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# IT Adoption Strategy to Promote Batik Micro-Scale Industry in Central Java, Indonesia

## Strengthening Universities Role in Batik Micro-Scale Industry

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*Abstract*—Though it is unarguable that the adoption of Information Technology (IT) has a significant contribution to many industries, batik micro-scale entrepreneurs in Central Java, Indonesia, have a different view making the utilization of IT not optimal to support their business. Hence, to increase the benefit of IT to this group, this research aimed to offer an IT adoption strategy that attaches knowledge management system, collaboration-based information system and shared e-commerce application as an integrated system to support problem solving in batik making process and in reaching the global market. The strategy highlights on two concerns of improvement on product quality and better product selling. However, because batik micro-scale industry in Central Java mostly faces IT skill problems and limited budget to be allocated on IT matters, the involvement of universities around the industry location is recommended to play an essential role through its work field program, community service program and research and as a collaborator between stakeholders.

*Keywords*—knowledge management system; collaboration-based information system; batik indonesia; IT adoption

### I. INTRODUCTION

The advance of information technology (IT) has revolutionized the way to conduct business in globalization, hyper-competitive and information revolution. This information technology epoch has led to modern economic environment affecting all enterprises scales enabling the adoption of this technology to bring many advantages to enterprises in which it later can enhance its value to the public. There are many success stories on how corporates reengineer their business processes by involving information technology infrastructures and applications to bring a better performance, and effectively focuses on the convenience of the business itself and costumers. In addition, a wider market can be achieved considering the ability of internet technology to connect people around the world.

It is undeniable that most of global corporates have successfully taken many benefits from the information technology support. However, there are many challenges on IT

adoption for micro-scale to medium-scale enterprises mainly in view of the limited budget and skills to operate the technology [1][5][6][10]. To deal with such problems, Al-Qirim [9] attempted to identify a number of critical success factors for innovation adoption and to test their significance on E-Commerce adoption in small enterprises. In his research, it has been found that focusing on marketing/selling strategies and selecting appropriate technology are the critical factors. On the other hand, education and the background of the entrepreneurs also play the role [1] as well as the policy makers or the government.

However, a case examined by Hairuddin et al. [1] showed that batik micro-scale enterprises (M-SEs) in Malaysia refuse to adopt information technology. Besides suffering from the problems previously described, entrepreneurs in this category also need some helps in production process to improve their product quality. Not only do Malaysian batik entrepreneurs experience IT adoption problems, but batik MS-Es in Central Java, Indonesia, which is the case in this research, also have similar problems in reaching wider market using e-commerce applications. Therefore, an IT adoption strategy to establish a link between stakeholders (e.g. government and universities), suppliers, customers and M-SEs is required to acquire financial support or a particular training to improve a product quality from stakeholders and to reach the potential or existing customers. To deliver information about MS-Es' problems to the related parties, knowledge management system (KMS), that will be used by all involved stakeholders must be developed covering the processes of batik making, marketing/selling transaction, supplier chains, production and IT implementation difficulties. By establishing KMS application, entrepreneurs are able to request to the government or universities any supports they need. Meanwhile, to bring M-SEs product to the market, shared e-commerce application and online social network can be utilized.

Hence, by selecting M-SEs from batik industry in Central Java Indonesia as a case study, this research aims to develop an IT adoption strategy to strengthen those enterprises in the modern economic environment through the utilization of shared e-commerce application, collaboration-based information system and implementation of knowledge-based management

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system. In summary, the main contributions of this paper include:

- IT adoption strategy that emphasized on the role of universities
- Collaboration-based information system approach to promote communication between stakeholders to M-SEs

The rest of this paper is organized as follows: Section two and three present some related works in promoting batik micro-scale industry and its literature, respectively. Section 4 discusses about proposed approach while conclusions as well as future research are drawn and suggested respectively in Section 5.

## II. RELATED WORK

This section briefly reviews the related works with a concern to promote M-SEs by adopting information system and technology to gain competitive advantages. The first work was conducted by Suzianti et al. [11] identifying all the knowledges related to batik value chain (process of producing batik from raw materials to customers' hand) and translated them into knowledge-based SECI model to assist Small-Medium Enterprises (SMEs) in improving their management of knowledge to drive the innovation process within the SMEs. This model comprises four processes: socialization, externalization, combination and internalization processes. Socialization process deals with an experience-based learning as an output and externalization process generates control sheet and standard operational procedures (SOP). Then, database and documentation activities will be involved in combination process. Meanwhile, internalization process will be held to improve quality and sales forecasting. Similar to Suzianti et al., Fachrunnisa et al. [13] also developed a framework to maintain SME's sustainability, which consists of partner search module, agreement module, monitoring module, and evaluation module. This research implemented Digital Collaboration Network (DCN) architecture that accommodated social networks, IT networks, and knowledge networks in order to keep SME's existence.

