Requirements Elicitation for the Technology Conception of a Community Information System for the Indigenous Microenterprise: A Contextual Multi-Analysis Approach on Business and Community Requirements of Batik Making

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Abstract: Batik is a traditional art form whose charm lies in its power of storytelling. Batik making is practiced by various indigenous communities in Asia and Africa and has evolved into a socio-economic uplift existing as a cottage industry. The Malaysian batik industry was revived by the government intervention to emphasize batik as a cultural identity and also to improve the livelihood of batik producers where the majority operates as indigenous microenterprises. However, the batik making tasks and the management of batik microenterprises are currently not supported by the use of ICT. To facilitate batik microenterprises ICT adoption we proposed the development of ICT-based information systems that emphasize the cultural context of batik production. In our work we argued that the facilitation of batik microenterprises ICT adoption can happen by developing an ICT-based information system that emphasize the cultural context of batik production. We argued that a technology conception needs to consider the ecological aspect of batik production that comprises of resources, technology and geography to understand barriers and opportunities of technology. To support our argument, we conducted a batik microenterprise business requirements elicitation to formulate the technology conception for an ICT-based information system. We adopted the framework that considers a cultural diversified practice and focus on the cultural context as a business requirement for ICT adoption. We conducted a contextual inquiry using multi-activity inquiries that include site visits, face-to-face and focus group interviews with an informal batik making community of practice. Our participants are representatives of batik advocators, entrepreneurs, practitioners and apprentices. We strategize the focus group inquiry in a workshop setting using verbal and visual cues to navigate the chaotic and fragmented storytelling of group members. From the contextual multi-analysis conducted we discovered that the technological conception for batik microenterprise is incomplete if we only address the usual business productivity requirements. Our findings reveal that the concern for batik aesthetics and the fear of batik cultural erosion should not be overlooked as these concerns are equally imperative as business productivity. In addition we also discovered that a social structure dimension is an important input to understand the primary and secondary actors within a technological conception. This concept will be useful in defining roles within future socio-technical systems that will be created to support business and knowledge activities of indigenous microenterprise. We formulated this technology conception as core elements of the community information system requirement specification for the batik microenterprise. Our work will contribute to the literature on systems engineering of ICT-based information systems for indigenous or cultural influenced business.

Keywords: community informatics, requirements engineering, microenterprise, technology adoption, indigenous business, socio-technical system

1. Introduction

Batik is an indigenous cultural artefact that is influenced by the creativity of a single or collective human actions inspired by natural surroundings. Batik is predominant in various indigenous communities in South East Asia, Africa, India and China. The charm of batik lies in its power of pictorial storytelling where batik motifs depict nature as well as everyday lives and practices. Batik making has evolved into a socio-economic uplift within indigenous communities and has long existed as a cottage industry. In Malaysia, the batik industry has been revived by the government intervention in support of the industry. Besides emphasizing batik as a cultural identity, the Malaysian government is also interested in improving the livelihood of batik producers where the majority operates their trade as microenterprises. The Malaysian Ministry of International Trade and Industry has emphasized on the necessity of enhancing domestic capabilities and competitiveness of manufacturers of batik by facilitating the utilisation of ICT and new technologies in the design, production and marketing of batik. The interest to promote and increase the production of batik is currently hampered by use of traditional methods of batik making like hand painting and block printing. Currently the management of batik microenterprises is also not supported by the use of ICT. This situation prevails as batik makers are concerned with issues of the disruption of the craft's cultural heritage and acts of design theft when batik designs are published. The unique situation of batik making as an indigenous business is a strong motivating factor to explore on the ICT adoption of batik microenterprise to gain

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an insight on to improve their operational efficiencies and market positioning. Here, we present our technology conception approach for batik microenterprises practices from the framework of socio-technical systems. We scope our work on the elicitation of business requirements for batik microenterprise business management. Realizing that batik making involves a cultural heritage influence, we focus on the demand of rational and affective attitude towards batik making in the elicitation. We argue that the approach of contextual inquiry can help us gain better understanding of the batik making situation before attempting to look into possible socio-technical systems solutions. Our paper covers a broad literature review of microenterprise and batik making, technology adoption and socio-technical systems issues. We then report on the contextual inquiry work that we conducted to elicit business requirements of batik making and our findings highlighted pertinent issues in business and ICT strategy alignment.

2. Literature review

This section covers a review on pertinent issues of the Malaysian batik industry, ICT adoption and microenterprise, ICT-based work systems and elicitation methods.

2.1 The batik making enterprise

The Malaysian batik industry is clustered under the creative industry and is divided into small and medium enterprises (SMEs) and the cottage industry which operates as microenterprises (Wan Teh 1997). However, based on Porter's industry cluster (Porter 1990) batik will be placed as a handicraft industry and categorized as a historic know-how-based cluster. Within this cluster, the batik business knowledge is based on the traditional activities that survived over the years through the inheritance phenomenon across generations spurned by a mentoring process knowledge transfer traditions. Batik microenterprise business model is about producing batik traditionally for the local market and batik microenterprise are known for the expertise in batik making technique and design creativity. In Malaysia there is no official differentiation between batik manufacturers and batik artist as they both belong to one nationwide community of batik makers. Batik has been endorsed as a cultural heritage entity by UNESCO in 2009. The knowledge asset is one of the preservation entities. Batik exists as the object of traditions that inherits traits of traditional knowledge and preservation, imperative to the community memory. As a handicraft product, batik reflects the cultural aspect of the batik making community and is subjected to the batik makers' prioritized agenda. The batik maker is comprehended to have both an artist and a designer attitude within the batik making task model. A batik maker is a person who assumes the role as an artist, a designer and a promoter to make batik for cultural and business endeavour. The versatility of the role playing is due to the craftsmen model of business as microenterprises and livelihood strategies. As the role of batik maker is to "make" batik, this demands both rational and affective attitude towards the artefact and its making. The attitude of an artist features of adhering to self-driven task model, having artistic sense and life enrichment objective. On the other hand the designer attitude emphasized on engineering process driven task model, having the technical sense and creative sensibility as attitude towards product development.

