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Design Thinking: Construction of a Meme-Based Model for Culture-Specific Design

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Abstract

Designers across the globe are facing challenges to incorporate cultural elements in design process. There is limited research from design perspective that focuses on integrating culture in design thinking. The literature review carried on for this study indicates that there is very less systemic approach to identify and assimilate the cultural elements in design process. Thus, the aim of this study is to construct a model for cultural-specific design based on basic units of cultures, i.e., memes. The model mainly consists of three phases: identification of cultural units, evaluation as memes and incorporation in design thinking process. The constructed model provides a new way of understanding users' need for developing culture-specific design.

Keywords Design models · Design methodology · Design research · Design studies · Culture-specific design

Introduction

Design thinking is defined as a human-centred approach to innovation that is anchored in understanding customer's needs, rapid prototyping, and generating creative ideas (Brown, 2021). The term 'design thinking' has gained popularity (Dorst, 2011) since Rowe used it as the title of his book (Rowe, 1987). The process of design thinking composes of various phases such as empathize, define, ideate, prototype,

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test and implement (Plattner et al., 2010). Although several researchers (Banfield et al., 2015; IDEO, 2015; LUMA, 2012) have employed different terms for the main phases of design thinking process, all of them advocate a similar iterative sequence of activities (Ericson, 2021). At the initial phases, observational and information-gathering methods are used to empathize with a target user. In intermediate phases, divergent thinking method is used to generate creative ideas. Subsequently, convergent thinking method is used to narrow the focus to a particular idea to test. In final phases, prototypes are developed to conduct experiments and obtain feedback from users. The resulting feedback is used to validate the original research-based assumptions or hypotheses and to make improvements to the initial prototype. At present, design thinking is identified as a new paradigm for dealing with problems in many professions, most notably information technology (IT) and business (Dorst, 2011). The global technological marketplace demands to address international and local target audiences (Young, 2008a, b). It has been noticed that, in reaction to globalisation, an opposite trend is emerging within design, which promotes local identity and highlights cultural values and traditions (Moalosi & Hickling-Hudson, 2007). Therefore, designers are encouraged to cultivate cultural diversity through localisation of products in the face of globalisation. Consideration of cultural factors may prepare the way for diversification of design concepts (Moalosi & Hickling-Hudson, 2007). The current design approaches fall short with respect to integrating cultural context in the design process. There is hardly any proper theoretical model or framework for culture-specific design found (Kersten et al., 2000). Although IDEO has recently developed a cross-cultural design-thinking course in the context of products that is expected to work across cultural boundaries in the field of healthcare (Ferreira et al., 2020), there is lack of model or framework that will help to identify cultural unit. Such a model is required to address how the core components of culture can be embedded in the design process (Moalosi & Hickling-Hudson, 2007).

Models of culture have traditionally been constructed to explain humanity and planetary existence, explore diverse learners and learning and provide a framework for cross-cultural analysis, research and design (Young, 2008a, b). In the field of design, models of culture act as databases for gathering information pertinent to the needs of a target audience (Nielsen, 1996) by aiding designers to understand the cultures and cultural context of their users. From the design perspective, Lee (Lee, 2004) proposed a culture structure with three layers such as basic assumptions, values and artefacts. However, according to an earlier researcher, it is hard to draw a precise line between the notions of 'basic assumptions and values' (Spencer-Oatey, 2000). The researcher (Spencer-Oatey, 2000) developed four layers of model including (i) basic assumptions and values; (ii) beliefs, attitudes and conventions; (iii) systems and institutions and (iv) artefacts, products, rituals and behaviour. The basic assumptions and values form the inner core layer of culture that is intangible, whereas beliefs, attitudes and conventions' form the second inner layer, i.e. tangible. These inner levels influence the outer two levels to consist of behavioural and non-behavioural patterns of human beings. Similarly, for studying cultural objects, researchers (Leong & Clark, 2003) have developed a framework with three special levels: the outer 'tangible' level, the mid 'behavioural' level and the inner 'intangible' level. In the study of culture-oriented product design (Moalosi & Hickling-Hudson, 2007), culture has been defined as a shared set of three

