Batik KR Semantic Network: Visualizations of Creative Process and Design Knowledge for the Malaysian Batik Designers' Community

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Abstract. Designing batik, a decorative textile is guided by insights acquired from the confluence of design and heritage knowledge accompanied by cultural and aesthetic constraints, resulting in the preservation of the designer's and regional identity embedded in the design artifact. Insights and inspiration are gained from stories, non-textual references of images and photographs from repositories of knowledge such as books and the Web, objects of nature, environmental phenomena, fashion trend and human events. In addition evaluating existing products may lead to the possibility of inspired innovation or repetition of successful design solutions. With surplus on inspirational data available today, batik designers requires knowledge visualization to gain insights for designing task. Reporting a qualitative approach, this paper described our findings as the Batik Knowledge Repository (KR) semantic network to enable knowledge visualization of creative process (task) and design (domain) knowledge for batik textile designers' community.

Keywords: aesthetic, design knowledge, semantic network, storytelling, creative process.

1   Introduction

The task of designing batik textile has evolved from task inherited by generations of batik maker families to team effort within an organization to produce batik textile for a more diversified consumer communities. However, it is still guided by a set of directives and intuitions reflecting a confluence of design and heritage knowledge confined to specific community culture and aesthetic constraints, resulting in the preservation of the designer's and regional identity. Batik textile is crafted by dyeing fabric using resist technique visualizing batik patterns consisting of one or a combination of motifs. The batik makers community exist in Southeast Asia with Indonesia as the pioneer in this wax-resist technique method of decorating fabric, responsible in bringing batik to a respectful height with associated identity as a manifestation of the region's culture and heritage knowledge. Batik makers in

Malaysia exist since early 1900 dominantly located in the east coast region of Malaysian Peninsular.

In our research case, we observed our local batik designers relying heavily on integration of knowledge gained by experience and knowledge acquired explicitly from mentor stories, related non-textual references such as photographs and images from books and other repositories of knowledge including individual or collection of batik textiles. They are inspired by objects of nature, environmental phenomena, fashion trend and human events. Today, the rapid growth of images and information repositories on the Web have made available surplus of knowledge sources and inspirational data (images). Subsequently, with easy accessibility to digital images of existing products exhibited online, the effort of evaluating existing products may lead to the possibility of inspired innovations and repetition of successful solutions. Hence the workflow of batik textile designing process requires visualization of the related knowledge both from internal and external repositories. Visualizing the right inspirational data and preferred information will assist designers to create designs conforming to specific culture and aesthetic preferences more efficiently. Guided visualization enabling the right information in context on cultural and aesthetic constrains will result in product innovation and heritage preservation. We aimed to construct a semantic network of creative process and design knowledge acquired from local batik designers and locally produced batik images as exemplars for a Batik Knowledge Repository (KR).

2   Creative Process and Design Knowledge

In this paper we shall use creativity and creative process interchangeably. Creative process or creativity has been claimed to be knowledge intensive [5, 8, 9, 10] involving few stages which varies among individuals or from situation to situation [6, 8, 12]. Plsek [12] stated that reviewers discovered more than eight (8) models of creativity are developed since 1908. The Wallas model of creative process [8, 12, 15] as the earliest, proposed the process involved four (4) steps of preparation, incubation, illumination and verification. This early model has become the basis for most of the creative thinking training programs today [9, 10]. Creativity has been defined by the psychological discipline as production of an idea, action or object that is new or valued dependable of domain-relevant knowledge, invoking change, involving mental processes and demand appropriateness which is tacit [6, 8,12,15]. Borden [1] differentiated two (2) kind of creativity; for P-Creativity "an idea is P-creative if it is valuable, and the person in whose mind it arises could not have it before"; "the relation holds whether or not the idea has been had before" and H-Creativity as "the idea is not only P-creative but also must never have been had by anyone else in all human history". However, creative is dependent on the cultural context [6]. Stenberg and Kaufman [6] reviewed published researches of creativity to conclude that creativity research is difficult and not mainstream. Design knowledge is known to be synonymic to tacit knowledge as designers having difficulty to articulate what they are thinking as it is beyond boundaries of verbal discourse [3]. From the psychological perspective it is learned in relations to situations [3, 7] involving mental models.