Our synthesized understanding of the Malaysian batik maker is illustrated in Figure 1 and is derived from formal sources of batik maker definitions from Jamal (1994), Ismail (1997) and Elamvazuthi and Morris (2000). An elaboration of the synthesized understanding refers to the duality of creative design which described designing as a rational and a non-rational process (Schön,1983) and between reflective practice and technical rationality (Schön, 1983). In addition the dual faceted attitudes in batik making can be described from the need perspectives which influence the cognitive reasoning of the batik maker. Maslow's (1943) hierarchy of needs is the theoretical basis of understanding levels of need. The artist as a romanticist need is to create for self-actualization. The satisfaction gained from the batik artefact is beyond economical purpose in contrary to the need to develop a product for market acceptance. The designer as a rationalist emphasized on the engineering process driven task model, having technical sense and creative sensibility as attitude towards product development. However the transcendental, proximity, aesthetics and serendipity characterizing elements of both attitudes are presence within the artist and designer task models to provide the philosophical component of the batik design artefact.

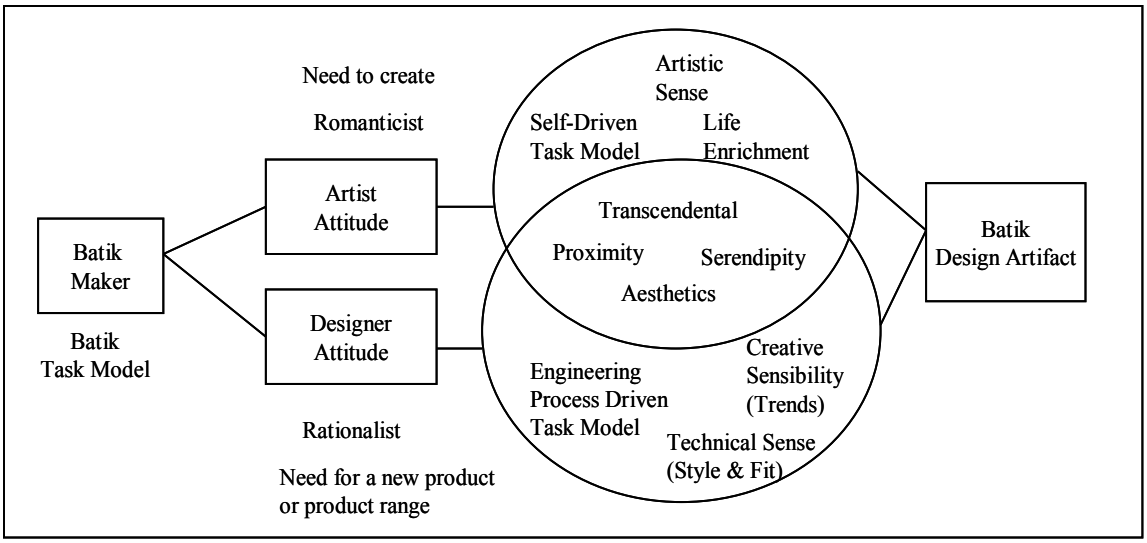


Figure 1: A synthesized understanding Malaysian Batik Maker

The synthesized understanding of the batik maker gives an important insight to their attitude towards ICT adoption.

2.2 ICT adoption, community informatics, socio-technical systems and knowledge systems

The adoption and diffusion of ICT throughout a productive system assumes a core position in the new economy and has spurred numerous ICT adoption research conducted from different approaches. Generally there are three approaches to ICT adoption: the diffusion approach, the adoption approach and the domestication process (Manueli, et al 2007).

2.2.1 The diffusion approach

In the diffusion approach, the Roger's Diffusion of Innovation (DOI) theory is used to explain the role of the media and interpersonal contact in providing information that influences a person's opinion and judgment of the technology that leads to the adoption of the technology. DOI theory is used to view the adoption stages and factors leading to adoption. From the DOI theory, the Rogers' Innovation-Decision Process model is used to gain further understanding of the adoption process related to issue of access. ICT adoption by SMEs is studied in many settings. In the Italian industries, Atzeni and Carboni (2006) revealed that weak ICT penetration is due to the size of industry, the lower reorganization of work practices and the sectoral specialization. For the Malaysian SMEs, Khong and Eze (2008) confirmed the factors of DOI theory and added two other factors which are ICT security and costs. For SMEs in Poland, Spain, Portugal and the United States, Arendt (2008) highlighted that the impact of the lack of access to ICT is less important when compared to the lack of proper knowledge, education and skilled owner-managers and employees within the enterprise. This indicates that the issue of ICT non-adoption cannot be solved simply by the provision of ICT access.

ICT adoption studies also scope into adoption by rural poor focusing on the barrier to ICT adoption from the digital divide perspective. Barriers often cited are factors of limited physical access, socio-economic and socio-personal factors and low education level of potential adopters (Foley et al 2002). However, when addressing ICT adoption in community development, issues of technology compatibility is more important than issues of access. Helmersen (2006) criticised the approach of ICT adoption that forces Western technologies on the poor in developing and third world nations and stressed the need to have a deep local insight that attempt to understand the cultural context that facilitates ICT adoption. Similarly, Kivunike, et al (2009) studied the facilitating and inhibiting factors of ICT adoption by the rural poor in Uganda from a demand-oriented perspective. They too highlighted the importance of understanding the contextual factors that influence ICT adoption. They then suggested that strategies of ICT adoption should move beyond the provision to facilitate adoption and the use of ICT by the rural poor by considering factors such as maintenance costs, quality of services, ICT skills and creating awareness of potential benefits in the rural communities.

Community ICT adoption has evolved into a new discipline known as community informatics (CI) and is related to the discipline known as development informatics or ICT4D. Led by Gurstein (2008), research on CI explored into various methods of research inquiry and practice. Moor (2009) conceived different aspects of community informatics research to consist of contexts/values, cases, process/methodology, and systems and is illustrated in Figure 2.