phases. The first phase deals with the identification of the sources of socio-cultural factors and their categorisation. The next phase is the integration of socio-cultural factors in the design process. The last phase consists of the output that is cherishability in culturally orientated design. In tandem with it, the framework for studying cultural objects was summarised into three layers (Hsu et al., 2011): physical or material culture, (2) social or behavioural culture and (3) spiritual or ideal culture. In accord with previous studies, these cultural objects can be incorporated into cultural design, as follows: (1) the inner level containing special content such as stories, emotion, and cultural features; (2) the mid-level containing function, operational concerns, usability and safety and (3) the outer level dealing with colours, texture, form, decoration, surface pattern, line quality and details (Hsu et al., 2011). However, the earlier researcher has argued that, in the design process, designers tend to overlook incorporating the inner core layers of culture, and most of the products are designed based on the outer layer of culture (Lee, 2004). In this view, it is necessary to develop a cultural model based on 'cultural units' that are able to represent elements from inner to outer layers of cultures.

Methodology

Design thinking has co-evolved across a variety of disciplines and industries (Luchs et al., 2016). Over time, the best and most generalizable methods and practices have emerged and converged in a quasi-Darwinian process of natural selection. To sustain through the Darwinian principle, any evolving process needs a replicator (Blackmore, 2000). In biological systems, the most familiar replicator is the gene. Analogous to gene, evolutionary biologist Richard Dawkins coined the term *memes* (Dawkins, 1989) to illustrate the principles of universal Darwinism in cultural context. In his book 'The Selfish Gene', Dawkins has defined *meme* as a unit of cultural transmission or a unit of imitation (Dawkins, 1989). Further, Dawkins has described the term imitation as replication. As in biological evolution, genes are replicators floating around in a gene pool by leaping from body to body, so in cultural evolution, memes propagate in the meme pool by leaping from brain to brain. Thus, a meme is a cultural replicator, i.e. an element of culture such as a tradition, belief, idea, melody or fashion that can be held in memory and transmitted or copied to the memory of another person (Heylighen & Chielens, 2009). The earlier researchers (Pocklingtona & Best, 1997) have described cultural replicators as the largest units of socially transmitted information that reliably and repeatedly withstand transmission. According to Dawkins (Dawkins, 1989), any successful replicators consist of three characteristics:

- Longevity: the longer any instance of the replicating pattern survives, the more copies can be made of it.
- Fecundity: the faster the rate of copying, the more the replicator will spread.
- Copying-fidelity: the more faithful the copy, the more will remain of the initial pattern after several rounds of copying.

For culture-specific design, it is important to find out the cultural units, which will satisfy the above-mentioned characteristics. It should be noted that the term
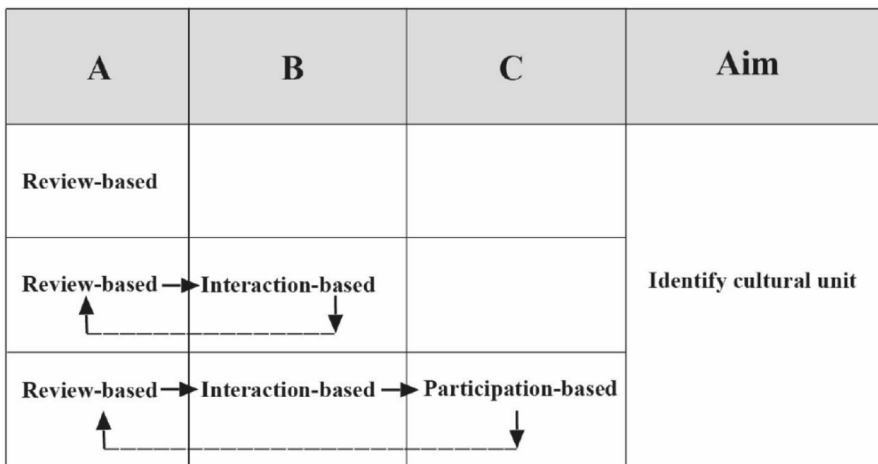
'meme' is adopted in this present study by following the academic definition of it (Dawkins, 1989), and hence, it does not include the "Internet meme" that is widely in use by the netizens. As pointed out by the researcher (Shifman, 2013), an Internet meme may spread in its original form, but it often also reproduces user-created derivatives. Thus, it does not obey the 'copying-fidelity' as well as the 'longevity' characteristics of a successful replicator. In this present study, only the cultural units that fulfil the main three characteristics of replicators (Dawkins, 1989) will be considered as meme.

