


Development of a Conceptual Model of E-commerce Adoption for SMEs in Indonesia


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Abstract—E-commerce adoption provides many benefits for small and medium enterprises. In Indonesia, adoption of e-commerce by SMEs is still in low level because they meet such several problems to adopt e-commerce as difficulty to learn and use e-commerce, to understand the role of e-commerce, etc. Based on the literature review, a conceptual model that is capable of measuring the adoption level of e-commerce is proposed. The model—that consists of both functional and non-functional requirements of an e-commerce—can be used as a framework for raising their e-commerce adoption level.

Keywords—conceptual model; e-commerce adoption; framework; SMEs

I. INTRODUCTION

Small and Medium Enterprises (SMEs) are small-scale firms that contribute a critical role in an environment characterized by rapid growth. They support industry development and reserve as economic growth drivers [1]. The globalization of the world economy accentuates SMEs as a backbone of the national economy. In Indonesia, SMEs play an important role in reducing the rate of poverty and unemployment. In the middle of 1997, when the crisis occurred in Indonesia, SMEs remained and even tended to grow [2].

In a changing and competing environment, notably in global market, SMEs need to improve their ability as well as to respond to the changes. E-commerce adoption among SMEs have experienced rapid growth in the past few years [3]. E-commerce provides opportunities and benefits to organizations of all sizes, particularly to the small-business sector [4].

There were several works related to implementation and adoption of e-commerce for SMEs. Many works have been trying to identify factors influencing e-commerce adoption. Those works are expected to be a reference for implementing successful e-commerce in SMEs [4]–[11]. However, e-commerce adoption by Indonesian SMEs is still in low level. This study found

several obstacles faced by SMEs when adopting e-commerce, particularly there were difficulty to learn and use e-commerce related with inadequacy of human resource capability [11]. Other study found that some SMEs have failed to adopt e-commerce because they did not know how to develop activities concerning the adoption of e-commerce in their firms. Moreover, they did not know how to understand a complex role in order to manage their e-commerce [12].

As already mentioned earlier that, although e-commerce provides many benefits for SMEs and there were several factors influencing successful adoption of e-commerce, there is still a problem on how to raise the level of e-commerce adoption in order to gain more benefits regarding each level they will achieve.

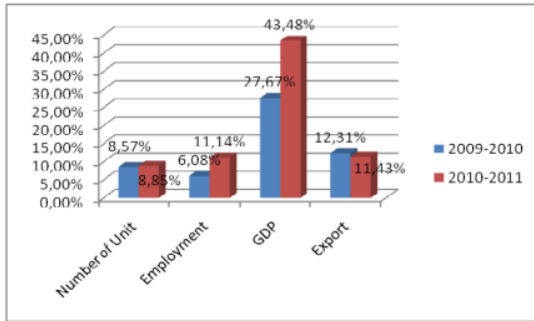
Based on the problem faced by Indonesian SMEs, this paper proposes a conceptual model for e-commerce adoption by SMEs. The proposed model is facilitated with a metric to measure the adoption level. The conceptual model also consists of functional and non-functional requirements which are provided in each e-commerce adoption level. In the future, this conceptual model can be used as a framework to develop e-commerce applications needed by Indonesian SMEs based on their benefits.

II. LITERATURE REVIEW

A. SMEs in Indonesia

SMEs in Indonesia play an important role in reducing the rate of poverty and unemployment in Indonesia economy. A report noted that SMEs contribute to the employment, gross national product (GDP), and export. In Indonesia, Indonesian's Central Bureau of Statics report indicated that the growth and the role of SMEs in Indonesia economy from 2009 to 2010 and 2010 to 2011 were significant, as show in Figure 1. This report indicated that Indonesian's SMEs should be more active

in the global marketplace in order to increase their revenue and advantage competition.



