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To Craft, By Design, For Sustainability: Deconstructing craft as an input into constructing sustainability design

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Abstract

Production to consumption systems are shifting to developing countries as they are emerging markets, cheap labour and huge renewable resource bases. There have been several design initiatives aiming to leverage this labour and resource base to tap sustainability aligned markets, as these materials are inherently renewable. Unfortunately, most of these attempts take a technology-intensive industrialized route. This destroys traditional economies and skill sets, instead of mindfully recontextualizing them and realigning them with contemporary sustainability oriented markets thus contributing to the sustainability of these value chains and global sustainability in general. This paper presents design science research, which explores how craft can be deconstructed into sustainability design parameters —including social, economic, ecological and cultural tenets. Craft and the non-industrial production to consumption systems that comprise it—including localized natural resource management, participatory design, socio-economic systems, material culture, and indigenous bioregional knowledge-based livelihood strategies—offer valuable inputs into design for sustainability praxis. However, both craft and sustainability are unfamiliar domains for the industrial designer. Therefore, this paper proposes the Rhizome Approach and the mechanisms to actualize it, towards facilitating craft-design collaborations for sustainability. This includes the Holistic Sustainability Checklist, which seeks to deconstruct craft into sustainable design parameters, familiar to industrial designers. The applications of this approach will be discussed, including the refinement and use of this framework by the author for UNIDO in Vietnam in order to brand and market Vietnamese craft SMEs with the aim of aligning them to sustainability oriented markets.

Keywords

craft - sustainability - sustainable design - indigenous knowledge - industrialization

Problem context

THE IMPORTANCE OF RENEWABLE MATERIALS

The environmental damage caused by over-extraction of materials for human production-to-consumption systems has led to serious concerns about the earth's carrying capacity, and brought to light the importance of renewable materials (Thorpe 2007). 70 per cent of the materials we use post-industrialization—such as coal, natural gas and oil—come from the lithosphere (ibid.). These materials take millions of years to form and are therefore considered 'non-renewable', as opposed to bio-sphere resources, which take a comparatively shorter time to regenerate, and are therefore 'renewable' (ibid.). Therefore, one of the key sustainability design thumb-rules is to use renewable input materials from the natural biosphere—such as wood, cotton, linen, hemp and bamboo (Crul and Diehl 2006).

Renewable resources from the bio-sphere—such as grasses and other natural fibres, vegetables and fruits such as coconuts and squashes and animal-based materials such as leather and sea shells (Rissati 2005)—have been input materials for craft-based production-to-consumption systems around the world, due their easy availability in the natural environment. Craftspeople spanning several categories—including 'the skilled master craftsman, the wage worker, the fully self-employed artisan, the village artisan producing wares for local use, the part-time artisan whose craft activities supplement his meagre earnings from the land, and the landless artisan'(Jaitley 2001: 14)—have historically been and still are, employed in crafting these materials into produce for the use of their own communities or for trade and export (ibid.).

THE DECLINE OF CRAFT POST-INDUSTRIALIZATION

Post-industrialization, craft-based production-to-consumption systems—and the craftspeople who are an integral part of them—have been jeopardized by the influx of nationally and internationally produced industrial products, which have captured their market segment. These products have entered their traditionally closed economies (ibid.) as a spin-off of the Industrial and Information Revolutions, each of which has impacted access and reorganized economic activity (Humbert 2007) across the world. The physical and virtual connectivity of the Information Revolution has exposed developing country consumers—including rural buyers—to globalized lifestyles, which they now aspire for.

This preference for technology over tradition (Chaudhary 2010) and mass-produced substitutes to craft products has disrupted traditional localized production-to-consumption systems, resulting in a loss of livelihoods for traditional producers in developing countries—thereby contributing to poverty and unemployment.

The unsustainability of livelihoods for craftspeople, given their lack of economic or productive skills, assets and options apart from craft, has led many indigenous craftspeople to migrate to urban areas in search of wage labour (Reubens 2010). This causes unsustainability at several levels. Several crafts have vanished or are declining and the pressure of the mass-migration and unprecedented urbanization (Craft Revival Trust 2006) makes it difficult to even imagine the possibility of sustainable development for all.

