The Influence of B2B e-Commerce on SME’s Performance and Efficiency: 
A Literature Review

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ABSTRACT
Business-to-business (B2B) is the most common application of electronic commerce (EC) systems. It accounts for the largest number of transactions and sales volume of any EC system applications (Cunningham, 2002). Hoffman and Novak (2000) explore the extent of B2B adoption as Internet technology usage that provides the capacity to buy and sell online, which includes market creation, ordering, supply chain management (SCM), and money transfer through open protocols. The literature suggests that the way that B2B systems are measured may explain some of the discrepancies of its effects on SMEs’ performance and efficiency. Hence, the extent of B2B adoption is positively correlated with enterprise performance and efficiency (Brews & Tucci, 2004).

1. Introduction

Business-to-Business (B2B) provides the gateway for an enterprise’s employees, managers, customers (clients) and all trusted suppliers and trading partners (TPs) to access electronic data applications and all information they need (Akoh, 2001). Therefore, the growth of B2B system adoption and capability has become a requirement for effectively servicing the business of many large, small and medium enterprises (SMEs) around the world (Kartiwi and MacGregor, 2007). B2B systems can be defined from several perspectives (Turban, et al. 2004). First, from a communication perspective, B2B is the delivery of goods, services, information, or payments over computer networks or by any other electronic means. Second, from enterprise’s functions and activities perspective, B2B is enterprise’s process such as buying, selling, transferring, or exchanging products, services and/or information electronically by completing functions, activities and procedures over electronic networks. Third, from a commercial perspective, B2B provides the capability of buying and selling products, services and information on the Internet and via other online services. Lastly, from a service perspective, B2B is a tool that satisfies the need of governments, enterprises, trading partners (TPs) and suppliers to cut costs of services while improving the quality of partners’ services (Turban, et al. 2004). Previous studies such as Sahawneh (2005), Davies (2003), and Gulati (2000) have shown that the adoption of Information Technology (IT) has created significant effects on enterprises, specifically concerning high profitability, performance, and efficiency. In addition, Gulati (2000) noted in his study that adoption of B2B systems by enterprises may improve the efficiency of process, reduce cost of product, improve information, reduce rogue purchases, streamline the supply chain, and improve service (Devaraj & Kohli, 2003).

Definitions of performance have ranged from general to specific and from quantitative to qualitative. Qualitative descriptions tend to be used for functions and activities that are complex and comprehensive such as those at managerial levels and relationships with TPs and suppliers. Quantitative descriptions are used frequently to describe procedures for which TPs and suppliers interactions can be considered (Sahawneh, 2005; Devaraj & Kohli, 2003). In this paper, four indicators such as productivity, profits, sales, and costs are used to measure the performance before and after adoption of B2B (Dewan & Kraemer, 2000). Efficiency
could be examined by how the enterprises minimise the input to give a certain level of output. Some researchers such as Banker, et al. (2007), Sahawneh (2005), and Davies (2003) have concentrated their efforts on defining efficiency in terms of outcomes. Also three indicators such as operation efficiency, procurement business process, and inventory management and control are used to measure and explore enterprise efficiency in relation to B2B system adoption before and after the adoption (Bendoly & Schoenherr, 2005). The purpose of B2B systems is to provide managers with better control over their enterprise’s functions and activities and their relationship with local and global trading partners and suppliers (Akoh, 2001). Therefore, one of the aims of this research is to investigate the internal and external organizational factors that influence adoption of B2B systems in SMEs. Data is obtained through the collection of related literature to represent the extent of B2B system implementation and adoption by SMEs.

2. Literature Review

2.1 Definition of Business-To-Business (B2B) Systems

Gunasekaran et al. (2002) define B2B from an applications viewpoint as a form of IT that electronically enables enterprise transactions among a variety of entities in order to satisfy organizational or individual objectives. However, Cunningham (2002) defines B2B systems as transactions between internal enterprise operations, such as marketing, sales, manufacturing, and support. Hence, B2B is the deployment of any electronic tools to contact others for the purpose of business including running any type of transactions with other enterprises. B2B systems range from the electronic transfer of funds between buyers, TPs and suppliers, to internet-based marketing, and intranet and extranet based information networks for both inter and intra organizational support (Turban, et al. 2004). Kamel and Hussein (2001) in their study defined B2B as: "buying and selling of products, services, and information via computer networks, primarily the Internet" (Kamel & Hussein, 2001 p.119). This research adopts a definition of B2B, as the sharing of business information, transferring and delivering products and services, maintaining business relationships, and conducting business transactions with local and global business trading partners (TPs) and suppliers by means of telecommunication networks (Zwass, 2003; Zwass, 1996 p. 3).

