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Using practice-led industrial/product design research to explore opportunities to support manufacturing-related enterprise in Overseas Development Assistance (ODA) countries

Mark Evans, Loughborough University, Loughborough, United Kingdom,
M.A.Evans@lboro.ac.uk

Timothy Whitehead, Aston University, Birmingham, United Kingdom,
T.Whitehead@aston.ac.uk

Abstract

The profession of industrial/product design has the capacity to support wealth generation through a product-driven supply chain that extends across services that include manufacturing, distribution, sales and maintenance. Moving away from the more typical manufacturing approaches of developed countries, where the resources available to support designers employ advanced technologies and materials, this paper discusses an on-going UK Arts and Humanities Research Council-funded project to explore ways in which industrial/product design can provide opportunities for entrepreneurship and employment in countries on the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) List and receive Overseas Development Assistance (ODA). Through practice-led research with participants from Uganda, Kenya, Indonesia and Turkey; industrial/product design educators/researchers/practitioners shared knowledge and expertise and engaged in creative activity to translate propositions into proposals with the potential for manufacture in each of the four countries. The findings, articulated product visualisations, indicate significant potential to support manufacturing in countries in a variety of levels of economic development by adding value to the packaging of traditional foods; integrating low-cost imported components to add value to indigenous crafts and materials; producing contemporary furniture designs using materials that can be considered as traditional materials; and employing unorthodox and unexpected materials.

Keywords: industrial design, product design, developing countries, practice-led, design practice

Product design-based approaches have the potential to facilitate physical change to quality of life and deliver tangible results (iDE, 2010; UNICEF Innovation, 2016; UNHRC Innovation, 2016; Proximity Design, 2013). Creative product/industrial design has the capacity to identify user-centred problems and commercial opportunities, addressing them through a process that adds value by transforming physical materials into useful artefacts (IDSA, 2015). The range of possible transformations are broad, ranging from the craft-based manipulation of a natural material, such as the bamboo bicycle project initiated by the United Nations (2014), to metal-working and more industrial processes such as wood machining and injection moulding as evidenced in Myanmar (Whitehead, 2015). Regardless of material and process, the intellectual processes of developing a level of understanding of the problem/issue/opportunity, engaging with stakeholders (users/producers) and devising solutions using the most effective modelling processes (e.g. sketching, mock-ups, prototypes (Evans, 2014) has generic application in developed countries. Whatever and wherever the context, the opportunity for the designed outcomes to enter a scaled-up production process that is aligned with a supply chain network has the capacity to provide employment through material supply, material processing, assembly and distribution (Proximity Design, 2014). While some design-based enterprises may provide employment for a sole trader under a designer-maker model, the opportunities for scaling-up to provide employment for specific and specialist activities opens up the potential to make a significant impact on wealth generation (Polak, 2008).

Governments and Non-Government organisation (NGOs) continue to donate resources to developing countries, but evidence suggests that often these solutions are inadequate to meet the unique needs of local communities (Whitehead, 2015). The current approach typically involves designing and manufacturing products in developed countries which are then distributed locally. This can be described as a top down approach to development which, in some cases, can hinder economic progress in the recipient country and weaken local design activity (Donaldson, 2008). However, a bottom-up approach focuses on creating the capacity to facilitate self-sufficient 'home-grown' innovation to address local/regional need and potential for export, with the key outcome being opportunities for employment which can ultimately impact on the alleviation of poverty.

This paper reports on the intermediate findings from a research project to explore how industrial design can support manufacturing-related enterprise in Overseas Development Assistance (ODA) that are on the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC) List for 2016. This involved the sharing of existing context specific case studies from Uganda, Kenya, Indonesia and Turkey with the generation of project-based case studies that adopted a co-design approach (Sanders, 2002) to identify strengths, weaknesses, opportunities and threats (van Boeijen et al, 2013).

Co-design and the application of User Centred Design (UCD) have been advocated by design consultancies such as IDEO (2011) and adopted as an approach to problem solving by the United Nations High Commissioner for Refugees (UNHRC, 2016). Initial evidence from existing case studies suggest that embedding a UCD design process into the design of products for marginalised people will enhance existing offerings (Hussain et al., 2012).

The aim of the research project, which goes beyond the intermediate findings reported in this paper, is to use resources created through the project to build on existing provision and provide guidance for future creative industrial/product design activity that will facilitate enterprise through the development of a creative economy and ensuing employment/wealth generation.