THE GAP BETWEEN SUSTAINABILITY-ALIGNED MARKETS AND CRAFTSPEOPLE

Globalization, the Information Revolution, and unprecedented development—the same constituents which contributed to the unsustainability of craft-based livelihoods—offer new market opportunities for products crafted by communities (Ihatsu 2002) in the growing demand for 'sustainable' products (Potts et al. 2010). These markets are expanding faster than markets for conventional products, and are increasingly embracing initiatives that factor in a wider spectrum of sustainability criteria—including ecological, social and economic considerations (ibid.).

However, despite being ideally positioned to do so, economically-poor craft-producers are unable to access and navigate these markets for sustainable products, which developed and organized regions have privileged access to (ibid.). This is because these markets and their mechanisms are unfamiliar to craftspeople, because, unlike the traditional craft production-to-consumption systems, there is no direct link between the producer and the buyer in globalized production-to-consumption systems. This link was severed during the process of industrialization, when, industrial concepts such as standardization and economy of scale heralded the need to divide the integrated craft-based production-to-consumption process into segregated, specialized disciplines (Dormer 1997)—including design, production and marketing— in order to increase the productivity of each process, in line with the new concept of division of labour (Cusumano 1992).

In contemporary globalized value chains, craftspeople are able to function as producers, but there are several gaps which need to be filled with supplemental players: value chain actors—who directly produce, process, trade and own the products; value chain supporters—who don't deal directly with the product but whose services add value to the product; and value chain influencers—who create and moderate the regulatory framework, policies, infrastructure etc. at a local, national and international level (Roduner 2007). Value chain actors, supporters and influencers who can identify and elucidate potential markets can help bridge the gap between craftspeople and sustainability aligned markets.

Bridging the craft-sustainability market gap through design

The scenarios outlined above—the unsustainability of traditional craft production-to-consumption systems in the developing world, and simultaneous demand for recontextualized craft production-to-consumption systems globally—encompass both the agendas and opportunities for sustainability and sustainable development (Chatterjee 2014). These include social and environmental degradation, inclusive development, gender issues, globalization, localized livelihoods, urbanization and distress migration (ibid.). The UN's recent development agenda echoes these in its call for sustainable development with the inclusive economic growth, decent employment, social justice and protection and environmental stewardship, towards addressing global challenges with local solutions (Moon 2014). Craft has the potential to do all of this (Chaterjee 2014) vis-à-vis the each of the four tenets of sustainability—ecological, economical, social and cultural.

The Information Revolution creates both a push and pull for craft to leverage emerging sustainability-aligned market opportunities. However, craftspeople are unable to access these lucrative markets for sustainable products (Potts et al. 2010), because of the information gap. 'While the "Know-How" (How-to-make-things-knowledge and skills) exists abundantly in the crafts sector, there is a severe shortfall in the "Know-what" (what-to-make-strategies and designs) that curtails the ability of crafts communities to survive intense competition or, better still, develop value-added solutions in a complex economic and social matrix in which they exist.'(Panchal and Rangan 1993)

A synergistic collaboration between craft and design—which centres on innovation, responding to contemporary needs, and sustainability issues—seems to offer a way forward (Greenlees 2013). Successful examples of craft-design synergies include the Italian model, where sophisticated design and fine craftsmanship have been used synchronously as a mode of economic and cultural development (Secondo 2002). In similar vein, several countries—including Japan, Taiwan, South Korea, Switzerland, Germany, Scandinavia and Italy—attribute their success in design and manufacturing to their craft legacy (Chatterjee 2014).

Designers, who have traditionally functioned as the bridge between production and marketing, are ideally positioned to do this. The design skill-set equips designers with the skills and tools to envisage distant scenarios and innovate accordingly—a skill which craft producer communities lack. Design is also able to internalize industrial concepts like batch production, productivity, quality checks etc. needed to maintain these markets. For these reasons and more, designers can be instrumental in enabling craftspeople to leverage sustainability-aligned markets, and thereby sustain their livelihoods.

SUSTAINABLE DESIGN'S ECO-CENTRIC FOCUS

Emerging design initiatives and approaches already look at leveraging sustainability aligned markets, including in developing country contexts. Several of these initiatives have an ecological focus, and look at recontextualizing renewable materials—including those traditionally used in non-industrial craft production-to-consumption systems such as cork and bamboo—through industrial techniques and technologies, to create innovative products and systems for sustainability-aligned markets. While the resultant designs contribute to ecological sustainability, they miss contributing to complex and interlinked social, cultural and economic unsustainabilities—such as poverty and unemployment—in the developing countries where these products are produced. They therefore bypass the need and opportunity for design to be a vehicle to address social, cultural and economic dimensions of sustainability alongside its ecological aspect. In order to address the many layers of sustainability in developing country contexts, design needs to facilitate production-to-consumption systems that are underpinned by technologies which have a high potential for employment, require less investment and are not capital-intensive and are highly adaptable to social and cultural environments (Jequier and Blanc 1983).

