Exploring the influence of design culture on ICT healthcare product and service design for rural China

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Abstract

Design culture is usually considered as one of the important aspects that influence designers' decisions and actions, especially in Design for Base of the Pyramid projects including ICT Healthcare Product Design in Rural China (IHDRC). There are two research questions in this issue: what are the cultural factors and how these factors influence designers' cultural values. This paper investigates the first question focusing on the influence of designers' own cultural background. Based on existing models such as Hofstede’s onion model, the framework of Mohammad and Mariano and Julier’s discourse, the authors propose four dimensions that are relevant: 1) Education and skills of the designer 2) Consumption of design 3) Manufacturing of design 4) Design activities’ management and organization. After two rounds of interviews with Chinese design professors and students, 15 factors within these four dimensions were finally identified. The results show that the unconscious impact of design culture on design can be better controlled and even altered if designers and management are aware of these factors.

Keywords

Design culture, ICT, healthcare, product design, Design for Base of the Pyramid, rural China

1. Introduction

1.1 Base of the Pyramid (BoP) and ICT Healthcare Design for Rural China (IHDRC)

Currently there are about 4 billion people living on an income less than US$3 per day and 1 billion living less than even US$1 per day (Prahalad and Hart, 2002). This part of the world population is typified as “Base-of-the-Pyramid” (BoP). Most of BoP is living in rural areas of developing countries such as, India, China, Brazil, and so on.

BoP is a special consumer target, which is not the focus of most of the entrepreneurs, professional designers and design institutes. They are targeting the end-users in advanced markets as this group has a higher purchasing power averaging more than US$10,000 per
year. Prahalad and Hart’s (2002) work about BoP suggests that there is a fortune to be made for entrepreneurs with BoP initiatives, while at the same time offering great opportunities for the world’s poor to escape from poverty. Prahalad’s book ‘The Fortune at the Bottom of the Pyramid’ (Prahalad 2005) proposes a framework for the active engagement of the private sector and suggests a basis for a profitable win-win engagement. He argues that all that is needed to develop business from designing, producing and delivering products and services to meet the needs of the world’s poor, is human ingenuity - innovation. This topic has unleashed an extensive and generally enthusiastic response from academics, businesses, NGOs and governments. Already a number of industrial enterprises and design institutes have been involved in BoP activities: Multi National Companies (MNC) such as HP, Intel, Philips and Microsoft have been aware of the design opportunities of this market, as well as some design institutes such as Delft University of Technology (TuDelft), Illinois Institute of Technology (IIT), Berkley and Stanford who are all partnering with small and big enterprises for BoP design. These design cases also could be found in the books by Prahalad and Hart (2002), Brown and Hagel (2005), Wilson and Wilson (2006), or Jamie and Niels (2007), Kandachar et al (2009).

The business opportunities for BoP are composed of a number of domains such as housing, consumer products, water technologies, energy, etc. Healthcare is also regarded as an important topic. Soete (2008) claims that when it comes to research and design for Base of the Pyramid users, “the main focus within the developed world at the moment is on BoP innovations in the health area”. Worldwide more than 10 million children younger than 5 years die yearly due to pneumonia, diarrhea, malaria, neonatal pneumonia or sepsis, preterm delivery, and asphyxia at birth. More than half of all child deaths are associated with malnutrition, which weakens the body’s resistance to illness. Millions more survive only to face diminished futures, unable to develop to their full potential. At the same time, more than half a million women die in pregnancy, childbirth or soon after (Millennium Development Goals - MDG, no. 4 and 5). While addressing these issues, the details of design, the details of both the products and the institutional arrangements surrounding them, matter. Also in the case of the development and introduction of health care technologies, there are many (design) options available along the way, some of which will be more successful in terms of raising human capabilities than others.

In this study, the authors have interests in one enabling technology, Information and Communication Technology (ICT), for healthcare solutions in rural areas and rural China is chosen as a study case. In general, ICT healthcare product design in developing counties is receiving increased attention all over the world. (Martínez et al, 2005; Cecchini et al, 2004;
ICT can play an important role towards reducing information and communication poverty and be part of an overarching process of empowerment in healthcare.

