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Developing and Validating Readiness Measures of Inter-organizational E-commerce on SMEs

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Abstract

This paper seeks to contribute to the development of inter-organizational or business-to-business (B2B) e-commerce readiness model for Small and Medium Enterprises (SMEs), which focus specifically on the validation process of e-readiness assessment indicators. The model and tool developed in this research are multidimensional constructs composed of theoretical dimensions that capture key elements involving

individual, organizational and environmental aspects of B2B e-commerce. Drawing on mixed methods approach of sequential exploratory strategy, this study adopted the face validity and content validity approach to evaluate and validate the effectiveness of the survey instrument. The survey instrument is used to assess the organization e-commerce readiness. In-depth semi-structured interviews were conducted with sixth experts from various organizations who had extensive knowledge on inter-organizational e-commerce theories and practices. The results showed that experts generally agreed on the appropriateness of various e-readiness indicators. Based on the comments and recommendations from experts, the pool of items associated is refined and restructured.

Key words: **B2B e-commerce, e-readiness, small medium enterprise, expert reviews, face validity and content validity.**

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INTRODUCTION

The use of inter-organizational or also known as Business-to-business (B2B) e-commerce that able to enhance the effectiveness of upstream and downstream business transactions is now becoming a global objective. However, as the adoption of the application is being slowed among SME, e-readiness assessment tool can help to measure the preparedness of SME to adopt applications related to online B2B transactions.

The importance of e-readiness research has been acknowledged through various e-readiness assessments made by reputable agencies and researchers. E-readiness assessment is importance since the competitiveness of countries is highly being associated with their readiness in improving service, create new opportunity and have competitive edge over other countries (Huang et al. 2004). For business enterprise, their readiness in adopting the technologies such as the Internet, personal computer, wireless telephone, have expected to lead the company to a more positive direction in managing the relationships with their key stakeholders such as suppliers, customers, employees and investors.

Considering the importance of the e-readiness tools, it is necessary to develop and validate e-readiness assessment tools appropriate to the issues and setting of SME in developing countries. One of the key principles of e-readiness approach is that, whatever possible variables are chosen as indicators, need to be validated by representatives of the beneficiaries or stakeholders (Menor and Roth, 2007). As part of the larger study, this paper focuses on validity and reliability testing process of survey tools. According to Khoja et al (2008), "validity is a measure of accuracy and indicates if the tool is measuring exactly what it is supposed to measure". Streihener (1993), Yip, Chang, Chan and Mackenzie (2003) and Bowling (1997), explained the variance of the validity methods that are based on the purpose of the assessment.

RELATED WORKS

The importance of e-readiness research has been acknowledged through various e-readiness assessments made by reputable agencies and researchers. The e-readiness assessment tools are used to identify the great disparities between and within societies in the use of digital technology. Among the various e-readiness assessment tools that have been developed international and nationally are, Mosaic Group with its Global Diffusion of the Internet tool, Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group with its E-commerce Readiness Assessment tool and World Information Technology and Services Alliance (WITSA) with its International Survey of E-Commerce tool.

Other e-readiness assessment tools are United Nations Development Program's with its Technology Achievement Indices tool and World Bank Institute with its Knowledge Assessment Methodology (Ghavamifar, Beig and Montazer, 2008). Even though, these existing e-readiness tools include most of the important indicators in terms of diversified assessment factors, the focus are more on ICT infrastructure and national business environment (Dada, 2006). Thus, the frameworks have limited power in explaining how and what level of internet technology development effect the adoption at organizational level especially in SME sector. Furthermore, many e-readiness models provide limited information on how their indices were constructed or how they might be adjusted to analyze particular e-environment (Ojo et al, 2008).