Resulting from the challenges both creative process and design knowledge portrayed, related researches addressing knowledge transfer of creative process and design knowledge are very limited. With less than sufficient discoveries, efforts to utilize these researches into practical used for the benefit of the designer communities has venture into using technology to enable an alternative medium for knowledge sharing and transferring activities. Ogawa, Nagai and Ikeda [11] investigated explanation style of artistic-idea for specific team of costume design in Japan in their quest to build design support computer system for designing textile.

3   Visualization of Creative Process and Design Knowledge

Knowledge visualization encourages creation of new knowledge and knowledge transfer [2, 4]. Visualization allows presentation of the knowledge according to different context, handling by different categories of users [2]. A knowledge visualization framework comprised of three perspectives addressing the type of knowledge to be visualized (object), the visualization goal (purpose of visualization) and the visualization format (method of representation) [2]. Figure 1 shows an extended knowledge visualization model [4] re-emphasizing the value of visualization [14] to justify the development of the Batik KR Semantic Network in promoting knowledge transfer and creation among batik designers.
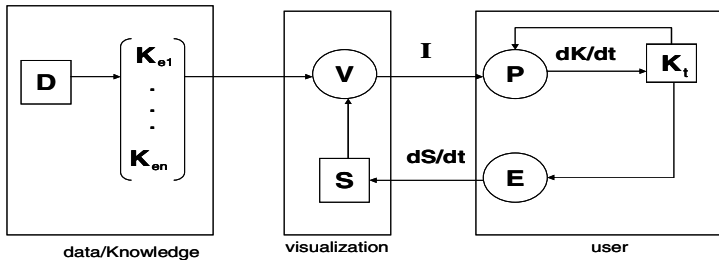

Fig. 1. Knowledge Visualization Model [4] based on van Wijk's Model [14]

4   Research Method

To achieve the research aim we proceed with an attempt to acquire knowledge of related vocabulary, cultural and heritage perception in developing ideas for batik designs. For generations this knowledge has been passed through storytelling and mentoring process. At initial stage we attended knowledge sharing sessions with targeted dual objectives. The first is to build social network with the batik making community members in order to allow informal discussion and interviews. The second is to understand the process, the communication style, and issues currently in practice of batik making.

Subsequently seven (7) case of local batik designers are selected for observations and interviews. The processes of identifying, locating and profiling and selecting were conducted with the assistance from the National Museum representative as custodian batik textile knowledge, the custodian of research and development of batik artefact in

Malaysia, Batik International Research and Design Access (BIRDA) and the research team. We grouped case studies into apprentice cases (3), designer cases (3) and advocator cases (3). During observations and interviews, photographs of products and videos of processes are captured for qualitative analysis using Atlas Ti. Each data collected for each case are analysed simultaneously adapting the principles of grounded theory. We analyze the explicit and implicit elements contributing to concepts and semantic relation [7] Group sessions were conducted for knowledge validation. Knowledge of batik designing consists of concepts and relations related to the designer, the design artifact and design aesthetics in performing the process of designing. Upon validation, a hybrid semantic network of definitional and implicational networks [7, 13] emerged as result of linking concepts, entities (instances of concepts) with meaningful relations as discussed in the next subsection.

5   Batik Knowledge Repository (KR) Semantic Network

The Batik KR is intended for visualization of knowledge, as the semantic network accurately navigates knowledge workers to search and retrieve information at the right time, in the right place and within the context of their task and problem solving.
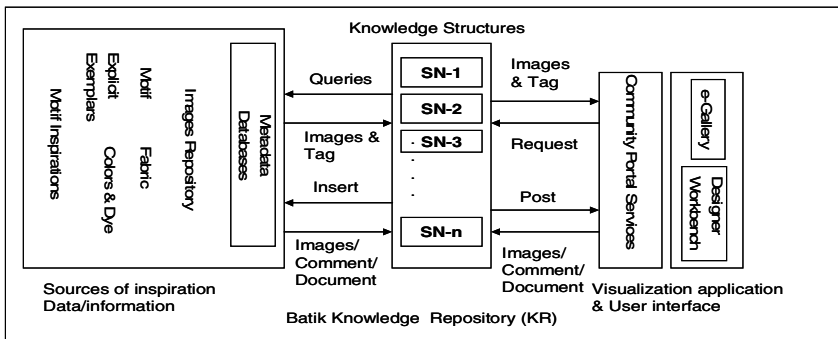