To do this, design needs to challenge mainstream technology-intensive industrial design approaches which do not approach the concept of sustainability holistically (Maxwell et al. 2003). This is more easily said than done because the design-industrialization bond is deeply rooted: the discipline of design emerged as a result of the process of industrialization, and therefore inherently aligns to industrial logic and philosophies. This spotlights the need for further research on alternatives to mainstream design approaches; alternatives which generate collective benefits to the ecology, society, economy (ibid.) and culture in the developing country context.

EXISTING CRAFT-LIVELIHOOD CENTERED DESIGN INTERVENTION MODELS: NOT IMPACTING SUSTAINABLE DEVELOPMENT TO THEIR FULLEST POTENTIAL

Most of the craft-design interactions documented in literature are initiated by international development agencies, NGOs and governments, who interface with community-based organizations (Rhodes 2011). These interactions are intended to widen the reach of products crafted by communities (Borges 2013), and also serve as vehicle to achieve sustainability agendas—particularly the social development themes of economic empowerment, poverty alleviation and livelihood generation. The common modus operandi for most craft-design interactions is through 'design intervention'; in which craft communities feature as skilled—and often low-cost—labor, who produce designs developed by a professionally trained designer (Borges 2013: 11-15): the resulting products are positioned as being inspired by local culture. The aim of several of these projects is to link languishing traditional crafts to wealthier markets in the West, through design assistance (Murray 2010). The ubiquity of this model is evidenced in the several transnational examples of designers leveraging developing-country craft, to create products with a western aesthetic (Chotiratanapinun 2009). These products are positioned as combining 'northern design intelligence with southern craft traditions (Murray 2010)', thereby, 'reach[ing] across a global north/south axis.'

Several of the projects following the model described above, have indeed widened the reach of products crafted by communities, and may be construed to be fair—if all the concerned parties are clear on the nature of the transaction and agreeable to the terms of payment (Borges 2013).

However, these projects have not been so successful in addressing the social development theme (ibid.), and cannot actually be deemed social-design projects, because they lack an equal exchange, continuity and respect for the local culture (ibid.). Several craft-design projects, which are positioned as 'aid' to artisans, in reality, facilitate dependency relationships, rather than contributing to their eradication (Bonsiepe 2011). One of the reasons for this is that the design paradigm— due to its deep connection with industrialization—overlooks craft, and thereby craftspeople, craft culture and craft knowledge systems (Kodapully). Even though the ultimate beneficiary of several of these projects is meant to be the craftsperson, and not the private sector (Murray 2010), the limitation of perception and perspective limits designers' ability to facilitate livelihood solutions for craftspeople (Kodapully).

The insufficient internalization of the craft scenario—including technique and context—can also lead designers to inadvertently intensify the problem of craftspeoples' livelihoods. Borges (2013) narrates an example of such a situation in Paraguay, where potters were provided with loans to purchase kilns, intended to improve the quality of their pottery. Unanticipated by the designers, the new ovens changed the firing process, and thus the colour of the final product. The eventual designs in the new colour were not well-received by markets, leaving craftspeople with no new income from the product line, while simultaneously struggling to pay off the loans. Sometimes, the unintended adverse effects of design interventions are more serious than an untapped market; they extend to the erosion of the communities' cultural capital and well-being. Design-interventions which fail to capitalize on the indigenous knowledge repositoried in craft do not actualize their potential to align with sustainability markets. Even worse, such approaches may dilute and diffuse the communities' cultural capital—thereby jeopardizing the very resource that can provide the basis and direction for differentiation, which can help these craft products find their place in a globalized world (Frater 2009).

While literature contains several examples of top down designer-led approaches which fail to contribute to the sustainability of craft-communities in terms of their income or social status (ibid.); it also contains some heartening examples that showcase the benefits of collaboration in craft-design interactions. Rhodes' (2011) research describes how Western makers worked in collaboration with craft communities in Africa, translating craft capital into eco-income generating activities.