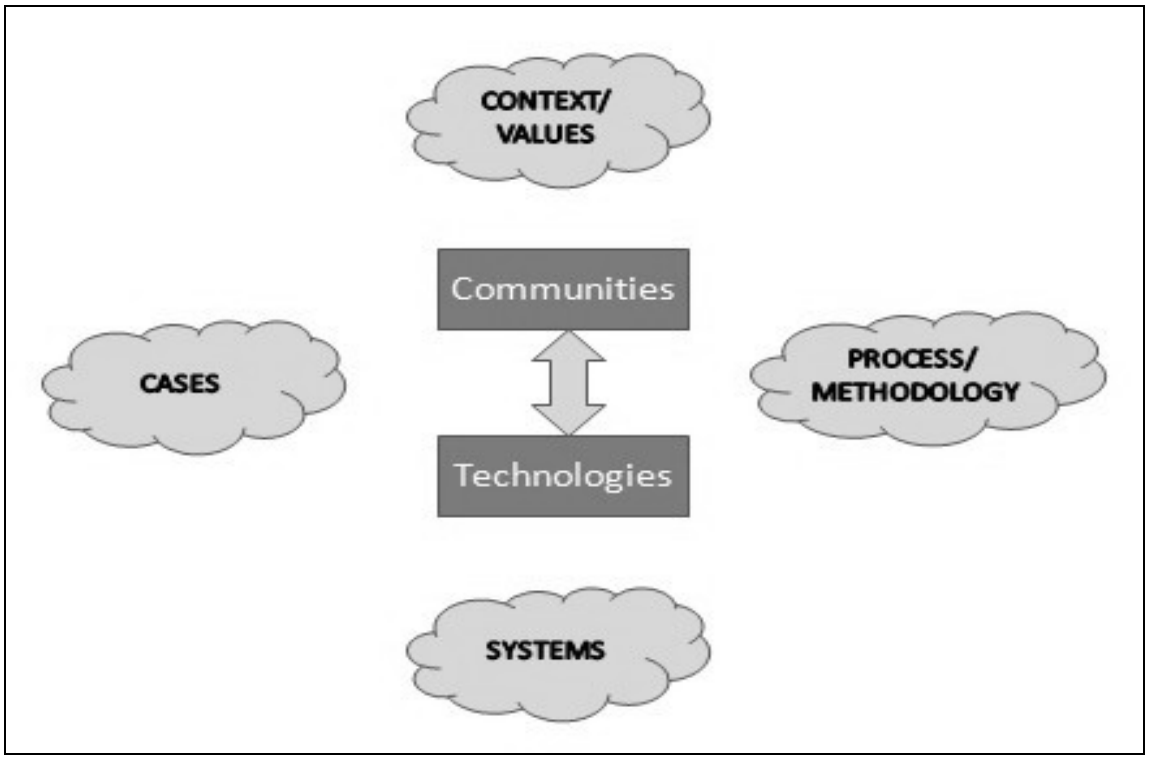


Figure 2: Pillars of community informatics research *(sources: Moor 2009)*

Moor (2009) also highlighted two important CI research contexts: community-centred development and community knowledge sharing through the development of socio-technical systems such as knowledge management systems (KMS).

2.2.2 The adoption approach

The adoption approach explains the adoption decision of users applying different individual and social decision making theories. The adoption literature began with the technology acceptance model (TAM) which was first presented by Davis in 1975. Since then TAM has been validated in numerous technology settings and is heavily cited in the literature. TAM is used to determine adoption influencing factors in IT systems both in the voluntary and mandatory used systems and adoption is reflected in the overall user acceptance. Key constructs of TAM are perceived usefulness and perceived ease of use of IT systems and have been used to determine the acceptance of the technology. However in TAM, personal control factors like behavioural accounts are not taken into consideration. TAM is also used with the Delone and McLean IS Success Model to determine the influence of systems quality and information quality of the IT systems on the success and failures of IT systems. Further extension of TAM will be the Information Technology Adoption Model (ITAM) by Dixon (1999) that seeks to refine the IT requirements of the information systems that influences IT adoption leading to the development of the IT adoption framework that includes the interaction between individuals, technology and tasks (FITT framework). The FITT framework focuses on the significance of the optimal interaction (fit) of individual user, technology, and task attributes. Now the fit between the attributes is seen to be more important than the individual attributes themselves. For example, IT skills of the users are not sufficient for the success of an introduction. The IT skills must match the requirements by the IT software.

2.2.3 The domestication process

Domestication is described as the process of technology adoption into everyday life and originates from other disciplines such as anthropology, consumption studies and media studies. Domesticating

ICT involves a process of bringing new forms of ICT into the home (Chen and Zhang 2009) and involves the integration of technologies into social relationships and structures. The domestication framework has four concurrent phases: the appropriation, the objectification, the incorporation and the conversion. This approach of adoption considers the context in which ICT is experienced by the people using them. Conceptual context distinctions are applied to approach where three important distinct contexts are identified. The first is the work and leisure context, the second will be the end-users that belong or do not belong to a demographic group and the third is the private and the public.

2.3 Microenterprise, information systems and socio-technical systems

Researches on ICT adoption by SMEs attempt to determine whether ICT adopted throughout the production process can produced positive outcomes related to operational efficiencies, increased revenues and better market positioning. Alter (2002), defined an information systems framework that outline nine elements that can be used to analyze the professional context to address issues of productivity and sustainability. However, the challenge of microenterprise ICT adoption is multi-dimensional where human factor is a central issue (Duncombe and Molla 2009). Kamal, et al (2010) raises the issues of affordability, awareness, management capabilities and the lack of ICT infrastructure which are not addressed in the earlier information systems framework such as Alter's framework. Duncombe and Molla (2009) who presented four archetypes of information systems formalization amongst SMEs in Botswana, pointed out the importance of looking into the systemic approach when considering the adoption of information systems in SMEs. A firmer assertion was made by Hoffman, et al (2009) who argued that information systems can be viewed from the socio-technical systems perspective to include cultural phenomena approach that will help researchers comprehend the application of works systems outside the professional work context. They further elaborated on the macrocognition approach to help comprehend information systems robustness, resilience and adaptiveness.

A micro-perspective of microenterprise ICT adoption can be viewed from the theoretical lens of socio-technical systems (STS). STS is a social system sitting upon a technical base and comprises of the technology, the people and their personal communication and tasks, views, organizational structures, co-operation and others (Whitworth 2008). Here an STS perspective will shed some light on factors to work on promoting microenterprise ICT adoption. This view is aligned to earlier findings of Tschiersch and Schael (2003) who stated that as industry gets shaped by technology through the process of production automation, computer-supported information and co-operation networks, the reliance will no longer be on mere technical systems but rather on STS. Three technology related dimensions of STS are namely, the workplace, the group work and the network. In the workplace dimension, the concern will be on the actual use of technology within the working process. According to Tschiersch and Schael (2003), from the human centered perspective, the most complex aspect of human work takes into consideration the intrinsic need of people to develop themselves further and to experience through their work, challenges, motivation, success and satisfaction. They further added that the design of STS should try to fulfill meaningful and rewarding tasks which also take account of the individuality of the human operator. The approach to design a socio-technical system is to explicitly recognize the technology's symbiotic relationship with society, and so tries to involve end-users in the creation of the technical products that will affect their lives.