Identification of Cultural Units

A cultural unit can be identified through three possible types of design research method (DRM) such as review-based study, interaction-based study and participation-based study. DRM is not to be interpreted as a set of stages and supporting methods to be executed rigidly and linearly (Blessing & Chakrabarti, 2009). Researcher/designer may escape any step depending on their research need. The three phases of studies for the identification of cultural units are as described as follows (Fig. 1).

A) Review-based study:

> A review-based study is based on the review of the literature and review of any secondary data resources like oral and visual. The purpose of a literature study is to analyse critically a segment of a published body of knowledge through summary, classification and comparison of prior research studies. The literature consists of three layers of knowledge (Galvan & Galvan, 2017). The first layer of knowledge mainly contains the primary

A	B	C	Aim
Review-based			
Review-based → Interaction-based			Identify cultural unit
Review-based → Interaction-based → Participation-based			

Fig. 1 Design research method for identifying cultural units: Based on the research need, cultural unit can be identified through three types of design research methods such as review-based study, interaction-based study and participation-based study

studies that researchers conduct and publish. The second layer extends reviews of primary studies by summarizing and offering new interpretations. The third layer consists of perceptions, conclusions, opinion, and interpretations that are shared informally that become part of the lore of the field. Hence, the literature review is designed to provide an overview and synthesis of pertinent sources (Fink, 2014).

B) Interaction-based study:

The interaction-based study is based on the practices adapted from social anthropology and ethnography. It helps to capture the real-life situations, social meanings, and ordinary activities of people. Ethnography study is one of the principal research methods in the social sciences and foremost in the repertoire of qualitative researchers (Hammersley & Atkinson, 2007) (Brewer, 2000) (Saukko, 2003).

C) The participation-based study:

A participation-based study is based on the *design it yourself* (DIY) method. This method will help to capture common attributes of the culture including culture-related preference for design and style of a product. The DIY method was developed to study cultural differences based on a comparison between two cultures (Christiaans & Diehl, 2007). The DIY method can be applied while conducting participatory research or workshop. In participatory research, local knowledge and perspective can be identified through sequential reflection and action carried out by local people (Cornwall & Jewkes, 1995). Also, as a part of participatory research, participants may conduct a workshop on a selected topic and share their ideas with the researchers and team members. Researchers can obtain common attributes of any culture while participants express their own beliefs and preference on a particular topic. Although the DRM has become a mature academic field, it still suffers from a lack of confidence in it by design practitioners, and it has had little practical application (Cross, 1993). The memetic perspective on culture is complementary to the traditional social science perspective of DRM, which focuses on the characteristics of the individuals and groups rather than on the characteristics of the information being communicated (Heylighen & Chielens, 2009). As culture is a dynamic process shaped by beliefs and practices, in many cases, this dynamism can be modelled more simply from the memetic point of view than by analysing individual or group characteristics as discussed in the next segment.

Result

Model Based on Cultural Units

The introduction of the memetic perspective of cultural evolution has led to generate several models of cultural evolution for studying the propagation of memes (Heylighen & Chielens, 2009). Most of these models are either purely theoretical

(Blackmore, 2000; Dennett, 1995; Flinn & Alexander, 1982; Hull, 1982; Lake, 1998) or mathematical (Boyd & Richerson, 1985; Lumsden & Wilson, 1981; Lynch, 1998) and computational (Best, 1997; Bull et al., 2001; Gabora, 1995) in nature. However, as per knowledge, no models have been developed yet to incorporate the memetic perspective of culture in culture-specific design thinking. Cultural evolution process from a design perspective can be systematically modelled by identifying the structures of memes. Heylighen (Heylighen, 1999) proposed a four-stage model to analyse the mechanics of meme replication:

1. Assimilation by an individual, who thereby becomes a carrier of the meme
2. Retention in that individual's memory
3. Expression by the individual in language, behaviour or another form that can be perceived by others
4. Transmission of the thus created message to one or more other individuals

The transmission stage is again followed by assimilation stage, thus closing the replication loop. At each stage, there are selection criteria, which means some memes will be successfully assimilated, retained, expressed or transmitted, and others will be eliminated. In his study, Heylighen (Heylighen, 1999) has expressed the overall survival rate of a meme *m,* as the meme *fitness F(m).* This fitness has been expressed in a simple mathematical model as follows:

$$F(m) = A(m) \cdot R(m) \cdot E(m) \cdot T(m)$$

A denotes the proportion of memes independently discovered by the host that are assimilated $[A \leq 1]$.