2.2 Small and Medium Enterprises (SMEs)

A number of studies have used the number of employees as a measure of enterprise size (Thong, 1999; Kartiwi & MacGregor, 2007). Other studies have identified enterprise size
based on annual turnover (Ramamurthy, et al. 1999), while some studies have applied both the number of employees and the revenue as indicators of enterprise size. A wide review of the literature such as Simpson and Docherty (2004), Stockdale and Standing (2006), and Kartiwi and MacGregor (2007) suggests that SMEs have the following characteristics: strong owner influence, centralised power, lack of specialist staff, small management team, multifunctional management, unwillingness to take risks, low employee turnover, lack of the necessary expertise and avoidance of sophisticated software or IT applications’ adoption. Despite the evident benefits obtained from the adoption of IT and IS such as B2B systems, SMEs are slower to adopt the technology compared to their large business counterparts (Kartiwi & MacGregor, 2007). This is the particularly the case in developing countries such as Jordan where factors such as the lack of telecommunication infrastructure (Titi, 2005; Wood, 2004), further restrict the viability of using B2B systems (MacGregor & Vrazalic, 2005). Furthermore, König, et al. (2003) noted that SMEs have more difficulties in attracting IT specialists to their enterprises, and they also do not have sophisticated distribution systems in comparison to large enterprises. Therefore, SMEs are not adopting B2B systems with the same speed as their larger counterparts.

2.3 The Factors That Influence B2B Adoption

The original version of the Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action (TRA) to the field of IT and IS. Davis (1989; 1986) found that TAM posits two most important variables; perceived usefulness and perceived ease of use. Venkatesh et al. (2003), and Wixom and Todd (2005) also introduced additional factors that influence the perception and intention of enterprise managers to adopt new IT and IS.

![Technology Acceptance Model (TAM)](image)

On the other hand, Rogers (1995) established the Diffusion of Innovation (DOI) model as a technology acceptance model. The DOI model is comprised of five factors: relative advantage, compatibility, trialability, observability and complexity (Rogers, 1995). Further, Bradford and Florin (2003) used Rogers’ model and asserted that the three major factors impacting the adoption of innovation are; technical compatibility, technical complexity, and relative advantage.

**Diffusion of Innovation (DOI)**

*Source: Bradford & Florin, (2003)*

Research by Iacovou et al. (1995) found the major factors that influence the adoption of IT and IS in small enterprises are: perceived benefits of IT, organizational readiness, and external pressure by trading partners and suppliers. They also illustrated that small enterprises with highly integrated, computerized processes were better prepared to undertake integrated IT and IS, which increased the impact of the technology and provided greater benefits.

**Factors Influence on IT and IS Adoption in SME**
In understanding the adoption of B2B systems by SMEs, a key aspect is to look at the factors that influence the adoption (Chitura, et al. 2008). Experience of SMEs regarding B2B systems and the extent to which an enterprise feels ready to adopt B2B systems are considered the internal organizational factors (MacGregor & Vrazalic, 2005). Previous studies such as Chitura et al. (2008), and Kartiwi and MacGregor (2007) widely recognized that the support of top management, experience of enterprise managers, and knowledge and awareness of enterprise managers about B2B systems are critical internal organizational factors in adoption B2B systems. They also noted that the size of the enterprise has been identified as an internal organizational factor of adoption B2B systems. The level of IS and IT sophistication and readiness of local and global trading partners and suppliers have often been identified as external pressure factors to successful adoption of B2B systems. Table 1 shows the list of previous studies examining the factors that influence the adoption of B2B systems in SMEs.