Fig. 2. Batik KR Architecture

Based on the case studies, we assert that creative process of the Malaysian Batik designers is initiated by applying explicit and tacit knowledge to a specific design problem resulting in emergence of aesthetic elements that are constrained by cultural context. The apprentices told their stories of designing experience and embarking on their creative process by relying heavily to explicit knowledge acquired through learning and tacit knowledge acquired undergoing mentoring; the designers elaborated the stories of utilizing specific tacit knowledge gained through experience with the consideration of a specific design problem while the advocators group highly considered case studies, historical and heritage knowledge to guide creative process. All the groups consensually agree that conversion of tacit design knowledge into explicit formats, such as sketches, models, and drawings is crucial in creative process. These explicit expressions are partial reflection of the maker's tacit design knowledge providing a medium for aesthetic elements realization.

The consistencies of participants' case stories and concepts from documentations agree that the semantic network visualizes the concepts of finesse, uniqueness (exclusivity) and fitness (culturally constrained) having an active relation to creative process manifestation, cultural traits and aesthetic constrains. The emerging concepts are traits of a visual story. Hence perceptions are to be derived from a semantic interpretation of the visual story created by the maker's by composition of motifs and colours. On the other hand, an associative relationship is identified between the visual story with the designer's traits; sincerity and fidelity in plotting a visual story.

Design Artifact. The design artifact has several categories namely the traditional design artifact and contemporary design artifact. The contemporary design artifacts are divided into two (2) known categories; the traditionally inspired and the abstract design. The design artifact has aesthetics elements, principles of arrangement (aesthetics) and aesthetics values.
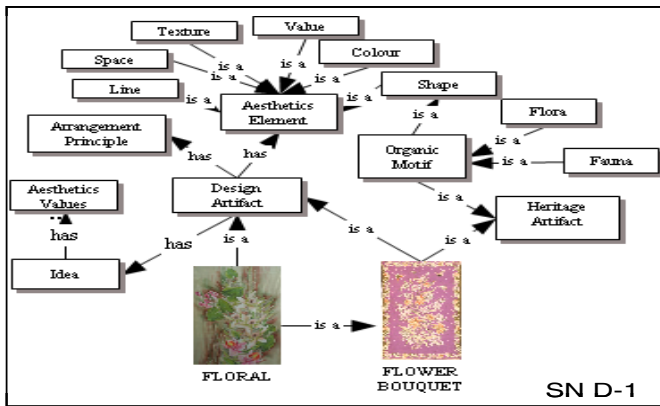

Fig. 3. A definitional semantic network for design artifact

The design is the form and content, it consists of a sincere manifestation of the designer's conception, embedded with tacit and explicit knowledge, expressed with fidelity (passion and patient).The heritage is the visual story as the non-discursive manifestation of the designer's conception. The stage of clarity of the visual story can be classified into three (3) clusters. The first cluster defined the visual story as a narrative (having clear traceability of theme and arrangement). The second cluster defines the visual story to be a story (possible theme or arrangement traceability). The third projected the chaotic pattern cluster having no theme or arrangement traceability.

