



MINDFULNESS AND RESOURCE-SENSITIVE DESIGN: A LITERATURE OVERVIEW AND AN AGENDA FOR RESEARCH

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Abstract

Mindfulness has aroused great interests in the past few decades and researches on mindfulness conducted have suggested that it is related to increase in awareness, creativity, quality decision-making, and sustainable behaviour in addition to many other benefits associated with it. As design is largely about decision-making and creativity and resource-sensitive design is related sustainability, there seems to be some correlation between mindfulness and resource-sensitive design. This paper presents a theoretical study on how mindfulness can be instrumental in resource-sensitive design and provides a research agenda on this topic.

Keywords: Creativity, Decision making, Design process, Mindfulness, Resource-sensitive design

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1 INTRODUCTION

Research on mindfulness has gained popularity in the past few decades but little has been done on how mindfulness affects design and in particular in the area of sustainable design. A systematic literature review by Siqueira and Pitassi (2016) showed that there is empirical evidence to prove that mindfulness brings about changes in individual cognitive mechanisms that will foster ecological concerns and creativity. They further proposed a “Mindfulness-based sustainability-oriented innovation model (MBSI)”. This paper presents a theoretical study on how mindfulness can be instrumental in resource-sensitive design and attempts to provide a research agenda on this topic. The goal of this paper is to study the literature and to propose hypotheses on how mindfulness might encourage resource-sensitive design.

Since mindfulness and design are two different subjects, the paper first present the relevant concepts that are related to design and then define what resource-sensitive design is. The concept of mindfulness and its benefits are then introduced in the paper. Next, the relationships between mindfulness and design in general are discussed followed by an analysis on how mindfulness might be useful to resource-sensitive design. The last part of the paper are the discussions on the related hypotheses, the research propositions and the proposed future research directions.

2 RESEARCH METHODOLOGY

Google Scholar Alert has been set up to monitor the academic literature related to “mindfulness”. The database of the Hong Kong Polytechnic University library was searched to identify publications bearing the key words. Key words used in the search are: resource sensitive, design process, design decision making, mindfulness, sustainable design, responsible design, and ecological design. The sources that we consulted for the literature study are: Science Citation Index Expanded, Scopus, Social Sciences Citation Index, ProQuest Dissertations and Theses, and Google Scholar. All records in these databases were searched and the search was completed at the end of November 2016. The literature was studied to identify the relevant concepts that are related to the topic of the paper.

3 PROCESS OF DESIGN

The design process is a complex process with multiple steps. Different models on the design process have been proposed. Atterberry (2000) suggested that the design process has the following steps: acceptance, problem definition, ideation, judgment, realization and analysis. According to the “Double Diamond Design Process” model developed by the UK Design Council, the design process consisted of 4 steps, viz. discover, define, develop and deliver (Council 2007). No matter what model is adopted, the design process will take into account the constraints imposed on the designed artifacts and services and resources inevitably are key constraints in the design process.

3.1 Design Decision-making

Design has many definitions depending on what type of design we are talking about but no matter what type of design, it is about decision-making (Bradley 2014). Design involves making chains of decisions which are connected together into a complex network (Dorst 2003). Alternatives, consequences and goals are the three elements in any design decision-making (Roozenburg 1995) and the designer has to decide on which alternative best meets the goals. Different stakeholders, including consumers of products, project leaders and companies, have different goals and these will affect the decision-making of the designer during a design process (Hansen 2004).

4 WHAT IS RESOURCE SENSITIVE DESIGN?

Attempts to search for the definition of “Resource-Sensitive Design” in the literature appeared to be futile. Instead, “Sustainable Design” and similar terms, including environmental design, environmentally sustainable design, environmentally conscious design, environmentally-sensitive design, environmentally responsible design, responsible design, ecological design, green design and bio-sensitive design which somehow are related to “resource” are found frequently in the literature. All the above terms look similar but they are not referring to exactly the same thing. Fletcher & Goggin (2001)

pointed out that the differences between these terms involve “issues of scale, ease of implementation, potential environmental benefits and the focus of design activity.” In order to better define what “Resource-Sensitive Design” is about, we focus on sustainable design.