Murray (2010) describes Martina Dempf's co-creation of grass-based jewelry with Rwandan women: following the project both Dempf and the women created their own version of the designs, reflecting and equity in opportunity and creativity. Marchand—(2011) over the course of his research with Yemeni minaret builders—developed an approach to leverage social knowledge towards social innovation solutions, which are facilitated, but not dictated by designers and development institutions.
Also encouraging is the emerging action-research and scholarship which looks at positioning craft as a methodological framework (Ferris 2009), through which to impact and leverage social, economic, cultural and economic sustainability (Borges 2013). This could provide basis for an alternate craft-design paradigm; the main challenge of which would be the same as that facing social innovation and design projects—namely, avoiding the highly criticized path of imposing top-down solutions on local communities, by engaging the community in the innovation process; and recognizing the communities values, priorities and character (Greenlees 2013).

The Rhizome Approach: to craft by design for sustainability

This research presents the Rhizome Approach towards a flexible methodology for collaborative, sustainable innovation–especially between a craftsperson and designer team. This allows for the simultaneous leveraging of both craft and sustainable design, given the analogies between the two concepts. The approach is named after bamboo's complex underground rhizome system: each rhizome connects into the other, forming a stable mesh network that prevents soil erosion. A rhizome is not amenable to any structural or generative model–it is a map and not a tracing (Deleuze and Guattari 1987). Similarly, the approach is designed to be an adaptable guide, consisting of steps of which are independently and interdependently sustainable and prevent the erosion of social, economic, ecological and cultural capital.
The approach consists of a seven point system, based on the barriers to sustainable innovation in product and service development as identified by Maxwell et al. (2003). These steps are described next.

STEP 1: PROVIDING KNOWLEDGE ABOUT SUSTAINABILITY THROUGH SECOND HAND INFORMATION

Step1 addresses the fact that in order to design sustainable products, designers have to understand sustainability as a systemic construct which rests on interconnected ecological, economic, social and cultural tenets. While sustainable design needs to constantly consider these tenets both singly and systemically during the design process, most industrial designers lack expertise and knowledge in this area (White et al. 2008; Shedroff 2009). The first step of the Rhizome Approach therefore aims to bridge the knowledge gap on sustainability– including its inter-linkages with craft and design– by providing designers with information through focused presentations, supplemented by reading material.

STEP 2: HOLISTIC OVERSIGHT OF PCS THROUGH EXPOSURE VISITS

Step 2 supplements the didactic learning inputs in Step1, through exposure-visit-based experiential learning inputs. Designers visit the different nodes of the production-to-consumption system and internalize how the different, interlinked actors of the value chain together, affect sustainability. The aim is to create and use dynamic experiences as a kinaesthetic learning tool, to sensitize designers to the systemic production-to-consumption systems and the value chain picture.

STEP 3: INCLUDING SUSTAINABILITY AT A STRATEGIC LEVEL THROUGH THE RHIZOME FRAMEWORK

A holistic strategy to achieve sustainability and reduce unsustainability is not often part of organizational mandates: designers therefore lack both an immediate reference point and the backdrop of the larger organizational scheme (Maxwell et al. 2003). Step 3 focuses on sharing the Rhizome Framework (Fig 1)– developed during this action research process–with the participants to provide an overarching strategy on the possibilities of craft-design engagement towards sustainability. The Framework proposes a model to conserve cultural capital which can then be 'decoded' for use in 3 different design directions of craft evolution, namely 'expressive', 'glocal' and 'prosumer'.

