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B2B E-Commerce Adoption in Iranian Manufacturing Companies: Analyzing the Moderating Role of Organizational Culture

Masoumeh Mohtaramzadeh^a, T. Ramayah^{ab}, and Cheah Jun-Hwa^c

^aSchool of Management, Operations Management Section, Universiti Sains Malaysia, Minden, Malaysia; ^bDepartment of Management, Sunway University Business School (SUBS), Jalan University, Bandar Sunway, Malaysia; ^cAzman Hashim International Business School (AHIBS), Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia

ABSTRACT

The objective of this research is to examine the factors affecting Business-to-Business Electronic Commerce (B2B EC) adoption within technology-organization-environment (TOE) framework, and to test how such effects are moderated by organizational culture. Using a survey questionnaire, 320 responses were received from managers and owners of manufacturing companies in Iran. PLS-SEM technique was used for analysis. B2B EC adoption in manufacturing companies was found to be affected by cost of adoption, top management support, competitive pressure, and government support; and organizational culture was found to negatively moderate the relationship between top management support and B2B EC adoption. Managers, owners, and policy makers can use these findings to facilitate the adoption of B2B EC. Previous research have not analyzed the moderating role of organizational culture; these findings contribute to the e-commerce literature by filling this gap. The results indicate that the TOE framework provides a strong base for the study of B2B EC in developing countries. The results also show that this framework is able to integrate moderating variable into the theoretical model.

1. Introduction

Business-to-Business Electronic Commerce (B2B EC) is defined as internet-enabled technologies that allow firms to buy and sell products and services electronically, and share value chain information (Sila, 2013). The B2B EC market is generally more profitable than the B2C EC market because its volume is almost ten times that of the B2C market (Unctad, 2015). For example, the US adoption of B2B EC technologies accounts for \$5.8 trillion in value, representing 91% of total E-commerce volume (US Census Bureau, 2015); in the Republic of Korea, B2B EC accounted for 91% of e-commerce value, and in the Russian Federation it was estimated at 58% in 2013 (Unctad, 2015). There are also positive perspective projections for future of B2B EC in emerging economies such as India and China (Sila, 2013). It also has been reported that of the total B2B EC volume, the largest contributor is the manufacturing sector, with a total of US\$3.3 trillion, or 57.1% of total B2B EC volume (US Census Bureau, 2013).

However, although the global B2B EC adoption is increasing fast, yet this new phenomenon is not happening for firms in Middle East countries (Unctad, 2015). For instance, the global B2B EC market is reported as \$15.2 trillion in 2013, but only 2.5% is traced to Middle East and African countries; with the balance from high-income economies such as USA (36%), UK (18%), Japan (14%), and China (10%) (Unctad, 2015). The low rate of B2B EC adoption in Middle East countries in general, and in

particular, Iran might erode their competitive positions in the global market.

In the IT/IS literature, it has been acknowledged that B2B EC adoption could be the key to survival for businesses and also an important indicator of economic growth especially for low-income economies (Ghobakhloo, Arias-Aranda, & Benitez-Amado, 2011; Molla & Licker, 2005). In this regard, manufacturing companies could play an important role in Iran's economy. Iran is heavily dependent on the export of oil and gas, which account for up to 82.5% of the country's total exports (Unido, 2003). Clearly, the Government of Iran sees the role of diversification and increase of non-oil exports in strengthening the economy by making it less dependent on oil and gas export. In addition, Iran needs to increase its non-oil exports in order to become an active partner in the WTO-led process of globalization (Elahi & Hassanzadeh, 2009). Therefore, research on the antecedents of B2B EC adoption is of great significant and interest. Although B2B EC adoption has been researched by academics and many theories have been proposed to explain it in different contexts, there are still critical issues that have not been thoroughly investigated and need to be addressed. First, the findings of previous studies on how sets of factors influence B2B EC adoption have not been consistent. This calls for more comprehensive research to investigate the potential moderators and contextual factors (Liu, Ke, Wei, Gu, & Chen, 2010; Sila, 2013). In fact, the moderating effect of organizational culture may help resolve the inconsistency in previous studies (Hewett, Money, & Sharma, 2002; Liu et al.,

2010). Second, there is a need to validate existing theories in different contexts (Asare, Brashear Alejandro, Granot, & Kashyap, 2011). It has been stressed that theories and management practices developed in the context of developed countries need to be reexamined in the context of developing countries to fit the cultural contexts of the recipient nations (Al-Somali, Gholami, & Clegg, 2011; Tan, Tyler, & Manica, 2007). This is because those issues that might seem insignificant for developed countries may, otherwise, play an important role for B2B EC adoption in developing countries (Asare et al., 2011). Thus, the need to understand whether existing theories apply to populations in the Middle East region is an important issue.

Therefore, the aim of this research is to (1) identify related technological, organizational, and environmental factors that influence B2B EC adoption, and (2) to test the moderating effect of organizational culture between influential factors and B2B EC adoption. This research contributes to the existing literature by demonstrating that different organizational cultures (weak or strong) play different roles in B2B EC adoption. It also provides strong evidence for the applicability of the TOE framework for analyzing the factors that influence B2B EC adoption in the context of Iran. The next section of the article discusses factors influencing B2B EC adoption in related literature, followed by a discussion on the role of organizational culture in technology adoption. This article concludes with a discussion of the findings and their implications, as well as recommendation for future research.

2. Factors affecting B2B EC adoption

In B2B EC adoption literature, scholars have studied B2B EC adoption from various theoretical perspectives. A summary of important studies on B2B EC adoption is provided in Table 1.

Many scholars have paid extensive attention to B2B EC adoption because of the huge potential that B2B EC systems can bring to firms. Generally, there are some important observations from a review of the literature. The first observation is that although scholars have identified many factors that influence B2B EC adoption, the findings have not been consistent. Factors that were found to be significant by one scholar, have not always been found to be significant by others. For example, the cost of adoption as a technological factor has been studied repeatedly, but the results were found to be inconsistent across studies (insignificant in studies by Alam et al., 2011; Al-Qirim, 2007 and significant by; Sila, 2013). Liu et al. (2010) and Sila (2013) highlighted that such inconsistency result could be because of the dependency of the research findings on the cultural of the organization in business and this contextual nature of IT adoption has often been mentioned but rarely explored. Organizational culture refers to a collection of assumptions, values, and beliefs that organizational members have in common (Liu et al., 2010). The literature has indicated that within the network of social relationship by radicalism, culture assumes an important role in business (Jaspersen, Carter, & Zmud, 2005) because it may affect how employees embrace an innovation and thus influence the adoption of B2B EC. Thus, organization culture plays an important role in successful adoption of B2B EC. However, existing research has largely focused on culture at the national level, social-cultural as well as political and religious

characteristics (Leidner & Kayworth, 2006; Stuart, Mills, & Remus, 2010) which has left gaps at the organizational level for work, which can be investigated how an organization's culture can affect the adoption of B2B EC. This study seeks to address this gap, which examines how organizational culture can be potential moderator effect in the successful adoption of B2B EC.

3. Organizational culture and e-Commerce adoption

Organizational culture has been identified as a critical factor in the success or failure of IS/IT adoption in organizations. Ruppel and Harrington (2001) who studied factors affecting the adoption of intranets found that intranet adoption is facilitated by organizational culture that emphasizes trust (ethical culture), flexibility and innovation (developmental culture), policies, procedures, and information management (hierarchical culture). Thatcher, Foster, and Zhu (2006) suggested that within the Taiwan textile industry, cultural factors such as power structure and tendencies, inhibited the adoption of B2B EC systems. On the other hand, the opposite was found in the electronics industry where top managers persuaded employees to adopt B2B EC systems (Rahman, Kamarulzaman, & Sambasivan, 2013). In another study, Zhu and Thatcher (2010) found that cultural infrastructure were powerful factors that affected the decision to adopt e-commerce among firms across the world. Valencia et al. (2010) suggested that organizational culture is one of the key elements in both enhancing and inhibiting innovation adoption. They found that while adhocratic cultures could enhance the innovation adoption, hierarchical cultures on the other hand, could inhibit it.

In summary, the literature indicates that cultural differences have different effects on the level of technology adoption in firms. It has been argued that different organizational cultures often possess different underlying values, assumptions, and expectation that directly or indirectly influence technology adoption in firms. In this regard, it can be concluded that organizational culture may weaken or strengthen the influence of antecedent variables on technology adoption. This research aims to verify such arguments on the relationship between technological, organizational, and environmental factors and B2B EC adoption.

4. Conceptual framework and hypothesis development

The review of literature indicates that past research were based on a single theory or a combination of theories. The most frequently applied theories were Diffusion of Innovation (DOI) theory (Roger, 2003), Institutional Theory, and Technology-organization-environment (TOE) (Tornatzky & Fleischer, 1990) theory. Models developed based on these theories have different focus, and were designed to analyze different aspects of B2B EC adoption. For example, the Roger's diffusion of innovation (DOI) theory is one the most widely applied theory in the prediction of B2B EC adoption (Al-Qirim, 2007; Zhu, Kraemer, & Xu, 2003). Rogers identified five technological characteristics (relative advantages, compatibility, complexity, trialability, and observability). However, DOI theory has limitations because it does not provide a lens to examine the environmental context. Conversely, models drawing upon the institutional theory attempt to examine a set of

Table 1. Review of prior literature on B2B E-commerce adoption.

Source & county of study	Theory Used	Key findings on factors influence B2B E-commerce adoption	
		Significant	Not Significant
Wu et al. (2003), U.S.A	Value chain framework	Management emphasis, Organizational learning, Customer orientation, Customer power, Normative pressures	Competitor Orientation
Al-Qirim (2007), New Zealand	DOI theory	CEO's innovativeness, Competition, Information intensity, Relative advantage, Pressure from suppliers and buyers, CEO involvement	Cost, Compatibility, Support from technology vendors, Firm size
Liu et al. (2008), Singapore	Institutional, & organizational capability-based theory	Net perceived benefits, External influences, Organizational capabilities	-nil-
Oliveira and Martins (2010), Europe	TOE framework	Perceived benefits, technology readiness, competitive pressure, trading partner collaboration	Technology integration, Firm size
Ghobakhloo et al. (2011), Iran	TOE framework	Perceived relative advantage, compatibility, CEO's innovativeness, information intensity, buyer/supplier pressure, Technology vendors supports, Competition	Cost, CEO IS knowledge, Business size
Alam et al., (2011), Malaysia	Broad literature on IS adoption	Perceived relative advantage, Compatibility, Organizational readiness, Manager characteristics, Security	Perceived Ease of Use, Perceived Cost
Duan et al. (2012), Australia	TOE framework	Top management support, Perceived direct benefit, External pressure, Trust	Perceived indirect benefit, Firm Size, Organization readiness
Sila (2013), U.S.A	TOE framework	Cost, Network reliability, Data security, Scalability, Top management support	Complexity, Trust
Al-Bakri and Katsioloudes (2015), Jordan	DOI and TAM theories	Internal factors (readiness, strategy, manager perceptions), external pressure (trading partner pressure)	
Rahayu and Day (2015), Indonesia	TOE framework	Perceived relative advantages, technology readiness, owner innovativeness, – owner IT ability, Owner IT experience	

environmental factors such as competitive, normative, and coercive pressure but ignores the organizational and technological context. Along with DOI and institutional theories, the TOE theory is one of the most frequently used theories in B2B EC adoption research. The literature suggests that the TOE framework might be a better starting point to study B2B EC adoption because this theory considers the three contexts of B2B EC adoption (Duan, Deng, & Corbitt, 2012): TOE theory posits that the adoption of a technology in an organization depends on three contexts, namely technological, organizational, and environmental. Thus, this research uses TOE framework to study the factors that influence the adoption of B2B EC systems in manufacturing companies in Iran because TOE's approach is comprehensive.

One of the issues that might be raised is why a new theoretical model for B2B EC adoption should be developed in this research given that there are already many B2B EC models under the TOE framework. At this point, it should be stressed that the TOE framework does not explicitly identify the major constructs in the framework; and the variables in each context (Wang, Wang, & Yang, 2010). As a result, previous researchers have used TOE theory based on their own research objectives and considerations. However, the main considerations that distinguished this researcher's B2B EC model from previous B2B EC models are (1) almost all B2B EC models were designed for developed countries. As such, the researchers in developed countries selected those variables that were more important in the context of their respective countries. For example, the main issues in adopting B2B EC systems in developed region were reported as privacy, security, and trust (Molla & Licker, 2005). As a result, researchers (e.g., Duan et al., 2012; Sila, 2013; Sila & Dobni, 2012) have included these factors along with other important factors in their research model to study B2B EC adoption in Australia, America, and Europe.