R represents the proportion of these assimilated memes that are retained in memory $[R \leq 1]$.

E is the number of times a retained meme is expressed by the host $[E > 1]$.

T is the number of copies of an expression that is transmitted to a potential new host $[T > 1]$.

From this expression, it can be noted that *F* becomes zero as soon as one of its components (*A*, *R*, *E*, *T*) is zero. Thus, a meme must successfully pass through all four stages to replicate.

In the design field, researchers come from the various fields of studies that span across science, engineering and fine arts. Thus, there might be difficulties for adopting a purely mathematical model in this multi-disciplinary field. Hence, a model needs to be developed to serve the purpose of designers across various disciplines to incorporate the memetic perspective of cultural evolution in the culture-specific design process.
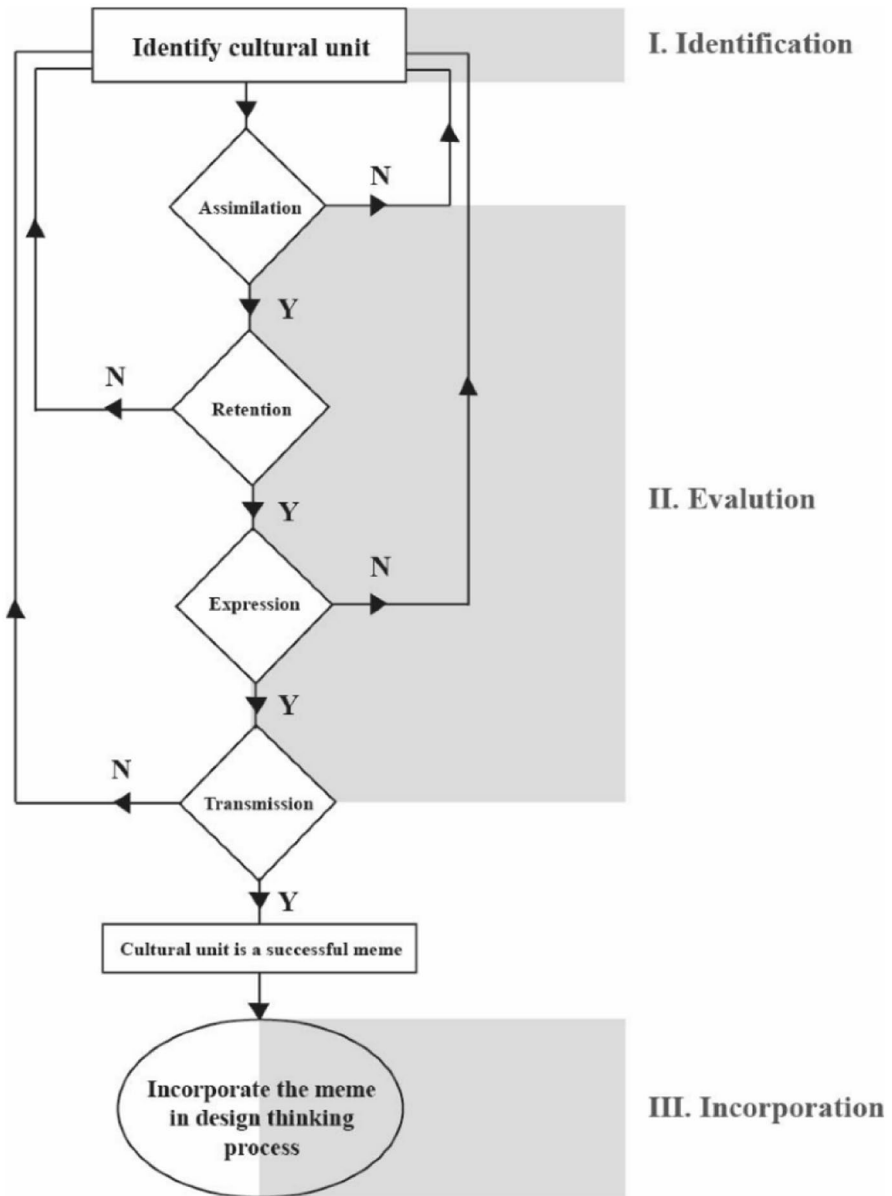
Fig. 2 Model for culture-specific design