### Table 1

**List of Previous Studies Examining the Factors That Influence B2B Adoption in SMEs**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Researcher</th>
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<tbody>
<tr>
<td><strong>Internal Organizational Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>Knowledge and Awareness of SME Managers (top management support)</td>
<td>Kaynak, et al. (2005), El-Nawaawy and Ismail (1999), Kartiwi and MacGregor (2007)</td>
</tr>
<tr>
<td>Experience of SMEs (size of enterprise)</td>
<td>Brown (2002)</td>
</tr>
<tr>
<td>SMEs Readiness</td>
<td>MacGregor and Vrazalic (2005)</td>
</tr>
<tr>
<td><strong>External Factors:</strong></td>
<td></td>
</tr>
<tr>
<td>Pressure by TPs and Suppliers</td>
<td>Looi (2003)</td>
</tr>
<tr>
<td>Readiness of Local and Global TPs and Suppliers</td>
<td>MacGregor and Vrazalic (2005), Kartiwi and MacGregor (2007)</td>
</tr>
<tr>
<td>Practicing EC by Local and Global TPs and Suppliers</td>
<td>Chitura, et al. (2008), Sahawneh (2005)</td>
</tr>
<tr>
<td>Global Networks</td>
<td>Taylor and Murphy (2004)</td>
</tr>
<tr>
<td>Telecommunication Infrastructure</td>
<td>Chitura, et al. (2008)</td>
</tr>
</tbody>
</table>
2.4 The Effect of B2B System Adoption on the Performance and Efficiency of the Enterprise

Previous studies generally recognised independent variables such as productivity, market value, profitability, size, and costs that have explanatory power when examining enterprise’s performance and efficiency (Jobber, 2001). B2B system adoption could affect the performance and efficiency of the enterprise through the usage of developed technologies that facilitate management of the enterprise using electronic tools. There are many studies such as Grey, et al. (2005), and Gefen (2004) that report little or no benefit of B2B adoption. Nevertheless, studies such as Chitura, et al. (2008), Kartiwi and MacGregor (2007), Davies (2003), Sahawneh (2005), and Craighead and LaForge (2002) found positive benefits of B2B adoption in areas such as cost, inventory control, cross-functional cooperation, sales, business process, and productivity. On the other hand, some mixed results could be attributed to an underestimation of enterprise performance, and difficulty in isolating B2B effects on enterprise efficiency (Zhu, 2004).

Enterprise performance is generally defined as lead time, production and administration costs, productivity, and conformance quality (Krajewski & Ritzman, 2002). Many studies such as Tang, et al. (2004), and Dewan and Kraemer (2000) show that IT applications such as B2B systems improve performance at a general level such as industry, supply chain level, and economy level. However, Carr (2003) noted that few studies examine the effects of B2B system adoption at the enterprise level. He added that these studies suggest that B2B systems affect specific indicators of performance such as productivity and cost. The influence of B2B adoption may be moderated by the length of use because B2B systems may increase costs in the short term, and reduce them in the long-term (Devaraj & Kohli, 2003). SSMR (2002b) suggests that production costs could be further reduced by improvements in productivity through the B2B systems of several processes, such as production planning. Studies such as Tang et al. (2004) and Liao et al. (2003) suggest that IT applications such as B2B systems improve enterprise performance directly, i.e. without intervention. On the other hand, other studies such as Carr (2003) suggest that B2B system adoption affects enterprise performance...
indirectly through an unspecified form of mediation. The literature is mixed on how best to measure the effects of B2B system adoption on enterprise performance (Craighead & LaForge, 2002). The major implication is that enterprise performance measures such as productivity, costs, sales and profitability have been used to evaluate performance more often than other metrics (Zhu, 2004).