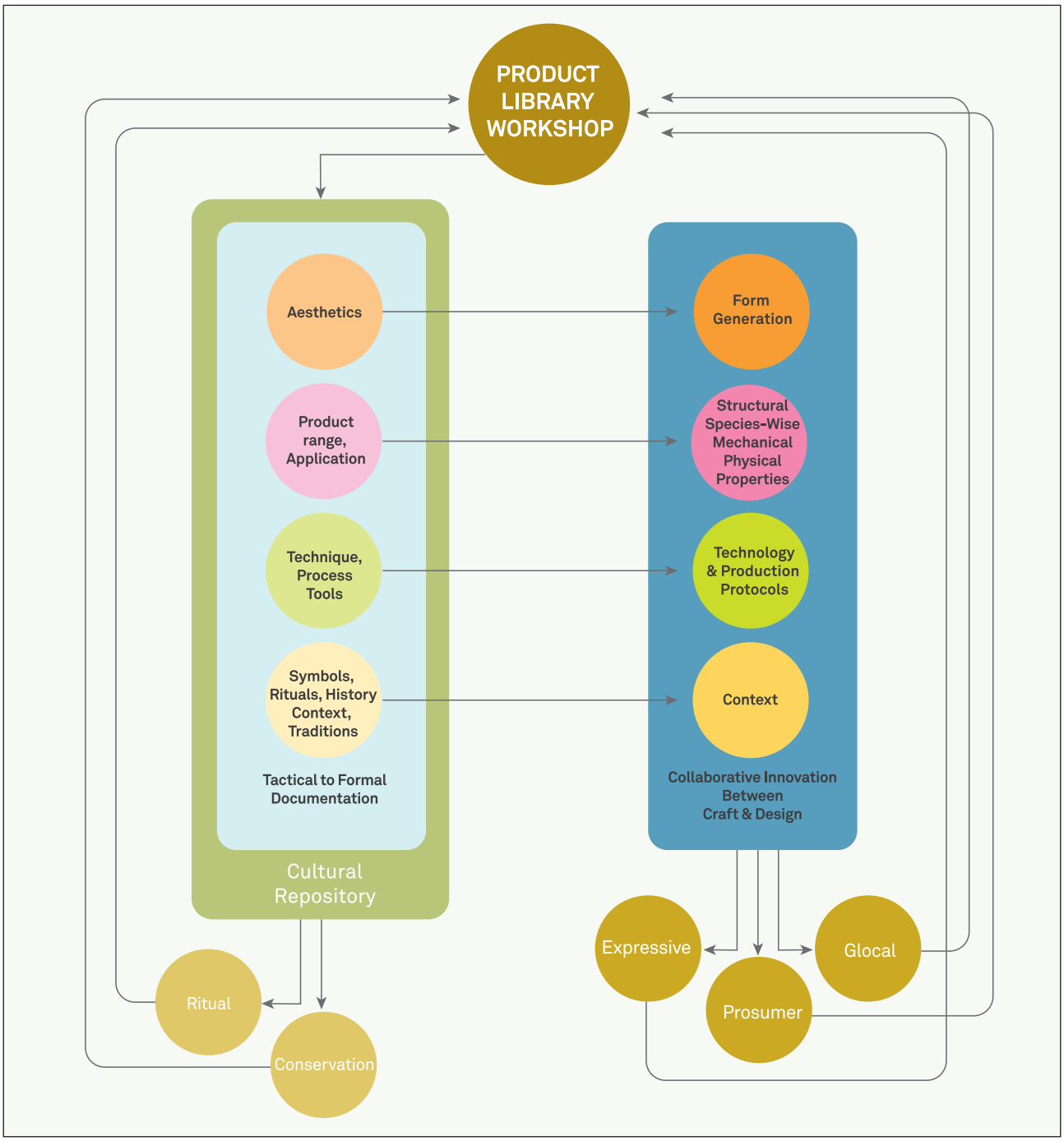


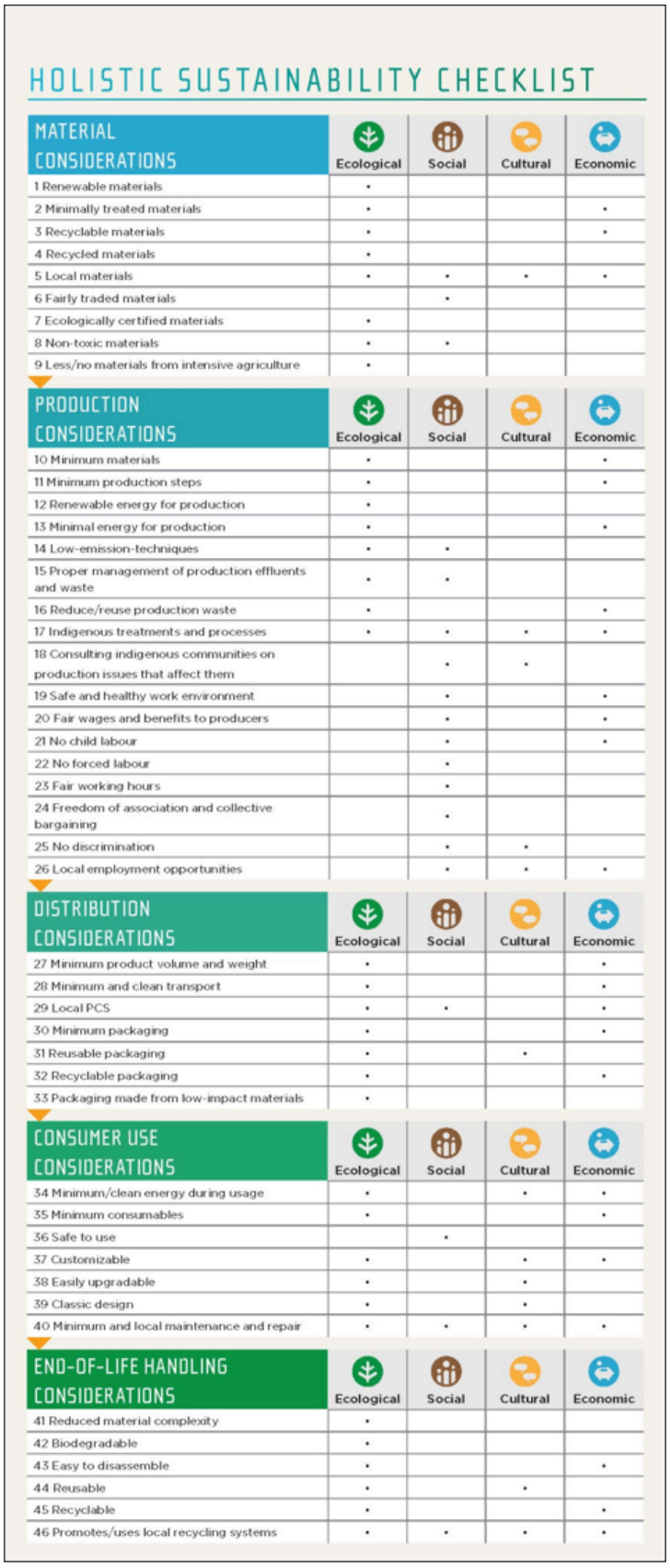
Fig 1: Rhizome Framework

The ‘expressive’ direction proposes aligning craft with art, through limited edition, exclusive products–such as in the case of studio-craft and haute-couture (Reubens 2010). These products will create an aspirational market demand which will ‘trickle down’ to the larger market segments (ibid.).
The ‘glocal’ direction proposes sustainably-crafted product lines for domestic and foreign urban markets (ibid.). The ‘prosumer’ direction proposes that rural producers produce products for nearby rural markets. The underpinning idea is ‘self sufficiency through production networks’ (Bersalona 2002), where the producer and the consumer is the same ideological group (Trapscott and Williams 2006).
The Rhizome Framework aims to address the entire pyramid, beginning right at the pinnacle with exclusive products ‘expressive’; to the middle with mainstream products ‘glocal’; and finally products for the base of the pyramid (BOP) ‘prosumer’. The aim is to position sustainable products at the top of the pyramid, thereby allowing sustainability to also be desirable for buyers lower down in the pyramid.

STEP 4: INCLUDING SUSTAINABILITY IN THE DESIGN BRIEF THROUGH THE SUSTAINABILITY CHECKLIST

In the absence of a clear brief which clearly articulates the desired sustainability criteria, the onus of incorporating sustainability into the design brief is on the designer: this is difficult, considering that sustainability has not been part of the expertise of traditional design function. Step 4 therefore focuses on providing a clear design brief which includes sustainability. A Sustainability Checklist (Fig 2) was developed as part of this research, to supplement and elucidate the brief. The checklist supplements the rules of thumb developed in the Design for Sustainability D4S-DE Manual (Crul and Diehl 2006), with inputs from the Global Reporting Initiative (GRI) Guidelines and Hawkes 2001 publication The Fourth Pillar of Sustainability.
The checklist illustrates the generic product production to consumption system–material selection, production, distribution, use and end of life handling. The sustainable design parameters relevant at each stage are listed along with the tenets of sustainability they influence strongly. The potential of craft to address each parameter is also indicated.

By understanding the systemic impact of the production-to-consumption system through the deconstructed parameters, the design can be strategized to be culturally, ecologically, socially, economically or holistically sustainable. The checklist throws light on the criteria that can make a product more holistically sustainable, and also serves as an indicator of sustainability factors achieved, once the product is developed.