In contrast, the main issues in developing countries that have been reported by scholars are not the quite the same; they are low internet speed, the high prices of internet service providers (ISPs), an insufficient regulatory environment, poor organizational culture, and poor IT and managerial infrastructure (Al-Somali et al., 2011; Elahi & Hassanzadeh, 2009; Ghobakhloo & Hong Tang, 2013; Molla & Licker, 2005). Thus, this research considers these issues (e.g., cost of adoption, top management support, IT infrastructure and capabilities, organizational culture, legal infrastructure, and government support) and incorporates them into the proposed research model. (2) Since the adoption of B2B EC systems is a joint decision between two or more organizations (e.g., Liu et al., 2010; Teo, Lin, & Lai, 2009) meaning that B2B EC systems are driven more by environmental factors than technical and organizational factors. Thus, the proposed research model includes four environmental factors (e.g., competitive pressure, trading partner pressure, legal infrastructure, and government support) to the model. (3) The previous B2B EC models do not address the issue of organizational culture vis-a-vis B2B EC adoption. Thus, the organizational culture construct is added to the model to test its moderating influence along with antecedents of B2B EC adoption. In this research, the dependent variable is B2B EC adoption, and there are eight independent adoption factors within the three contexts of TOE theory (see Figure 1). A brief justification for the research hypotheses and their relationships in the three contexts are discussed in the following section.

4.1. Technological factors and B2B EC adoption

Perceived relative advantage (Benefits)

Perceived relative advantage is defined as "the degree to which an innovation is perceived as being better than the idea it supersedes" (Rogers, 2003, p.229). According to Moore and Benbasat (1991), relative advantage is the same as the concept of perceived

usefulness (PU) in the Technology Acceptance Model (TAM) of Davis, Bagozzi, and Warshaw (1989). The perceived relative advantage positively influences the adoption of e-commerce in organizations (Alam et al., 2011; Duan et al., 2012; Zhu et al., 2004). Firms adopt a technology when there is a perceived need for using that technology to exploit business opportunities (Duan et al., 2012). The greater the perceived benefits, the more likely a firm will adopt e-commerce (Ghobakhloo et al., 2011; Al-Qirim, 2007; Ifinedo, 2011; Rahayu & Day, 2015). This perception is supported by the general innovation adoption research (e.g., Tornatzky & Fleischer, 1990; Rogers, 2003). In a highly competitive environment, these benefits make significant motivations for adopting B2B EC systems (Ramdani, Chevers, & Williams, 2013). Therefore, it is hypothesized that the higher perceived relative advantage of B2B EC adoption is likely to lead to higher adoption of B2B EC technologies. Thus:

H1: There is a positive relationship between perceived relative advantage and B2B EC adoption.

Cost of Adoption

The cost of adoption related to adopt a technology has been found to be a significant inhibitor to e-commerce adoption (Scupola, 2003; Zhu et al., 2006; Sila, 2013; Sila & Dobni, 2012). That is, the higher costs of adoption will result in the slower adoption of a technology (Rogers, 2003). The cost to implement the necessary infrastructure required for B2B EC adoption and to establish electronic linkages along the supply chain can be substantial (Sila, 2013). Further, there are considerable costs related to the training and re-engineering of the firms' structure to ensure successful adoption (Premkumar, Ramamurthy, & Crum, 1997), especially in the context of manufacturing companies because of their complex structure. The cost related to integrating B2B EC systems with trading partners can also cause concern and inhibit B2B EC adoption; Sila (2013) in a survey of manufacturing companies found cost to be a major inhibiting factor to B2B EC adoption. This could be a significant factor in manufacturing companies because most companies are small and medium sized, and the cost of adoption is a major variable in the decision-making processes especially in developing countries (Elahi & Hassanzadeh, 2009). In developing countries, ICT access charges, costs for connecting telephone lines to stay online in the internet, and subscription fees for ISPs are unavoidably expensive (Al-Somali et al., 2011; Elahi & Hassanzadeh, 2009). Therefore:

H2: There is a negative relationship between perceived adoption cost and B2B EC adoption.

4.2. Organizational factors and B2B EC adoption

Top management support

The importance of top management support for successful adoption of technology in organization is well documented (Premkumar et al., 1997; Wu, Mahajan, & Balasubramanian, 2003). Top management assesses strategic opportunities and conceive long-term visions that are important for successful

adoption of technology (Wu et al., 2003); and they have been consistently found to be a critical factor for successful adoption of technology in firms (Duan et al., 2012; Ifinedo, 2011). When organizations understand the relevance of internet applications, they tend to play a crucial role in affecting other organizational members to accept it; furthermore, they also commit resources to its adoption (Thatcher et al., 2006). Therefore:

H3: There is a positive relationship between top management support and B2B EC adoption.

IT Infrastructure and capabilities

IT infrastructure and capabilities refer to firms possessing appropriate infrastructure such as telecommunications infrastructure, technical infrastructure, facilities, diversity of electronic payments, and skilled workforce to support e-commerce adoption (Elahi & Hassanzadeh, 2009; Saprikis & Vlachopoulou, 2012). E-commerce can become an integral part of the value chain only if organizations have favorable infrastructure and technical skills (Oliveira & Martins, 2010). These factors may enable the technological capacity of the organization to adopt B2B EC systems. However, organizations that do not possess favorable IT infrastructure may not wish to risk the adoption of B2B EC, implying that organizations with greater IT infrastructure are in a better situation to adopt B2B EC (Ifinedo, 2011). Past empirical research found IT infrastructure to be a critical factor for e-commerce adoption in organizations (Duan et al., 2012; Ifinedo, 2011; Liu, Sia, & Wei, 2008; Oliveira & Martins, 2010; Tan et al., 2007). Therefore, we expect that:

H4: There is a positive relationship between IT infrastructure and capabilities and B2B EC adoption.

4.3. Environmental factors

Competitive pressure

Competitive pressures result from organizations response to uncertainty and refers to the degree that competitors in the market affect an organization (Scott, 2013). In a competitive environment, organizations need to constantly assess advances in new technology and adopt them to gain competitive advantages or out of strategic necessity (Premkumar et al., 1997). In the context of B2B EC system, many scholars have identified competitive pressure as an important factor of B2B EC adoption (Zhu et al., 2006; Oliveira & Martins, 2010; Sila & Dobni, 2012). There is a belief that competitive pressures influence the adoption of technology when firms perceive that such technology may strengthen their competitive position and assist them to gain performance (Grandon & Pearson, 2004). Reekers and Smithson (1994) suggested that such gains are not equally distributed among organizations and their trading partners in the competitive environment. However, many organizations may have to adopt B2B EC (2003). Manufacturing companies have to adopt B2B EC systems due to competitive pressure. Hence, we propose that:

H5: There is a positive relationship between competitive pressure and B2B EC adoption.

Trading partner pressure

Trading partner pressure has been reported as an important determinant of technology adoption because the value of it can be maximized when many trading partners are using it (Iacovou, Benbasat, & Dexter, 1995). From the empirical findings, the successes of e-commerce adoption depend on the trading partners' pressure to jointly adopt the Internet to conduct business activities (Ifinedo, 2011). In a trading community with greater partner pressure, firms reveal higher levels of e-business adoption due to network impacts (Zhu et al., 2006). Past empirical research found that trading partner pressure was an important factor for EDI (Premkumar et al., 1997), e-business (Zhu et al., 2006; Ghobakhloo et al., 2011; Oliveira & Martins, 2010), E-commerce (Al-Qirim, 2007), and B2B EC systems (Al-Bakri & Katsioloudes, 2015). Thus, we expect that:

H6: There is a positive relationship between trading partner pressure and B2B EC adoption.

Legal infrastructure

Scholars believed that a favorable legal environment should decrease the uncertainty faced by organizations by providing clear, adequate, and capable frameworks to adopt new technology (Thatcher et al., 2006). E-commerce is affected also by legal infrastructure that is very important for cyberspace market because it can encourage or inhibit the firm to adopt e-commerce (Al-Somali et al., 2011). The open nature of the internet brings many issues such as uncertainty, lack of transparency, fraud and credit card misuse, which in turn pose unique demands on regulatory support for internet technologies such as B2B EC (Liu et al., 2008). In particular, scholars claim that poor legislation and law enforcement create incentives for hackers to intensify their activities (Zhu et al., 2006). Several studies found that there is positive relationship between conducive legal environment in a country and adoption of e-commerce (Al-Somali et al., 2011; Zhu & Thatcher, 2010; Zhu et al., 2006; Zhu & Kraemer, 2005). Zhu and Thatcher (2010) suggested that the more effective legal environment for e-commerce, the more likely is that country to adopt e-commerce. Thus:

H7: There is a positive relationship between legal infrastructure and B2B EC adoption.

Government support

Government can support relevant actions for e-commerce adoption with in three different ways. First, by instituting relevant laws; second, by providing specific incentives, mostly economic; and third, by adopting IT infrastructure and creating a skilled workforce in order to develop analogous e-services and online trade (Saprikis & Vlachopoulou, 2012). Researchers have confirmed that government support and incentives have a significant positive effect on the decision to adopt technology in organizations (e.g., Elahi & Hassanzadeh, 2009; Scupola, 2003; Thatcher et al., 2006; Zhu & Thatcher, 2010). If a government shows a clear commitment to B2B EC adoption, this becomes apparent in its policy

measures, which in turn can encourage B2B EC transformation (Zhu & Thatcher, 2010). Therefore, we expect that:

H8: There is a positive relationship between government support and B2B EC adoption.

4.4. Organizational Culture and B2B e-Commerce Adoption

Organizational culture has been defined as a set of shared values, beliefs, and assumptions that is reflected in organizational goal and activities that support its members understanding of organizational functioning (Liu et al., 2010). Schein (1992) defined organizational culture as a pattern of basic assumptions the group learned as it solved its problems of external adaptation and internal integration. In the literature, scholars have proposed several ways to categorize organizational culture such as relation- and transaction-oriented culture (McAfee, Glassman, & Honeycutt, 2002) and flexibility-control orientation (Khazanchi, Lewis, & Boyer, 2007). Other scholars have applied culture traits, attributes, or dimensions to capture the pattern of values, beliefs, or assumptions that reflect an organization's culture (e.g., Gordon & DiTomaso, 1992; O'Reilly, Chatman, & Caldwell, 1991). O'Reilly et al. (1991) defined organizational culture as a collection of core belief and values consensually shared by organizational members. Based on this definition, Tsui, Zhang, Wang, Xin, and Wu (2006) conceptualized the framework in identifying organizational culture in different firms in China. They identified five organizational culture dimensions to be common across firms. These dimensions are employee orientation, customer orientation, systematic management control, innovativeness, and social responsibility. Using these dimensions, Liu et al. (2010) defines companies that exhibited a consistently high level of emphasis on all these values as "strong culture"; and those with a consistently low level as having a "weak culture." This definition considers both the intensity and the consensus of culture strength by identifying firms that are simultaneously high or low on all the culture characteristics (Calori & Sarnin, 1991). It is also consistent with the measurement of a strong culture used by Yeung, Brockbank, and Ulrich (1991) and Tsui et al. (2006).

Scholars increasingly have realized that organizational culture could play a key role on decisions in adopting advanced technology (Khazanchi et al., 2007; Liu et al., 2010). Specifically, it has been suggested that organizational culture can influence an organization's ability to process information, rationalize, and exercise discretion in its decision-making processes in technology adoption (Baird, Jia Hu, & Reeve, 2011; Liu et al., 2010; Rahman et al., 2013; Senarathna, Warren, Yeoh, & Salzman, 2014; Valencia, J. Valle, A., & Jime'nez, D, 2010). Baird et al. (2011) proposed that organizational culture could stimulate innovation behavior among an organization's members because it can lead them to accept innovation as a basic value of the organization and can foster commitment to it. In this regard, previous studies have found that organizations with "strong culture" and "weak culture" have different influences on the firms' interpretations of internal and external events, and thus differentially influence its response to the expectations and

requirements of that internal and external environment (Khazanchi et al., 2007; Liu et al., 2010).