Construction of Model for Culture-Specific Design

To incorporate the memetic perspective in culture-specific design thinking process, a model has been developed based on the mathematical expression defined by Heylighen (Heylighen, 1999). The constructed model is represented in the form of the

algorithmic flow chart as shown in Fig. 2. The model primarily consists of three phases, such as (i) identification, (ii) evaluation and (iii) incorporation.

i. Identification

The first phase of the model is the identification of cultural unit. It can be carried out by following the methodologies (Fig. 1) as described in "Methodology". After identifying the cultural unit, it is needed to verify whether the units of selection successfully represent memes. To understand the working principle of the model, an example of a cultural unit needs to be cited. In the Indian cultural context, 'Atithi Devo Bhava' (Swarvananda, 1921) or 'the guest is God' could be identified as a cultural unit. This phrase is part of a Sanskrit mantra scripted in 'Taittiriya Upanishad' (6th Century BCE) and still considered as norms while welcoming guests in Indian society. To evaluate the phrase as a successful meme, it must pass the evaluation phase as discussed below.

ii. Evaluation

To verify a cultural unit as a successful meme, it has to pass the evaluation phase (assimilation, retention, expression and transmission) as shown in Fig. 2.

The first stage of evaluation of the cultural unit as a meme is assimilation. To be assimilated, a cultural unit must be respectively noticed, understood and accepted (Heylighen & Chielens, 2009). In the present example, the idea of the guest is God is historically embedded in Indian culture and still in use as a tagline for promoting tourism in India. The host or the carrier of the cultural unit easily notices and understands this idea and willingly accepts it. Thus, it could be said that the phrase Atithi Devo Bhava is successfully assimilated in Indian society.

The second stage is the retention of the cultural unit in memory. It is similar to Dawkins's longevity characteristic for replicators, i.e. the longer any cultural unit survives, the more opportunities it will have to spread further (Heylighen & Chielens, 2009). Among all successfully assimilated cultural units, only a few are retained in memory. For example, there are so many noticeable ideas mentioned in age-old Indian scriptures, but a very few retain in memory for a longer time. The idea of the guest is God is successfully retained in the memory of hosts through recurrent assimilation of it.

After retention, in the next stage, a cultural unit must emerge from individual memory and perceived by others through expression (Heylighen & Chielens, 2009). The common means for expression are speech, text, pictures, behaviour and artefacts. In the present example, the host does not consciously communicate the phrase Atithi Devo Bhava to the guest; rather, it is expressed in behaviour and gestures.

Finally, to be a successful meme, a cultural unit must be transmitted generations after generations without deformation. The transmission stage is the one where the contrast between successful and unsuccessful memes is largest, and where the selection of cultural unit can have the largest impact (Heylighen & Chielens, 2009). Since immemorial time, the idea of hospitalising guest with respect of God prevails in Indian culture. The idea is transmitted through several generations by satisfying copying-fidelity characteristics of a meme. Thus,

it can be stated that the identified cultural unit the guest is God is a successful meme in the Indian cultural context. In this way, through four stages of verification, identified cultural units can be evaluated as successful memes. A cultural unit must pass each step of the evaluation process. If the identified cultural unit does not satisfy any of the evaluation steps, then it will not be considered as a successful meme. Failing to satisfy any step, return to the first phase (identify cultural units) of culture-specific design model is shown in Fig. 2.

iii. Incorporation

After the evaluation process, the successful memes need to be incorporated into the early phase of design process (e.g. empathy) for the execution of the culture-specific design. For final execution, a researcher/designer can follow the conventional design thinking process to reflect the memetic perspective of culture in their design.