4.1 Sustainable Design

According to McLennan (2004), sustainable design is “a design philosophy that seeks to maximize the quality of the built environment, while minimizing or eliminating negative impact to the natural environment”. This definition takes into account the economic, social and ecological impact. According to the US General Services Administration (GSA), principles of sustainable design consist of: the minimization of non-renewable energy consumption, the use of products that are environmentally preferred, the protection and conservation of water, the enhancement of indoor environmental quality, the optimization of site potential and operational and maintenance practices. The six principles of sustainable design introduced by Jones (2008) include: the respect for the wisdom of natural systems, people, place, cycle of life, energy, and natural resources and process. Though sustainable design is closely related to the environment, the concept of sustainable design is distinctly different from eco-design (Norman 2013). Eco-design involves paying attention to the use of materials, the processes, methods, etc. to achieve ecological efficiencies and to ensure that the “unavoidable waste” becomes the “raw material” of another process (Birkeland 1996).

4.2 Resource-Sensitive Design

Not only the definition of “Resource-Sensitive Design” is unavailable in the literature, the researches on the topic are also scarce. The terms resource sensitivity was mentioned in sustainability management (Madu 2012) and Gibson & Warren (2016) wrote about the resource sensitive global production network.

While sustainable design also includes sensitivity of resources, it is not equivalent to resource-sensitive design as it embraces other elements such as social impact, processes and methods. Resource-sensitive design seems to be more concerned with the optimal utilisation of resources, including financial, time and human capital. For design to be resource sensitive, it should also focus on the physical materiality and in particular paying attention to scarce and regulated natural resources. Natural resources include the capabilities of individuals (Comim *et al.* 2008). In actual practice, all design is resource-limited and resource is a constraint imposed on the designer during the design process. For a resource-sensitive design, during the design process, the designer will be required to put due weight on the resource when considering alternatives, consequences and goals in the design decision-making. Responsible and ethical decisions have to be made by the designer on how resources should be used in the design. Thus resource-sensitive design can be considered as category of design under the umbrella of sustainable design that focuses on resources.

Other than relating to the design process, another plausible definition of resource-sensitive design is related to the product itself. A sustainable design is a product that is economically viable and significantly reduces “important environmental and societal concerns” (Ramani 2010). Similarly, a resource-sensitive design can be one that induces behaviour change such that the user will become more sensitive to limited resources. The focus of this definition is on the effect on the user of the design rather than on the designer.

For the purpose of this paper, resource-sensitive design refers to the decision-making by the designer during the design process rather than the product itself.

5 WHAT IS MINDFULNESS?

5.1 Overview

In the past three decades, thousands of studies have been conducted on mindfulness and a vast amount of literature is available in a number of fields on mindfulness, but the majority of them are related to mental and physical health. Mindfulness research basically falls into two categories: studying contemplative mindfulness or socio-cognitive mindfulness. Contemplative mindfulness is related to work like Kabat-Zinn (1990) who used the traditional Buddhist meditation as a base for practising mindfulness and using breathing and body sensations as the main object of attention. According to Chambers *et al.* (2009), “mindfulness meditation involves a systematic retraining of awareness and non-

reactivity, leading to defusion from whatever is experienced, and allowing the individual to more consciously choose those thoughts, emotions and sensations they will identify with, rather than habitually reacting to them". The research on social-cognitive mindfulness is represented by Langer who defined it as "a process of drawing novel distinctions, with an emphasis on situational awareness and context" (Langer, E.J. & Moldoveau, M., 2000). The mindfulness techniques under this category are about noticing "new things" or "differences" about familiar objects, persons or even situations; engaging in new ways through skilful actions; embracing uncertainty by relabelling "truths" as probability statements. The difference between the two types of mindfulness is that contemplative mindfulness suggests effects resulting from practice over time and socio-cognitive mindfulness concerns "immediate heightened state of involvement and wakefulness or being in the present" (Rojas, F., English, S., Young, R., Spencer, N. 2015; Langer, 2000).

5.2 Related Concepts

The term mindfulness has a two-fold meaning. It can be considered as a state of mind or as a practice. Mindfulness (as a mind state) can be cultivated by practicing mindfulness (as a method) (Rojas, F., English, S., Young, R. & Spencer, N. 2015).

Mindfulness is also considered as a "way of being" (Shapiro, S.L., Wang, M.C., & Peltason, E.H., 2015) which stays with the present moment and is considered to be non-judgmental (Kabat-Zinn 1990). Killingsworth and Gilbert (2010) discovered that about 47 percentage of the time, people's minds are wandering about the past or the future instead of being in the present moment where production, creation and innovation occurs. Mindfulness meditation trains our moment-to-moment awareness so that we can remain in the present moment.