The literature indicates that an organization with “strong culture” would emphasize internal improvement with expanding resources to improve information sharing among its members, to improve human relations, to optimize existing operational equipment and practices, values generated information, and performance (Aktaş, Çiçek, & Kıyak, 2011). Specifically, the cultural focus on cohesiveness, innovativeness, risk-taking, participation, creativeness, and teamwork provides employees with an increased sense of ownership and responsibility in adopting new technology (Tsui et al., 2006). Consequently, as an organizations’ members are given the opportunity to use an IT application in an organization where participation, teamwork, creativeness, and innovativeness are encouraged (strong culture), they are better able to ascertain the extent of usefulness of the IT application in meeting their needs and hence, can the above determine the effectiveness of their adoption within the company. Specifically, based on mentioned arguments it can be claimed that organizations with “strong culture” may strengthen the influence of technological and organizational factors (e.g., perceived relative advantages, top management support, IT infrastructure) on B2B EC adoption.

In the context of environmental factors, an organization with strong culture might not value what may be gained from external pressures (Liu et al., 2010). An organization with a strong culture prefers to invest its resources in developing unique practices to differentiate itself from other players in the field. The organization believes that it is the heterogeneity that allows it to derive a competitive advantage (White, Varadarajan, & Dacin, 2003). In addition, an organization with a strong culture tends to evaluate the technology adoption independently, rather than being swayed by external and internal influences (Stock, McFadden, & Gowen, 2007). Following the logic of this argument, this research posits that an organization with strong culture may weaken the influence of environmental pressure (competitive and trading partner pressures) on the likelihood of B2B EC adoption. Specifically, trading partner and competitive pressure toward B2B EC adoption refer to the spread of B2B EC systems in the value chain, which implies that it is likely for an organization to gain first-mover competitive advantage or differentiate itself from its competitors via adopting B2B EC (Liu et al., 2010). With the preference for unique practices (Khazanchi et al., 2007), an organization with strong culture, compared to an organization with weak culture, may not respond as favorably to trading partner and competitive pressures. Further, due to the value it places on risk taking and spontaneity (Stock et al., 2007), an organization with strong culture would tend to evaluate the pros and cons of B2B EC adoption based on its own judgments, rather than the expectations and requirements of its powerful trading partners. Strong culture limits the influence of trading partner pressures (Liu et al., 2010). Hence, this research hypothesizes that, given the same level of perceived environmental pressures (competitive and trading partner pressure), an organization

with strong culture is less inclined to adopt B2B EC systems. Thus:

- H9:** The greater the organizational culture, the more the positive relationship between perceived relative advantage and B2B EC is attenuated.
- H10:** The greater the organizational culture, the more the negative relationship between perceived cost and B2B EC is attenuated.
- H11:** The greater the organizational culture, the more the positive relationship between top management support and B2B EC is attenuated.
- H12:** The greater the organizational culture, the more the positive relationship between IT infrastructure and B2B EC is attenuated.
- H13:** The greater the organizational culture, the more the positive relationship between competitive pressure and B2B EC is attenuated.
- H14:** The greater the organizational culture, the more the positive relationship between trading partner pressure and B2B EC is attenuated.
- H15:** The greater the organizational culture, the more the positive relationship between legal infrastructure and B2B EC is attenuated.
- H16:** The greater the organizational culture, the more the positive relationship between government support and B2B EC is attenuated.

5. Research methodology

5.1. Sample and data collection

A questionnaire survey was used to collect data and to test the hypotheses. The population of interest was the manufacturing companies in the large industrial cities in Iran located in Tehran, Esfahan, Shiraz, Kerman, and Bandar Abbas. Since the respondents were required to have specific knowledge such as knowledge of information technology and overall organizational culture, information systems (IS) managers, business operation managers, administration managers CEOs, and owners who were directly responsible for companies’ activities are targeted as respondents of this research. Although the use of a single respondent would not be ideal for organization level, this approach is common among recent empirical research such as those measuring organizational culture (e.g., Liu et al., 2008; Stock et al., 2007). However, these key respondents were deemed appropriate in the current research because as active executives, they have a good understanding of their firms’ organizational culture and environment in which their firms operate and they played an active role in making strategic decisions.

Table 2. The sample proportion.

Symbol/Size	10–100 Employees	101–200 Employees	201–500 Employees	501–1000 Employees	More than 1000 Employees	Total
N_{ka}	8960	666	500	189	118	10433
$N_k/N = p_{kaa}$	0.86	0.064	0.048	0.018	0.011	100%
$P_{kan} = n_{kaaa}$	559	41	31	12	7	$n = 650$

a Number of firms in each group of population **proportion of firms in each group *** Sample size in each group

Table 3. Measurement Items.

Constructs	NO/items	Source	Scale
			Likert-scale
1. Perceived relative advantages	9	Wu et al. (2003), Al-Qirim (2005)	1 "Strongly agree" to 5 "Strongly disagree"
2. Cost of adoption	6	Al-Qirim (2007), Al-Somali et al. (2011)	1 "Extremely low" to 5 "Extremely high"
3. Top management Support	5	Ifinedo (2011), Sila (2013)	1 "Strongly agree" to 5 "Strongly disagree"
4. IT infrastructure capabilities	7	Elahi and Hassanzadeh (2009), Tan et al. (2007)	1 "Extremely low" to 5 "Extremely high"
5. Competitive pressure	6	Zhu et al., (2006), Al-Qirim (2007)	1 "Strongly agree" to 5 "Strongly disagree"
6. Trading partner pressure	6	Wu et al. (2003), Al-Qirim (2007)	1 "Strongly agree" to 5 "Strongly disagree"
7. Legal infrastructure	5	Al-Qirim (2007), Al-Somali et al. (2011)	1 "Strongly agree" to 5 "Strongly disagree"
8. Government support	5	Scupola (2003), Al-Somali et al. (2011)	1 "Strongly agree" to 5 "Strongly disagree"

Due to the large population of the study, a stratified random sample has been taken and then by using random sampling, the required elements of each group were selected. The stratified random sample includes five groups classified in Table 2.

5.2. Measurement development

The dependent variable B2B EC adoption was measured as a dichotomous variable "YES" or "NO." To operationalize B2B EC adoption, we used the framework developed by Molla and Licker (2005), which is relevant to the e-commerce realities of developing countries. Researchers (e.g., Al-Somali et al., 2011; Ghobakhloo et al., 2011) applied this instrument in measuring e-commerce adoption as dependent variable in developing countries. We employed multi-items scale to measure independent variables within our theoretical model. We derived these items from the literature by integrating items from existing scales (Table 3).

The measurement items for organizational culture were adopted from the work of Tsui et al. (2002) and Tsui et al. (2006) organizational culture framework that identified five organizational culture dimensions to be common across the firms. Organizational culture construct consisting of 24 items on five dimensions: employee orientation (eight items), customer focus (five items), innovativeness (four items), systematic management control (four items), and social responsibility (three items). Respondents were asked whether their companies emphasized the values as described by the items on a five-point Likert-type scale, ranging from "Not emphasized at all" to "Emphasized very much." Appendix 1 shows each constructs, their items, and statistics related to dependent variable, independent, and moderating variables.

We first developed an English questionnaire and then translated it into Persian by a certified English-Persian translator and this was verified by two bilingual lecturers who each

hold a PhD in English linguistics. The preliminary survey instrument was first pre-tested for content validation, comprehensiveness, and clarity in meaning by panels from both academia and the practitioners. Some questions had to be reworded to improve their clarity because the scales had been developed and tested in other countries such as USA and Europe and the language was unclear. For example, many participants suggested that the word "B2B" is ambiguous and does not translate well into the Persian language. Accordingly, we provided a definition for it as the process of deploying the Internet and ICTs to support the entire value chain, from suppliers to the firm and finally improve performance. The refined instrument then was pilot tested with 23 manufacturing companies' managers to confirm the reliability of the measurement scales.

5.3. Survey administration

After pilot-testing the questionnaire, the distribution of questionnaire was started on 2014 July 25 and continued for three months. A total of 650 survey packets were delivered by research workers to the group target. The personal delivery approach followed by a later pick up methodology as suggested by Robertson, Al-Khatib, Al-Habib, and Lanoue (2001) was adopted in this research. Of the 650 distributed questionnaires, 210 questionnaires were collected by the agreed pick-up time by end of 2014 September 25. A pre-survey phone contact was done to enhance the response rate at this time and four follow-up contacts by e-mail and telephone calls were conducted every week to those companies which did not respond to the questionnaire. This strategy was effective in many cases and up to 2014 October 25, another 126 questionnaires were returned. However, 26 questionnaires were discarded and could not be used in the analysis because large sections of the questionnaires were incomplete or had

Table 4. Profile of sampled companies and the respondents' demographic.

Gender	N	Percentage
Male	296	92.5
Female	24	7.5
Management level		
President, managing director, CEO	54	16.9
Business Operation manager, COO	103	32.2
Information Services (IS) manager, Planner	129	40.3
Administration/Finance manager, CFO	34	10.6
Total	320	100.0
Organization's Size		
10–25 employees	94	29.4
26–100 employees	162	50.6
101–200 employees	29	9.1
201–250 employees	9	2.8
251–500 employees	16	5.0
501–1,000 employees	6	1.9
1,001–2,500 employees	2	0.6
More than 2,500 employees	2	0.6
Annual Sales (Million USD)		
Below 1	57	17.8
1–5	100	31.3
5.1–10	90	28.1
10.1–50	55	17.2
above 50	15	4.7

only one number on all Likert scale items. The final usable sample contained 320 responses (response rate of 49%). The profile of sampled companies and the respondents' demographic characteristics are listed in Table 4.

5.4. Non-Response bias

To test non-response bias, wave analysis was conducted method using Chi Square and independent *t*-test to compare the early and late respondents and test null hypothesis that there is no difference between the two groups. The results indicated that there is little difference in terms of gender. The Chi-Square value of 3.22 and sig. (*p*-value) of 0.200 suggested that there are no significant differences in early and late responses in terms of gender. The same results were obtained for other demographic variables such as respondent's age, position, education, organization's age, organization's size, sale, and industry type. There were no significant differences between early and late respondents in terms of such demographic variables. Therefore, it concluded that the sample is representative of the population of interest. In addition, independent *t*-test was used to compare the mean value of some continuous variables across early and late respondents and to test the null hypothesis that states there is no difference between two groups. The results of *t*-test indicated that there is no difference between two groups (early and late respondents). Therefore, the null hypothesis that there is no differences between early and late respondents cannot be rejected. Thus, the early and late response bias is not a serious issue in this research.

5.5. Data analysis method

PLS-SEM technique was used to validate the measures and test the hypotheses. The PLS-SEM technique employs a component-based approach and allows simultaneous examination of the measurement and structural models (Fornell & Larcker, 1981). It further accommodates the exploratory nature of the research model, the presence of large number of variables (Liang, Saraf,

Hu, & Xue, 2007), and the complexity of the model. PLS-SEM is also more suitable than CB-SEM for testing models with second-order constructs and moderating variables (Chin, 2003). PLS-SEM allows for the conceptualization of a hierarchical model through the repeated use of manifest variables (i.e., the higher order component uses all indicators of lower order components (Noonan & Wold, 1983; Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). The reflective-formative for the organizational culture construct was done using the two steps below:

- (1) We constructed the first-order latent variables (employee orientation, innovativeness, social reliability) and related them to their respective block of manifest variables using reflective indicators in the measurement model.
- (2) We then constructed the second-order latent variable (organizational culture) by relating it to the blocks of the underlying first-order latent variables, which are viewed as formative indicators for this second-order latent variables.

In this study, the dependent variable B2B EC adoption is a dichotomous variable, thus, we specifically used WarpPLS to analyze measurement and structural model. The algorithm Warp 3 for the Inner model assumes the S-curve relationships between IVs and DV (Kock, 2015a, 2015b).

6. Results

6.1. Measurement model

Measurement model assessment includes testing reliabilities through the squared standardized outer loading for each construct (i.e., internal consistency reliability using the composite reliability (CR) scores), convergent validity (using the average variance extracted, AVE), and discriminant validity (using the Fornell-Larcker criterion and the cross loading).

To reach an acceptable indicator reliability, the indicator loading must be higher than 0.70 (Hair, Ringle, & Sarstedt, 2011). Appendix 2 shows all the indicator loadings, but some of the remaining loadings were lower than the suggested threshold of 0.70 (Chin, 1998). One item for perceived relative advantage (PRA4), two items for IT infrastructure (ITI2, ITI3), two items for competitive pressure (CP3, CP4), and one item for government support (GS3) had loadings of 0.66, 0.64, 0.65, 0.67, 0.68, and 0.67 respectively, which are lower than 0.70. In general, loadings between 0.60–0.70 are often considered acceptable if the loadings of other items within the same construct are high (Chin, 1998). Therefore, the above mentioned items were retained. Table 5 indicates all composite reliabilities (CR) were larger than the suggested 0.70, and all average variance extracted (AVEs) values were greater than the suggested 0.50, indicating that the measurement model had acceptable convergent validity for first-order constructs (Fornell & Larcker, 1981). In addition, the AVE square roots were larger than the correlations among constructs (see Table 6). Thus, discriminant validity was achieved.