1.2 The intervention of design culture for Design for Base of the Pyramid and IHDRC

Designers who design for BoP and IHDRC have to consider many issues. One of them is the influence of their own design culture on their work. The intervention of design for BoP and IHDRC can be tracked in literature. For example, Kandachar and Halme (2008) mention that a designer should learn from several earlier BoP innovations to define an effective approach for a new design case, to serve the unmet needs of the BoP-community. They point out that probing cultural issues is one important innovative aspect in product development for BoP. Hart (2002) warns that due to cultural differences among BoP countries, existing successful cases cannot be implemented directly; a translation will always be needed. Also transferring enabling technologies from the developed world to BoP, according to Shiva (2001), is about cultural diversity and cross cultural fertilization of innovation. It is about bringing ecology and culture to the heart of technology.

Then what is design culture? According to Albrecht et.al (2000), design culture presents cutting-edge work in architecture, landscape architecture, urban design, theatrical design, fashion, typography, film graphics, products, and new media. Developing a strategic design culture is often considered as one important starting point when designers are introducing themselves into a new design context (Hertenstein and Plat, 1997) and used frequently. In the book “The Culture of Design”, Julier (2007) defined design culture as “Design Culture is the study of the interrelationships between design artifacts, in all their manifestations, the work of designers, design production (including marketing, advertising and distribution) and their consumption.” This definition is used in this paper.

Design culture has developed from interrelationships of social, political, commercial and technical innovations. It has also been formed by discussions about consumption behavior in cultural studies, anthropology and geography. (Miller, 1987; Jackson and Thrift, 1995) For instance, Hannerz (1996) argues that different elements of culture learned and acquired in social life are highly integrated and act as packages of meaning and meaningful forms. Hofstede (2001) believes that this integration is largely unconscious and that no mental activities of humans can be culture free. This suggests that design activity is unconsciously influenced by the designers’ cultural values and preferences. Collins and Pinch (1982) coined the phraseology ‘frame of meaning’ to describe the affective role of cultural patterns on designers’ actions and behaviors and preferences. Carlson (1992) calls this process as
'cultural creep', suggesting that designers intrinsically enforce on a new product their own pre-existing frames based on their past experience, rather than invent new frames.

Recently, the necessity of integrating the culture of users into the design of products has already been widely propounded by a number of researchers, authors and designers (Holt, 1989, Banathy, 1992, Williams, 1993, Ask, 1997, Vanka, 1997, De Souza, 1999, De Souza et al., 1999, Gagliardi, 2001, Powell, 2001, Rose and Zuhlke, 2001, Ellsworth et al., 2002, Kemnitzer and Grillo, 2002, Salimi, 2002, Bell et al., 2003, Hidaka, 2003). This extensive literature supports the notion that cultural integration plays a noteworthy role in the effective design of products. However, as far as can be determined, the relationship between the designers' own culture and the designs they create has not yet been investigated within the industrial design research field.

1.3 Problem statement and objective of this paper

The faculty of Industrial Design Engineering (IDE), TUDelft started ICT Healthcare for rural china (IHDRC) ventures through master graduation projects in 2003. Similar to other "design for BoP" projects, students often meet challenges to address non-physical design aspects such as the pleasure by objects, the experience and emotion in design, the sense of connectedness with product, and culture.

Similar designer behavior has been noticed elsewhere. Recently, industrial designers were challenged and encouraged by the International Council of Societies of Industrial Design to foster cultural diversity in the face of world globalization (ICSID, 2002). Thus, industrial designers are exhorted to implement the cultural wants, preferences and attributes of people into the products that they create, in order to make them culturally suitable and pleasurable for use by all potential users. Samuels (2002) also suggests the necessity of redefining industrial design in order to subsume 'culture' in the definition of industrial design as a goal for optimizing the lives of individual users.

Industrial designers are not specifically educated to understand and overcome their own culture in favor of incorporating the cultural requirements of a potential user's group. Consequently users, coming from a culture different from that of the designers' own, often find that a product does not match their cultural needs and wants, and often they have to somehow adjust their needs to the products that are available to them. (Mohammad and Mariano, 2005)

This is in particular the case for DfBoP and IHDRC. In principle ICT healthcare solutions help to solve medical problems, such as reducing infant mortality. However, these kinds of solutions are difficult to design, implement and to scale up because of physical and non-
physical reasons. Through observing IHDRC student projects within the faculty, we found that in particular non-physical factors play a decisive role. The observed weaknesses of non-physical factors are likely to have resulted from cultural and culture-related situational factors (Jiang et al, 2009), including:

- Cultural values of Chinese users are different from those of western users
- Industrial designer’s role in China is different from that in the west
- Cultural values of Chinese industries are different from western businesses

However, the limited number of design projects available at this time makes it difficult to decisively conclude about the influence of designer’s culture on the current design results for IHDRC. To help industrial designers, who are exhorted to implement the cultural wants, preferences and attributes of people regarding IHDRC, the objective of this study is to explore those cultural factors which influence design.