In relation to mindfulness, Langer (2014) discussed the concept of mindlessness. She considered that the various causes of mindlessness include the influence of context, education for outcomes, the notion of linear time, beliefs in limited resources, premature cognitive commitment and repetition.

5.3 Benefits of Mindfulness

Studies on mindfulness have unearthed numerous benefits of it in different aspects including health, social relationships and performance improvements. The major benefits are related to stress reduction and mental health. A review of psychotherapy related research on the benefits of mindfulness by Davies and Hayes (2011) shows that there are affective benefits which include emotion regulation, decreased reactivity and increased response flexibility; interpersonal benefits which include relationship satisfaction, act with awareness in social situations; and intrapersonal benefits which include enhanced self-insight, morality, intuition and fear modulation, increased immune functioning, reduce psychological distress and anxiety, decreased effort in carrying tasks and increased speed in processing information.

As regards performance in the workplace, mindfulness is linked to high-level performance (Goleman 2013). It helps to foster calmness, clarity and concentration (Walsh and Shapiro 2006). It can create attuned, empathic internal and external environments (Shapiro, S.L., Wang, M.C., & Peltason, E.H., 2015) and is found to have positive influence on cognitive, psychosomatic and emotional aspects of the workers and thus raising productivity, boosting creativity and innovation, enhancing decision-making and leadership and improving social relations (Langer 2014, Ribera 2014).

As far as design is concerned, the benefits of mindfulness that are seemingly related to design are: increase in awareness, creativity, empathy, and better decision making. Sundararajan and Fatemi (2015) defined mindfulness as "strategies of metacognition that facilitate the process of symmetry restoration in cognition". This definition suggests mindfulness has an "intrinsic connection" to creativity. Colzato et al. (2012) have shown that focused-attention meditation and open-monitoring meditation exert specific effect on creativity and these two types of meditation are the main techniques in mindfulness practice. Ostafin and Kassman (2012) have demonstrated that there is a direct relationship between mindfulness and creativity through their study on insight problem solving. Studies by Hafenbrack et al (2014) suggest that mindfulness helps to reduce the sunk-cost bias and prevent the "unrecoverable prior costs" to influence current decisions. The study by Moore and Malinowski (2009) suggests that attentional and cognitive performance are positively related to level of mindfulness.

Benefits of mindfulness that are related to sustainability are also found in the literature. Various studies have shown that mindfulness have positive correlation with increase in awareness, compassion, creativity, empathy, ethical decision-making and sustainable behaviour. Scharmer and Kaufer (2013)

are of the view that the quality of results produced by any system is directly related to the quality of awareness of the operator of the system. As mindfulness raises awareness, it therefore improves quality of result. Karelaia & Reb (2015) are of the view that mindfulness has positive effect on making high-quality decisions and judgment. Researches on literature revealed relevant empirical works that link mindfulness to ethical decision-making (Ruedy and Schweitzer 2011, Shapiro *et al.* 2012) and ecological concerns (Barbaro 2016, Barber 2016). Amel *et al.* (2009) conducted an empirical research and found that self-reported sustainable behaviour involves “acting with awareness”. Brown and Kasser (2005) found that mindfulness and intrinsic values were related to higher well-being and more sustainable behaviour. Mindfulness-based training has been found to enhance self-compassion (Shapiro, Astin, Bishop, & Cordova, 2005; Kingsbury 2009). Lim *et al.* (2015) also found that there is positive influence of mindfulness on compassion. A number of researches have been conducted based on the assumption that mindfulness meditation promotes empathy (Andersen 2005; Fulton, 2005; Walsh & Shapiro, 2006) and researches using different methods have supported this assumption (Shapiro, Schwartz, & Bonner, 1998; Aiken, 2006; Wang, 2007). Researches also support the notion that inducing empathy creates more “environmentally friendly” attitudes (Berenguer, 2007; Schultz, 2000).

6 MINDFULNESS AND RESOURCE SENSITIVE DESIGN

6.1 Mindfulness and Design

Design is largely related to decision making. In the design process, the state of mind of the designer and his/her decision making play a key role. Mindfulness is considered as a state of mind which is clear, open and with high awareness and also enable quality decision making. Thus it should be positively correlated with the design process. Various researches have revealed how mindfulness can have influence on the designers.