Table 5. Results of assessment of measurement model for first-order constructs.

Construct	Number of items	CR	AVE	Full Collinearity
Perceived Relative Advantage	9	0.93	0.59	1.023
Perceived Cost	6	0.92	0.66	1.225
Management Support	5	0.91	0.66	3.038
Competitive Pressure	6	0.88	0.55	2.401
Trading Partner Pressure	6	0.90	0.61	1.862
IT Infrastructure	7	0.88	0.52	1.031
Legal Infrastructure	5	0.89	0.63	1.077
Government Support	5	0.87	0.59	1.781

6.2. Generating second-order construct “organizational culture”

For generating second-order organizational culture, the two steps below were followed:

First, the first-order latent variables for employee orientation, customer focus, innovativeness, systematic management and control, and social responsibility were constructed and then related to their respective blocks of manifest variables using reflective indicators in the measurement model. For the measurement model assessment, all four parameters such as indicator reliabilities for all items, CR, AVE, and discriminant validity were checked. As indicated in Appendix 2, indicator loading for all related items were larger than 0.70 except for two items for systematic management (SMC4, SMC5) and one item for social responsibility (SR2), which were 0.63, 0.49, and 0.42 respectively. According to Hair et al. (2013), items with loadings between 0.40 and 0.70 should be considered for deletion, if the deletion increases the CR and validity such as AVE. The AVE for systematic management and control and social responsibility were 0.43 and 0.49 respectively, which are lower than 0.50 and hence, not satisfactory. Therefore, these three problematic indicators were removed and the model was run again to achieve acceptable AVE and CR. Table 7 indicates all composite reliabilities for five dimensions that were larger than the suggested 0.70, and all AVE values were greater than the suggested 0.50. Table 8 indicates the AVE square roots that were larger than the correlations among constructs. Therefore, the measurement model in this stage had good convergent validity and discriminant validity for making the second-order organizational culture construct.

Second, the second-order latent variable (organizational culture) was constructed by relating it to the blocks of the underlying first-order latent variables, which functioned as formative indicators for this second-order latent variable. For the formative constructs, the traditional indicators of reliability and convergent validity were not applicable (Bollen, 2014). Consequently, existence of co-linearity problems is checked by variance inflation factor (VIF) with cutoff values less than 3.3 and p -value < 0.05 (Kock, 2012).

Table 6. Correlations and squared roots of AVEs for first-order constructs.

Constructs	PRA	Cst	TMS	CP	TPP	ITI	LI	GS
Perceived Relative Advantage	0.785							
Cost of Adoption	-0.082	0.813						
Top Management Support	0.094	-0.295	0.815					
Competitive Pressure	0.034	-0.133	0.64	0.802				
Trading Partner Pressure	0.044	-0.203	0.497	0.584	0.781			
IT infrastructure	0.015	-0.005	0.096	0.047	0.074	0.771		
Legal Infrastructure	-0.046	-0.021	-0.054	0.06	0.002	-0.043	0.792	
Government Support	0.035	-0.291	0.446	0.376	0.478	-0.013	0.006	0.807

Table 7. Results of assessment of measurement model for five dimensions of organizational culture.

Constructs	N. of items	CR	AVE
Employee Orientation	7	0.94	0.67
Customer Focus	5	0.88	0.59
Innovativeness	4	0.91	0.72
Systematic Management	3	0.85	0.60
Social Reliability	2	0.90	0.71

Table 8. Correlations and squared roots of AVEs.

Constructs	EO	CF	INO	SMC	SR
Employee orientation	0.823				
Customer focus	0.483	0.768			
Innovativeness	0.551	0.482	0.848		
Systematic management	0.381	0.212	0.252	0.761	
Social responsibility	0.091	0.296	0.024	-0.026	0.841

Table 9. VIF and p -value for dimensions of second-order construct organizational culture.

Latent Variables (LVs)	VIF	p -value
Employee Orientation	1.71	$p < 0.01$
Customer Focus	1.58	$p < 0.01$
Innovativeness	1.60	$p < 0.01$
Systematic Management & Control	1.18	$p < 0.01$
Social Responsibility	1.12	$p < 0.01$

Table 9 indicates the value of VIF and p -value for these five constructs after modification.

All VIF were lower than 3.3, and the p -values were significant at $p < 0.01$ and highly acceptable for the measurement model for the organizational culture construct.

6.3. Structural model: Hypotheses testing

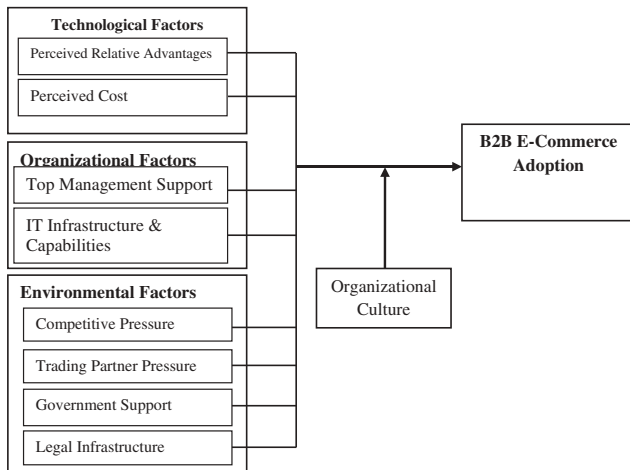
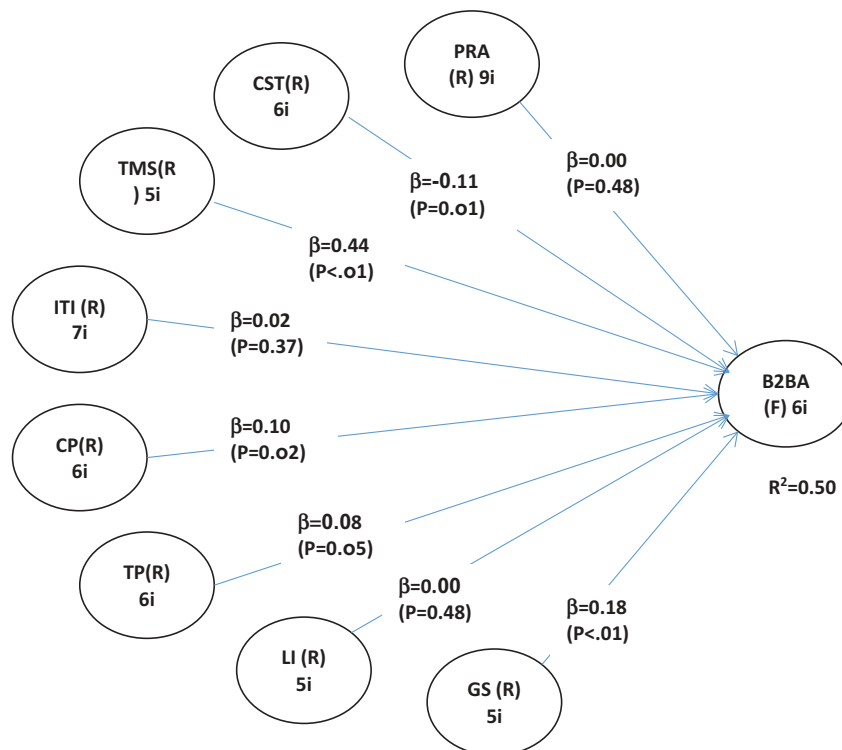
The measurement model assessment led to statistically acceptable goodness of fit between the data collected and proposed research model. Ten goodness-of-fit (GOF) and quality indices for the structural model had satisfactory values and supported the research model.

The measurement model assessment produced evidence of reliability and validity for both first- and second-order latent variables, thus qualifying for an examination of the structural model estimate. The primary criterion for structural assessment is the coefficient of determination (R^2), which represents 50% of explained variance by each endogenous latent variable. The results of hypotheses testing are summarized in Table 10 and Figure 2.

The results did not show that perceived relative advantage positively influenced B2B EC adoption ($\beta = 0.002$, $p = 0.48$) in manufacturing companies in Iran, hence not supporting H1.

Table 10. Results of direct effect of hypothesis testing.

Hyp.	Relationship	Path Coefficient	p Value	Effect Size	Supported
H1	Perceived relative advantage→B2B Adoption	0.002	$p = 0.48$	0	NO
H2	Cost of adoption→ B2B EC Adoption	-0.11	$p < 0.05$	0.03	YES
H3	Top management support→ B2B EC Adoption	0.44	$p < 0.01$	0.29	YES
H4	IT Infrastructure→ B2B EC Adoption	0.01	$p = 0.36$	0	NO
H5	Competitive pressure→ B2B EC Adoption	0.10	$p = 0.05$	0.04	YES
H6	Trading partner pressure→ B2B EC Adoption	0.07	$p = 0.05$	0.03	NO
H7	Legal infrastructure → B2B EC Adoption	-0.002	$p = 0.48$	0	NO
H8	Government support→ B2B EC Adoption	0.18	$p < 0.01$	0.09	YES

**Figure 1.** Research model of B2B EC adoption.**Figure 2.** Results of Structural Model for direct effect testing.

Cost of technology adoption was predicted to negatively and directly influence B2B EC adoption, and this effect was validated ($\beta = -0.11$, $p < 0.05$), thus supporting H2. It was also predicted that top management support directly and positively influenced B2B EC adoption and it was found that

this was indeed the case ($\beta = 0.44$, $p < 0.01$, effect size = 0.29), thus confirming H3. IT infrastructure and capabilities was predicted to positively and directly influence B2B EC adoption, but the result was not significant, thus H4 was not supported. Competitive pressure was predicted to also directly and positively influence B2B EC adoption; this influence was found ($\beta = 0.10$, $p < 0.05$), thus supporting H4. It was assumed that trading partner pressure and legal infrastructure directly and positively influenced B2B EC adoption; however, the results were not significant, thus H6 and H7 were not supported. It was assumed that government support positively and directly influenced B2B EC adoption; this assumption was upheld ($\beta = 0.18$, $p < 0.01$), thus supporting H8.

6.4. Moderating test

In testing for interaction effects between sets of influential factors and B2B EC adoption, the results revealed that the negative moderating effect of organizational culture was significant only on the relationship between top management support and B2B

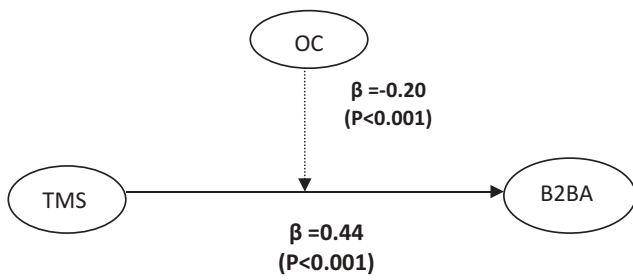


Figure 3. Moderating and direct link of TMS and B2B EC adoption.

EC adoption ($\beta = -0.20\%$, $p < .01$), which provided support only for H11. Figure 3 indicates the value of the direct and interaction effect of top management support with organizational culture toward B2B EC adoption.