Methodology

The paper reports on research undertaken to address the following objectives relating to the four levels of ODA recipient country which were to:

- Facilitate designer familiarisation with the distinctive cultural contexts
- Identify opportunities for the manufacture of products
- Undertake the industrial/product design of one product opportunity per country
- Establish parameters with which to guide future product development

In parallel with focus group activity, the research employed case studies (Yin, 2013) action research (Birley and Moreland, 1998) to develop understanding in the challenges and opportunities associated with industrial/product design-driven manufacturing in DAC List countries. The four levels of DAC List country were Uganda (Least Developed Country); Kenya (Other Low Income Country); Indonesia (Lower Middle Income Countries and Territories); Turkey (Upper Middle Income Countries and Territories). To ensure breadth of expertise and contextual challenge, academics from leading design schools/departments in each of the four countries were recruited as participants in the data collection.

Countries on the DAC List have been identified as requiring external support for “the promotion of economic development and welfare” (OECD, 2017). Product design contributes to a creative economy. Making/manufacturing industry adds value through the transformation of materials which takes place on a range of scales - from the individual designer-maker to multi-employee high volume manufacturing. In addition to general opportunities for wealth generation through making/manufacturing, specific issues relevant to the development challenges of the four participant countries, and others on the DAC List with similar profiles, have been identified as a lack of support for the development of creative industries in Turkey (Okandan, 2014); an over-dependence on unchanged traditional cultural industries that are tied to tourism in Indonesia (Hampton and Clifton, 2017); and an attitude of “replication over innovation” in Kenya and Uganda (Ekekwe, 2012). By developing, collating and disseminating approaches to creative industrial/product design that resolve these issues and are targeted to the distinctive needs of DAC List countries, entrepreneurial activity can contribute to the generate employment in creative industries and the associated supply chain. The contribution of global academics to this process has been identified by the British Council: “Wherever there is a strong and sustainable hub of creative economic activity, there is likely to be a university that has helped to plant the seed and that continues to nurture local creative businesses and the specialised local labour markets on which they may depend” (Newbiggin, 2010).

Method

A five-day collaborative workshop was held at Loughborough Design School in the UK supported by senior design academics from design departments/schools in Uganda, Kenya, Indonesia and Turkey. The activities of Day 1 were also supported by a presentation and feedback by a senior representative from a major UK-based charity that supports technological development in low income economies. Four capable final year undergraduate industrial design students provided additional design support, all of whom had completed one year internships in leading manufacturing and consulting organisations in the UK, Denmark and Holland.

The event and activities were facilitated by the co-authors who were the Principal and Co-investigators for the project that was funded by the UK Arts and Humanities Research Council. As part of the preparatory work for the workshop, the four international participants prepared a presentation to summarise the distinctive context of their country plus two case studies, each of which demonstrated successful examples in the commercialisation of industrial/product design. They also prepared a design brief for presentation to the participants that would be addressed during the workshop.

The activities were conducted as follows:

- Day 1 Contextualisation – Focus group overview of product development in Uganda, Kenya, Indonesia, Turkey with two product design case studies per country
- Day 2 Practice-led projects – Kenya & Turkey
- Day 3 Practice-led projects – Indonesia & Uganda
- Day 4 Practice-led design development – All projects
- Day 5 Focus group – comparative evaluation of process/outcomes and SWOT analysis

The Co-investigator undertook the role of note-taker for the discussions, with these being used for later analysis. The Principal Investigator facilitated the contextualisation and SWOT analysis in a focus group format using a data projector to display the case studies/design outcomes and white board to collate consensus findings. For all country-based sub-briefs, sketch-driven brainstorming was employed to generate concepts using typical sketching resources that included fine-line pens, markers and a variety of types of paper for sketching.

Whilst the 'Post-it' represents a somewhat small format for sketching, its capacity to be used in relatively large numbers over a wall to present and capture design intent was exploited as all participants were industrial/product designers and had the ability to sketch 3D form. Whilst some participants commenced sketch activity on the more typical A3 and A2 marker pads, these were then transferred to Post-its for design review in which those with greatest potential for further development were identified and discussed in greater detail.