Enterprise efficiency is generally defined as average inventory, operation efficiency; resources utilization, and business process (Krajewski & Ritzman, 2002). The efficiency of the enterprise can be increased as the quality and volume of transferred information increases through the same enterprise and the other trading partners and suppliers (Gulati, 2000). Therefore, in small and medium enterprises the adoption of B2B systems could depend on the extent of its application and the available infrastructure in the enterprise to facilitate comprehensive use of B2B systems (Kartiwi & MacGregor, 2007). According to Yau (2002) B2B reduces the need to carry inventory because it reduces information distortion, created by demand and supply uncertainty, which often leads to higher levels of buffer inventory. Inventory management and control is measured in this research because it is used more often in studies measuring the effects of B2B systems on enterprise efficiency than any other operational metric. Zwass (2003) also suggests that the level of B2B systems infrastructure in the enterprise may affect efficiency because the appropriate level of infrastructure is crucial to achieving the benefits of B2B systems. In addition, the growth of the internet and B2B infrastructure with respect to location can be traced using internet geography (Yuko, et al. 2005). Therefore, better information infrastructures such as improved networks, will improve internal business processes by eliminating duplicate efforts and preventing documentation errors (Bendoly & Schoenherr, 2005). In a review of the literature, multiple studies find that benefits due to B2B adoption are indirect and mediated by changes in business processes (Subramaniam & Shaw, 2002). The major business processes are order fulfillment, supply cycle, customer service, and new product development (Anupindi, et al. 1999). In addition, Yau (2002), and Anupindi, et al. (1999) describe the procurement business process as part of the supply cycle, which includes several sub-processes such as needs identification, order placement, and order receipt processes. Further, in an exploratory study, Venkatraman (1994) identifies several individual business processes at the operational level which utilize IT applications such as B2B systems to improve efficiency. Subramaniam and Shaw (2002) suggest that procurement business processes which are highly structured can be highly automated. On the other hand, Nurmilaakso and Kotinuemi (2004) find that improved flow of communication and information leads to improved business processes. Muffatto and Payaro
(2004) suggest that improvements in business processes that support procurement activities improve several elements of the procurement cycle in enterprises. Therefore, improvements in procurement business processes may create opportunities for improving efficiency. Business Integration Technology (BIT) (2007) as a leader in B2B integration consultancy illustrated that B2B system can reduce costs by eliminating data entry labour costs, reducing the costs of processing and resolving errors, and providing more timely information and lower-cost resolution of supply chain problems. The high concern of the enterprise to provide integrated infrastructure and IT could ensure good outcomes and profits (Yau, 2002). Hence, one of the purposes in this paper is to investigate the extent of readiness measures in SMEs to adopt B2B systems and the extent of improvement concerning their performance and efficiency. Davies (2003) in his study concludes that improvement in enterprise performance and efficiency is the main reason for B2B adoption in the SME sector in the USA. Table 2 shows Davies results for the percentage of respondents related to main drivers to adopt B2B in SMEs.

Table 2
Drivers to Adopt B2B in SMEs

<table>
<thead>
<tr>
<th>Drivers to adopt B2B</th>
<th>Percentage of respondents %</th>
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<tbody>
<tr>
<td>Improve performance &amp; efficiency</td>
<td>28</td>
</tr>
<tr>
<td>Increase turnover</td>
<td>22</td>
</tr>
<tr>
<td>Stay ahead of competitors</td>
<td>21</td>
</tr>
<tr>
<td>Customers/trading partners pressure</td>
<td>14</td>
</tr>
<tr>
<td>Develop new products or services</td>
<td>12</td>
</tr>
<tr>
<td>Enable collaboration</td>
<td>6</td>
</tr>
<tr>
<td>Follow the trend</td>
<td>5</td>
</tr>
<tr>
<td>Suppliers pressure</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: Davies (2003)

3. Conclusions
Outcomes are presented based on the literature review and many previous empirical studies. In the world of SMEs, the development in ICT has an enormous effect on the development of more flexible transaction methods between trading partners and suppliers and improvement in performance and efficiency in SMEs.
In the literature on organizational performance, it is well accepted that the alignment between production or distribution capabilities and market requirements and needs is one of the major
keys to enterprises’ performance. SMEs should provide their trading partners (TPs) and suppliers with timely and accurate information regarding feedback from their final customers about their experiences with the products or services, quality problems, and performance of their products or services in relation to the competition. Meanwhile, supplier-SME relationships are becoming adapted with the emphasis on reducing the number of suppliers and reducing the overall costs. It is claimed that B2B systems-based communications and functions, activities and procedures between TPs and suppliers can improve inventory management and control as well as reduce costs for all participants (Tang, et al. 2004). In other words, adoption can be influenced by the level of IT in the small and medium enterprise (Davies, 2003; Davern & Kauffman, 2000; Hitt & Brynjolfsson, 1996; Sircar, et al. 2000). Indeed, this paper highlighted the importance of B2B system adoption by SMEs for enhancing their performance and efficiency that may enable SMEs to become much more useful, effective and productive.

References


Davis, F. (1986). A technology acceptance model for empirically testing new end-user information systems: Theory and results (Doctoral dissertation, Sloan School of Management, Massachusetts Institute of Technology).