The direct link between top management support and B2B EC adoption, as indicated in Figure 3, was positive and significant. However, the interaction link between top management support and organizational culture toward B2B EC adoption (TMS*OC→B2B EC) was negative (-0.20), and significant ($p < 0.01$). The negative moderating effect between two variables means that as organizational culture goes up or increase, the value of direct link between top management support and B2B EC adoption goes down or decrease. To confirm this result, a scatter plot of the interaction effect was tested. Figure 4 indicated the plotted graph used for analyzing the interaction effect of organizational culture between top management support and B2B EC adoption. The scatter plot indicates a distribution of points on the plots for low culture on the left side and for high culture on the right side of the figure. As indicated in the graph, with low organizational culture the effect between top management support and B2B EC adoption is stronger than with high organizational culture. On the other hand, on the right side,

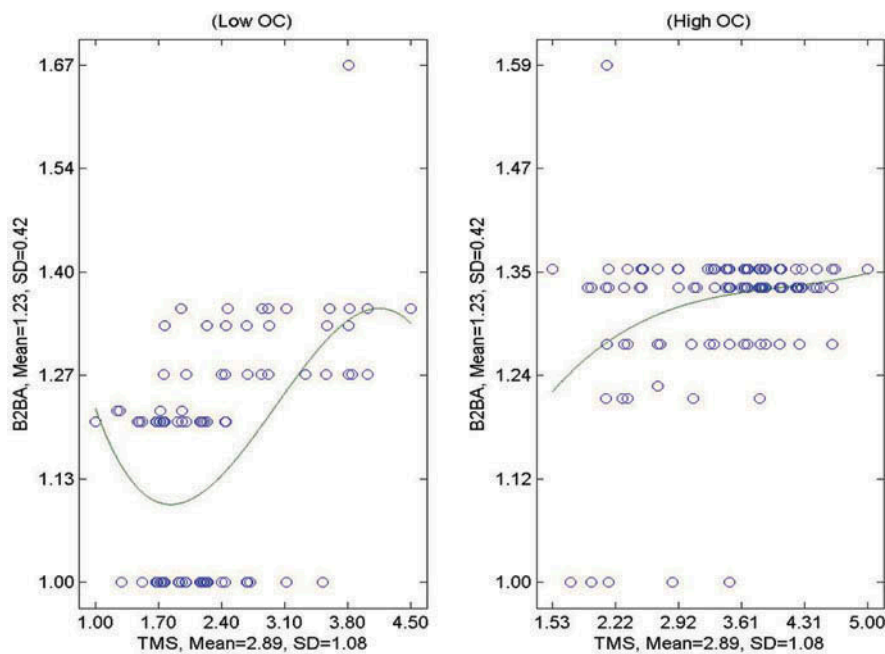


Figure 4. Plotted graph for moderating effect of organizational culture.

the effect between top management support and B2B EC tends to be smoother in high organizational culture. This suggests that the moderation effect of organizational culture on the relationship between top management support and B2B EC adoption is stronger for low organizational culture as compared to high organizational culture. Therefore, hypothesis H11 is supported.

The results also indicated no significant moderating effects for the rest of the developed hypotheses, as such; hypotheses H9, H10, H12, H13, H14, H15, and H16 were not supported by the data.

7. Discussion

The findings of this research are discussed under four separate categories: technology, organization, environment, and organizational culture.

In the context of technological factors, it was found that perceived relative advantage does not have any significant effect on B2B EC adoption in manufacturing companies in Iran. It was somewhat surprising that the potential benefits accruing from the use of technology was found to be unimportant in this research. This finding is inconsistent with almost all previous B2B EC/business adoption literature which showed that perceived relative advantage is among the strongest predictors of intention of technology adoption and has a positive significant relationship (e.g., Duan et al., 2012; Ghobakhloo et al., 2011; Ifinedo, 2011; Rahayu & Day, 2015; Ramdani et al., 2013; Venkatesh, Morris, Davis, & Davis, 2003). The potential relative advantages from B2B EC adoption could increase the speed of business activities and coordination along the value chain thus leading to improved performance. Tornatzky and Klein (1982), in their analysis related to innovation adoption, stressed that not all research findings that reported perceived benefits from

innovation adoption was associated with its actual adoption. Similarly, surprising results have been found by other researchers (e.g., Mainura, Ngugi, & Kanal, 2016; Mndzebele, 2013) that relative advantage is not a predictor of the extent of adoption of EC within micro and small enterprise in underdeveloped countries. Based on the study, the insignificant influence of perceived relative advantage on B2B EC adoption in manufacturing companies in Iran does not imply that B2B EC systems have a low level of advantages. It could be argued that manufacturing companies in Iran understand the relative advantage from using these systems, but that their knowledge might be inadequate. One possible reason for this is that B2B EC is a new and complex technology for manufacturing companies in Iran. Another possible reason is that the potential advantages of having B2B EC systems is not obvious to them and that their existing infrastructure is inadequate. This likely because the majority of manufacturing companies in Iran are small- and medium-size enterprises (SMEs). Iacovou et al. (1995) found that the advantages and benefits from technology adoption were not perceived in small business and they are less informed compared to large enterprises. Therefore, such reasons could significantly influence the “weak” perceptions of manufacturing companies in Iran. Thus, more promotional efforts are required to increase knowledge and awareness in manufacturing companies to highlight the potential benefits and advantages of B2B EC systems and to raise the level of adoption.

Regarding the influence of cost of technology adoption on B2B EC system, this research found that B2B EC adoption was significantly and negatively influenced by the cost of adoption in manufacturing companies in Iran. This result is consistent with the majority of e-commerce adoption literature, suggesting that the cost of adopting B2B EC systems is a major barrier to adopt and use such systems (e.g. Al-Somali et al., 2011; Cho, 2006; Al-Qirim, 2007; Sila, 2013; Sila & Dobni, 2012). The high cost of fixed broadband tariff and cost of access to the internet is the major obstacle to use the Internet and its application in Iran. Another reason is that manufacturing companies often lack financial resource to invest in technology and re-engineer traditional ways of doing business. This is because the structure of manufacturing companies is completely different compared to service firms in general. Manufacturing companies follow a complex structure relating to inventory systems, coordination with supply chain and operational process, while service firms do not. Thus, manufacturing companies might be reluctant to invest in costly integrated B2B EC systems.

In the context of organizational factors, it was found that the effect of top management support on B2B EC adoption determines the high dependence of the organization on the strategic decisions made by top managers. This result provides support for H3, which posited that Iranian manufacturing companies, with more innovative support from senior manager, are more likely to adopt B2B EC systems. This result supports prior findings related to organizational technology adoption, suggesting that top managers’ support and commitment are important because they positively influence e-commerce adoption (e.g., Al-Somali et al., 2011; Ghobakhloo et al., 2011; Ifinedo, 2011; Al-Qirim, 2007; Ramadani et al., 2013; Sila & Dobni, 2012; Thatcher et al., 2006). Given the specific characteristics of manufacturing companies, top managers have an overriding role in

shaping all activities, both current and future. Hence, organizations with managers who are creative and innovative would be more inclined to adopt integrated B2B EC systems. A comparison of prior literature related to B2B EC adoption in developing and developed countries reveals that crucial problems in developed countries is lack of trust, security, and privacy risks that restrict the expansion of B2B EC systems; while in developing countries the main problems were related to management issues (Ghobakhloo et al., 2011, Tan et al., 2007; Rahayu & Day, 2015). The findings of this research support prior researches that were mainly conducted in developing countries: B2B EC adoption is extensively determined by top manager attributes and perception (Ghobakhloo et al., 2011; Rahayu & Day, 2015). Given that the majority of the manufacturing companies in Iran are small and medium businesses, the role of top managers is even more crucial to adopting B2B EC systems. In SMEs, the main decision makers of the companies are usually owners, therefore, their knowledge, support, and innovativeness guarantee the limited resource to be allocated for the adoption of technology as well as for creating a supportive climate to overcome the barriers in adopting B2B EC systems. The strong relationship between the top management and the adoption of B2B EC in this research indicates that in order to promote the adoption of B2B EC in Iranian SMEs, it is necessary to communicate with managers at the top level to secure their buy-in.

Regarding the influence of IT infrastructure and capabilities on B2B EC adoption, this research found that IT infrastructure was not a significant factor to influence B2B EC adoption in manufacturing companies in Iran. This result is in line with the findings by Duan et al. (2012) and Ifinedo (2011) who found that IT infrastructure and readiness was not a significant determinant in technology adoption. This finding could be due to the reason that the IT infrastructure in the manufacturing companies is not adequate to the degree that it can influence their acceptance of B2B EC systems. Another possible reason is that the level of technical skills and human resources that are knowledgeable in IT applications to manufacturing companies are not available.

In the context of environmental factors, it was found that competitive pressure is an important factor that positively influences B2B EC adoption among manufacturing companies in Iran. The importance of competitive pressure on the adoption of B2B EC in manufacturing companies in Iran is consistent with the previous studies (Zhu et al., 2006; Duan et al., 2012; Ifinedo, 2011; Liu et al., 2010; Oliveira & Martins, 2010; Scupola, 2003). Thus, this research’s finding consolidates the body of knowledge in the area. In this research, the positive relationship between the competitive pressure and B2B EC adoption reveals that Iranian manufacturing companies are more prone to adopt B2B EC systems in order to maintain their competitive position and to strengthen relationships along the supply chain. The adoption of B2B EC by influential competitors would surely accelerate their decisions in adopting B2B EC systems. This suggests to B2B EC service providers that in order to increase the level of technology adoption, some free adoption offers and incentives should be given to the influential parties first. After realizing the benefits of B2B EC systems, the influential parties are likely to encourage or force smaller companies to adopt B2B EC systems. Hence,

gaining competitive advantages is still one of most important drivers of B2B EC adoption. Managers should be aware that competitive pressure has the same importance for B2B EC adoption across the industries, which points to the same level of competition in the online environment.

In the context of influence of trading partner pressure on B2B EC adoption, although prior studies have demonstrated the significance of demand and pressure from supply chain and customers to adopt B2B EC systems (e.g., Al-Qirim, 2007; Zhu, 2008; Zhu et al., 2006; Sila, 2013; Sila & Dobni, 2012), this research does not find support for this claim in the context of manufacturing companies in Iran. The finding of this research is in line with the findings by Hsu, Kraemer, and Dunkle (2006). Ineffective of pressure from partners and the lack of cooperation to use such systems might be the cause of the low rate of penetration B2B EC systems in the manufacturing company sector in Iran until now. In this regard, service providers and government should encourage manufacturing companies in different ways. For example, service providers should allow businesses to try the products before committing to it; or allowing their customers to specify the level of their compatibility with the complexity of the product. This effort could support manufacturing companies to validate their choice and thus reduce the perceived risk.

The findings of this research related to the influence of legal infrastructure on B2B EC adoption indicate that there is no relationship between legal infrastructure and B2B EC adoption among manufacturing companies in Iran. This finding is in line with the results of Gibbs, Kraemer, and Dedrick (2003) who found that legal infrastructure was not a significant factor in organizational technology adoption. This finding does not imply that manufacturing companies ignore law and regulations; rather, it implies that existing regulations protecting the adoption and use of B2B EC systems have not been seriously considered by decision makers in manufacturing companies in Iran. Such legal infrastructure is necessary to inspire confidence required for manufacturing companies to introduce technology to augment the traditional ways of doing business. The lack of legal infrastructure that makes good sense to companies, seems to be insufficient to overcome the impediments of using B2B EC systems in Iran.

This research also found that B2B EC adoption in Iranian manufacturing companies is positively influenced by support from government which is consistent with prior research (e.g., Elahi & Hassanzadeh, 2009; Scupola, 2003; Thatcher et al., 2006; Zhu & Thatcher, 2010). Manufacturing companies that experience a lack of support such as financial resource, IT expertise, and training services from government had faced major challenges in adopting B2B EC systems. In this regard, governments should provide the necessary IT expertise and allocate sufficient budget to manufacturing companies if they hope to increase the whole performance of manufacturing companies. If managers in manufacturing companies perceive that authorities are sensitive to their needs and requirements, then they would be more likely to adopt and use B2B EC systems.

Regarding the influence of organizational culture as a moderator variable, the results from interaction effect testing indicate that organizational culture moderates negatively and significantly the relationship between top management support and B2B EC

adoption. In other word, the relationship between top management support and B2B EC adoption is significantly stronger for companies with “weak culture.” The explanation of this finding is that companies with “strong culture” are better positioned to adopt B2B EC systems. This is because, companies with “strong culture” are more likely to be innovative, able to transmit knowledge, skills, information sharing along the value chain, adopt high-tech bravely, emphasize team building and have more champions as compared to companies with “weak culture” (Khazanchi et al., 2007; Liu et al., 2010). As a result, the process of adopting a new technology is facilitated in companies with “strong culture” as compared to companies with “weak culture.” This argument supports the previous findings that posit e-commerce adoption is facilitated by organizations that emphasizes an atmosphere of trust, flexibility, innovation, and knowledge sharing among employees and their trading partners (Zhu & Thatcher, 2010; Senarathna et al., 2014; Valencia, J. Valle, A., & Jimenez, D, 2010, Hribar & Mendling, 2010). The result of interaction effect in this research indicates that the role of top managers is weaker in organizations with “strong culture.” This result is true because these organizations are inherently technology-oriented and they are less dependent on support from senior executives in technology adoption. In contrast, the role of top managers for adoption technology is highlighted in organizations with “weak culture”: That is, organizations with “weak culture” possess complex hierarchy, and control structures that inhibit the process of technology adoption (Valencia, J. Valle, A., & Jimenez, D, 2010); thus, they depend more on support from top managers. The finding of this research conveys a very important message for manufacturing companies in Iran, namely, that organizations with “weak culture” do require the support and commitment from top manager to adopt B2B EC systems. Managers should embrace their roles as active leaders in adopting innovations especially in organization with “weak culture,” and evaluate whether and how they are adding value to the innovation process. This requires managers to fully understand the barriers and facilitators that influence B2B EC adoption.