Furthermore, even though research done by Molla and Peszyenski (2011), Molla, Peszynski and Pittayachawan (2010), Kurnia (2008), Fathian, Akhavan and Hooral (2008), Dada (2006), Rizk (2004), Gopi and Ramayah (2007), and Molla and Licker (2005) provide interesting insights of e-commerce readiness models for SMEs in developing countries, the organizational and environmental indicators are still not sufficient in providing points of reference on specific B2B e-commerce adoption influence factors. The formulation of B2B e-commerce readiness has so far been mainly addressed from either one or two perspectives: the perspective of the individual firm (Lai et al 08) or the perspectives of a whole industry (Aminali, 2007; Khoja et al 2008) or the perspectives of country e-readiness (Ghavamifar, Beig and Montazer 2008). Few studies have addressed two levels but very limited assessment factors (Tan, 2007). This seems to be a serious shortcoming as the benefits of B2B e-commerce mostly come from understanding on the integration of individual, industrial and national perspectives.

Thus, in conceptualizing multidimensional B2B e-commerce readiness, we draw upon the existing e-readiness model to explain the influence indicators associated with building the requisite of B2B e-commerce elements.

However, realizing the major differences between existing e-readiness models in terms of scopes and geographical areas applied, it was necessary to develop and validate the model appropriate to the scope and setting of the study (Khoja et al, 2007). Thus, e-business readiness framework by Huang and Zhoa (2004) applied expert evaluation methods in assessing the validity and correctness of the framework. The three dimensions of e-business success factor of organizations were finalized through interviewed with ten Chief Information Officers (CIOs) in industries and five university professors in e-business related fields. However, according to Fotouhiyehpour (2008), the Huang's indicators for e-readiness assessment are not very practical due to the

generalized point of views. Since, the results on e-readiness indices weighting were so close together that the analysis of the results was not clear.

In a similar vein, Rosenzweig and Roth (2007) developed a set of new, multi-item construct of infrastructural competencies of manufacturers to engage in internet-enabled activities. Through existing theory and literature, the conceptual domain of the B2B-supply chain (B2B-SC) dimensions and eight construct definitions were initially identified and defined. In order to ensure the content validity and the adequacy of the items under each construct, seven consultants and senior managers who were knowledgeable and experience with B2B e-commerce were invited to validate the model. From the validation process, construct definitions and items were redefined and gaps were filled.

Similarly research by Fathian et al (2008) employed the same methods that they invited eleven experts to participate in the survey instrument evaluation process. The questionnaires were sent to information, finance, research and development, academic and human resource departments of SME, in order to access their readiness in adopting the ICT.

Thus, synthesizing insights from existing literature and practices, we believed expert validation helps to ensure the accuracy and efficiency of the model. Thus, this paper intend to provide practical guidance to other researchers in testing and establishing the survey instrument so that the developed tools will give more confidence to potential users in the results obtained. The paper also addresses the gap in the e-readiness operation and strategy literature concerning the salient e-commerce in B2B-SC relationships. In addition, the model developed is a multidimensional B2B e-commerce readiness constructs composed of dimensions that capture individual, organizational and environmental perspectives.

RESEARCH METHODS AND MATERIALS

This section attempts to evaluate and validate the effectiveness of the B2B e-commerce readiness model that is being developed based on its specific scope and purpose. The model is developed with the purpose to assess the readiness of SME regarding B2B e-commerce implementation. Thus, for the development of conceptual framework for B2B e-commerce readiness for SME in developing countries, we applied various sources of literature reference to build the conceptual B2B e-commerce readiness model, which later will be validated by experts. The research is conducted in three phases as discusses below.

Literature review

In order to theoretically ground the conceptual domain of B2B e-commerce, we conducted a full literature and search for existing scales. Literature review helps to understand the concept and overview of e-readiness and the relationships with the process of change towards digital evolution (Rosenzweig and Roth 2007; Khoja et al 2007). In addition, past research helps to understand the functions of e-readiness measurement tools in other areas and the relationship with B2B e-commerce. Through literature review, we are also able to locate and analyze existing e-readiness measurement tools in wider areas other than e-commerce. Through an extensive

literature review, critical success factors for B2B e-commerce implementation success are gathered which are used to build e-readiness assessment indicators model. The articles were identified through a computer search of published works and conference proceedings in the e-commerce area. Adopted from articles searching method used by Nah and Lau (2001), the articles were searched by the title based on the criteria such as it must contains either the keyword 'success' or 'influence factors' and it must contain the term 'e-commerce' or 'e-business' or more specific 'B2B e-commerce' or its equivalent, for instances inter- organizational system (IOS).