HOLISTIC SUSTAINABILITY CHECKLIST

MATERIAL CONSIDERATIONS	Ecological	Social	Cultural	Economic
1 Renewable materials	•			
2 Minimally treated materials	•			•
3 Recyclable materials	•			•
4 Recycled materials	•			
5 Local materials	•	•	•	•
6 Fairly traded materials		•		
7 Ecologically certified materials	•			
8 Non-toxic materials	•	•		
9 Less/no materials from intensive agriculture	•			

PRODUCTION CONSIDERATIONS	Ecological	Social	Cultural	Economic
10 Minimum materials	•			•
11 Minimum production steps	•			•
12 Renewable energy for production	•			
13 Minimal energy for production	•			•
14 Low-emission-techniques	•	•		
15 Proper management of production effluents and waste	•	•		
16 Reduce/reuse production waste	•			•
17 Indigenous treatments and processes	•	•	•	•
18 Consulting indigenous communities on production issues that affect them		•	•	
19 Safe and healthy work environment		•		•
20 Fair wages and benefits to producers		•		•
21 No child labour		•		•
22 No forced labour		•		
23 Fair working hours		•		
24 Freedom of association and collective bargaining		•		
25 No discrimination		•	•	
26 Local employment opportunities		•	•	•

DISTRIBUTION CONSIDERATIONS	Ecological	Social	Cultural	Economic
27 Minimum product volume and weight	•			•
28 Minimum and clean transport	•			•
29 Local PCS	•	•		•
30 Minimum packaging	•			•
31 Reusable packaging	•		•	
32 Recyclable packaging	•			•
33 Packaging made from low-impact materials	•			

CONSUMER USE CONSIDERATIONS	Ecological	Social	Cultural	Economic
34 Minimum/clean energy during usage	•		•	•
35 Minimum consumables	•			•
36 Safe to use		•		
37 Customizable	•		•	•
38 Easily upgradable	•		•	
39 Classic design	•		•	
40 Minimum and local maintenance and repair	•	•	•	•

END-OF-LIFE HANDLING CONSIDERATIONS	Ecological	Social	Cultural	Economic
41 Reduced material complexity	•			
42 Biodegradable	•			
43 Easy to disassemble	•			•
44 Reusable	•		•	
45 Recyclable	•			•
46 Promotes/uses local recycling systems	•	•	•	•

Fig 2: Sustainability Checklist

STEP 5: COLLABORATIVE INNOVATION THROUGH DIALOGUE AND TECHNICAL BACKSTOPPING

There is a need to bridge diverse actors within the organization to facilitate transitioning from a pipeline design sequence to an integrative design process (White et al. 2008). This logic has parallels in the craft production-to-consumption systems, where design, production and marketing are anchored in a single person, or close group, thus allowing for constant dialogue between the actors. Step 5 of the Rhizome Approach facilitates developing systems, methodologies, platforms and frameworks that allow for communication and collaborative decision-making and participatory design (Shedroff 2009), by encouraging and actively facilitating a constant linkage and interaction between the actors, facilitators and enablers of the value chain.

STEP 6: MEASURING SUSTAINABILITY ACHIEVED AGAINST THE SUSTAINABILITY CHECKLIST

Step 6 aims to increase the accountability of designers to factor sustainability into innovation, by scoring the sustainability of their designs. In Step 6, the designed product is evaluated against the Sustainability Checklist introduced in Step 4, by the designer, and two other experts. These three sets of data allow for investigator triangulation (Denzin 1978) and results in a number indicative of the 'sustainability-quotient' of the product: this can be used as a reference for further development and also figured into the marketing strategy. Findings from the evaluation allow the designers to reconsider certain aspects of their design, to achieve better holistic sustainability during the final product actualization phase.

STEP 7: FINAL PRODUCT ACTUALIZATION

In the traditional pipeline design sequence, the production, costing and marketing revisions often happen between the time product is realized and is marketed. By this time, the product design function is essentially disbanded (White et al. 2008) and changes in the product are often made without the information or agreement of the innovator/innovation team. As a result, nobody has the bird's eye view of the product and the cascading effect of the changes–including vis-à-vis sustainability. Step 7 therefore involves incorporating the necessary tweaking and changes arising as a result of Step 6, and the additional feedback from the actors across the production-to-consumption system in a continued collaborative manner. The design team is kept in the loop along with the other collaborators, until the final actualization of the product.