8. Research contributions, implications, and limitation

8.1. Research contributions

Primarily, the major contribution is extending innovation adoption and IS literature to the context of B2B EC systems. Second, this research extends the TOE framework which was developed for Western countries, to investigate issues in the context of Middle East developing countries. Further, this research operationalized the organizational culture construct as a second-order latent variable in the formative mode to the model, which facilitated testing the moderating effect in this model. This is an important contribution to the existing literature in organizational technology adoption because the moderating role of organizational culture has often been overlooked in prior research related to the B2B EC adoption in general. As a result, this research contributes largely to the existing knowledge base by filling the current literature gaps in relating to moderating effects of organizational culture in the adoption of B2B EC in the context of developing country of Iran.

Third, the current research demonstrates that top management support is primarily important in the B2B EC adoption process. Thus, this research reinforces the importance of this factor in the adoption of B2B EC domain in Iran through the lens of TOE framework. Further, this research demonstrates that organizational culture negatively moderates the relationship between top management support and B2B EC adoption. Indeed, this is an important contribution by itself because these types of conclusions given the domain and the context of this research are unexpectedly missing from prior literature.

8.2. Research implications

Given the importance of widespread adoption for the success of B2B EC and the slower than expected growth of B2B EC adoption among manufacturing companies in Iran, there is a great need for more understanding of what factors are important in the adoption of B2B EC. Thus, the current research represents an early attempt to examine technological, organizational, and environmental factors grounded by the TOE framework. Findings of this research have a number of important implications that might assist managers, government, and policy makers to facilitate the adoption of B2B EC systems. These implications are explained below.

Implications for Managers: This study sought to help companies become more successful in moving from traditional commerce to electronic commerce by identifying the profile of B2B EC adopters. Empirical findings from this research demonstrate the importance of top management roles in manufacturing companies in the context of developing countries. In fact, without the commitment and the support from top managers and owners, B2B EC systems are not likely to be adopted.

Management teams should commit continued support to B2B EC initiatives by dedicating a high level of resources to foster the greater use of B2B EC systems, especially in small and medium manufacturing companies, which have limited resource and “weak” culture. First, top managers should exert their significant influence on organizational members in terms of the promise and importance of conducting B2B EC systems. Undoubtedly, if senior managers and owners of companies are motivated to be innovative, there is likely to be a positive attitude to implement the technology, and resources will be allocated for its acquisition and implementation. In fact, senior managers can express their belief and participation through various types of support mechanisms, such as steering committees, working groups, and training activities and programs. Second, senior managers and owners should recognize that exploiting the full potential of B2B EC would require them to go beyond initial financial investment. They must provide more technical and organizational support to promote a favorable environment to infuse B2B EC and to reduce uncertainties around technical and organizational changes.

Implications for Government and Policy Makers: This research found that government support is an important factor that influences the tendency of firms to adopt B2B EC systems. B2B EC adoption requires the existence of appropriate government policies and support. Such policies include promotion of computer use among organizations, endorsement of low taxes and tariffs on computer imports, consumer privacy, resolution of

conflicts of international law, and intellectual property protection. Indeed, government support is a critical factor in fostering B2B EC and it has an important role in overcoming these concerns and challenges. For government bodies or others tasked to support business and promote B2B EC adoption in firms, one implication would be to assist organizations in identifying and incorporating B2B EC systems in the firms’ processes that would improve their performance. This would also imply finding appropriate ways to identify and transmit the required knowledge to the decision makers of these companies. B2B EC growth and development could involve government reviewing its policies and incentives to promote the adoption of B2B EC systems in manufacturing companies. As mentioned earlier, the government of Iran has taken various measures to refine and enhance business processes and to transform Iran in a digital society. In fact, this research model will help maximize the potential benefits of Iran’s government ICT implementation effort by providing an understanding of the factors that influence the adoption and implementation of Internet technologies such as B2B EC. This will lead to more acceptable internet technologies to enhance companies’ capabilities and better choices for ICT. It should be noted that the manufacturing companies in Iran play a critical role in creating employment opportunities and the Iran government aims to increase employment in this sector by 8% per year. In fact, this research suggests that B2B EC systems can be seen as an opportunity to increase employment in the industrial sector.

8.3. Research limitation

This research has the following limitations that should be addressed by future research. First, this research only investigates B2B EC adoption at one point in time and in fact, applying the cross-sectional survey does not allow the interpretation of causal inferences between variables. Therefore, a longitudinal research would be preferable. In general, the adoption of organizational technology adoption and implementation is a process that will occur over time; also, organizations’ member attitudes toward the desirability of various behaviors change over time (Ouchi, 1979).

Second, in this research each respondent represented one company; and self-reported measures were used to evaluate all of the variables in the questionnaire. The data gathered from a key informant of each company made this research subject to certain drawbacks. Organizational technology adoption scholars have criticized the appropriateness of self-reported measures of technology usage. For instance, Devaraj and Kohli (2003) suggested that self-reported measures of technology adoption have several limitations and might not be an appropriate resource for actual usage due to subjects’ lack of information, attention lapses, and bounded rationality. However, such functions are common in IS research and only replications could validate the measures applied in the research findings. This challenge brings questions about the threat of biased responses because of social desirability. However, such threat is not believed to be a serious concern for this research because of the respondents’ lack of knowledge related the objectives of the research. The second concern may come from the use

of single respondents where the research uses a key decision maker who presents relevant information as the representative of the decision-making unit in a company. It was assumed that such managers are involved with the strategic activities of the firms, have had particular experiences they could elaborate, and are reliable sources of information about companies' activities. Therefore, multiple respondents from each firm would have been more favorable for this study. However, access would have been difficult, and likely would have resulted in a smaller usable sample size from companies. Therefore, the single respondent approach was used. The third limitation is that some of items in the questionnaire differed in wording from those used for measuring the same variables by other researchers. In fact, some items were revised to ensure they were valid for use in the context of B2B EC adoption in manufacturing companies in Iran. Therefore, for future empirical investigation research that use these variables, it is suggested to use the original source of reference. The final limitation is that this research was limited to the cities of Bandar Abbas, Tehran, and Esfahan. Indeed, more research is required to validate the results achieved for B2B EC adoption determinants. Therefore, to enhance the generalizability of findings over different areas (e.g. in different regions, countries, and different cultures) and to understand the role of cross-national differences on organizational technology adoption more, research is needed.

Disclosure of potential conflicts of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

References

- Aktaş, E., Çiçek, I., & Kiyak, M. (2011). The effect of organizational culture on organizational efficiency: The moderating role of organizational environment and CEO values. *Procedia-Social and Behavioral Sciences*, 24, 1560–1573. doi:10.1016/j.sbspro.2011.09.092
- Alam, S., Ali, M. Y., & Mohd. Jani, M. F. (2011). An empirical study of factors affecting electronic commerce adoption among SMEs in Malaysia. *Journal of Business Economics and Management*, 12(2), 375–399. doi:10.3846/16111699.2011.576749
- Al-Bakri, A. A., & Katsioloudes, M. I. (2015). The factors affecting e-commerce adoption by Jordanian SMEs. *Management Research Review*, 38(7), 726–749. doi:10.1108/MRR-12-2013-0291
- Al-Qirim, N. (2005). An Empirical Investigation of an e-commerce Adoption-Capability Model in Small Businesses in New Zealand. *Electronic Markets*, 15(4), pp.418–437.
- Al-Qirim, N. (2007). The adoption of eCommerce communications and applications technologies in small businesses in New Zealand. *Electronic Commerce Research and Applications*, 6(4), pp.462–473.
- Al-Somali, S. A., Gholami, R., & Clegg, B. (2011). Determinants of B2B e-commerce adoption in Saudi Arabian firms. *International Journal of Digital Society (IJDS)*, 2(2), 406–415. doi:10.20533/ijds.2040.2570.2011.0049
- Asare, A. K., Brashear Alejandro, T. G., Granot, E., & Kashyap, V. (2011). The role of channel orientation in B2B technology adoption. *Journal of Business & Industrial Marketing*, 26(3), 193–201. doi:10.1108/08858621111115912
- Baird, K., Jia Hu, K., & Reeve, R. (2011). The relationships between organizational culture, total quality management practices and operational performance. *International Journal of Operations & Production Management*, 31(7), 789–814. doi:10.1108/01443571111144850
- Bollen, K. A. (2014). *Structural equations with latent variables*. New York: John Wiley & Sons.
- Calori, R., & Sarnin, P. (1991). Corporate culture and economic performance: A French study. *Organization Studies*, 12(1), 049–74. doi:10.1177/017084069101200104
- Chin, W.W., 1998. The partial least squares approach to structural equation modeling. *Modern methods for business research*, 295(2), pp.295–336.
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information Systems Research*, 14(2), 189–217. doi:10.1287/isre.14.2.189.16018
- Cho, V. (2006). Factors in the adoption of third-party B2B portals in the textile industry. *Journal of Computer Information Systems*, 46(3), 18–31.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982–1003. doi:10.1287/mnsc.35.8.982
- Devaraj, S. and Kohli, R., 2003. Performance impacts of information technology: Is actual usage the missing link?. *Management science*, 49(3), pp.273–289.
- Duan, X., Deng, H., & Corbitt, B. (2012). Evaluating the critical determinants for adopting e-market in Australian small-and-medium sized enterprises. *Management Research Review*, 35(3/4), 289–308. doi:10.1108/01409171211210172
- Elahi, S., & Hassanzadeh, A. (2009). A framework for evaluating electronic commerce adoption in Iranian companies. *International Journal of Information Management*, 29(1), 27–36. doi:10.1016/j.ijinfomgt.2008.04.009
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 39–50. doi:10.2307/3151312
- Ghobakhloo, M., Arias-Aranda, D., & Benitez-Amado, J. (2011). Adoption of e-commerce applications in SMEs. *Industrial Management & Data Systems*, 111(8), 1238–1269. doi:10.1108/02635571111170785
- Ghobakhloo, M., & Hong Tang, S. (2013). The role of owner/manager in adoption of electronic commerce in small businesses: The case of developing countries. *Journal of Small Business and Enterprise Development*, 20(4), 754–787. doi:10.1108/JSBED-12-2011-0037
- Gibbs, J., Kraemer, K. L., & Dedrick, J. (2003). Environment and policy factors shaping global e-commerce diffusion: A cross-country comparison. *The Information Society*, 19(1), 5–18. doi:10.1080/01972240309472
- Gordon, G. G., & DiTomaso, N. (1992). Predicting corporate performance from organizational culture*. *Journal of Management Studies*, 29(6), 783–798. doi:10.1111/joms.1992.29.issue-6
- Grandon, E. E., & Pearson, J. M. (2004). Electronic commerce adoption: An empirical study of small and medium US businesses. *Information & Management*, 42(1), 197–216. doi:10.1016/j.im.2003.12.010
- Hair Jr, J.F., Hult, G.T.M., Ringle, C. and Sarstedt, M. (2013). A primer on partial least squares structural equation modeling (PLS-SEM). Sage Publications.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152. doi:10.2753/MTP1069-6679190202
- Hewett, K., Money, R. B., & Sharma, S. (2002). An exploration of the moderating role of buyer corporate culture in industrial buyer-seller relationships. *Journal of the Academy of Marketing Science*, 30(3), 229–239. doi:10.1177/0092070302303004
- Hribar, B. & Mendling, J. (2014). The correlation of organizational culture and success of BPM adoption. 22nd European Conference on Information Systems, Tel Aviv, available at: <http://ecis2014.eu/E-poster/files/0249-file1.pdf>.
- Hsu, P. F., Kraemer, K. L., & Dunkle, D. (2006). Determinants of e-business use in US firms. *International Journal of Electronic Commerce*, 10(4), 9–45. doi:10.2753/JEC1086-4415100401