Development of conceptual framework:

Through an extensive literature review, conceptual framework of B2B e-commerce implementation success was constructed and produced. Based on the conceptual framework, survey instrument was developed contain items that appropriately assess the preparedness of organization in adopting B2B e-commerce from eight aspects which are:

Individual readiness - based on the motivation, personality and characteristics of owner/ top management regarding the adoption of B2B e-commerce. Specifically it assesses the optimism, innovativeness, and other entrepreneurial attitudes.

Enterprise readiness - based on organization's ability to provide technology, policies and procedures, innovation culture, strategies and visions, governance as well top management commitment.

Competency - considers the social and cultural aspects of relationships, exposure, knowledge and skills of employees

Technology - variables include the availability of technology infrastructure, the flexibility and the capability of existing system.

Business process - covers the practices, business flow process, collaborations, communication and procedures that compliment and accommodate the e-commerce technology activities within and between organizations.

Market forces - construct include the e-readiness assessment on related customers, suppliers and competitors with regards to B2B e- commerce. The constructs include the integration, collaboration and cooperative norms among trading partners.

Supporting industries - attributes involve the support of industries on the availability of telecommunications, financial, trust enablers, IT industry and consultant services.

Government readiness- involves the conduciveness of the B2B e- commerce climate, economic, financial support, national infrastructure conditions and government initiatives.

Expert reviews on indicators

For the sake of completeness and to ensure the validity of the B2B e- commerce integration scale, expert evaluations are used. One of the key principles of expert validation approach is that whatever possible variables are chosen as indicators need to be validated by representatives of the beneficiaries or stakeholders (Menou, 2001).

Thus, six management executives from six various organizations were selected and interviewed. The management executives include CEOs, managing director, general manager, directors and managers in charge of e-business projects and development strategies. Table I summarizes the profile of the participating experts in this study.

Table I
Expert's Profile

Expert	Position	Organization	Years of experience in B2B e-commerce
Expert A	Project manager	Government link company	6 years
Expert B	CEO/ Director	Multinational corporation	6 years
Expert C	Vice President	Multinational corporation	4 years
Expert D	Director	Government agency	9 years
Expert E	Project director	Government link company	4 years
Expert F	Project leader	Multinational corporation	6 years

In validating the conceptual framework, this study adopts the method used by Khoja et al (2007) which used a mixed methods approach of sequential exploratory design. Khoja used content validity approach through case study analysis and in-depth semi-structured interviews. The purpose of content validity is to measure the sufficiency and the coverage of the items related to B2B e-commerce influence factors.

The validation process involves face-to-face approach that provides an opportunity to gather complex data that involve deep explanation and simultaneous feedback from respondents. Considering the complexities of the inter-organizational technology such as B2B e-commerce, the face-to-face approach provides opportunity to follow up, by probing. Probing encourage respondents to enlarge on, clarify, or explain the answer further (Zikmund, 2003). The expert should provide feedback in relevance of influence factors of B2B e-commerce readiness based on the conditions of developing countries.

RESULTS

The validation process primarily focuses on the assessment of the accuracy and uncertainty of each constructed element of the B2B e-commerce readiness model. The results concerning the validity of B2B e-commerce readiness tools developed are discussed in relation to the overall tools and the individual constructs comprising the tools. As mentioned earlier, the purpose of expert validation approach is to ensure the content validity of the B2B e-commerce critical aspects and the adequacy of the indicators pertaining to each aspect. Experts were asked to evaluate and comment on each aspect and indicator. Their assessments are explained below.

Aspect 1- Personal traits

The assessment includes indicators related to individual behaviorism of optimism, innovativeness, discomfort, insecurity and other entrepreneurial attitudes. Experts agree

on the inclusion of personal traits dimension, as they believed that personal traits also contribute significantly to the smooth implementation of new technologies.

Thus, experts agreed that the assessment regarding personal traits should contain five indicators as shown in Table II.