Source: Indonesian's Central Bureau of Statistic

Figure 1. Growth of SMEs Indonesia

B. E-commerce Adoption in SMEs

Many previous studies have examined the e-commerce adoption by SMEs. According to Hong[13], there were three factors influenced SEMs to migrate toward e-commerce; i.e., technology integration, web functionalities, and web spending. The firms that have more web-compatible technologies are likely to be earlier to adopt e-commerce. In this context, there are several web functionalities that can specify the level of technological capabilities that are definitely related to the adoption of e-commerce [13]. A study on e-commerce adoption in New Zealand found that there were several factors affecting e-commerce adoption, such as innovative and involvement of Chief Executive Officers (CEOs), relative advantage, competition, information intensity of product, and supplier pressure [14]. In order to gain several advantages of e-commerce adoption, a study was conducted for evaluating implementation of e-commerce in Iran. Results of this study identified three factors that evoked positives relationship between the degree of e-commerce adoption and stages of e-commerce development in a firm; i.e., technical, organizational, and inter-organizational [15].

Currently, very limited studies that were already conducted in related with e-commerce adoption in Indonesia (see for example Yulimar[10]; Maryeni[16]). According to Yulimar, there were five factors effecting adoption e-commerce in Indonesia; these are, compatibility, top management support, organizational readiness, external pressure, and perceived benefit. In addition to this, results obtained from Maryeni's study indicated that there were several variables of technological and

organizational factors that influenced the adoption of e-commerce by manufacturing SMEs in Indonesia, particularly in West Java province. These variables are relative advantage, compatibility, complexity, observability, planning, infrastructure, and security, IT skills of users, IT knowledge of owners/managers, management support, funding capacity, the required effort and turnover.

C. E-commerce Adoption Level

Rao proposed a four-stage model for the e-commerce development and its implication for SMEs[17]. The model could be used by SMEs to classify their position in compared to other SMEs. The model was developed based on the evolutionary nature of e-commerce. The characteristics of each stage in this model indicate a functional requirement of e-commerce. The model consisted of presence, portals, transaction integration, and enterprises integration [17].

A Study related to e-commerce adoption that measured the level of adoption was conducted by Wahid [11] and Govindaraju [18]. Wahid's study found that, in general, the e-commerce adoption by SMEs in Indonesia (particularly in Yogyakarta region) is still low. This level was measured using Knol and Stroekeng model [19]. Govindaraju also found that most Indonesian SMEs participating in his study are currently still adopt e-commerce at the lower level. There were three factors pursued the adoption of e-commerce such as push forces, man, and source of information. According to Govindaraju, Indonesian SMEs needed the support of their management, educated employee, and more sources of information about e-commerce. Moreover, although the adoption level of most SMEs are currently still at the lower level, they desire to migrate to higher level adoption.

III. THE PROPOSED CONCEPTUAL MODEL

In this study, a modified model of e-commerce adoption developed by Rao were used to measure the adoption level of e-commerce [17]. The initial design of the conceptual model is shown in figure 2. In this regard, a modification was made by involving the functional requirements and other attributes to measure the level of adoption by SMEs.

A survey was conducted to determine functionality requirements of e-commerce, where 15 best e-commerce platforms ranked in the Web Appers sites (<http://www.webappers.com>) as listed in Table 1. We analyzed and looked for to obtain the required functionalities. The analysis was conducted by determine the unique functionality had each platform. At least 10 platform supported the unique functionality. Based on this analysis, initial functional is

