A Culture-Inspired Approach to Gaining Insights for Designing Sustainable Practices

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Abstract

This paper explores a design method to generate insights for designing less resource-intensive forms of everyday life. This study takes the assumption that looking at cultural diversity can widen the variety of insights which can be used as a source of inspiration for designing sustainable practices. However, there is a lack of clear-cut approaches for collecting information on sustainable everyday practices from multiple cultures. Therefore, this study explores: 1) how to collect information about resource-consuming everyday practice from different cultures, and 2) what kinds of insights can be gained from this information.

An experimental culture survey was conducted. The survey had the practice 'bathing' as the central topic, and featured three countries; the Netherlands, Japan and India. The results suggest that a self-observation probe with a feature of recording the practice by a set of elements was successful in collecting information from users in three countries. From this information, three types of insights were generated, which are expected to be useful in the context of designing sustainable practices. These are: 1) different styles of bathing and their respective resource consumption, 2) relations between the contextual elements and 3) particular actions which have a considerable impact on the total resource consumption.

Key words: *cross-cultural research, eco-design, design methods, household routines, product development, sustainability, user-centered design*

1. Introduction

The mainstream of eco-design strategies focuses on environmentally conscious energy sources and increasing energy efficiency through technological solutions. However, the interaction of users with a product can play an important role in determining its environmental impact [2]. Or as Wever, et al. (2008) [3] put it: "Energy-saving features are only sustainable if they are actually used by consumers". Reflecting this, there is increasing recognition that designers are in a position to influence user behavior in a more sustainable direction [2] [3]. A design approach called 'user-centered design', which puts users center stage during the entire design process, allows design teams to gain an insight into the 'actual' behavior of users. In the eco-design context, user-centered design enables design teams to identify the most energy intensive behaviors, and encourages them to address these issues as a priority [2] [3].

Based on user-centered design, a variety of design strategies aimed to change user behavior towards more sustainable product usage were developed, summarized as 'Design with Intent (DwI)' by Lockton (2009) [4]. Although valuable for steering product use toward better energy efficiency, this approach is not suitable when aiming for more radical sustainable innovation. Because it mainly looks at a single immediate user behavior, paying little attention to the dynamics of daily life and the situations or context in which products are used. [6].

To address this issue, a new design method combining principles from social practice theory and co-design was proposed by Scott (2008) and further developed for design by Kuijer (2009) [5] [6]. Social practice theory takes daily practices such as cooking, laundry and bathing as the basic unit of analysis, rather than single products. Co-design involves people as the experts of their own everyday life. This practice-oriented co-design approach was applied in two case studies with the topic of bathing, and successfully achieved eliciting information from ordinary people by using probe tools. The pilot studies concluded that the practice-oriented co-design approach can indeed generate product ideas based on and supporting practice level innovation [6]. However, the pilot study also highlighted some limitations of the approach, two of which are addressed by the present study. The first limitation lies in the range of ideas for possible less resource-intensive practices. The ideas

generated by the approach tend to stay close to the current practice because they were developed in the existing context of participants' homes. The other limitation is in the assessment of the generated ideas. The self-reported, rough estimations of water consumption made it difficult to assess the effectiveness of the ideas from the viewpoint of sustainability. Considering the ultimate goal of saving resources, adding more structured assessment of resource consumption of the current and novel practice would make sense. The research described in this paper therefore addresses two needs:

- To increase the variety of insights on possible less resource-intensive practice
- To improve the precision of data on resource consumption

Regarding the first need, looking at everyday practices in different cultures was thought to be a prospective direction since clear differences can be observed here. Based on this observation, this study focuses on culture and its diversity in everyday practice as a source of insights for sustainable innovation.

In order to address the second need, survey tools that enable researchers to collect more precise data on resource consumption of the everyday practice were explored as additions to the probe used in the studies by Scott and Kuijer.

2. Theoretical framework

To explore a culture-based design approach, the definition of the term 'Culture' used in this study needs to be clarified. Then, issues related to culture in the field of industrial design are reviewed to form a theoretical base.