2.4 Business requirements elicitation

The traditional approach of requirements elicitation is mainly centered on hardware and software requirements and is often dominated by technical issues of functionality, connectivity, interoperability and security. Isabirye (2009) highlighted the issue of design-reality gaps between ICT analysts and users which is due to the detachment from the context of a proposed system to be implemented. This follows Heeks (2002) beliefs of the gaps between the system design which is based on the analyst's perceptions and the reality which is often foreign to the analyst. According to Disse (2001) system requirements are best determined through merging the different viewpoints of the stakeholders involved. Whitworth (2009) presented a comprehensive view of socio-technical requirements that he hierarchically group into physical, information, personal and communal requirements. He suggested that STS which involves community influence and participation should consider personal and communal requirements that he prescribed in his Web Of System Performance (WOSP) model. We interpret this into the necessity of understanding the cultural context of the problem domain of batik making. This implies that the technological conception of an ICT-based information system for batik microenterprise demands a holistic understanding of the problem situation and the current resolution

towards community empowerment with desirable cultural identity development. A contextual inquiry is therefore necessary for the requirements elicitation.

2.5 Contextual inquiry

The contextual inquiry is useful for examining and understanding users and their workplace, tasks, issues and preferences. Within the human computer interaction (HCI) literature, contextual inquiry is commonly-known as the user-centered approach. It is viewed as a synthesis of ethnographic, field research, and participatory design methods that provide designers with grounded and detailed knowledge of user work as a basis for their design (Hotzblatt and Jones 1993). Contextual inquiry studies on the users are made in the context of their work by observing how they perform tasks, the tools they used and the process involved in their work. In HCI, contextual inquiry can be conducted in a laboratory where participants in the inquiry are observed under a usability testing set-up or conducted in an ethnography study set-up or conducted as a focus group workshop (Summers, et al 2004).

Outside the context of HCI studies contextual inquiry is also used in information systems requirements elicitation that apply the soft systems methodology (SSM) as seen in the work of Bednar and Welch (2005a, 2005b, 2005c 2006) and Bednar (2009). Bednar's work view contextual inquiry as a technique for interpretive modelling of a problem situation in recognition of the importance of context for systemic analysis. In further refinement of the contextual analysis, Bednar (2009) introduced the Strategic Systemic Thinking (SST) framework consisting of three aspects of analysis: the intra-analysis, the inter-analysis and the value-analysis. SST is intended to be iterative, and therefore it is possible to move from one analysis to another repeatedly and in any direction and this is easily aligned with the grounded theory methodology. The researcher acts as the external analyst facilitating the research participants to articulate their worldviews using various methods such as rich pictures, brain-storming, mind-maps, diversity networks, drama transfers, role-playing all of which are supporting creation, visualization and communication of mental models and narratives. The purpose of intra-analysis is to enable the creation of an individual process for structuring a problem (through individual interviews and workshop observation). This analysis aims to create and capture a range of narratives from participating stakeholders by providing an enrichment and visualization process for them. Inter-analysis is the aspect of the inquiry which represents collective reflections of decision-making alternatives (through focus groups). The aim is to have a dialogue and to reflect upon ranges of narratives derived through intra-analysis. The purpose is not to achieve consensus or to establish common ground, but to produce a richer base upon which further inquiry and decision-making could proceed. Grouping of narratives takes place through consideration and discussion of individually produced narratives. Results of these inquiries might be considered to form a knowledge base relating to problem spaces under investigation.

The strength of conducting contextual inquiry in requirements elicitation is the ability to investigate the phenomenon of the processes that involves human interaction that gives an opportunity to recognize individual emergence. This will be useful if the information system is seen as a network of human actors, interacting and communicating using available means (including technological artifacts), and then complexity is recognized through the individual sense-making processes of each actor Bednar (2009).

3. Methodology

We aim to formulate a technological conception of an ICT-based information system for batik microenterprise. We employed the contextual inquiry in accordance with the work of Bednar (2009) in the elicitation of business requirements of batik microenterprise to gain insight on batik making operational efficiency and sustainability. Based on our literature work, our research took into account the importance of community and cultural context of the batik microenterprise. We described our approach in the next sub-section.

3.1 The overall method

The data collection is conducted over a period of six months through different data collecting activities consisting of personal interview with stakeholders, visits to actual business sites and focus group interview before attempting to produce the refinements of the business requirements (Figure 3).

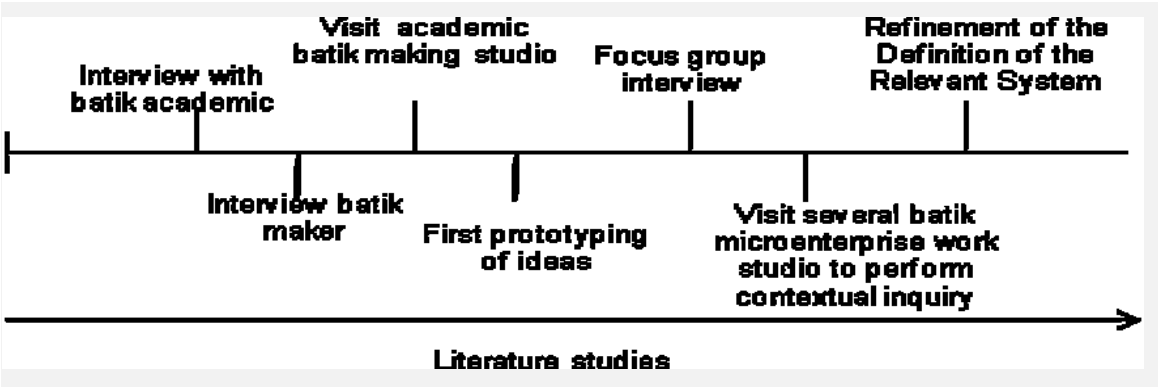


Figure 3: Overall method

Although the focus of this research is on batik microenterprise the contextual inquiry covers other batik making stakeholders to gain an understanding of the batik making ecosystem. The data collection was done sequentially to allow for re-adjustment and re-alignment of our understanding the batik making context.