- Iacovou, C. L., Benbasat, I., & Dexter, A. S. (1995). Electronic data interchange and small organizations: Adoption and impact of technology. *MIS Quarterly*, 465–485. doi:10.2307/249629
- Ifinedo, P. (2011). Internet/e-business technologies acceptance in Canada's SMEs: An exploratory investigation. *Internet Research*, 21(3), 255–281. doi:10.1108/10662241111139309
- Jaspersen, J. S., Carter, P. E., & Zmud, R. W. (2005). A comprehensive conceptualization of post-adoptive behaviors associated with information technology enabled work systems. *MIS Quarterly*, 29(3), 525–557.
- Khazanchi, S., Lewis, M. W., & Boyer, K. K. (2007). Innovation-supportive culture: The impact of organizational values on process innovation. *Journal of Operations Management*, 25(4), 871–884. doi:10.1016/j.jom.2006.08.003
- Kock, N., 2012. WarpPLS 3.0 user manual. Laredo, TX: ScriptWarp Systems.
- Kock, N. (2015a). PLS-based SEM algorithms: The good neighbor assumption, collinearity, and nonlinearity. *Information Management and Business Review*, 7(2), 113.
- Kock, N. (2015b). *WarpPLS 5.0 user manual*. Laredo, TX: ScriptWarp Systems.
- Leidner, D. E., & Kayworth, T. (2006). Review: A review of culture in information systems research: toward a theory of information technology culture conflict. *MIS Quarterly*, 30(2), 357–399.
- Liang, H., Saraf, N., Hu, Q., & Xue, Y. (2007). Assimilation of enterprise systems: The effect of institutional pressures and the mediating role of top management. *MIS Quarterly*, 31(1) 59–87.
- Liu, C., Sia, C. L., & Wei, K. K. (2008). Adopting organizational virtualization in B2B firms: An empirical study in Singapore. *Information & Management*, 45(7), 429–437. doi:10.1016/j.im.2008.06.005
- Liu, H., Ke, W., Wei, K. K., Gu, J., & Chen, H. (2010). The role of institutional pressures and organizational culture in the firm's intention to adopt internet-enabled supply chain management systems. *Journal of Operations Management*, 28(5), 372–384. doi:10.1016/j.jom.2009.11.010
- Mainura, K. O., Ngugi, P. K., & Kanal, C. (2016). The role of compatibility in technology adoption among automobile mechanics in micro and small enterprises in Kenya. *International Journal of Academic Research in Business and Social Sciences*, 6(5), 503–511.
- McAfee, R. B., Glassman, M., & Honeycutt, E. D. (2002). The effects of culture and human resource management policies on supply chain management strategy. *Journal of Business Logistics*, 23(1), 1–18. doi:10.1002/jbl.2002.23.issue-1
- Mndzebele, N. (2013). The effects of relative advantage, compatibility and complexity in the adoption of EC in the hotel industry. *International Journal of Computer and Communication Engineering*, 2(4), 473–476. doi:10.7763/IJCC.2013.V2.229
- Molla, A., & Licker, P. S. (2005). e-Commerce adoption in developing countries: A model and instrument. *Information & Management*, 42(6), 877–899. doi:10.1016/j.im.2004.09.002
- Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research*, 2(3), 192–222. doi:10.1287/isre.2.3.192
- Noonan, R., & Wold, H. (1983). Evaluating school systems using partial least squares. *Evaluation in Education*, 7(3), 219–364. doi:10.1016/0191-765X(83)90003-4
- O'Reilly, C. A., Chatman, J., & Caldwell, D. F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. *Academy of Management Journal*, 34(3), 487–516. doi:10.2307/256404
- Oliveira, T., & Martins, M. F. (2010). Firms patterns of e-business adoption: Evidence for the European Union-27. *The Electronic Journal Information Systems Evaluation*, 13(1), 47–56.
- Ouchi, W. (1979) A conceptual framework for the design of organizational control mechanisms. *Management Science*, 25 (1), 833–848.
- Premkumar, G., Ramamurthy, K., & Crum, M. (1997). Determinants of EDI adoption in the transportation industry. *European Journal of Information Systems*, 6(2), 107–121. doi:10.1057/palgrave.ejis.3000260
- Rahayu, R., & Day, J. (2015). Determinant factors of e-commerce adoption by SMEs in developing country: Evidence from Indonesia. *Procedia-Social and Behavioral Sciences*, 195, 142–150. doi:10.1016/j.sbspro.2015.06.423
- Rahman, A., Kamarulzaman, N. H., & Sambasivan, M. (2013). A study on organizational culture, performance, and technological adoption behaviours of Malaysian food-processing SMEs. *Pertanika Journal of Social Sciences & Humanities*, 21(spec. June), 231–256.
- Ramdani, B., Chevers, D., & Williams, D. A. (2013). SMEs' adoption of enterprise applications: A technology-organisation-environment model. *Journal of Small Business and Enterprise Development*, 20(4), 735–753. doi:10.1108/JSBED-12-2011-0035
- Ramadani, V., Gërguri, S., Dana, L.P. and Tašaminova, T. (2013). Women entrepreneurs in the Republic of Macedonia: waiting for directions. *International Journal of Entrepreneurship and Small Business*, 19(1), pp.95–121.
- Reekers, N., & Smithson, S. (1994). EDI in Germany and the UK: Strategic and operational use. *European Journal of Information Systems*, 3(3), 169–178. doi:10.1057/ejis.1994.18
- Robertson, C. J., Al-Khatib, J. A., Al-Habib, M., & Lanoue, D. (2001). Beliefs about work in the Middle East and the convergence versus divergence of values. *Journal of World Business*, 36(3), 223–244. doi:10.1016/S1090-9516(01)00053-0
- Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.
- Ruppel, C. P., & Harrington, S. J. (2001). Sharing knowledge through intranets: A study of organizational culture and intranet implementation. *Professional Communication, IEEE Transactions On*, 44(1), 37–52. doi:10.1109/47.911131
- Saprikis, V., & Vlachopoulou, M. (2012). Determinants of suppliers' level of use of B2B e-marketplaces. *Industrial Management & Data Systems*, 112(4), 619–643. doi:10.1108/02635571211225512
- Schein, E. H. (1990). *Organizational Culture*, 45(2), 109. American Psychological Association.
- Schein, E.H. (1992). *Organizational culture and leadership*. 2nd ed. San Francisco: Jossey-Bass.
- Scott, W. R. (2013). *Institutions and organizations: Ideas, interests, and identities*. Sage Publications.
- Scupola, A. (2003). The adoption of Internet commerce by SMEs in the south of Italy: An environmental, technological and organizational perspective. *Journal of Global Information Technology Management*, 6(1), 52–71. doi:10.1080/1097198X.2003.10856343
- Senarathna, I., Warren, M., Yeoh, W., & Salzman, S. (2014). The influence of organisation culture on e-commerce adoption. *Industrial Management & Data Systems*, 114(7), 1007–1021. doi:10.1108/IMDS-03-2014-0076
- Shih, C. F., Dedrick, J., & Kraemer, K. L. (2005). Rule of law and the international diffusion of e-commerce. *Communications of the ACM*, 48(11), 57–62. doi:10.1145/1096000.1096005
- Sila, I. (2013). Factors affecting the adoption of B2B e-commerce technologies. *Electronic Commerce Research*, 13(2), 199–236. doi:10.1007/s10660-013-9110-7
- Sila, I., & Dobni, D. (2012). Patterns of B2B e-commerce usage in SMEs. *Industrial Management & Data Systems*, 112(8), 1255–1271. doi:10.1108/02635571211264654
- Stock, G. N., McFadden, K. L., & Gowen, C. R. (2007). Organizational culture, critical success factors, and the reduction of hospital errors. *International Journal of Production Economics*, 106(2), 368–392. doi:10.1016/j.ijpe.2006.07.005
- Stuart, L. H., Mills, A. M., & Remus, U. (2010). *The influence of organizational culture across the stages of enterprise system implementations*. Proceeding of the Pacific Asia Conference on Information Systems. Retrieved from <http://aisel.aisnet.org/pacis2010/194>
- Tan, J., Tyler, K., & Manica, A. (2007). Business-to-business adoption of eCommerce in China. *Information & Management*, 44(3), 332–351. doi:10.1016/j.im.2007.04.001
- Tenenhaus, M., Vinzi, V. E., Chatelin, Y. M., & Lauro, C. (2005). PLS path modeling. *Computational Statistics & Data Analysis*, 48(1), 159–205. doi:10.1016/j.csda.2004.03.005
- Teo, T. S., Lin, S., & Lai, K. H. (2009). Adopters and non-adopters of e-procurement in Singapore: An empirical study. *Omega*, 37(5), 972–987. doi:10.1016/j.omega.2008.11.001
- Thatcher, S. M., Foster, W., & Zhu, L. (2006). B2B e-commerce adoption decisions in Taiwan: The interaction of cultural and other institutional

- factors. *Electronic Commerce Research and Applications*, 5(2), 92–104. doi:10.1016/j.elerap.2005.10.005
- Thong, J. Y., & Yap, C. S. (1995). CEO characteristics, organizational characteristics and information technology adoption in small businesses. *Omega*, 23(4), 429–442. doi:10.1016/0305-0483(95)00017-1
- Tornatzky, L. and Fleischer, M., (1990). *The process of technology innovation*, Lexington, MA. Lexington Books.
- Trott, P. (2001). *The Role of Market Research in the Development of Discontinuous New Products*. *European Journal of Innovation Management*, 4, pp.117–125.
- Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *Processes of technological innovation*. Lexington Books.
- Tornatzky, L. G., & Klein, K. J. (1982). Innovation characteristics and innovation adoption-implementation: A meta-analysis of findings. *Engineering Management, IEEE Transactions On*, (1), 28–45. doi:10.1109/TEM.1982.6447463
- Tsui, A. L. Farhand Xin, K. (2002). 'Social Capital or Negative Capital: Particularistic Ties in Chinese Managerial Networks', Paper presented at the Annual Meeting of the Academy of Management, Denver, Colorado.
- Tsui, A. S., Zhang, Z. X., Wang, H., Xin, K. R., & Wu, J. B. (2006). Unpacking the relationship between CEO leadership behavior and organizational culture. *The Leadership Quarterly*, 17(2), 113–137. doi:10.1016/j.leaqua.2005.12.001
- Unctad, R. (2015). *United Nations conference on trade and development. Unlocking the potential of E-commerce for developing countries*. United Nations.
- Unido, V. (2003). Industrial and economic development in the Islamic Republic of Iran. *Small and Medium-Sized Enterprise Sector*. Available from: <https://www.unido.org/>
- US Census Bureau. (2015). US census e-stats. Retrieved December 12, 2015, from <http://www.census.gov/econ/estats/2015/2015reportfinal.pdf>
- US Census Bureau. (2013, August 18). *US census e-stats*. Retrieved December 12, 2015, from <http://www.census.gov/econ/estats/2013/2013reportfinal.pdf>
- Valencia, J. Valle, A., & Jimenez, D. (2010). Organizational culture as determinant of product innovation. *European Journal of Innovation Management*, 13(4), 466–480. doi:10.1108/14601061011086294
- Venkatesh, V., Morris, M., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425–478.
- Wang, Y. M., Wang, Y. S., & Yang, Y. F. (2010). Understanding the determinants of RFID adoption in the manufacturing industry. *Technological Forecasting and Social Change*, 77(5), 803–815. doi:10.1016/j.techfore.2010.03.006
- White, J. C., Varadarajan, P. R., & Dacin, P. A. (2003). Market situation interpretation and response: The role of cognitive style, organizational culture, and information use. *Journal of Marketing*, 67(3), 63–79. doi:10.1509/jmkg.67.3.63.18654
- Wu, F., Mahajan, V., & Balasubramanian, S. (2003). An analysis of e-business adoption and its impact on business performance. *Journal of the Academy of Marketing Science*, 31(4), 425–447. doi:10.1177/0092070303255379
- Yeung, A. K. O., Brockbank, J. W. and Ulrich, D. O. (1991), Organizational culture and human resource practices: An empirical assessment. In Richard W. Woodman and William A. Pasmore (eds.), *Research in organizational change and development*, pp. 59–82. Greenwich, CT: JAI Press.
- Zhu, K., 2004. Information transparency of business-to-business electronic markets: A game-theoretic analysis. *Management Science*, 50(5), pp.670–685.
- Zhu, K., Dong, S., Xu, S.X. and Kraemer, K.L., 2006. Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European journal of information systems*, 15(6), pp.601–616.
- Zhu, K., & Kraemer, K. L. (2005). Post-adoption variations in usage and value of e-business by organizations: Cross-country evidence from the retail industry. *Information Systems Research*, 16(1), 61–84. doi:10.1287/isre.1050.0045
- Zhu, K., Kraemer, K. L., & Dedrick, J. (2004). Information technology payoff in e-business environments: An international perspective on value creation of e-business in the financial services industry. *Journal of Management Information Systems*, 21(1), 17–54. doi:10.1080/07421222.2004.11045797
- Zhu, K., Kraemer, K., & Xu, S. (2003). Electronic business adoption by European firms: A cross-country assessment of the facilitators and inhibitors. *European Journal of Information Systems*, 12(4), 251–268. doi:10.1057/palgrave.ejis.3000475
- Zhu, L., & Thatcher, S. M. (2010). National information ecology: A new institutional economics perspective on global e-commerce adoption. *Journal of Electronic Commerce Research*, 11(1), 53.