Designer. The designer is the creator of the design and the holder of artistic idea [11]. As a member of the community of batik makers, the designers directly involved in producing a design playing the role of a mentor or an apprentice. The designer has personality. Good personality traits associated with designers are sincerity and fidelity which implies positive aesthetics of their idea development.
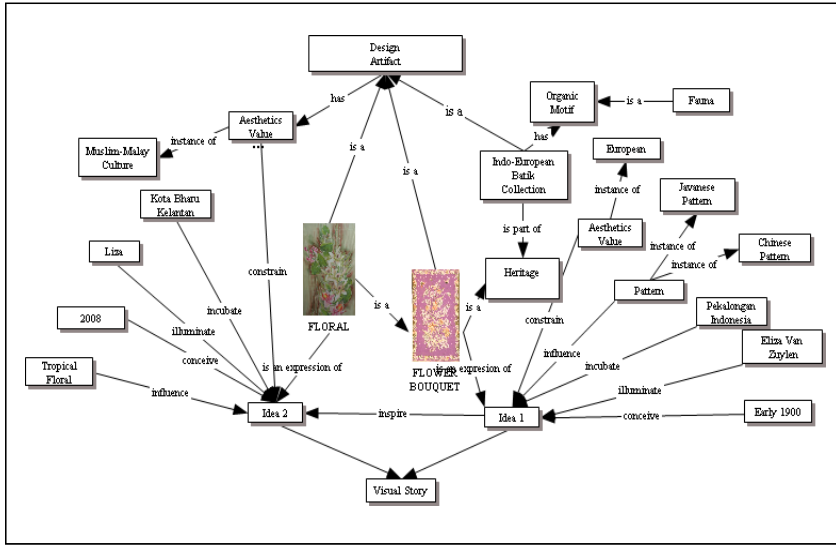
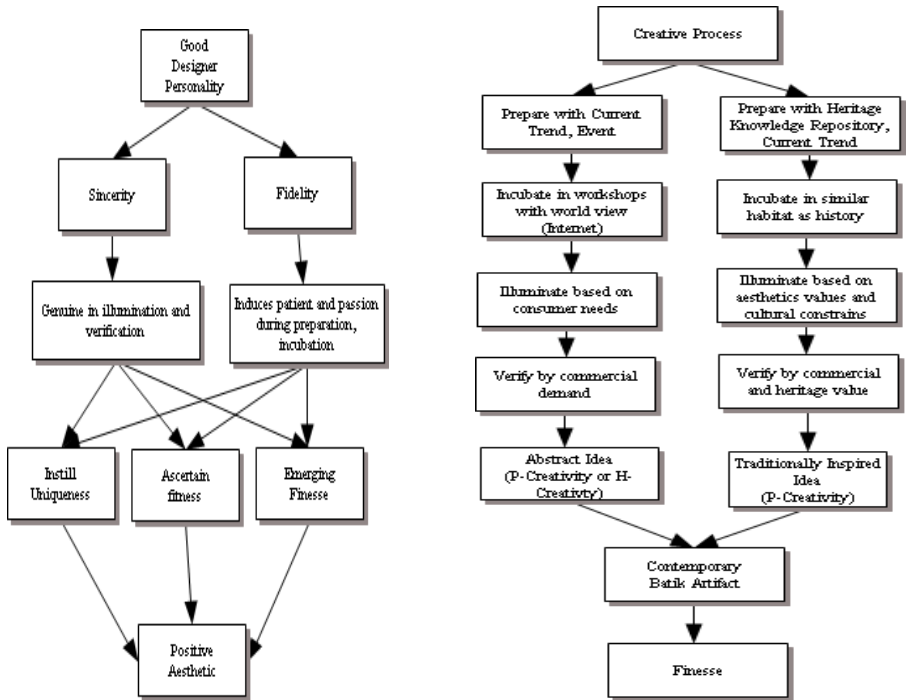**Fig. 4.** Instance of Semantic Network for Batik Traditionally Inspired Design

Fig. 5. Implicational Semantic Network of Creative Process

Design Aesthetics. Finesse (df) is conception clarity (c), degree of sincerity (s) and degree of fidelity of the designer (fd).

$$df = k(c, f, s) \ where \ c = f(t, l), \ s=g (o, p), \ fd = h(a, q, u) \tag{1}$$

where [t : Theme, l : Storyline, o : Originality of Theme, p : Composition of Storyline, a : Theme Accuracy, q : Composition Adequacy, u : Technique Unity]

6   Conclusion

Concluding this paper, we highlight our aim to construct the semantic network of creative process and design knowledge based on acquired knowledge from local batik designers and locally produced batik images for a Batik Knowledge Repository (KR) has been achieved. The initiative is aimed to enable a future work of developing knowledge visualization application such as an e-Gallery or Designer Workbench for batik designing. The Batik Knowledge Repository promotes a new approach of visualization emphasizing on relevant design knowledge. We begin by developing the definitional networks for batik design artifact to organize the relevant design knowledge, and then we build the implicational networks to visualize the creative process. Finally, we elaborate additional constrains pertaining to the semantic networks produced.

For our work, we look forward to develop relevant databases for batik design knowledge vocabulary and implement the knowledge repository as the structure of visualization application such that the e-Gallery or Designer Workbench. We believe that by utilizing the Batik Knowledge Repository structure, visualizations will be able to enhance designer's existing tacit knowledge through understanding of the explicit design knowledge and creative process implied knowledge. The Batik Knowledge Repository and visualization application are significant efforts to encourage shifting the designers' paradigm from cottage industry to production of crafted artifact by team effort in the era of knowledge economy.

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