3.2 Sampling

For the sampling process, an informal categorization of the batik community membership was made based on early discussion with batik academics with reference to the context of batik knowledge transfer mode (Figure 4).

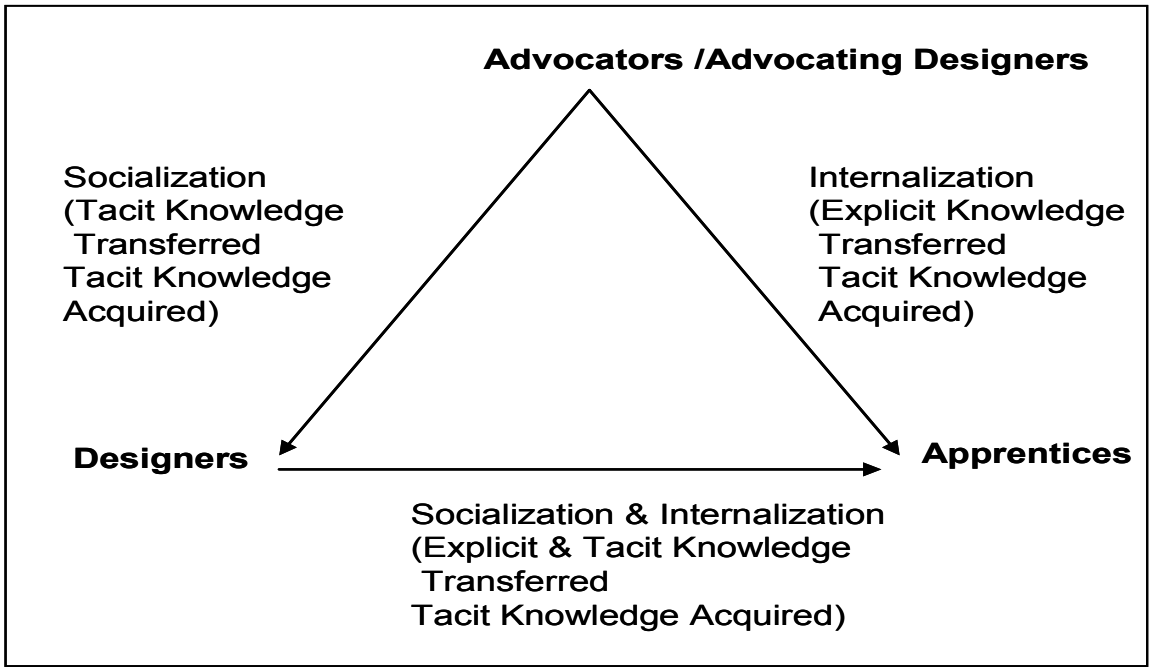


Figure 4: Batik knowledge transfer mode

The informal categorization consists of the experts group (designers, advocators, advocating designers) and novice group (apprentices) and is used in this study as a duality strategy (individual – collective) is chosen for the unit of analysis and comprises of (1) individual microenterprise/SME and (2) the collective- component of informal batik community of practice made of advocators, designers and apprentice). The overall sampling for the contextual inquiry is done based these different stakeholders and the roles of the actors within these groups are illustrated in Table 1.

Table 1: Hierarchy of batik makers

Actor	Role
Apprentice	A novice designer who have less than 5 years experience of practice.
Designers	A designer with experience more than 5 years in practice and still actively practicing.
Advocating Designers	A teacher for formal learning who is a textile designer by formal training and practice with more than 10 years practicing experience or teaching or mentoring

3.3 Face-to-face interview

We conducted face-to-face interview with an advocating designer and a practising designer to familiarise with the research context. As we familiarised with the research phenomenon our ability of focusing into areas the respondents considered important is crucial. For example, one of the respondents introduced the conception design by accident/serendipity which means that knowledge is sometimes shared in ad hoc situations and this received further attention in the following interviews. The interviews were recorded and after transcription they were sent to the respondents to be verified.

3.4 Focus group interview

The focus group interview was conducted in a story-telling workshop that allows the participants to share their story and able to express their opinion. The participants consist of representatives from three actor groups shown in Table 1. A facilitator from the research team was involved in the story-telling session. Video recording of the workshop session was done and two assistant researchers transcribed the discussion in the session. The preparation and the conduct of the workshop were done in a careful manner to take great care that the participants' opinions are respected.

3.4.1 Instrumentations

Two types of instruments were used. The first is the visual cues which are digitized images of batik artefacts. Artefact digitization sessions were done during the early stage of the research before focus groups session. The visual cues are used similarly like technology probe to trigger stories and boundaries for the storytelling session. Verbal cues are used by the facilitator to align stories with the research questions formulated prior to the workshops. The verbal sues used are shown in Table 2.

Table 2: Verbal cues

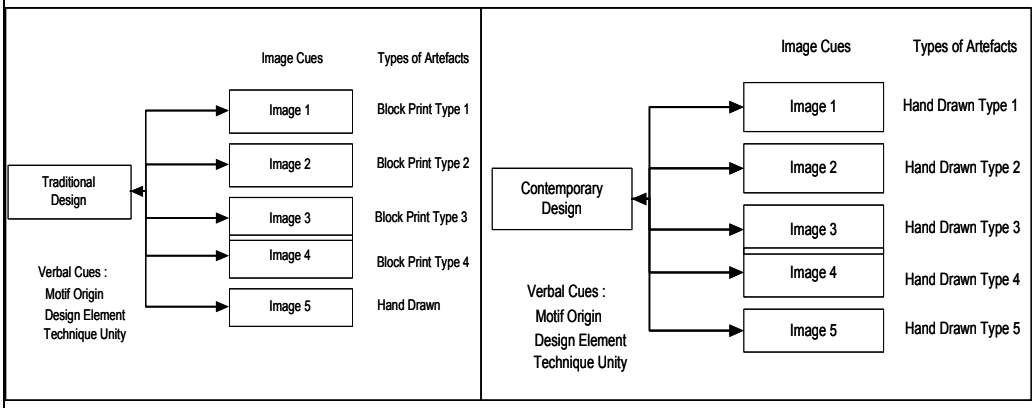
Objective	Cues
Domain Knowledge Acquisition	*Tell us your life story of making batik:* How you do learn to make batik? How do you get involve in batik making? What are your social network, social responsibility as a batik maker? How can we identify traditional and contemporary batik?
Applied Design Knowledge Visualization	*Describe your experience to produce a batik product from planning to finish product:* How do you know what to produce?
Aesthetic Knowledge Visualization	*Describe stages of idea development until sketches of design* How do you know your product has aesthetics value realized? How do you judge batik aesthetics?