Findings

During the contextualisation and case study focus group, there was consensus that a significant opportunity existed to export goods to more developed economies where cultural heritage artefacts were valued and premium prices could be achieved. A need and opportunity to move

away from an overly traditional aesthetic to one in which cultural heritage was blended with a contemporary stylistic approach was identified, with this becoming the aim of the practice-led design activity. To identify the capacity of this approach to support economic development and provide employment opportunities in ODA recipient countries, practice-led research was undertaken using a design brief to “identify export opportunities that utilise craft heritage and/or indigenous resources as an integral part of a contemporary industrial design aesthetic”.

This brief was addressed for each country using the industrial design expertise of all participants plus the specialist knowledge of the academic from the country for which the design activity was being undertaken. The student designers also supported this activity. A display of the Post-it-based concept generation for all countries can be seen in Figure 1.

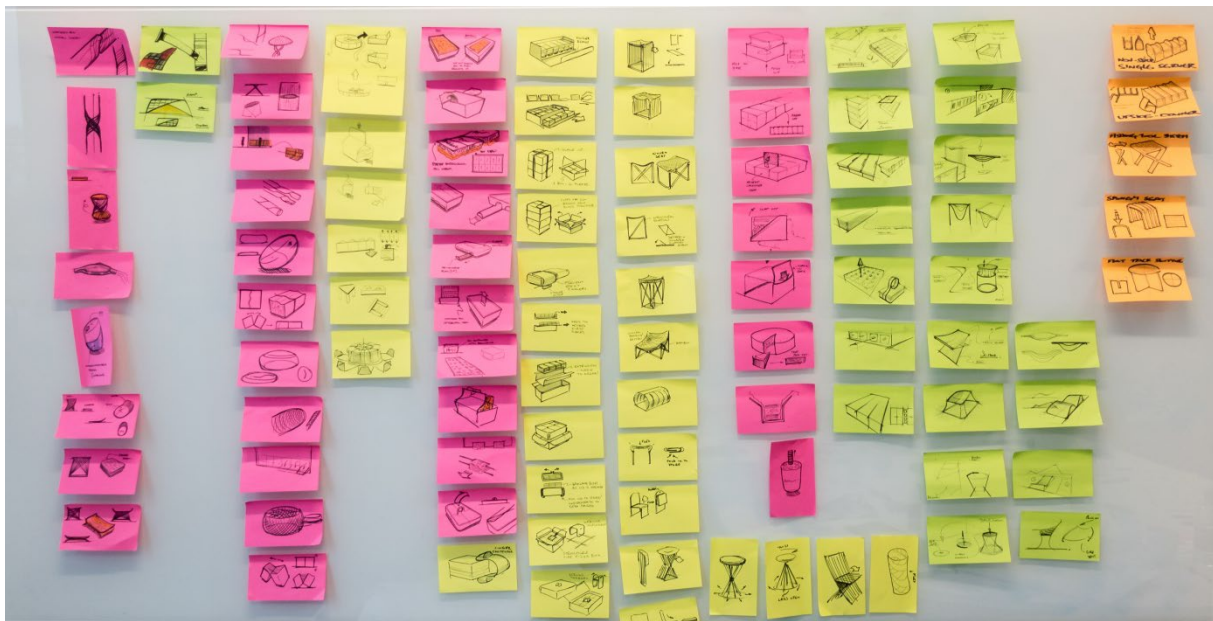


Figure 1. Display of sketch-driven brainstorming for all countries using Post-its

Kenya

The strong craft tradition in Kenya was recognised and wide range of indigenous materials as resources for the industrial/product design proposals identified. A significant leather industry included materials that were not typically seen in developed countries, such as Nile perch, ostrich, camel and goat. Craft capability in the weaving of dried water hyacinth had the potential for 3D structures with Masai textiles having a distinctive cultural association a strong/contemporary aesthetic were regarded as a significant opportunity.

Based on the findings from the contextualisation and case studies, the sub-brief identified for Kenya was summarised as “Cultural heritage translated into desirable products for export”. As a result of brainstorming, the following operational bullet points were identified:

- Craft-based production processes
- Contemporary aesthetic
- Potential for raffia, water hyacinth, dried sea grass, baobab wood, jacaranda, fish leather, ostrich leather, Masai textiles, crocodile leather
- Distinctive branding device

As a way of maximising the availability of distinctive leathers and associated craft capabilities, including Masai textiles, the sub-brief selected for Kenya was to explore product design opportunities that integrated these materials in to watch straps. This approach would buy-in contemporary watch bodies for which the faces included a branding device that had an association with Kenya. It was felt that this was an effective way in which to maximise the added value of the leather and textile elements. A developed proposal for the Kenyan sub-brief can be seen in Figure 2.