**Table II
Personal traits readiness indicators**

1. Optimist that B2B e-commerce technologies are convenient and benefits to use
2. Willingness to spent time, money and effort on B2B e-commerce implementation
3. Able to lead people in achieving success regarding B2B e-commerce adoption
4. Able to distinguished and critically analyze B2B e-commerce possible risk and its solutions
5. Innovative to be the earliest to acquire new e-commerce technology when it appears

Aspect 2- Enterprise readiness

For organizational readiness, experts agreed on all the indicators listed particularly on the importance of influence factors related to the availability of vision, goals and strategies of B2B e-commerce. However, considering the slow acceptance level of B2B e-commerce among SMEs, experts added that it is extremely important to ensure SME can clearly see the advantages of having B2B e-commerce. Thus, in terms of goals and objectives of having B2B e-commerce in organization, experts suggested to include the objective as to stay competitive by being able to reach market faster, improve business efficiency or driving cost down. Only through this, SME are able to compete and differentiate themselves from other players in the industry.

Practitioners also appreciated the inclusion of indicators related to B2B e-commerce governance, policy and procedures. They emphasized on the importance of comprehensive plan, policy and procedures in using B2B e-commerce in daily transaction activities. However, they strongly stressed the importance of privacy policies and online security procedures.

Experts also agreed on the importance of top management to practice open communication, knowledge sharing and adopt changes due to technology changes. Using the comments and feedbacks from field experts, the indicators for evaluating enterprise readiness are listed as shown in Table III.

**Table III
Enterprise readiness indicators**

Goals and strategies for B2B e-commerce
1. Clear goals on B2B e-commerce which later widely communicated and understood
2. Identification of opportunity, treats, benefits and importance of B2B e-commerce to organization
3. Establishment of well-defined related inter-departmental strategies plan.
4. Continuously revise operations, strategies, plans and business models of organization
B2B e-commerce governance
5. Provides clear and sufficient B2B policy involving contractual arrangement and documentation

6. Provides metrics and indicators for assessing investment and impact of B2B e-commerce
7. Clear ownership of B2B e-commerce project if it involve corporative works with other industry players
8. High centralization of purchase process, budgeting, product pricings and product introductions
9. Provides systematic process to manage any changes as a result of B2B e-commerce
Top management support
10. Provides initiatives and guidance to encourage B2B e-commerce development process.
11. Provides allocation for training, ICT equipment & maintenance investment related to B2B e-commerce
Innovation Culture
12. Encourage new marketing initiatives in terms of market analyses, e-business model design etc
13. Encourage shared values, common aims and open communication among employees and departments

Aspect 3- Competency

For the category of competency, experts agreed to the importance of employee's ability to use computer and have unrestricted access to the technology. They also agreed that it is important for top management and project leaders to have sufficient knowledge about buyer-supplier relationships and the industry structure in order to help them to manage B2B e-commerce projects and resources wisely. Thus, lack of education, information, experience and knowledge among employees and top management have been identified by experts as one of the major barriers to the adoption of B2B e-commerce.

Experts particularly emphasized that sufficient knowledge and understanding on the benefits of B2B e-commerce to their businesses able to attract related industry players to participate in B2B e-commerce application. Furthermore, continuous trainings on the mix aspects of B2B e-commerce within the firm are needed since IT expertise is critical to support the future advancement of B2B e-commerce. However, experts specifically stressed on the importance of B2B e-commerce champion to lead the project. The indicators are revealed in Table IV.

Table IV
Competency readiness indicators

People capability
1. Knowledge and skills on B2B relationships, process, policies and industry structure
2. Access to computer and information regarding B2B applications
3. Able to govern and coordinate projects related to B2B e-commerce
4. Able to adopt changes and use of B2B e-commerce
Job specification on B2B e-commerce
5. B2B e-commerce champions available to lead the project
6. The role and responsibilities are clearly established and approved within each B2B e-commerce project
7. Liaison personnel available to coordinate cross functional teams involving B2B

projects
Training and reward motivation
8. Training on mix aspects of B2B e-commerce management and technical areas.
9. Initiatives to increase willingness of employees to adopt B2B e-commerce.