3.4.2 Procedures

The activities of the focus group interview are described in Table 3.

Table 3: Focus group activities

Component	Description
Structure	Each focus group workshop was conducted with 12 selected participants who are group according to their actor's role.
Timeframe (150 minutes)	*Introduction. (5 minutes):* The facilitator explained the research-driven story to the group and provided everyone with paper and pens. The timing was controlled to avoid unnecessary delay. *Case Story Session (5 – 10 minutes)* The workshop participants spent time before the session writing their story based on their experience of a particular theme. As the story is being told, participants were told to note details of the story and ideas for questions and not to interrupt, and to respect confidentiality. The observer for each group took notes. *Conversational & Informal Dialogue (25 – 30 minutes)*

	The listeners write down their immediate reflections on the story: similarity/difference of the story with own story. Then they share their reflections within the group, one at a time with no interruptions. The observer for each group took notes.
Component	Description
Group Ethics & Protocol	*Promotes Emergence Not Forcing:* Critical, asking and answering probing questions about the subject matter in order to do it better not to force emergence. *Promotes Caring:* Ensure that our questions and our answers are generated in a climate of respect for the values. *Promotes Confidentiality:* Respecting the storytellers who are taking the risks to share their experiences. Video Recording is done with permission from participants
Provision of Visual Cues	 Visual cues are used to trigger stories and boundaries for the storytelling session. Verbal cues are used by facilitator to align stories with the research questions formulated prior to the workshops.
Video Recording	Video Recording is done with permission from participants

3.5 Actual site visit

We visit two batik microenterprise sites to make live observation of the batik making realities. We also conducted informal interview with the batik maker. The live observations verify processes of batik making for each technique to gain inside knowledge of actual practices and to gain real life experience in batik making for comparison with stories acquired from interviews and focus group sessions.

4. Analysis and findings

A micro analysis was conducted where content of the transcripts from the personal and focus group interview were coded to make sense of data to facilitate the emergence of open codes using the In Vivo Coding by Atlas TI. As the process is tedious, we took care to avoid the tendency of over-conceptualizing. The open codes for this study were derived from multiple sources of data allowing a precise differentiation among categories. The contextual analysis attempted to model the problem situation using text from data corpus using reflective coding matrix. The content analysis attempts to triangulate the empirical data with secondary data from literature. Observations made during the site visit also supported the contextual analysis and these observation forms evidence of multiple sources of data.

Two important discoveries emerged. The first is the business reliance on batik makers' tacit knowledge gained from personal experience, batik mentor storytelling and non-textual references such as photographs and images from books and other repositories of knowledge that includes batik collection.

The second is the concern for the business sustainability in the globalization era related to the concept of batik cultural erosion. This stems from batik makers resort for discontinuity of batik cultural rules in order to survive the socioeconomic impact of business globalization. The discontinuity of traditional aesthetics attributes category of concept is characterized by a number of properties, processes and dimensions reflecting individual and contextual causal themes which either singularly or in combination provided a foundation for cultural erosion situation. Themes emerged as singular definitional concepts and on a causally or implicationally linked. The discontinuity category of

concepts has a relationship with the core categories modelling community-based information system as a requirement. We further enumerate three dimensions that cover competency deficit, isolated strategies and diverse level of need shown in Figure 5. The rest of this section presents the dimensions and related elements.

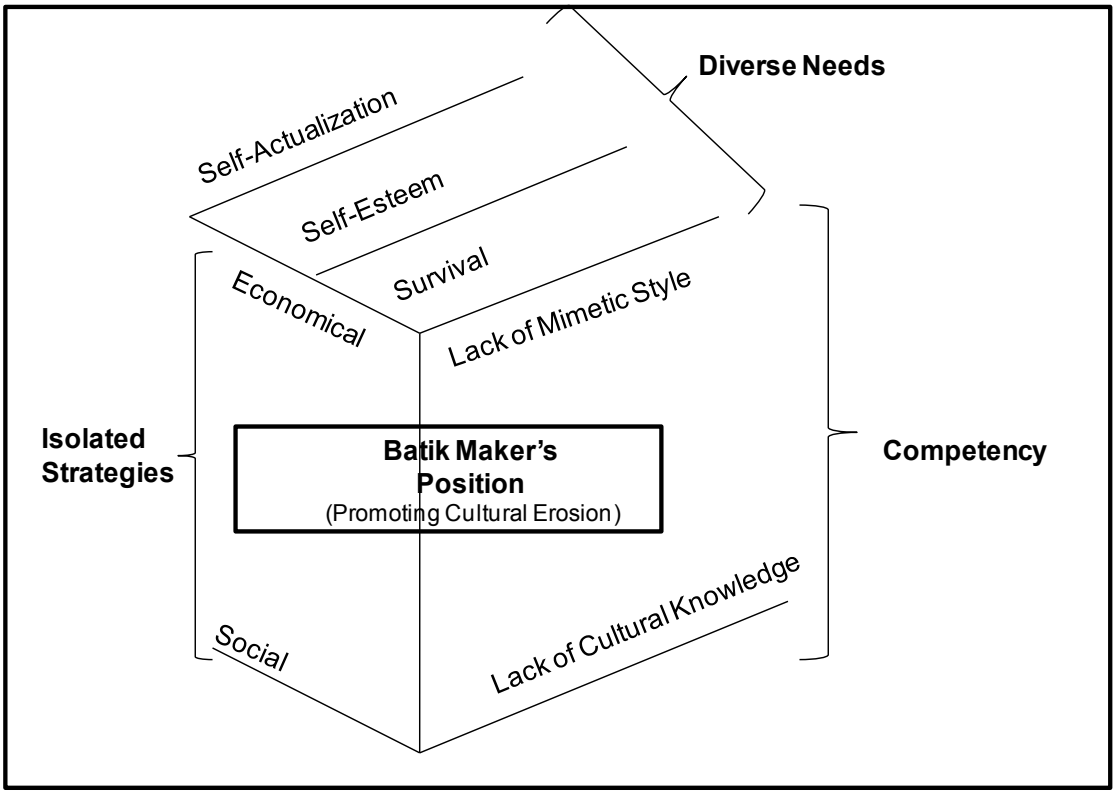


Figure 5: Dimensions of batik makers' position

4.1 Competency deficit

As illustrated in Figure 5, the lack of cultural knowledge and mimetic style is related to the batik maker's competency dimension. Competency refers to the set of skills related to cultural knowledge and attributes that allow an individual to make batik. There are two types of competency: (1) personal and mimetic. Personal competency relates to individual emotional intelligence while mimetic competency relates to mimetic styles capability and social semiotic.