2 Investigation areas

The target group of this research, as illustrated in Figure 1, is the influence of culture on product and services for rural china (limited to Chinese designers designing to China). The influence is expected to be coming from two sides: the culture of the designer (Culture A) and the culture of the user (Culture B). In first explorative research, the authors only focus on Culture A.
Obviously there are hundreds or possibly thousands of values within culture A at the level of society, organizational and individual values. For this reason a reference model is required to enable examination of the multitudinous influences of designers’ cultural values on product design at the societal level. This system would organize values into a limited number of cultural dimensions and facilitate a comparison of the designers’ impacts across cultures. We found the framework of Mohammad and Mariano (2005) which is based on Hofstede’s onion model (Hofstede, 2001), as one of the more appropriate reference models for our study. This framework helps us link the manifestations of culture to the underlying values. The Cultural Dimensions of Mohammad and Mariano have been used to teach cultural differences between nations with a focus on people and the interaction between people in context. Moreover, these cultural dimensions seem to be applicable to understanding and designing for people’s interaction with products. For instance, Press and Cooper et al. (2003) used the model in order to adjust typically Western’ design research tools and techniques for application in Asia.

3 Hofstede's onion model and the framework of Mohammad and Mariano
Hofstede (2001) argues that every person carries within himself or herself patterns of thinking, feeling, and potential acting, which were learned throughout their lifetime. Hofstede itemizes the main manifestations of cultures, , which can be seen in the practices in the world - the behaviors of “people doing things”, which in turn can be broken up in values, rituals, heroes and symbols, indicating that symbols express the most superficial while values comprise the deepest layer of culture. His ‘onion diagram’ (Figure 2) illustrates the concept of cultural layers.

![Figure 2: Different levels of cultural manifestations (Hofstede, 2001)](image)
In his model, Hofstede empirically defined four common dimensions of values for national cultures, which includes Power Distance Index (PDI); Individualism versus Collectivism (IDV);
Masculinity versus Femininity (MAS); and Uncertainty Avoidance Index (UAI). Furthermore, he asserts that no part of humans' lives can be exempt from the influence of culture in the above four dimensions.

Based on Hofstede’s model, Mohammad and Mariano (2005) have proposed a framework for the influence of the designers’ own culture on the design aspects of products. This framework announced five cultural relationships between designers and the design concept of product/service: Concept-Function Relationship (CFR), Concept-Manufacturer Relationship (CMR), Concept-User Relationship (CUR), Concept-Designer Relationship (CDR), and Design Concept-Context Relationship (CCR). (Figure 3)

![Figure 3: Five cultural relationships between the concept of the product/service (Mohammad and Mariano, 2005)](image)

This framework is considered as a prerequisite to understand the relationships between cultures, designers, users and products. The current study focuses on the influence of designer’s cultural values (Culture A) in the design process.

4 Four design cultural dimensions of our study

As mentioned in section 2, our research hypotheses are: “designer’s own cultural values influence the cultural value of their design”. By this we mean that designers from one cultural background concentrate on one particular aspect of design – on features that are important within their cultural dimensions, whereas designers from another cultural background would
probably not focus on same aspects, since their cultural values will be directed to other aspects of design.

We argue that this investigation has to be, firstly, carried out during the very early stage of the design process, such as project preparation and planning period. This period is sometimes called mindset setting period in certain literatures (Roozenburg and Eekels, 1995; Hekkert and van Dijk, 2001; Paul et al, 1985). The mindset setting period is in the fuzzy front end where the organization formulates a concept of the product to be developed and decides whether or not to invest resources in the further development of an idea. It is the phase between first consideration of an opportunity and when it is judged ready to enter the structured development process (Kim and Wilemon, 2002; Koen et al., 2001). It includes all activities from the search for new opportunities through the formation of a germ of an idea until the development of a precise concept.

Even though literature provides substantial categorizations of product and aspects of design such as the five relationships (Figure 5, Mohammad and Mariano, 2005) and Julier’s nine disciplines (Julier, 2007), none of these models are completely suitable for this study because of special design features in IHDRC such as governments’ role (Jiang et al, 2009). Therefore we combined elements from the 5-relationship framework and from Julier’s nine disciplines into four ‘manifestations of culture relevant for design’ which can (in principle) be linked to Hofstede’s ‘underlying values’ (PDI, IDV, MAS, and UAI).