Evaluation of Culture-Specific Design Model

A study has been conducted to evaluate the constructed model for culture-specific design. Feedbacks from various domain experts (such as visual communication, architecture, product design, interaction design, fashion design, industrial engineering, etc.) have been collected. The following questions were asked to the participants to understand whether the model is helping in ideation phase of culture-specific design.

- Does this model help you to identify and evaluate the cultural units?
- Does this model help you in Ideation phase of a culture-specific design?

The participants have responded that the model helps to categorize different kinds of cultural units based on the extent of how much it is used. It also helps to recall and reflect on how a particular cultural unit has died out with time or has improved its longevity. The participants have also mentioned that the model helps the designer to take decision for generating concepts in ideation phase by understanding how much a particular community has understood and passed on the essence of identified cultural unit. Following the constructed model, the participants have identified the memes and have gone through brainstorming session as shown in Fig. 3:

It can be seen from Fig. 3 that participants were able to identify cultural unit that has fulfilled longevity, fecundity and copying fidelity criteria of a defined meme. In Fig. 3A, the participant has identified motif of lotus as a cultural unit as it can be found out in 'Madhubani' art form, i.e. a folk-art form of India. On the other hand, in Fig. 3B, the participant has identified Kwai (Beetle-nut) as a cultural unit. As described by the participant, Kwai is the combination of a neatly folded betel leaf smeared with a generous dose of lime and areca nut, which is chewed with the optional tobacco leaf. While chewing Beetle-nut is common in India, the state of Meghalaya has a very special relationship with it. The offering of Kwai to a guest is regarded as a welcoming gesture which has a deep connection with Khasi folklore. This welcoming gesture is followed by all the people in that region irrespective of

(A) Identified cultural unit: Lotus   **(B)** Identified cultural unit: 'Kwai' (Beetle-nut)

Fig. 3 Glimpses of brainstorming sessions in ideation phase. **A** Identified cultural unit: Lotus. **B** Identified cultural unit: 'Kwai' (Beetle-nut)

their religious or economic backgrounds. Thus, the identified cultural unit can be termed as cultural meme due to its transmission and retention in a particular community for a longer duration without any distortion. The participant has suggested that the identified meme can be applied to culture-specific product design (e.g. Fridge magnet, wall art, keychain etc.) in the incorporation phase. Hence, after completing the first two phases of constructed model, i.e. identification and evaluation, participants proceeded toward the third phase, i.e. incorporation. Figure 4 depicts the incorporation of memes into culture-specific design.

A participant having expertise in visual communication has identified 'Kulo' (Rice grain cleaner of Bengal) as a meme (Fig. 4A). Kulo is used in various rituals in Bengali community. It is a symbol of auspiciousness that has been transmitted generation after generation with copying fidelity. Thus, the identified meme was applied

(A) Packaging design with identified meme 'Kulo' (Rice grain cleaner of Bengal)   **(B)** Book cover design with identified meme 'Punyakoti' (Kannada folk song)

Fig. 4 Glimpses of incorporation of identified memes in culture-specific design. **A** Packaging design with identified meme 'Kulo' (Rice grain cleaner of Bengal). **B** Book cover design with identified meme 'Punyakoti' (Kannada folk song)

in culture-specific packaging design. Figure 4B represents design ideation of book cover based on 'Punyakoti', a Kannada folk song. A participant having expertise in design thinking has identified Punyakoti folk song of Kannada as a meme. As mentioned by the participant, the concept of animal worship, cooperation, peace, power and truth is transmitted generation after generation in that community through this folk song. Therefore, taking inspiration from this folk song, culture-specific design for the book cover has been ideated.

It can be said from participants' feedbacks that the constructed culture-specific model contributes to identify cultural meme of a community which in turn helps the designer to incorporate cultural units in design process. The model also helps in ideation phase of different kinds of design such as product, packaging, accessories etc.

Discussion

An attempt has been taken to construct a meme-based model for culture-specific design. This has been attained by identifying cultural units (Fig. 1) and then evaluating and incorporating it in design process (Fig. 2). The main steps to follow the meme-based model for culture-specific design can be summarized as below.