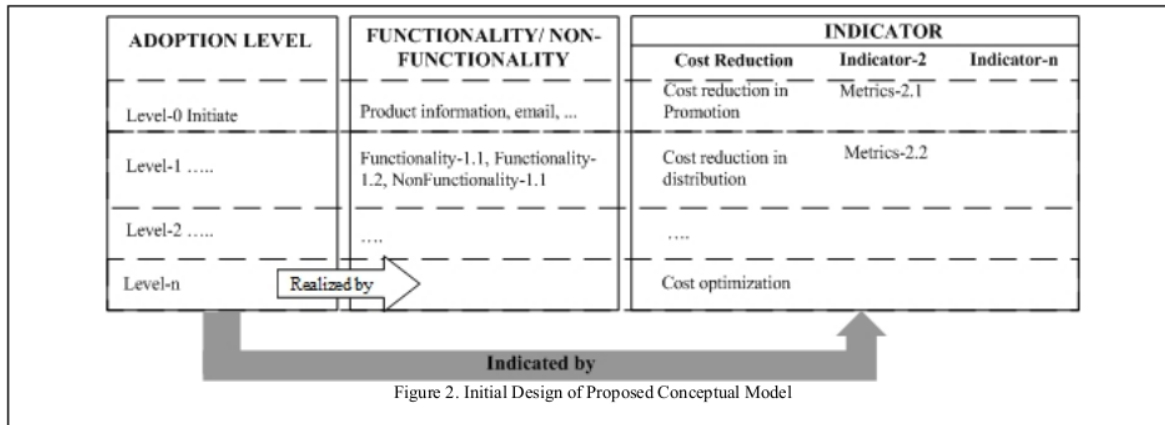


Figure 2. Initial Design of Proposed Conceptual Model

defined as shown in Table 2.

TABLE 1. E-COMMERCE PLATFORMS

ID	Platform	Website Address
ID01	Magento	http://www.magentocommerce.com
ID02	osCommerce	http://oscommerce.com
ID03	OpenCart	http://www.opencart.com
ID04	Spree Commerce	http://spreecommerce.com
ID05	PrestaShop	http://www.prestashop.com
ID06	VirtueMart	http://virtuemart.net
ID07	Ubercart	http://www.ubercart.org
ID08	Zeuscart	http://www.zeuscart.com
ID09	Afcommerce	http://www.afcommerce.com
ID10	Zen Cart	http://www.zen-cart.com
ID11	SimpleCart js	http://www.simplecartjs.org
ID12	Tomato Cart	http://www.tomatocart.com
ID13	CuberCart	http://www.cubercart.com
ID14	RokQuickCart	http://www.rocketheme.com
ID15	StoreSprite	http://www.storesprite.com

TABLE 2. FUNCTIONALITY REQUIREMENTS

No.	Functionality	Website ID
1	Information product	ID01-ID15
2	Checkout	ID01-ID15
3	Payment	ID01-ID15
4	Shipping	ID01-ID15
5	Promotion	ID01-ID10, ID11, ID13, ID15
6	Searching	ID01-ID10, ID11, ID13, ID15
7	Search Engine Optimization (SEO)	ID01-ID10, ID11, ID13, ID15
8	Provide security	ID01-ID10, ID11, ID13, ID15
9	Customer account	ID01-ID10, ID11, ID13, ID15
10	Management order	ID01-ID10, ID12, ID13, ID15
11	Reporting and analytic	ID01-ID08, ID12, ID13, ID15
12	Multi language and currency	ID01, ID02, ID05, ID06, ID08, ID09, ID10, ID12, ID13, ID15

Non-functional requirements define the overall qualities or attributes of the resulting model[20]. There are a number of quality models that can be used as a basis for developing the software quality. The WebQual 3.1 [21] and the international standard ISO 9241-151 [22] were proposed to determine non-functionality requirements of e-commerce. The WebQual provides 4 2 aspects that are related to quality of a Website; these are, informational fit-to-task, tailored information, trust, response time, ease of understanding, intuitive operations, visual appeal, innovativeness, emotional appeal, consistent image, on-line completeness, and relative advantage [21]. On the other hand, ISO 9241-151 provides guidance on the Web user interfaces with the aim of increasing usability. ISO 9241-151 is structured into five major areas: high-level design aspects, conceptual content model, content object and functionality, navigation and search, and content presentation[22].

The analysis was conducted toward Webqual 3.1 and ISO 9241-151. Non-functionalities requirement of e-commerce were determined based on the need of e-commerce platform, as shown on Table 3.