Figure 2. Example of craft produced watch straps proposals for the Kenya sub-brief

Turkey

As a country in the Upper Middle Income Countries and Territories category of the DAC List, Turkey has the capacity to design and manufacture products that are comparable with major international brands. This status was clearly made in the two case studies, both of which were for consumer products. Industrial/product design education was recognised as having a broadly modernist tradition due to influences from the USA and Germany. In striving for modernity, it was felt that craft traditions were in decline but the distinctive nature of the nation's food and drink remained.

Based on findings from the contextualisation and case studies, the sub-brief identified for Turkey was summarised as “Protect, present and serve baklava”. As a result of brainstorming, the following operational bullet points were identified:

- Eat baklava appropriately/effectively
- Packaging system to facilitate group or individual eating experience
- Provide support to prevent breakage
- Baklava to remain crispy
- Distinctive branding device
- Minimal hand contact with baklava
- Maintain structural integrity

Distinctive cultural traditions about the way in which baklava should be served and eaten came out of the contextualisation and provided useful opportunities for innovation. These included rotating the baklava slice by 90 degrees to make it easier to bite into and rotating by 180 degrees to reduce the risk of syrup dripping out. One of the three developed proposal for the Turkey sub-brief can be seen in Figure 3.

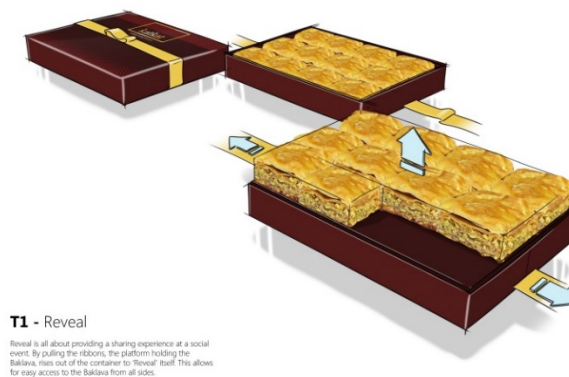


Figure 3. Example of Baklava export packaging for the Turkey sub-brief

Indonesia

Indonesia has a strong craft tradition in the use of bamboo and other natural materials and an opportunity was identified to utilise these materials in the design of furniture. Based on findings from the contextualisation and case studies, the sub-brief identified for Indonesia was summarised as “Use indigenous plant materials in the design of furniture-based products”. As a result of brainstorming, the following operational bullet points were identified:

- Contemporary aesthetic
- Bamboo as primary material
- Rattan, water hyacinth, banana leaf, pandanus leaf as secondary materials

- Elevate status of material

Concept generation resulted in a range of proposals that included fold-out seating, a hammock chair and fold-out chair with rattan seat. One of the three developed proposal for the Turkey sub-brief can be seen in Figure 4.

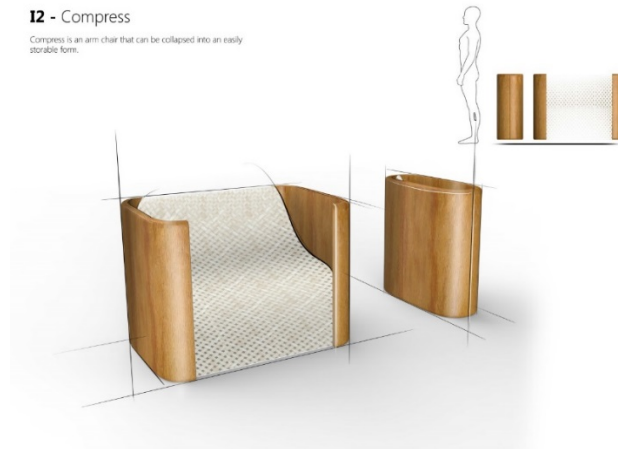


Figure 4. Example of bamboo and rattan for the Indonesia sub-brief

Uganda

As a Least Developed Country from the DAC List, Uganda started to develop capability in craft and design from the 1960s. However, materials suitable for the manufacture of designed products were limited, with access to basic metal fabrication and a variety of natural resources that can be used for industrial/product design such as gourd strengthened with egg shells, bark cloth and Jacaranda wood (a softwood with the visual quality of a hardwood). As with the Kenya design brief, the potential to integrate available material resources with imported components was identified as a means by which value could be added and a low voltage/heat LED light source identified as a product opportunity. Based on the findings from the contextualisation and case studies, the sub-brief identified for Uganda was summarised as “Lighting design options from indigenous craft resources and metal fabrication”. As a result of brainstorming, the following operational bullet points were identified:

- Capability in local metal fabrication
- Use of bark cloth, gourd, Jacaranda, fabric or leather
- Imported LED light/fitting
- Contemporary aesthetic
- Potential for floor, ceiling, table light

Concept generation resulted in a range of proposals that included a ceiling lamp with matching floor lamp; a modular uplighter/down-lighter/task lamp system; and opportunities to use a gourd

as a unique lampshade through a range of lighting options. One of the three developed proposal for the Uganda sub-brief can be seen in Figure 5.



Figure 5. Example of lighting options using a gourd for the Uganda sub-brief

SWOT analysis

Having undertaken a phase of development to translate propositions into more viable proposals, the full range of visualisations were presented and discussed in the focus group. The session was facilitated by the Principal Investigator, with design proposals for each country being introduced in turn followed by more holistic discussions that included comparative interpretation and summative remarks. When translated onto a SWOT matrix in real time during the focus group, to facilitate manufacturing opportunities in ODA countries with potential for export the key strength to be identified as the availability of local and sometimes unique/esoteric manufacturing processes that included the adaption of craft techniques. Key weaknesses were identified as difficulties in internal travel (remote areas); limited 'conventional' manufacturing capability; need to audit suppliers for quality control; and the lack of distinctive indigenous materials/crafts in some regions. Key opportunities were the potential to use new and unfamiliar materials; a strong and growing craft tradition in some regions; the potential to expose new and unfamiliar materials to designers; the use of craft materials and processes for packaging; reinforcing the links to the maker for products with a high craft component; and promotion of the value of design by government initiatives. The key threats were import duties on machinery and components; the uncertainty of being able to maintain manufacturing quality; communications in remote locations (telephone/internet); difficulties in communicating immersive understanding of culturally embedded activities (e.g. cooking with banana leaf); significant cultural differences

within a single country (e.g. Indonesia with over 250 ethnic groups); political uncertainty; and a decline in some craft practices.

Discussion

Industrial/product designers have a distinctive creative capability to translate product propositions into desirable manufactured artefacts. The research demonstrated how exposure to cross-cultural collaboration could provide novel and unexpected opportunities for product propositions. When employed at a relatively high level, industrial/product design can create compelling and desirable product opportunities from a diverse range of materials and contexts that, in the context of this research project, can be summarised as:

- Adding value to the sale of a traditional food (Turkish baklava)
- Integration of low-cost imported components to add value to indigenous crafts and materials (Kenyan watches, Ugandan lighting)
- Producing contemporary furniture designs using materials that can be considered as traditional material (Indonesian bamboo/rattan)
- Employing unorthodox and unexpected materials (gourd, bark cloth, Nile Perch leather)

A wide range of research methods are available to academic researchers in the social sciences and humanities but, when exploring issues relating to the creative arts, a practice-led approach has the capacity to translate what might appear as abstract concepts into tangible outcomes that can then be used as a basis for research findings. The contribution of this approach to support entrepreneurship and wealth generation in ODA countries is not a trivial undertaking and, if executed as a complete product development cycle, from proposition to product launch, has the potential to provide employment opportunities and improve quality of life for some of the poorest members of society. This project has demonstrated the first iteration in this process and further work is currently underway to further develop the design proposals and progress these towards manufacture.

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Author Biography

Mark Evans

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.

Timothy Whitehead

Dr Timothy Whitehead is a Lecturer in Product Design in the School of Engineering and Applied Science at Aston University. Timothy is a member of the Sustainable Environment Research Group and has an interest in developing tools and methods for New Product Development in Low Income Economies. Timothy has a bachelors qualification in Industrial Design and prior to joining the university was employed as an industrial designer in a leading engineering consultancy and worked for the Centre for Vision in the Developing World. Timothy is particularly interested in ways design can increase value and uptake of essential products, such as; solar lighting, cook stoves and water filtration. To date he has worked on various

design/engineering projects which aim to develop new design tools and methods of practice for enhanced product development. Timothy is also interested in exploring the potential impact of a digital design process and ways in which additive manufacture can be utilised in these markets as a way to bridge the technological divide (www.bridgingthedivide.org).