In their study to improve the understanding of the dynamic development of designers’ professional self-awareness, Rojas *et al.*, (2012) came up with the concept of “stillness” which is defined as “mindful awareness and reduced habitual reaction”. With this mindful state, the designer can become more open to the full potential of the design situations. Rojas *et al.*, (2015) presented the idea of a Systemic-Mindfulness Device that will be useful in Design Education and help increase the inner awareness of designers.

In his PhD study, Spencer (2009) concludes that “peace of mind” is important to expert designers in their work and “peace of mind” is in part related to making the world a better place. He also brought out the benefits of attaining the state of stillness and mindfulness that are relevant to designers, including focus, presence and empathetic recognition.

Akama (2012) argued that the transformative process of a designer to a human-centred practitioner could be achieved by continual reflection of his/her activity, behaviour and relationship with others which would result in increase in self-awareness. Mindfulness practice will assist in this transformative process. She further pointed out that by being able to be “open” when looking at things in a new way and be “awake” to possibilities, seemingly unrelated things can have synergy with each other.

Niedderer (2007, 2014) developed the idea of mindfulness in design based on work of Langer (1997, 2000). It focuses on the design object and is used to describe how the object can facilitate mindful attention to how it is being used and the consequences of the usage.

Young (2012) suggested that “metic” tendencies contribute to design’s current dysfunctions which leads to distrust, loss of empathy, ambiguity and subterfuge of the designers in the design process. “Metic” tendencies are related to mindlessness and is described by Raphals (1992) as a state of mind or mode of action that is acquired by repeating similar tasks for a long time and often displayed unconsciously. The issue of mindlessness in designing was also raised by Akama and Light (2015). They suggested that mindlessness in design may result in poorly considered ecological outcomes. They considered that designing in a mindful way may raise awareness of “unsustainable impacts”.

6.2 Mindfulness and Resource Sensitive Design

As discussed earlier, for a resource-sensitive design, the designer will be required to put due weight on the resources in the design decision-making and he/she should make responsible and ethical decisions on how resources can best be deployed in the design process. The literature review indicated a number of characteristics of mindfulness that seem to be related to resource-sensitivity.

According to Pronin (2007), human judgment and decisions are “distorted by an array of cognitive, perceptual and motivational biases” and so a design will be related to the designer’s biases which they may not be aware of. By increasing the designer’s awareness, mindfulness can help the designer to be more conscious of his/her biases and come up with designs that are more resource sensitive. Without following the routine and being creative through mindfulness, a designer will be able to become more sensitive to resources in the design process.

Values are important in design. The designer’s value system will inevitably affect his/her design as the design process involves subjective value judgment (Lawson 1997). A designer’s value system will affect all aspects of the designing process (Rojas 2015). Values are inscribed in the designers’ practices and to be able to be reflective of the others’ values, the designer must first be aware of his/her own values (Akama 2008). Resources are related to value and if the designer is mindful, he/she will be aware of the value of the resources and thus be more sensitive to it during the design process. According to Langer (2000), mindfulness is about drawing novel distinctions and the consequences is related to enhanced sensitivity to one’s environment; openness to information; enhanced awareness to different perspectives; and creation of new categories for perception. All these qualities are essential for the designer to be sensitive to resources during the design process.

Being mindful is about being more aware of not only the inner self but also the environment. Although there is so far no research to show that there is any relationship between mindfulness and resource-sensitive design, studies have already suggested that mindfulness might encourage pro-environmental behaviours. Mindfulness has been found to have positive effect on well-being and empathy and promotes awareness of individuals’ “true” value and these can turn into more sustainable behaviour (Ericson *et al.* 2014).

Based on the literature review done by Ericson *et al.* (2014), it was suggested that promoting mindfulness practice will contribute to more sustainable ways of life. The study also suggested that as mindfulness is about being in the present which gives rise to stronger empathy and compassion and also facilitates clarification of goals and values, it will help avoid the “hedonic treadmill”. The findings of Chambers *et al.* (2009) on mindfulness meditation also helps to support that a mindful person will be able to consciously choose their thoughts and be more sensitive in resources when making decisions. It is believed that a mindful designer with sustainable behaviour is more sensitive to resources and will be able to come up with resource-sensitive design.