2.1. Culture and its elements

Culture is a complex concept that accompanies many controversies in both definition and application. [7] Culture can be described by means of visual models, such as the 'Onion model' developed by Geert Hofstede (1994) and the Iceberg model of culture, developed by Selfridge and Sokolik (1975) [8] and W.L. French and C.H. Bell (1979) [9]. These models have the common view that culture can be described as a set of elements forming layers in an embedded structure. Commonalities also exist in the elements among the cultural models. For example, Schein (1999) [10] proposed a model of culture with three layers; 'basic assumptions', 'values' and 'artifacts.' While Hampden-Turner and Trompenaars (1997) [11] and Spencer-Oatey (2000) [12] presented a culture model that consists of four layers; 'basic assumptions and values', 'beliefs, attitudes and conventions', 'systems and institutions' and 'artifacts, products, rituals and behavior.'

The way of describing culture as a set of elements has also been applied in the field of industrial design. For instance, Lee (2004) [13] proposed a culture model with multi-layers including 'basic assumptions', 'value and norm' and 'artifact', which is consistent with Schein's model. Based on this three-layer model and the four–layer model, Moalosi, Popovic and Hickling-Hudson (2007) [14] defined culture as a shared set of three elements: 'basic assumptions and values', 'behavioral norms, attitudes and beliefs' and 'systems and institutions (material and non-material elements)'. This three-layer model was thought fit for this study since the model was explored for use by designers.

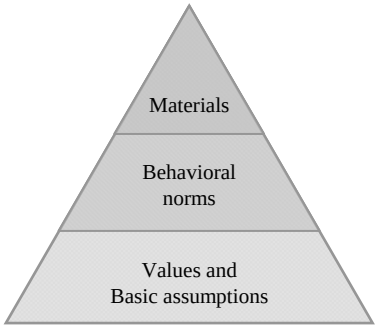

Figure1 The culture model applied to this study

2.2. Design and culture

Previous studies suggest a dynamic, interdependent relationship between design and its many cultural contexts. Moalosi at el. (2007) claim that the relationship between design and culture has taken many twists and turns throughout the last century, as design is seen both as a mirror and an agent of change. It is observed that modifications in the formers' evolution both reflect and determine developments in the latter [15]. A similar idea has been mentioned by Röse (2004) in simpler terms, he said "Design changes culture and at the same time is shaped by it [16]." Thus, design can play an active role toward culture, but at the same time, subjects to constant change of the cultural context.

2.3. Cultural diversity and product development

When cultural diversity is discussed in the field of product development, culture tends to be regarded as an issue to be addressed in the design process. Recently however, a broader viewpoint on the active use of culture and its diversity is gaining attention in industry. This development is based on the observation that diversity in teams allows them to tap into a broader array of relevant information, increasing comprehension of the implications of each potential path taken [17] [18].

This positive effect of cultural diversity has been discussed also in the context of product development. Jeong, I. (2003) suggests that the increased international diversification enables the firm to appropriate the benefits of innovations more advantageously by learning across markets [19]. Y. Q. Wang, et al. (2006) claim the benefit of integrating knowledge of engineers from different cultures on idea generation and creative problem solving [20]. These studies support the idea that cultural diversity can facilitate innovation in new product development.

2.4. Culture-inspired approach

In the preceding studies, some culture-specific insights were generated in the multicultural co-design team, which is consistent with theories on the effect of cultural diversity on the variety of perspectives. Therefore, it can be reasonably expected that the positive effect of cultural diversity will become apparent in the context of developing products with sustainability-conscious design.

The project-specific assumption made here is: "Looking at cultural diversity in daily practice can facilitate innovation in sustainable product development by increasing the variety of insights on everyday practices, which can be a source of inspiration for designers." In this study, the approach based on this assumption was named "Culture-inspired approach" and explored as an add-on feature of the practice-oriented co-design approach for sustainable innovation.

3. Method

3.1. Objective

In literature, no study was found that focuses on the value of paying attention to cultural diversity in designing sustainable products. Consequently, clear-cut approaches for collecting information on resource-consuming daily practices from multiple cultural groups are yet to be developed. Furthermore, no study has specifically identified what kinds of insights can be obtained from the collected information. Reflecting these backgrounds, this study explored the following two questions.

- How to collect information on a resource-consuming everyday practice from different cultures?
- What kinds of insights for sustainable innovation can be obtained from the collected information?

3.2. Approach

An experimental survey on an everyday practice in different cultures was used for this research. Like the preceding studies, this study is also geared toward developing more sustainable forms of bathing practices.