Aspect 4- Technology

Regarding the technology aspect, experts showed satisfaction with the range of indicators covered. All experts emphasized on the importance of having reliable broadband internet access connectivity as basic infrastructure to allow the exchange of large volumes of information. In conjunction with this, experts identified the limited bandwidth and high cost of internet access is among major problems in establishing good coordination and connection with trading partners.

Experts also appreciated the inclusion of secured and reliable security system to protect network and transmission of sensitive information.

The B2B e-commerce systems need to be flexible enough to cater changes for example changes that relate to business environment as well as handle the data growth. Table V shows the readiness indicators under technology aspect.

Table V
Technology readiness indicators

Technology availability and accessibility concerning:
1.Reliable internet connectivity and speed
2. Online internal information system
3. IT technical support (in house or external)
4. Appropriate security systems to protect information and online transactions
5. Internal ICT standard that comply with industry quality standards
6. B2B that equip with main e-commerce capability and contents (e-payment, online communities etc)
7. B2B systems which are flexible to changes (eg. growth of customer's data)
8. B2B system that emphasis on e-service quality (response time, reliability, easy to access and use, market variability, quality information on products etc)
9. E-customer relation management to support before and after sales services
10. B2B system which can be monitored by trading partners
11. Large quality selection of online products

Aspect 5- Business process

During the interviews, all experts demonstrated similar understanding on the importance of the products, services and current business activities to be continuously reviewed to meet the suitability of online trade transactions. Experts suggested to include items that relate with continuous review of existing working rules, procedures or others that compliment and accommodate the B2B e-commerce technology activities within and between organizations. Generally, experts satisfied with the range of indicators included in this section. However, experts expressed their most appreciation on the availability of indicators that access the effectiveness of trading partners in fulfilling their roles and responsibilities to ensure the successfulness of the B2B e-commerce project. However, experts disagreed on the statement that certain products or services are quite complex, thus not suitable for online trading. Table VI shows the lists of indicators.

Table VI
Business process readiness indicators

Compatibility of current process	
1.	Organization's products or services are continuously reviewed to ensure suitability for online trade transactions
2.	Business process continuously reviews to facilitate B2B e-commerce process
3.	B2B project involves cooperation from expert and trading partners
4.	Company's online system is well coordinated and integrated with trading partner's systems

Aspect 6- Market forces

Experts satisfied with the issues and indicators raised by researcher regarding market forces aspect. They agreed that B2B e-commerce requires a lot of support and participation from trading partners, thus trust factor and the availability of systematic systems, policy and procedures that able to resolve disputes among supply chain partners are required. They gave suggestions to include some important items such as standard purchasing procedures and well defined treaty for monitoring supplier quality, as part of B2B e-commerce policy and procedures. Experts also shared some unpleasant experience in dealing with suppliers which sometimes they said can escalate the violent confrontations between different parties.

In addition, experts believed that the power issues and the lack of support and guidance from more powerful trading partners in implementing the technology could significantly hinder the development of B2B e-commerce. The seven indicators are presented in Table VIII.

Table VIII
Market forces readiness indicators

Enterprise- Trading Partners Integration	
1.	Develops relationship with industry leaders and industry domain experts
2.	Develops understanding of the risks, functionality and requirements of B2B e-commerce in trading partners.
3.	Develops relationships based on understanding, trust, common goals and sufficient coordination with trading partner's online system
4.	Imposes risk-sharing agreements and supporting programs to resolve any disputes with trading partners
5.	Views differences in opinion with partners as an opportunity to improve relationships effectiveness
6.	Provides clear picture of the positive impacts of B2B e-commerce to each other
7.	Provides motivational support, assistance, incentives and guidance related to B2B e-commerce implementation

Aspect 7- Supporting industries

Experts appreciated the inclusion of items regarding the availability of supports and services of telecommunication and other related industries. All experts gave high rating of the indicators under this section. Experts particularly emphasized on the importance of having reliable internet technology infrastructure, reliable logistic services and

universal communication standards and protocols that enough to support the existing and future B2B e-commerce activities as revealed by the interview excerpt:

However, experts added that market monopoly in communication and information industry by specific company might only create more barriers to B2B e-commerce adoption due to possible weakness such as low quality of internet connection offered by single monopoly company might lead to low customer desirability to implement internet based application like B2B e-commerce. The indicators are given in Table IX.