- Education and Skills of Designers (ESD): Education scapes the role of designers and designer’s cultural values, of which innovation is often considered as most important.
- Consumption of Product and Service (CPS): The designer has a specific mindset. There are several established design factors in IHDRC including usability of product and design through anticipation of user’s interactions, acceptations and satisfactions.
- Design Activities’ Management and Organization (DAMO): This refers to the time and the setting or environment of the design, which is influenced by culture.
- Manufacturing of Design (MD): This connection is associated with the production constraints or the wills imposed by the manufacturers on a product.

In this first study we will reframe to explore the level of ‘manifestations of culture for design’.

4 Methods: Interviews on exploration of four dimensions in IHDRC

It is difficult to interview professional IHDRC designers because, to our knowledge, there are no specialized professional healthcare or ICT designers in China and IHDRC projects are few. Therefore, to explore what are manifestations of culture for design in detail in DRC,
two interview rounds were carried out. In the first round design professors were interviewed to explore the Chinese situation and in a second round several of the initial impressions were verified by asking design students about their experiences. All the interviewed professors and students have design experience in IHDRC.

4.1 interviews with Chinese Industrial Design professors

In the first part, three full Chinese full-professors in industrial design were interviewed, by open interview technique. All of them are department heads in the design schools in mainland China and have more than ten years of industrial design education and design project experience. In the interviews the professors were asked to describe cultural influence for design projects in China regarding the four manifestations of culture for design. Example questions are: “What is the role of Industrial designer in Chinese societies?”, “What are education goals in design school?”, “What is the relationship between your school and industrial companies?”,

The interviews were recorded in writing.

4.2 Interviews with Chinese design students

In the second round interview, these general findings about the influence of culture on design in China was verified with six Chinese master/PhD students and specified for IHDRC. Some additional questions were added to deepen the understanding of the situation. These Chinese master/PhD students are studying in Industrial Design Engineering faculty/TUDelft. All of them have been educated previously in China and had IHDRC project experiences in China. Each interview lasted for half an hour and was held in the Netherlands.

Briefly the interviews were composed of four parts.
1. Attendee’s introduction: Participants were asked to give a two minutes self introduction, which including his/her name, master department, bachelor institute, department and bachelor graduation project.
2. Basic questions: Two questions were asked in this part. (1) Are you familiar with rural China design? (2) Are you familiar with design for ICT enabled healthcare? The attendees were asked to describe an IHDRC project he/she ever took part in.
3. Main body questions: This part took about twenty minutes. Based on their described IHDRC projects, fourteen questions were asked regarding the manifestation of culture for design. (1) ESD: Six questions were asked such as “What were design education courses in Chinese universities in your bachelor?”, “What kind of design methodology did you use in your bachelor graduation project?” and so on. (2) CPS: In this part three
questions were asked including “What kind of interaction between designers and users happened in your design projects” and “what was the users’ attitude in the design process” etc. (3) DAMO: three questions were asked about the role of industrial companies in a design project, such as “How did the involved company work with academics?” and “What kind of cooperation took place?” (4) MD: Two questions were asked about industrial academic cooperation in China, including “Is there any academic cooperation between your previous department and other countries?” and “What kind of cooperation is it?”

4. Open comments: Finally participants were asked to give three minute of comments and suggestions about all questions.

All interviews in this part were recorded by audio devices.

5 Results

In the first round, answers from professors covered all four manifestations of culture for design and were about design in general in China (G) and the findings from the students in second round were specified for IHRC (I).

The situations in China in the four manifestations of culture were described as follows by the professors: For example, Professor 1 (P1), the dean of a top design school in China, about Chinese designers’ role (ESD):

“The creativity capability of Chinese designers is limited in China because the responsibility of industrial designers is limited in Chinese companies. Designers sometimes are looked as craftsman in drawing in companies.”

This viewpoint is repeated by other professors. Furthermore, Professor 2 (P2) from a regular design school in China added his comments in this aspect:

“This means that design courses in the schools have to be changed to train students’ skills rather than develop their creativity capabilities. And, it results in big competition for fresh designers.”

About Consumption of Product and Service, P2 demonstrated the relationship between university and industry as one of sales and consumers: “Education is also design work. What we did here is to design a good student and sell it to the industrial companies.”

P1 and P3 added their comments in this issue and they divided industrial companies into two groups.

“According to my experience, big companies such as Multinational Companies (MNC) do not need design knowledge from academics. Small companies, especially local companies
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need it. However, they have no budget to transfer knowledge. It is a pity because industrial
design is not emphasized in most companies in China.”