Personal competency deficit comprised of cognitive and behavioural attributes causing dissenting conducts reflected by themes such as: "copycat syndrome"; "shortcut to market"; "compromised quality" and "shallow in feel", "forgoing tradition for material gained", "motif hallucination", "chaotic arrangement" and "technique disunity". These themes are resulting trajectories of personal competency deficit which have led to isolated strategies for batik making in addition to livelihood and business drivers: poverty alleviation, and mass production. To gain better understanding of the situation a sensitized interpretation has been done. Drawing from psychological theory of emotional intelligence by Goleman(1998) personal competency embodied a form of intelligence relating to the emotional side of life, such as the ability to recognize and manage one's own and others' emotions, to motivate oneself and restrain impulses, and to handle interpersonal relationships effectively. The theory denoted the cluster of abilities relating to the emotional side of life as components of emotional intelligence: knowing our own emotions, managing our own emotions, motivating ourselves, recognizing the emotions of others, and handling relationships. As for learning capability it is claimed that potentials for learning the practical skills are based on the five elements: self-awareness, motivation, self-regulation, empathy, and adeptness in relationships. Participants have pointed out that due to livelihood condition batik makers have adversities (hardship) to deal with. As a result personal competency development has been neglected to survive a better income and living conditions (fire fighting phenomenon). Table 4.2 below maps an array of adversities theme which interprets the state of personal competency deficit in batik making task associated with Golemans' traits of personal emotional competencies.

Table 4: Adversities theme Interpretations

Themes – Adversities	EQ Traits for personal competency
Emotional but lack of awareness Personal strength engulf by adversities Self-worthiness low	LACK OF SELF-AWARENESS Emotional Awareness: recognizing one's emotions and their effect Accurate Self-assessment: knowing one's strengths and limits Self-confidence: A strong sense of one's self-worth and capabilities
Feel insecure , self-control dependent on others Honesty and integrity secondary, follow the flow to survive Personal performance determine by following market trend Innovation is secondary, livelihood is priority	LACK OF SELF-REGULATION Self-control: Keeping disruptive emotions and impulses in check Trustworthiness: Maintaining standards of honesty and integrity Conscientiousness: Taking responsibility for personal performance Adaptability: Flexibility in handling change Innovation: Being comfortable with novel ideas, approaches and new information
Lack of initiative to improve Not important to strive for quality Out-of-group perception towards quality Not willing to increase cost for design improvement	LACK OF MOTIVATION Achievement drive: Striving to improve or meet a standard of excellence Commitment: Aligning with the goals of the group or organization Initiative: Readiness to act on opportunities Optimism: Persistence in pursuing goals despite obstacles and setbacks.

The argument lead by the emerging themes of both competency issues and adversities is the lack of cultural knowledge and mimetic style related to batik maker's competency dimension is a main concern for business sustainability of batik making. Mimetic as defined by Hofstadter (1976) is "the idea to describe a unit of information residing cognitively and is mutating in human cultural dynamics". Mimetic has been claimed to be an approach to evolutional model of cultural knowledge. The workshop participants have also pointed out due to livelihood condition batik makers have adversities to deal with. As a result personal competency development has been neglected as survival process strives for better income and living conditions. The process of survival demands low cost of production and product market availability.

4.2 Isolated strategies

Participants highlighted that isolated strategies results from the lack of understanding of the inherent culture and the overwhelming urge to improve livelihood. Isolated unwritten strategies that govern behaviours to meet those demands, places the batik maker in a difficult position to oblige to the cultural rules (indigenous nature) to fit in the business scenario. Four areas of concern related to these strategies are:

- Efficiency: the optimal method to accomplish batik making task;
- Calculability: quantifiable aesthetics values rather than subjective, establishing mass production, to match quantity with quality and to meet demand at lowest cost of production;
- Predictability: Standardized and uniformity;
- Control: Replacement of human and non-human technologies in batik making.

The isolated strategies dimension declares the plan of actions batik makers formulated for batik making. As identified from intra analysis and verified by inter analysis these isolated strategy themes are: (1) acting not part of community; (2) act to promote non-conformance to community memory and (3) act to promote non-conformance to cultural heritage requirement. Isolated strategies are closely related to individual motivational factors to make batik which can be clustered as creative expression, entrepreneurship and profit generation, cultural heritage preservation and economic and social survival. These motivational factors explain differences in intensity and direction of batik makers' attitude. The isolated strategies dimension of position in addition to competency was revealed by two factors: social and economic driven.

Social cultural factors include ideology; belief and language represent a perspective of solitary attitude contributing to the discontinuity of traditional aesthetics attributes. Social change emerged as a conceptualisation promoting risk or threat that exists with every batik tradition. There is, primarily, difference between the collective and individual culture. This differential illustrates how the cultural attributes of individual in terms of issues of cognition and dissenting behaviours provide impetus for out-of-group perception and the consequences of isolating strategies. This trajectory provides the

understanding of motivations for discontinuing traditional aesthetics attributes. To illustrate this contention a number of cases are explored during the focus group sessions. The first case of exemplary analysis illustrates two batik designs produced from isolated strategies. Both designs shows traits of traditional discontinuity but fit the customer requirement while maintaining a structural fit with aesthetic need. It was revealed by the designs that both are business artefact made to satisfy modern taste of batik. The isolating strategy of making these designs for modern taste was instigated by the consumer requirements.

The economic motivational factor reveals in one of the batik design exemplary case during the focus group. Not knowing the aesthetics attributes for judging batik aesthetics was found to be the core of dissenting behaviour. Focus group participants voiced out that they know that some batik makers do not have the skill to make batik but are able to sell batik products in large scale. Knowingly bending the rules was identified with a few participants acknowledging that their practices were not in accordance to the standards but their motivations lay within the immediate needs of the customers and opportunities to make profit. The livelihood factor is dominant, isolated strategies can arise from not knowing the rule; just accepting the rules; and mentor-apprentice relationships. The isolated strategies contribute to the dissenting phenomenon that the participants voiced out. This isolated strategies revealed by not knowing the aesthetics values of the community, and if the aesthetics values were known, ignoring them can be part of their choice. Participants revealed many isolated batik designers experience the lack of understanding of cultural knowledge.

