide a long lasting and effective solution.

Supporting local design and manufacture is the ultimate aim of many NGO initiatives and product designers. Evidence to date suggests that, in some situations, this has resulted in poor quality products which fail prematurely and are neglected by users. There is now an opportunity for industrial designers to play a leading role in this area by combining their skills in user centred design, manufacturing and design thinking to create product solutions which support the local economy while meeting the desires and needs of users.

### **Further Research**

Further study is required to identify new methods and tools which could be created to allow designers to better support new product development at a local and global level.

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