At every stage of the design process, ethical (or unethical) decisions are made by the design professionals (Birkeland 1996) and in particular in resource-sensitive design, ethical decisions should be made. The notion that mindfulness, which helps to promote empathy and trust, addresses ethical behaviour consideration and support social responsibility was suggested by Young (2012). This is an indication that mindfulness will help in making ethical decision during the design process.

Mindfulness is a key mechanism for design that leads to social behaviour change. A mindful design will enable conscious decision-making. The goals and approaches for design for behaviour change are mostly driven by the need to conserve the worlds’ limited resources (Niedderer 2013). As such, mindfulness is also a driver for resource-sensitive design. For designers to be able to come up with resource-sensitive design, he/she should also be sensitive to the deployment of resources during the design process.

7 DISCUSSIONS

From the reviewed literature, it can be deduced that the components of mindfulness that are related to resource-sensitive design include: awareness, compassion, creativity, empathy, ethical decision-making and sustainable behaviour. From these, two hypotheses are derived which are as follows:

Hypothesis 1 (H1) - A mindful designer is empathetic, compassionate and acts in a sustainable manner and he/she can show high awareness of the value of resources in his/her design.

Hypothesis 2 (H2) – A mindful designer is ethical in decision-making leading to resource-sensitive design.

H1 hypothesizes that if a designer is mindful, he/she has a high awareness of the value of resources because he/she is empathetic, compassionate and acts in a sustainable manner. It is used to hypothesize the process of design. On the other hand, H2 hypothesizes that if a designer is mindful, he/she is ethical in decision-making and can come up with designs that are sensitive to resources. It is about the outcome if a designer is mindful.

Testing of these two hypotheses will involve first establishing the level of mindfulness of the designers, which can be done by validated self-reporting surveys. Bergomi (2012) showed that there are at least seven scales available to measure trait mindfulness. In an experimental approach some of the designers will be trained with mindfulness-based intervention and their level of mindfulness measured again to make sure that they have become mindful. For H1, the next step is to establish whether the designer bears the quality of empathy, compassion and acting in a sustainable manner and also whether he/she has high awareness of the value of resources when designing. For H2, it is necessary to prove that the designer is ethical in decision-making and the outcome of the design is a resource-sensitive design. For testing both hypotheses, qualitative methods using interviews and observations are recommended. They will then be given a design problem and their process of design and the products will be checked to see if they exhibit the qualities as described in the hypotheses.

8 FUTURE RESEARCH DIRECTIONS

Although the current research points to the direction that mindfulness can have a positive effect on resource-sensitive design, it is only derived from the findings of researches in other areas like meditative practices, social psychology, sustainability and decision-making. The current research on literature has arrived at the two hypotheses relating to the design process and design outcome as stated above. These hypotheses will need further empirical tests to find out whether or not they can be accepted. The state of mind of the designer during the design process; how resources are related to this state of mind; the level of sensitivity to resources and the factors that will affect it; which factors will affect the designers' sensitivity to resources and how they affect the designer, are areas for research. The test mentioned above is just a high level approach and it is clear that many considerations need to be taken into account in conducting the actual tests.

The testing of the hypotheses can be quite complex. As a start, tests can be done with students in design schools and later extend to professional designers. The level of mindfulness that will have effect on the resource-sensitive design is also an aspect worth studying. It would be interesting to study whether in certain countries, mindfulness will make a bigger change in resource-sensitive design as against countries where its nationals are more mindful in general. Studies can also be done with design award winning teams to test their level of mindfulness. Whether there is a gender difference for resource-sensitive design is yet another possible research.

9 CONCLUSION

The review of literatures on mindfulness and sustainable design have revealed that certain mindfulness traits are useful for sustainable design. As resource-sensitive design is considered as a category of sustainable design which focuses on resources, mindfulness is expected to have a similar positive effect. The lack of empirical tests on the effect of mindfulness on design and in particular resource-sensitive design provides good opportunities to further research on this area. This paper presents two hypotheses and suggests directions for future research. The research on this topic will be challenging as both mindfulness and design have their own ontologies and trying to establish a causal relationship between them is not an easy task. Nevertheless, the establishment of a positive relationship between mindfulness and resource-sensitive design will offer a valuable means for designers to further enhance themselves in making sustainable design as it has already been shown that the state of mindfulness can be attained through mindfulness meditation and practices.

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