- Identify the cultural units through review-based, interaction-based and participation-based study methods.
- Verify whether the identified cultural unit has been assimilated in the mind of each individual person of a group of target users.
- Verify the retention of the cultural unit, i.e. longevity of it in the connected memory of the target users.
- Observe the behaviour of the target users to verify whether the identified cultural units are expressed through it.
- If the identified cultural units are transmitted generation after generation without any distortion, then it can be declared as cultural meme.
- Incorporate the cultural meme in early phase of design thinking process.

All the human civilizations are the manifestations of long processes of acculturation whereby original concepts, cognition and thinking inevitably are distorted or lost (Leong & Clark, 2003). The novelty of the constructed model is to identify and revitalize the inner values of a culture that laid the grounding for developing prescriptive attitude of people or society through design thinking process. In the existing situation, most of the frameworks to improve user experience in design place the individual at the centre and merely hint at the social, leaving design teams empty-handed, or ill-informed (Postma et al., 2012). The proposed model focuses on the social values instead of individual's belief. Simultaneously, it tries to merge the different layers of cultures so that designers can easily engulf cultural elements in design process. The study reconstructs the conventional design thinking by introducing the memetic perspective in the culture-specific design process that identifies the copying fidelity and longevity of identified cultural units. It integrates cultural context in design process that in turn satisfies users' expectations. In this model,

the cultural elements are considered at the very beginning of the design process that will create a ground to ideate and prototype the outcome in a feasible way. Consequently, it will help to reduce the number of iterations in the design process that in turn will save time and cost. Moreover, as per the model, users can participate actively from the initial phase (i.e. identification of cultural units) of design process that will ensure the reliability of design outcome.

It is expected that the incorporation of meme-based cultural model will contribute to innovation process which is a key driver for economic growth. The psychological capital, which refers to peoples' values, attitudes and behaviours, is one of the essential components of innovation (Martinidis et al., 2021). Thus, understanding of inner values of a culture will help to contribute to economic development. Also, as hypothesized by the earlier researcher, cultural understanding significantly affects internationalization strategies and management behaviour (Nurcholis, 2020). Therefore, it can be anticipated that not only designers, but also researchers associated with cultural studies in various domains will be beneficial by this constructed meme-based model.

The thrust of this study was to create a new paradigm for culture-specific design thinking process. In spite of the novelty of the proposed model, the study is limited to its theoretical approach. Therefore, further study needs to be carried out to support the proposed model with empirical evidence. The theoretical model will be practically successful whence it will be implemented to the various domains such as design, engineering, business and/or managements.

Conclusion

In this economic era, every country focuses on promoting cultural applications as the main step of economic development (Hsu et al., 2011). Design thinking has been described as a panacea for the economy (Johansson-Sköldberg & Woodilla, 2013). It is gradually in use in various domains that contribute to the economic growth such as product development, environmental design, social policy making etc. The adaptation and application of design thinking process in various fields has created a necessity for model or framework that will allow diversification of process. Nationally and internationally, designers are facing the challenge to meet the needs of diverse populations (Young, 2008a, b). The literature study points out that to incorporate cultural diversity in design process, it is required to identify cultural units that can withstand transmission, generations after generations. These cultural units lie in the core of each society, the groups that constitute it, even in the core of each family, among its members (Moalosi & Hickling-Hudson, 2007). As argued by the earlier researchers (Bjögvinsson et al., 2012), a fundamental challenge for designers and the design community is to move from designing objects to designing socio-material assemblies. This movement involves the challenges of designing beyond the specific project and toward future stakeholders as designers. The memetic perspective of cultural evolution helps to understand and anticipate the core values of culture depending on the propagation of ideas and behaviours (Heylighen & Chielens, 2009). Hence, it comes out with a concrete and reliable list of successful memes that

propagate widely and easily across large populations (Heylighen & Chielens, 2009). These identified memes can be stored and programmed to predict the future pattern of a society. This will help to face the challenges of futuristic design. Therefore, it can be said that the present model is an endeavour to approach the culture-specific design challenges by understanding the basic units of culture. This meme-based cultural model will help the industries to attain the diverse need of target users that, inter alia, will help to fulfil the business goals.

Availability of Data and Material Not applicable.

Code Availability Not applicable.

Declarations

Competing Interests The authors declare no competing interests.

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