**Table IX
Supporting industries readiness indicators**

Supporting industries
1. Sufficient services involving Internet and telecommunication infrastructure from IT industry
2. Sufficient and reliable service and technical support of IT industry's
3. Ability of courier and logistic industry to integrate B2B services and products delivery
4. Ability of financial institutions to support and offer financial assistance
5. Ability of commercial and financial institutions to support secured technology infrastructure for e- commerce transactions
6. Ability of qualified legal expertise to draw up related B2B e- commerce contracts and agreements

Aspect 8- Government

When asked about government roles in encouraging B2B e-commerce adoption as included under this section, all experts expressed their satisfaction and agreement for the indicators included. Experts agreed to the indicators relevance and appropriateness, since in order to have a comprehensive overview at the environmental level, the government involvement in ensuring the conduciveness of the B2B e-commerce climate are needed. Government also needs to provide financial support and national technology infrastructure as well as other related initiatives. However, unless rectified, experts believed that the barriers of poor national legal framework, poor e-commerce infrastructure and lack of national standard procedures, policy and guidelines to implement B2B e-commerce will confine future B2B e-commerce adoption letting only fragmented networks and standalone applications. The assessment indicators under government are shown in Table X.

**Table X
Government readiness indicators**

National legal framework and initiatives on B2B e- commerce
1. Provides internet infrastructure and network coverage facilities to bridge digital divide
2. Provides sufficient B2B e- commerce interoperability framework that include local and international trade issues.
3. Provides sufficient and appropriate financial support and incentive
4. Setting up research centre that combine expertise from various disciplines
5. Provides the country's economic and political stability

Based on the analysis, the study provided tentative evidence of the reliability and validity of the B2B e-commerce readiness constructs and indicators. The model was considered finalized after some minor modifications. The results will be used as a foundation for the preparation of a survey instrument and measurement scales for next stage of data collection involving SMEs e-readiness stage of growth.

CONCLUSIONS

Existing literature review with regards to e-readiness in developing countries showed the positive and negative aspects of such measures. Even though most e-readiness models provide a useful overview of the significance factors of e-readiness, they do not completely provide meaningful multidimensional measures that specific for SME in developing countries. In order to obtain a more accurate e-readiness assessment, it is necessary to look at the environment in which SME operate. The more robust e-readiness models and measurement tools are necessary to facilitate the assessment of organization's readiness in adopting B2B e-commerce technology. Thus, we have suggested that these issues are definable and measurable through the developments of new e-readiness model. The model uses a more sufficient determinants and assessment approaches which addresses key issues related to individual, organizational and environmental dimensions.

We believe the findings able to provide the practitioners or users a comprehensive guidance in assessing their capability or improving their weakness before jumping onto the B2B e-commerce bandwagon (Huang et al 2004). The face validity and content validity done on the survey instrument would ensure that the tool development is comprehensive and complete. The results showed that experts generally agreed on the appropriateness of various critical success factors included with related to people attitude and capability, management, technological, cultural, political and economical issues. Based on the comments and recommendations from experts, the pool of items associated with eight aspects of B2B e-commerce critical factors are refined and restructured.

The testing and validating approach used in this study also proved that the newly conceptual framework as well as the instrument tools developed is acceptable and valuable to be used. The selection of experts from various size and types of organization, with different working experiences also can be considered as the major strength since each expert brought different perspectives and ideas that also increased the richness of the model developed. The B2B e-commerce readiness tool develop can assist organization in identifying their readiness to undertake implementation, in measuring change during implementation, and in identifying areas where internal and external assistance, and support are needed.

While our conceptual framework and survey instrument provides a high-level design for implementing the e-readiness model, many questions remain to be unanswered as: what are the weight of criticality of the motivational factors and its inhibitors towards building B2B e-commerce readiness model? How the indexes score of critical factors being constructed? What are the specific B2B e-commerce indicators for each e-

readiness stage? How the model assessment sessions will be conducted? These and many other questions must be addressed, as our future work will develop the comprehensive set of determinants that can be used to measure the e-readiness level of SME in developing countries.

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