Status of research

Validating the Rhizome Approach's was an integral part of this research. The aim of the trial was to validate the hypothesis that inputs from different stakeholders–especially craftspeople, can inform design–especially for and with SMEs; about the underlying interdependencies between the tenets of sustainability and that this visions and scenario analysis Swart et al. 2004), will lead to holistically sustainable design.

BAMBOO SPACE-MAKING CRAFT WORKSHOP

The approach was first trialed through a multi-institution, fourteen day workshop in the bamboo sector; which began on 20 January 2011 at the Design Innovation and Craft Resource Centre (DICRC) at the Centre of Environmental Planning and Technology University (CEPT), Ahmedabad in India. The twenty-three design participants included professionals, fresh graduates and postgraduates and students from the Faculty of Design, CEPT University and the Indian Institute of Crafts and Design (IICD). The twenty-three craft participants were Kotwalia bamboo-craftspeople linked to the NGOs, the Tapini Bamboo Development Center (TBDC) and the Eklavya Foundation.

DEVELOPING THE CHECKLIST AS A TOOL FOR UNIDO

One of the main findings was the positive feedback and interest vis-à-vis the sustainability checklist used in the workshop. Therefore, it was decided to develop this tool further through a second round of iterations, after checking its generalizability and validation. The generalizability and validation of the Rhizome Framework and Approach—and the mechanisms to actualize them especially the sustainability checklist—was tested through three group-administered questionnaires in Vietnam. Based on the positive feedback from the focus groups, it was decided to use the sustainability checklist as an input for UNIDO's Branding Initiative in Vietnam, under the Joint Programme on Green Production and Trade to Increase Income and Employment Opportunities for the Rural Poor. This involved refining the checklist and developing a branding, labeling and certification system to support its operationalization. A detailed account these can be found in UNIDO's manual, Achieving, Assessing and Communicating Sustainability: A manual for the Vietnamese Handicraft Sector. Various options were designed for the graphic representation of the label and the Holistic Sustainability Checklist. These were evaluated through focus groups in Vietnam, and also by administering random questionnaires at UNIDO's booth at the Lifestyle fair.

Conclusion

This research argues that design-craft collaboration offers the opportunity for to leap-frog the unsustainability created in the West, in developing country SME scenarios. The interconnected nature of craft holds the potential to integrate the tenets of sustainability, and thus offers a valuable input into sustainable design. In contrast to industrial design– which is driven by industry, craft is driven by the integration of tacit knowledge, innovation, skill, bio-regional knowledge (Ithatsu 2002) and traditional practices. All of these link into a single system determined by the interconnectedness between people, land, materials and energy (ibid.) If design manages to tap into the indigenous knowledge systems of craft communities, they can also leverage the systems of social, ecological, cultural and economic sustainability that underpin them. Collaborating with craftspeople offers designers a window into systemic production-to-consumption system, and the opportunity to be part a value chain that is localized and transparent—where stakeholders have greater accountability to each other and the outcome of the production-to-consumption system in general. Collaborative innovation also offers the potential of designs which call for PCSs which are non-industrial, labour-intensive, localized, and community-centric, in line with the concept of holistic sustainability. Industrialization has caused designers—like the other actors in the production-to-consumption system—to lose sight of the systemic picture. This makes it difficult to approach sustainability in a holistic manner: designers look at addressing immediate issues (such as the fragile ecological situation) rather than looking for holistic, integrated and sustainable solutions. In order to leverage the opportunity that craft-design collaboration offers, designers need to view sustainability in a systemic manner: they need to go beyond capitalizing on the market opportunity that 'green design' presents, to develop products that are strategized to contribute to systemic and integrated social, economic, ecological and cultural sustainability.

The paper therefore proposes the seven point Rhizome Approach, which was developed through the author's PhD action research with the Design for Sustainability department, at the Technical University of Delft, the Netherlands. The approach is a methodology towards an inclusive innovation process where collaboration with craftspeople and other stakeholders of the production-to-consumption system orient design to the systemic production-to-consumption system. This results in collaborative design that views and addresses sustainability holistically.

This research is relevant to the design of products using renewable materials in labour intensive situations i.e. developing countries in general. In a broader perspective, this research is also relevant to traditional industrial-design practice which seeks to collaborate with different stakeholders in order to allow the designer a systemic picture towards holistic sustainability. It is hoped that the outcomes and findings of this research will contribute to existing scholarship towards formulating a road-map for designers to design more sustainably –especially in the context of craft-based SMEs working with natural materials in developing countries.

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