Most of professors’ viewpoints were proven and extended in the second round interview,
when questions were specialized in IHDRC. For instance, Student 1 (S1), a PhD student
from IDE/TU Delft described his role in IHDRC as “Wow.. I were only responsible for Product
appearance design and modeling in the project...It is also the role I played in other IHDRC
projects.” While Student 2 (S2), a master student who had three year industrial experience
in China gave his answer like “My duty in that project is medical system infrastructure
design...I didn’t have much time to touch users...you know, designers in China are different
from designers here in the Netherlands...”

Based on the two rounds of interviews, a combined overview of professors and Master
and PhD students on the four manifestations of culture is given in table 1:

<table>
<thead>
<tr>
<th>Education and Skills of Designers</th>
<th>Interviewees</th>
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<tbody>
<tr>
<td>Chinese design education is still emphasizing product appearance</td>
<td>P2,P3,S1,S2,S4,S6</td>
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<tr>
<td>and modeling, including IHDRC</td>
<td></td>
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<tr>
<td>Courses about design methodology are weak in China including IHDRC</td>
<td>P1,S3,S1,S3,S5,S6</td>
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<tr>
<td>Team work is weak in Chinese design education and consequently team</td>
<td>P2,P3,S1,S2,S3,S4,S6</td>
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<tr>
<td>work between designers and others is weak in IHDRC practice</td>
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<tr>
<td>Student designers get little support from industrial companies to</td>
<td>P1,P2,P3,S1,S2,S4,S6</td>
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<td>improve design skills including ICRC</td>
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<tr>
<td>User involvement is still weak in IHDRC</td>
<td>S2,S6</td>
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<th>Consumption of Product and Service</th>
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<tr>
<td>Users’ habits and requirements are already important in Chinese design</td>
<td>P1,P2,P3,S1,S2,S3,S4,S5,S6</td>
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<tr>
<td>including IHDRC</td>
<td></td>
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<tr>
<td>Using habits are important in IHDRC</td>
<td>S1,S2,S3,S4,S5,S6</td>
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<tr>
<td>The involvement of medical insurance is important in IHDRC</td>
<td>S1,S5,S6</td>
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<tr>
<td>Affordability is important in IHDRC</td>
<td>S1,S2,S3,S4,S5,S6</td>
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<th>Design Activities’ Management and Organization</th>
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<tr>
<td>Knowledge transfer between industrial and academic is poor, including</td>
<td>P1,P2,P3,S1,S2,S3,S4,S5,S6</td>
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<td>IHDRC</td>
<td></td>
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<tr>
<td>Role of industrial Designers in societies is not emphasized, including</td>
<td>P1,P2,P3,S1,S2,S3,S4,S5,S6</td>
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<tr>
<td>IHDRC</td>
<td></td>
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<tr>
<td>Budget for design in local company is often limited, including IHDRC</td>
<td>P1,P3,S1,S2</td>
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Governments play an important role in IHDRC

Manufacturing of products and services

- Designers are not involved into manufacturing process including IHDRC
  - P1,P3,S1,S4,S6

- The connection between designers and engineers is weak, including IHDRC
  - P1,P2,P3,S1,S2,S3,S4,S5,S6

- Manufactory lack awareness about the importance of design, including IHDRC
  - P1,P3,S1,S4,S6

Table 1: The results of two rounds of interviews (P=Professor, S= Master or PhD Student)

6 Conclusions and future research

Table 1 has provided answers for the research question “What are cultural factors that influence designers in ICT Healthcare Design for Rural China (IHDRC)”. The results showed that important manifestations of culture for design (Culture A, figure 1), are composed of four dimensions: 1) Education and skills of Designer 2) Consumption of Design 3) Manufacturing of Design 4) Design Activities’ Management and Organization. These 4 dimensions can be split up in the 15 factors as listed in table 1. As mentioned earlier manifestations of culture (as described by Hofstede) can also be seen as ‘practices’, which eventually can be split up in rituals, heroes and symbols. However, how Hofstede’s dimensions of values are underpinning these practices, and how these elements finally influence IHDRC and designers’ mindsets has not yet been answered. This investigation will be carried out in a next step.

Through the interviews we learned that industrial designers’ roles are different in China and abroad. It was aware by all Master and PhD students in the interviews. Also it would be useful if management in companies become aware of the cultural situation surrounding designers in China, which is not exploiting the intellectual potential available in designers. We expect and hope that by uncovering underlying cultural influences and thereby making them available to designers and managers, the impact of design culture on design can be better controlled and even altered and therefore improved.

Acknowledgements:

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