4.3 Diverse need

The need of a community system is unlikely to be singular. The batik makers have needs and their decisions to make batik depend highly on fulfilment of needs. Batik makers were propelled by the need to address the acuity of the survival situation, either an issue of social, economical or an individualized issue. The diverse need dimension portraying the decision making position can be viewed as follows:

- Batik Artist: The experienced artist aims for self-actualization when designing batik to realize paintings or craft work for the collector's market. On the other hand the new artist aims for acceptance and recognition by the community and to be able to compete in the marketplace. Themes emerging related to need of batik artist are "uniqueness", "art" and "creation" which are interpreted as Striving towards Self-Actualization;
- Batik Designer: The batik designers who have more than 10 years experience express needs of culture heritage preservation while the apprentices are striving to be recognised and accepted. Themes related to their needs are "exclusiveness", "taste", "storytelling, "drawn batik" which are deduced as Projecting Self-Esteem and Gaining Self-esteem; and
- Form Maker: The form maker needs are inclined to getting paid and realizing batik for consumer market. Themes related to their needs are "clothing need" which is interpreted as Act of Survival.

4.4 Community-based information system model for batik microenterprise

We synthesized our findings to depict a core concept for the technology conception for a community-based information system for a batik microenterprise. Sustainability of batik making is pointing towards batik maker's competency dimension and adversities. We propose that competency issue due to the lack of cultural knowledge and mimetic style may be addressed by the provision of information systems that provide access to batik documentary and learning system as a complement. In addition, a mentor-apprentice relationship community strategy can help overcome the discontinuity of traditional aesthetics attributes due to the lack of knowledge. From these findings we formulated the core concepts that need to be addressed and captured during requirements elicitation. They are the content requirement (the batik domain knowledge), the cultural requirement (batik community culture) and the context requirement (pertinent or critical issue that pose risk to the batik business survival). In our observation, we discovered that the batik domain knowledge is mainly captured in visual forms either as batik artefacts which are worn or displayed or as images in books or exhibited as museum or gallery exhibits. Batik making knowledge on the other hand is encapsulated in the batik making process and is shared through the mentoring process during batik making itself and/or through story-telling scenarios. Issues influencing the survival or the flourishing of batik can be a barrier to ICT adoption. The fear of cultural erosion of batik amongst batik advocators and batik makers is strengthen by their belief that ICT can propagate the erosion process. We strongly propose that the technology conception must try to remove this fear. Figure 6 illustrate the core concepts that

we have discovered from our analysis and synthesized them as a technology conception for the community-based information system model for batik making.

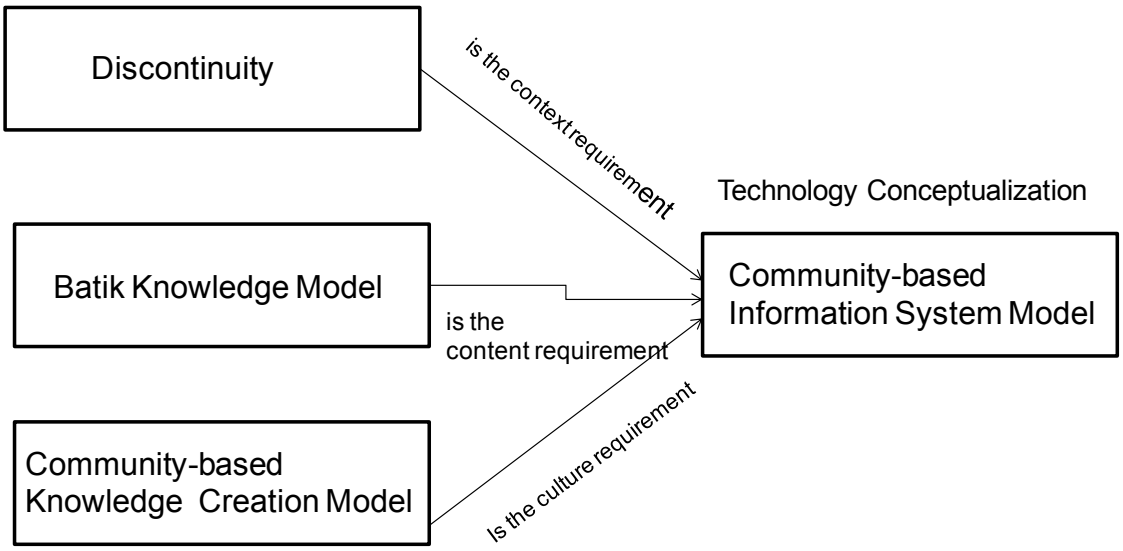


Figure 6: Core concepts of the technology conceptualization

A technology conception of a community-based information system model for batik microenterprise must not endanger the survival of batik making and must respect the different knowledge and role of the community members. For instance if a technology conception is achieved through a batik digital gallery, it becomes an important system's requirement that the gallery protects the intellectual right of the batik community member as well as the batik knowledge so that the gallery do not actually contribute towards the cultural erosion of batik. The findings from this work have huge implication on the development of ICT-based information systems for batik microenterprise. Although batik makers were concern with efficiency, they are not willing to sacrifice the indigenous nature of their batik artefacts. An ICT-based information system that only increases their operational efficiency may not be able to help them retain the competency of batik making which is seen to be more crucial. A new set of requirements dictated by the batik domain knowledge cannot be ignored. A relevant ICT-based information system for batik microenterprise will be one that supports the knowledge creation of batik either for an individual or for a community of batik makers.

5. Conclusion

In this paper we have presented our concern for the technology conceptualization required for the development of an ICT-based information system for the batik microenterprise. We attempted a business requirement elicitation work for batik microenterprise by conducting a contextual inquiry aligning it with concern of batik community. We made two important discoveries of batik makers' concern which influences the batik making business requirements. The first is on the reliance of tacit knowledge of batik making and the second is on the fear of batik cultural erosion which cannot be overcome by the development of production-based information systems that only emphasize efficiency. From our findings, we are suggesting that any attempt to develop an ICT-based information system for batik microenterprise must not ignore these two concerns. Our future work will be on the exploration of future ICT-based information systems for batik microenterprise.

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