About the Authors

Dr. Masoumeh Mohtaramzadeh completed her PhD from Universiti Sains Malaysia. Her research focused on use of B2B EC and the effect of culture in the Iranian context. Currently she is working free-lance taking on assignments which sparks her interest only.

T. Ramayah is currently a Professor of Technology Management at the School of Management, Universiti Sains Malaysia, Visiting Professor King Saud University, Kingdom of Saudi Arabia and Adjunct Professor at Sunway University, AIMST University and Universiti Tenaga Nasional, Malaysia. His publications have appeared in *Information & Management*, *International Journal of Operations & Production Management*, *Tourism Management*, *Journal of Travel Research*, *Journal of Environmental Management*, *Technovation*, *Journal of Business Ethics*, *Internet Research*, *Computers in Human Behavior*, *Information Systems*, *Resources*, *Conservation and Recycling*, *International Journal of Information Management*, *Evaluation Review*, *Social Indicators Research*, *Quantity & Quality*, *Service Business*, *Knowledge Management Research & Practice*, *Journal of Medical System*, *International Journal of Production Economics*, *Personnel Review*, and *Telematics and Informatics* among others. His full profile can be accessed from <http://www.ramayah.com>

Dr. Cheah Jun Hwa is a senior lecturer with Azman Hashim International Business School in Universiti Teknologi Malaysia (UTM), Kuala Lumpur. He obtained his PhD in Business Economics from Faculty of Economics and Management, UPM. His research interest is in marketing specialization and quantitative analysis as he has collaborative research and co-authored papers on topic related to Consumer Behaviour, Marketing Strategy and Advertising.

Appendix 1. Survey items and statistics

	Scale	Mean	SD.
Which one of the following options best describes your current B2B E-commerce status			
B2B E-commerce adoption (B2BA)	1–2	1.01	0.13
1. Not connected to the Internet, no e-mail			
2. Connected to the Internet with e-mail but no website	1–2	1.17	0.38
3. Static Web: that is, publishing basic organization information on the web without any interactivity.	1–2	1.23	0.42
4. Interactive web presence: that is, accepting queries, e-mail, and form entry from users.	1–2	1.10	0.30
5. Transactive web: that is, online selling and purchasing of products and services including customer service	1–2	1.23	0.42
6. Integrated web: that is, a website connecting your computer systems with online systems allowing most	1–2	1.23	0.44
Which of following questions describe your opinions about the potential benefits of using B2B E-commerce technologies in your organization			
Perceived Relative Advantage (PRA)	1–5	4.29	0.61
1. B2B E-commerce use would help increase business profitability			
2. B2B E-commerce use would help reduce costs.	1–5	4.15	0.56
3. B2B E-commerce use would help us to work better with our suppliers.	1–5	4.25	0.63
4. B2B E-commerce is useful to expand the market share for existing products/services.	1–5	4.26	0.56
5. B2B E-commerce allows us to enhance our productivity.	1–5	4.32	0.58
6. B2B E-commerce provides timely information for decision-making purposes.	1–5	4.23	0.60
7. B2B E-commerce allows us to save time in searching for resources.	1–5	4.26	0.59
8. B2B E-commerce is useful to increase customer satisfaction.	1–5	4.27	0.57
9. B2B E-commerce is useful to increase international sales.	1–5	4.30	0.60
The following questions ask level of financial and cost requirements for B2B e-commerce adoption			
Cost of Adoption (CA)	1–5	2.98	0.88
1. Expected cost of B2B EC equipment (e.g. computers, access to the internet), hardware and networkings			
2. The cost of access to the Internet	1–5	2.59	0.81
3. The hosting charge for websites with sufficient bandwidth is	1–5	3.38	0.75
4. The cost of integrating B2B EC technology with existing information management systems is	1–5	3.38	0.90
5. The cost of substantial investment in training for employees to maintain a multi-skilled workforce is	1–5	3.34	0.63
6. Expected cost of reengineering business processes around B2B EC is	1–5	4.10	0.89
The following question looks for your opinion about top management support and interest in the use of electronic business in the firm			
Top Management Support (TMS)	1–5	2.89	1.09
1. Top managers are willing to try to provide the necessary resources for implementing e-commerce practices.			
2. Top managers often advise employees to keep track of the latest	1–5	2.73	1.10
3. Our top management is likely to consider the implementation of e-commerce applications as strategically important.	1–5	2.66	1.28
4. Top managers in our firm keep telling people that they must bring more of their business practices online in order to meet customers' future needs.	1–5	2.79	1.09
5. According to top managers in our firm, incorporating e-commerce practices is a very important way to gain competitive advantage.	1–5	2.89	1.08
Please rate the level of the following statements about the Iranian IT infrastructure and support given to institutions wanting to migrate to the Internet.			
IT Infrastructure and Capabilities (ITI)	1–5	3.30	0.74
1. Level of reliability and efficiency of telecommunication infrastructure to support B2B e-commerce is			
2. Level of capability technology infrastructure of commercial and financial institutions to support B2B e-commerce transactions is	1–5	3.31	0.76
3. Level of facilities and sufficiently in electronic payment is	1–5	3.16	0.73
4. Level of quality e-commerce applications and services which are available at increasingly affordable rates is	1–5	2.86	0.96
5. Level of reliability and availability of wireless lines and wireless communication services at affordable rates is	1–5	3.22	0.61
6. Level of sufficiently in the current Internet connection speed for B2B e-commerce transactions is	1–5	2.45	0.76
7. Level of sufficient individual(s) with "expert" knowledge of IT and e-commerce technologies in the labor market is	1–5	3.74	0.77
The following question asks your opinions on the competitive pressure on your organization's move on the Internet			
Competitive Pressure (CP)	1–5	2.24	1.07
1. Our firm is under pressure from competitors to adopt B2B EC systems			
2. It is easy for our customers to switch to another company for similar services/products without much difficulty.	1–5	2.36	0.98
3. The competition among companies in the industry which my company operating in, is very intense	1–5	2.38	1.06
4. An industry move to utilize the B2B E-commerce systems would put pressure on my firm to do the same.	1–5	2.28	0.93
5. Some of our competitors have already started using B2B E-commerce systems.	1–5	2.47	0.99
6. Our competitors know the importance of B2B EC systems and using them for operations.	1–5	2.57	0.98
The following questions ask your perceptions about the influence and pressure of your firm's suppliers to implement B2B EC technologies			
Trading partner pressure (TPP)	1–5	2.80	0.96
1. Our trading partners are demanding the use of B2B EC systems in doing business with them.			
2. Our trading partner is pressuring us to adopt B2B E-commerce	1–5	2.71	0.98
3. Our distant partners' demands for better communications and data interchange are pressuring us to adopt B2B E-commerce systems	1–5	2.60	0.98
4. Our main trading partner decides on the rules and regulations for using B2B EC system in order processing.	1–5	2.00	0.86
5. Our main trading partner decides on what information systems applications are to be exchanged with my firm.	1–5	2.03	0.91
6. We know our partners suppliers and they are ready to do business over the internet	1–5	2.96	0.87
Please rate the degree to which you agree with the following statements about the legal framework for B2B e-commerce			
Legal Infrastructure (LI)	1–5	2.40	0.93
1. Information about electronic commerce laws and regulations is sufficient.			
2. There is adequate legal protection for Internet buying and selling.	1–5	2.30	0.88
3. Information about e-commerce privacy and data protection law are sufficient.	1–5	2.14	0.91
4. Information about consumer protection and conflict resolution is sufficient.	1–5	2.16	0.90
5. In general, we receive enough information about e-commerce laws and regulations from the government and chamber of commerce.	1–5	2.18	0.93
Please rate the degree to which you agree with the following statements about the government support for B2B E-commerce			
Government Support (GS)	1–5	2.58	1.08
1. Government provides necessary and sufficient support to implement and use of B2B EC for our organization.			
2. Government has provided guarantees for organizations for use B2B E-commerce.	1–5	2.52	1.05
3. Government has provided adequate consulting services for use B2B EC for organizations.	1–5	2.47	1.07
4. Government has provided various educational services to train staff in the use of B2B EC for organizations.	1–5	2.43	1.03
5. Government has provided adequate financial assistance to implement and use B2B EC for organizations.	1–5	2.55	1.05

(Continued)

(Continued).

Please rate the degree to which your organization emphasizes with the following statements about the employee orientation			Scale	Mean	SD.
Employee Orientation (EO)			1-5	2.86	1.14
1.	promoting feeling-sharing among employees		1-5	2.38	1.05
2.	emphasizing team building		1-5	2.95	0.91
3.	encouraging cooperation		1-5	3.10	0.87
4.	Trusting in employees		1-5	3.13	0.89
5.	Fertilizing cooperative spirit		1-5	3.07	0.98
6.	Concerning for the individual development of employees		1-5	3.03	0.97
7.	Consideration among employees		1-5	2.56	0.95
8.	Caring about opinions from employees		1-5	3.38	0.90
Please rate the degree to which your organization emphasizes with the following statements about the customer focus			Scale	Mean	SD.
Customer Focus (CF)			1-5	3.38	0.90
1.	Satisfying the need of customers at the largest scale		1-5	3.41	0.98
2.	Sincere customer service		1-5	3.29	1.01
3.	Customer is number 1		1-5	3.35	0.92
4.	Providing first class service to customers		1-5	3.35	0.92
5.	The profit of customer is emphasized extremely		1-5	3.56	0.94
Please rate the degree to which your organization emphasizes with the following statements about the Innovativeness			Scale	Mean	SD.
Innovativeness (Inn)			1-5	2.49	1.09
1.	Developing new products and services continuously		1-5	2.51	1.03
2.	Ready to accept new changes		1-5	2.56	0.99
3.	Adopting high-tech bravely		1-5	2.53	1.05
4.	Encouraging innovation		1-5	2.53	1.05
Please rate the degree to which your organization emphasizes with the following statements about the systematic management and control			Scale	Mean	SD.
systematic management and control (SMC)			1-5	3.75	0.94
1.	Keeping strictly working disciplines		1-5	3.90	0.93
2.	Formal procedures generally govern what people do		1-5	3.76	0.96
3.	Having a clear standard on praise and punishment		1-5	3.65	0.88
4.	Possessing a comprehensive system and regulations		1-5	3.80	0.86
5.	Setting a clarity goals for employees		1-5	3.80	0.86
Please rate the degree to which your organization emphasizes with the following statements about the Social Responsibility			Scale	Mean	SD.
Social Responsibility (SR)			1-5	3.28	0.82
1.	Showing social responsibility		1-5	3.66	0.75
2.	The mission of the firm is to serve		1-5	3.17	0.83
3.	Emphasizing on economic as well as social profits		1-5	3.17	0.83

Appendix 2. Combined and cross-loadings for first-order constructs

Items	loadings	Items	Loadings	Items	Loadings
PRA1	0.81	COA1	0.81	TMS1	0.80
PRA2	0.77	COA2	0.85	TMS2	0.83
PRA3	0.80	COA3	0.80	TMS3	0.80
PRA4	0.66	COA4	0.80	TMS4	0.81
PRA5	0.75	COA5	0.74	TMS5	0.83
PRA6	0.71	COA6	0.86		
PRA7	0.76				
PRA8	0.77				
PRA9	0.87				
ITI1	0.70	CP1	0.79	TPP1	0.80
ITI2	0.64	CP2	0.78	TPP2	0.74
ITI3	0.65	CP3	0.68	TPP3	0.75
ITI4	0.81	CP4	0.67	TPP4	0.81
ITI5	0.74	CP5	0.76	TPP5	0.80
ITI6	0.73	CP6	0.76	TPP6	0.79
ITI7	0.77				
LI1	0.72	GS1	0.74		
LI2	0.81	GS2	0.83		
LI3	0.84	GS3	0.67		
LI4	0.80	GS4	0.79		
LI5	0.79	GS5	0.81		
EO1	0.86	CF1	0.76	INO1	0.83
EO2	0.86	CF2	0.78	INO2	0.90
EO3	0.80	CF3	0.79	INO3	0.80
EO4	0.77	CF4	0.74	INO4	0.86
EO5	0.80	CF5	0.76		
EO6	0.81				
EO7	0.83				
EO8	0.84				
SMC1	0.72	SR1	0.80		
SMC2	0.72	SR2	0.42		
SMC3	0.70	SR3	0.81		
SMC4	0.63				
SMC5	0.49				