Determining the recording units of the survey is challenging since it is still not clear what kind of information is most useful in generating insights for sustainable innovation. Therefore, this survey was designed to collect data on a wide variety of elements. To create order in the data from the viewpoint of sustainable product design, the bathing practice was mapped according to the elements of culture as selected for this study. The three elements used are; 'Expectation', 'Action' and 'Water consumption'. Water is not the only resource consumed in bathing, but it can be regarded as the primary one. Furthermore, water consumption involves a variety of human actions, as opposed to for example the heating of the bathroom, and could therefore reveal larger diversity across cultures. Figure 2 and Table 1 indicate the definition of each element and the relationships among them.

The Netherlands, India and Japan were chosen as the target countries based on the results of an exploratory research that showed these countries have clearly different styles of bathing.

3.3. Procedure and materials

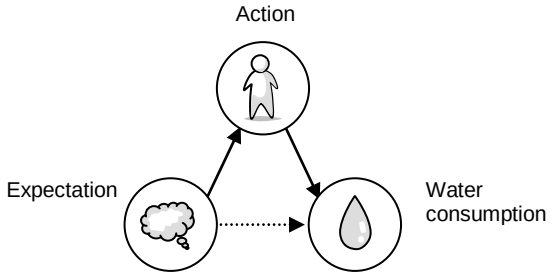

Figure2 Elements of Bathing Practice

Table 1 Definition of Elements

Expectation	An idea that tells what the participant want from daily bathing or the action taken while bathing. For example; Get clean, Get warm, Relax
Action	A single behavior or a sequence of behaviors taken while bathing. Described by; posture, movement, duration, product use and feelings
Water consumption	Amount of the water used for a bathing or each action taken while bathing. Described by either liters or duration of time for water-using actions

The procedure of the experimental survey can be divided into three steps. Firstly, information related to participants' profiles and their bathing practices were collected. Secondly, participants were asked to work on self-observation. Thirdly, participants take part in an

interview to and provide feedback on the survey supplement their self-observation results.

Step 1: Preparatory questionnaire. Consisting of a questionnaire of two parts; questions about participants' profiles and about their bathing practices. The results of this questionnaire were used to customize the probes for each participant in order to improve efficiency and outputs of their self-observations.

Step 2: Self-observation. The cultural probes that consist of two materials, a workbook and a recording format, were used in participants' self-observation task. Figure 3 shows the appearance of the culture probe.

Workbook 'Discovery in daily life': The workbook aimed to; 1) sensitize the participants to the bathing topic, 2) guide them to do self-observation, and 3) obtain feedback on the survey. It consisted of a set of homework tasks such as making a 'mind map' and 'timeline', an instruction for using the recording format, a task of taking photos and questions about the survey. It has two language versions, English and Japanese.

Recording format for self-observation 'Action cards': The A5-size recording format named 'Action cards' intended to enable participants to describe and depict their actions taken while bathing in structured way. This card set was worked as an add-on feature of the probe used in preceding studies, which aimed to improve the precision of the data on resource consumption.

Figure 3 Cultural probes

Step 3: Wrap-up and complement.
Feedback and Follow-up interview: The interviews with participants were held when collecting the cultural probes in order to obtain feedback on their self-observation. In addition, supplemental interviews with participants were held to complement their outputs if necessary.

3.4. Set-up

Participants: Three participants from three countries were recruited for this survey. People with an industrial design or user research background were given higher priority with the expectation that they will bring valuable comments on the survey from an expert's view point.
Communication: During the survey period, face-to-face meeting, phone and E-mail were available as means of communication with participants, and applied case-by-case basis responding to each participant's needs.
Duration: One and a half month was allotted for this culture survey.

3.5. Data analysis

This study applied two ways of analyzing the data collected from the experimental cultural survey. Firstly, a systematic analysis was applied to structured data from the preparatory questionnaire and action cards in order to discover the diversity of bathing practice among participants and classify them into several meaningful groups. Then, content analysis was applied to less-structured data like handwritten comments, sketches and pictures. It aimed to make cross-cultural comparison of contextual information on participants' personal bathing practices, such as procedure, posture and tools for bathing.

4. Results and discussion

4.1. Findings from culture survey

During the survey period, eight participants have completed the cultural probes, and the data on eleven bathing experiences was collected. According to the main facilities used for bathing, these bathing routines were classified into three major styles: 1) shower only, 2) bathtub only, 3) reservoir only. In addition, three combinations of these styles were observed, they were: 4) combination of shower and bathtub, 5) combination of shower and reservoir and 6) combination of three means. Clear cultural tendencies were detected in bathing style. For instance, 'shower only' was reported only by the Dutch participants while 'reservoir only' was reported only by the Indian participants. Combination styles were found only among the Japanese participants.