The second work was conducted by Noor and Nordin [4] that provided the broad literature review of microenterprise and batik making, technology adoption and socio-technical systems issues. This research found that although batik makers concern with efficiency, they are not willing to sacrifice the indigenous nature of their batik artefacts. An ICT-based information system that only improves their operational efficiency may not be able to help them to retain the competency of batik making which has been seen to be more crucial. Hence, to develop community-based information system model for batik entrepreneurs, Noor and Nordin offered technological conceptualization that consists of discontinuity, batik knowledge model, and community-based knowledge creation as a suitable information system model to support M-SEs.

Previously, Nasir and Noor [12] proposed an ontology-based approach in KMS to construct batik heritage ontology, the main role of ontology in KMS is to deliver the meaningful information for the ease of integration and exchange between communities in, for instance, e-museum applications. The result will

expectantly allow a room for ontology growth in e-museum applications and create a wealth of opportunities for interactions with collections of experts' knowledge from the community. For further development, this ontology can also be used in e-commerce applications to provide more relevant detail information about batik products to customers.

## III. LITERATUR

### A. Knowledge Creation Process

The concept of knowledge management is suitable well with what is needed by batik SMEs in Java [11]. Knowledge Management refers to the efforts to systematically find, organize, and make a company's intellectual capital foster and culture of continuous learning and knowledge sharing available so that organizational activities build on what is already known [16].

Prior to implement KMS, it is usually started with a knowledge creation started by identifying what kind of knowledge has been already owned and needed, and what kind of advantage will be achieved. Meanwhile, as stated Wahid et al. [3], the knowledge-creation process starts with socialization where the tacit knowledge of customers and competitors is acquired through field building, and then externalized through a dialog into explicit knowledge to be shared within an organization. Next, the explicit knowledge is in a form appropriate to be diffused throughout the organization and combined with other existing knowledge. Subsequently, the organization's workers internalize these complex sets of explicit knowledge, and then determine the most favourable application to be put in action. Fig. 1 shows an example of framework that illustrates a new knowledge creation process.

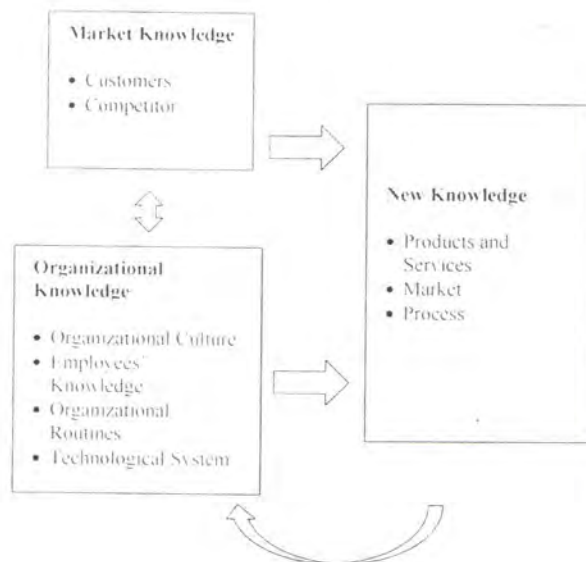


Fig. 1. The Framework of Knowledge Creation [3]

### B. E-Commerce: dependence on IT adoption

In today internet era, website becomes one of important components in doing any e-commerce activities. Through the e-commerce sites, a buyer candidate can obtain any information related to the product or buy a product. Generally, e-commerce sites have some common features such as shopping chart, check-out/payment, product visualization, product price, and shipping [14]. However, if correlated to the system analysis of Landon and Traver [15], there will be 9 basic business objectives that an e-commerce site must deliver. These objectives must be translated into a description of system functionalities and ultimately into a set of precise information requirements. Table 1 shows the correlation of the business purpose, system functionality and information requirement.

TABLE I. BUSINESS OBJECTIVES, SYSTEM FUNCTIONALITY, AND INFORMATION REQUIREMENTS FOR A TYPICAL E-COMMERCE SITE [15]

Business Objective	System Functionality	Information Requirements
To display goods	Digital catalogue	Dynamic text and graphic catalogue
To provide product information (content)	Product database	Product database, stocking numbers, inventory levels
To personalize/customize product	Customer on-site tracking	Site log for every customer visit, data mining capability to identify common customer paths and appropriate responses
To execute a transaction	Shopping cart/payment system	Secure credit card clearing, multiple payment options
To accumulate customer information	Customer database	Name, address, phone, and e-mail for all customers, online customer registration
To provide after-sale customer support	Sales database	Customer ID, product, date, payment, shipment date
To coordinate marketing/advertising program	Ad server, e-mail server, e-mail campaign manager, ad banner manager	Site behaviour log of prospects and customers linked to e-mail and banner ad campaigns
To understand marketing effectiveness	Site tracking and reporting system	Number of unique visitors, pages visited, products purchased, identified by marketing campaign
To provide production and supplier links	Inventory management system	Product and inventory levels, supplier ID and contact, order quantity data by product

In real case, the utilization of e-commerce application by MS-Es is mostly dependent upon its internal organization factors [7]. Related to this, Manuelli et al. [8] identified a four-stage IT adoption process in an organization: (i) No IT adoption, (ii) Basic IT adoption, (iii) Intermediate IT adoption, and (iv)

Advanced IT adoption. The use of internet for checking or sending email is included at stage two, and then, the use of e-commerce tools (including websites) and business to business transaction electronically is grouped at stage three and four respectively. In addition, the role of online social media becomes crucial in the advanced stage of IT adoption. Online social media (OSM) that today has engaged millions of users over the Web, has become a necessity for SMEs to be present and get feedback about their products and services, as OSM can be a great venue for increasing their customer base, implementing customer relationship management, targeting advertisement campaigns and performing networking tasks [2]. However, all features offered by these technologies will be in vain without any successful IT adoption.