TABLE 3. NON-FUNCTIONALITY REQUIREMENTS

No.	Non-Functionality	Reference
1	Keeping content up-to-date	[22]
2	Communication with website owner	
3	Accepting online user feedback	

4	Providing a business policy statement	[21]
5	Providing privacy policy statement	
6	User control of personal information	
7	Information fit-to-task	
8	Trust	
9	Response times	
10	On-line completeness	
11	Relative advantage	

For the purpose of defining indicators required for quantifying the adoption level of e-commerce, a set of comprehensive literature surveys were performed. First, it was clear that the adoption of e-commerce provide opportunities such as increased number of customer, penetration of new market, faster communication with customer, competitive advantage over competitor, easy access to customer network, cost advantage and short delivery times [23]. In New Zealand, for example, 61.4% SMEs already used e-commerce to support their business processes. They gained benefits from adopting e-commerce such as effective advertising and brand building, increased customer based, increased sales, cost savings, increased profits, and better purchasing terms [24].

Second, it could be assured that SMEs were adopting e-commerce to improve their performance. The benefits gained from adopting e-commerce were increased revenues and reduced costs [25]. For examples, a study on implementing e-commerce by S 6 s in Australia and Singapore was found the benefits such as increased sales, improved profitability, reduce costs associated with inventory, procurement and distribution, improving quality of service and guarantee competitive [26]. Moreover, SMEs in China and Malaysia were concerned with e-commerce related with the benefits their gained such as increase ability to compete, increase sales, reducing transaction costs and enhancing the corporate image [27], [28].

Third, in the context of Indonesia, only a few studies were done related e-commerce adoption. Those studies described several benefits for adopting e-commerce such as increasing penetration market, increasing advertising, reducing costs, increasing profit and increasing customer services [29].

Based on the above literature surveys, it is envisaged that the adoption of e-commerce will provide many opportunities and benefits for SMEs. However, although there are works in the literature which present implementation and adoption of e-commerce, there are no work that define the benefit of e-commerce adoption as an indicator to measure the benefit gained by SMEs. In this study, those benefits of e-commerce adoption are used as a basis for defining some indicators for quantifying the adoption level of e-commerce. Table 4 shows those proposed indicators.

TABLE 4. INDICATORS OF E-COMMERCE BENEFITS

No.	Attribute	References
1	Costs reduction	[23]–[27], [29], [30]
2	Global market	[23], [25], [26], [29], [30]
3	Market penetration	[23]
4	Increasing revenue	[24], [25], [29]
5	Increasing customer services	[11], [23], [24], [29]
6	Improving information availability	[24], [27]–[29], [31]
7	Rapid time to market	[23]

It is important to note that this study is part of a bigger research work, which is still in progress. In order to establish the complete view of the conceptual model as a result of this study, data collection from Indonesian SMEs and e-commerce's

experts will be conducted. A set of questionnaires will be delivered to a sample of SMEs that will be selected from the Ministry of Cooperative and Small and Medium Enterprises of Indonesia through its website (<https://www.indonesian-product.biz>).

Data collected from SMEs will be first analyzed using the factor analysis. The aim of this method is to find the relationships among a large number of variables by defining sets of variables that are highly interrelated [34]. Results of data processing will be used to create mapping between indicator of e-commerce adoption benefit and requirement of e-commerce. A hierarchy clustering method will be then employed to group data objects into a hierarchy of clusters[32]. This scheme was similar to the work performed by Jalozie, where a hierarchical clustering method was used to identify e-commerce business models [33]. Results of such a clustering procedure will be used to determine the number of stages of the e-commerce adoption model of SMEs.

IV. CONCLUSION AND FUTURE RESEARCH

A conceptual model of e-commerce adoption, which is equipped with a metric to measure the level of e-commerce adoption has been proposed. The proposed list of both functionality and non-functionality requirements of e-commerce will be used to characterize each level of the e-commerce adoption. Together with the proposed list of indicators of e-commerce benefits, the model can be used to assess the adoption level of e-commerce by SMEs. In order to require the numerous benefits of e-commerce adoption, this model can be utilized as a framework to guide SMEs to move from their existing adoption level to the higher-level ones. Therefore, our future research will focus on development of e-commerce adoption framework for SMEs based on this study. A survey instrument consisting of a set of questionnaires related to the benefits' indicators of e-commerce for each level of the model will be developed. In this future research, empirical tests will also be employed in order to validate the model being developed.

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