In the systematic analysis, the duration and the amount of water consumption were compared between different bathing styles. The results suggest that the total water consumption is not always proportional to the duration of bathing, but depends greatly on the bathing styles. While analyzing the data, a way of classifying actions emerged, they were: 1) actions with running water, 2) action with bathtub water, 3) action with water in a reservoir and 4) action with no water. Calculating the

duration of each action type showed that participants who use more time for 'actions with water in a reservoir' take shorter time for 'actions with running water.' This implies that an increase in the duration of 'actions with water in a reservoir' can offset the increase in the duration of 'actions with running water.' The systematic analysis also pointed out relations between contextual elements. For example, a clear relation between postures and use of tools was detected. Most of the actions with using the water in a reservoir were done when participants were sitting on a stool; i.e. there were few actions using a water reservoir with a standing posture. From these observations, the combination of using a water reservoir and a standing posture came to the surface as a possible new bathing style with lower resource consumption. Particular actions that have a considerable impact on the total water consumption named 'water-intensive actions' were also detected.

The content analysis brought out minor differences between bathing styles which can make an impact on the total water consumption. For example, the action 'leaving the water running for adjusting water temperature' was reported by all participants, but only Indian participants achieved the action without using extra water since they used a reservoir while adjusting the water temperature. It also highlighted 'water-wasting actions', which are the actions in which participants let the water running without using for their main task, e.g. brushing their teeth. It can be expected though that it was used for a non-explicit purpose such as keeping warm.

4.2. Kinds of insights

The insights gained from the culture survey can be divided into three types. The first one is insights into a variety of styles used to accomplish the everyday practice with their possible consequence on the total resource consumption (Figure 4).

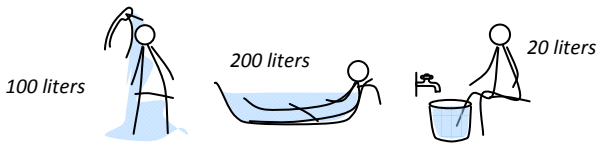

Figure4 Variety of bathing styles

This type of insights can offer an overall picture of the current situation and directions for sustainable innovation. The second one is insights into relations between contextual elements, for example the relation between a sitting posture and the use of tools. This type of insights can be useful in exploring new styles of practice by applying new combinations of contextual elements. The last one is the insights on particular actions that have a considerable impact on the total resource consumption. For example, the habit found with Dutch participants to extend their shower with several minutes just standing under the warm water. This type of insights can provide points of concern or focal points in designing new sustainable practices.

4.3. Survey methods

The cultural survey, using probe tools, worked well in collecting information about a private everyday practice from people in three different countries. Especially, describing the practice by a set of actions and recording the water consumption by each action brought rich information on the practice, which enabled the researcher to generate a variety of insights from a sustainability viewpoint.

At the same time, however, the pilot exposed a variety of challenges inherent to the method. The biggest challenge was how to standardize the definition of 'single action' among participants, especially because the definition of single actions can vary between different kinds of everyday practice. It requires an exploratory survey to identify a proper set of actions. Even when the actions are clearly defined, describing actions can be troublesome for participants. In particular, remembering the duration of each action was recognized as hard task for them. Cultural differences in the way of using resources brought another challenge. Measuring the water consumption of each action by the duration of the action worked only for participants who mainly use running water for bathing, and did not work for participants who mainly used water in a reservoir.

5. Conclusion and recommendation

Although collected from a small number of participants, the survey was successful in generating a variety of insights on different styles of bathing and their respective resource consumption. The three step survey method resulted in a rich source of data on the different actions involved in bathing and the experience and resource intensity of each of these actions. Furthermore, the clear differences between bathing styles in the different cultures strongly suggests that cross-cultural data collection achieves a wider variety of insights than a mono cultural survey.

A disadvantage of the survey method was the high demand on the participants. Giving a detailed account of ones bathing actions takes much effort and time. For more effective data gathering further study is needed to identify which elements play a crucial role in generating product ideas. Another option to relieve some of the burden on the participants is to investigate the use of different ways of

data collection, for example through video taping and sensor registration. The latter would also give more reliable information on actual resource consumption. However, for generating insights, such a detailed measurement may be obsolete. A final recommendation for further study is to make a more encompassing analysis of the resource consumption involved in the practice. Focusing on one major resource such as water in this study, may result in rebound effects in other resources such as space heating or cosmetics.

7. Acknowledgements

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