### IV. PROPOSED APPROACH

This research examined nine regencies (Jepara, Demak, Kudus, Temanggung, Magelang, Grobogan, Sragen, Rembang, and Salatiga) and one city (Semarang) of batik micro-scale industry in Central Java, Indonesia. The batik MS-Es is divided into three clusters: weak, medium and strong cluster. From each cluster, it has been found that improving entrepreneurs' skills and product quality are essential to be solved instead of marketing and selling product. Hence, the objective of the proposed approach is to increase IT contribution to enhance the competitive advantage of MS-Es by defining strategy that can be divided into four phases as follows:

#### 1) Phase 1: Knowledge creation

In this phase, knowledge about batik production process, organization, supplier relationship, marketing and selling strategy will be constructed to develop KMS. In addition to maintain knowledge about batik industry, this system also has a feature that serves as a channel to communicate MS-Es problems to its stakeholders such as government and universities. For example, it is possible for the entrepreneurs who want to enhance an employees' particular skill will be able to send a request from this channel so that related experts from universities or government can respond to the request by providing training for them.

#### 2) Phase 2: Developing collaboration-based information system

To enrich previously developed knowledge management system, collaboration-based information system is required to spread information from stakeholders such as suppliers, companies, government, universities, and other related parties to MS-Es. Through this feature, information about Corporate Social Responsibilities (CSR) fund can be easily delivered to MS-Es.

#### 3) Phase 3: Penetration of e-Commerce applications

For micro-scale entrepreneurs, the utilization of e-commerce application may consume their budget more and sometimes they lack of skill to optimally use the applications. Hence, it is recommended to use a shared e-commerce application to present batik products to market. Although web-based e-

commerce application still becomes the main option to be used, it is suggested to use a mobile application as well.

#### 4) Phase 4: Promoting application

Promoting products from each MS-Es group directly to the market will take more efforts rather than to introduce an application comprises all products of all MS-Es groups. This is the main reason of using shared e-commerce application in previous phase. For promoting application purpose, online social network, such as Facebook and Twitter, can be used to reach global market. In addition, by using CSR fund, the application can be advertised through television or radio.

In the first and second phase, the main goal is to set an IT support to contribute to improve batik product and entrepreneurs' skills. Meanwhile, to help entrepreneurs' products to be found easily by market, the IT contribution in third and fourth phase will accommodate it. However, since the micro-scale industry has not ready yet to initiate those steps above, it is recommended that universities in this region stand in the front as a collaborator. Research culture which is owned by universities, is suitable to develop the system and applications needed. In addition, universities also have work field study and community service program that can be set to continuously support batik micro-scale industry from various aspects. By considering its strategic position, it is believed that universities can extent its role to encourage the involvement of other stakeholders as well.

### V. RESULT AND DISCUSSION

Although the proposed IT adoption strategy was prepared to be executed in our next research timeline, there were efforts in this research to establish collaboration between university and M-SEs as preliminary study of IT adoption. In this case, the M-SEs was introduced and mentored to use web-based e-commerce application to help them promoting their products. The collaboration program was divided into two types: incidental program and continuous program in some period of time. For both program, the application hosting was provided free of charge. As a result, not only did M-SEs in incidental program end the utilization of e-commerce application, but also M-SEs in continuous program. However, M-SEs that participate in continuous program showed a positive progress to use IT support. Based on this case, it can be a small evidence that persevering and continuous IT adoption mentoring to M-SEs will bring positive influence to the growth of M-SEs. This effort will cost time, funding, and human resources that in our opinion it can only be provided by university. Therefore, implementing our proposed IT adoption strategy by strengthening the university role will be an opportunity to assist M-SEs.

### VI. CONCLUSION AND FUTURE WORK

In this research, it is found that IT contribution should not limited to help M-SEs in marketing or selling process only, but it can be extended to improve the quality of batik production through delivering batik making process problems to related parties. On the other hand, those parties will be able to help batik micro-scale directly by providing information to acquire its assistance from collaboration-based information system. In this scenario, universities will play a central role to collaborate each party. In addition, in order to save cost on e-commerce technology adoption, it is recommended to use shared e-commerce application to enable wider market to be reached by all group of MS-Es. This strategy is proposed conceptually and in the future work, it is planned to implement and evaluate this strategy, especially to promote batik micro-scale industry in Central Java, Indonesia.

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