A path analytic model and measurement of the business value of e-government: An international perspective

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ABSTRACT

The paper tests a model of measuring the business value of e-government. It provides results of its application to business firms operating in Dubai and using its government electronic services (e-government). The dimensions of the e-government business value model include information technology (IT) capability, search and transaction-oriented uses of e-government, intelligence generation, new business development, time savings, and firm profitability. The dimensions of e-government use and e-government benefits on firms’ profitability are tested. The study uses self-reported data and is based on a sample of 1859 firms operating in Dubai. Using LISREL, we employed confirmatory factor analysis to assess the factor structure of each of our latent constructs. Path analysis with composite variables is used to test the hypothesized relationships among the constructs. Several rival path models are tested by comparing the goodness-of-fit of each. The results confirm that firm’s IT capabilities are positively and directly associated with the use of e-government services, enhanced firm intelligence generation, and firm profitability. IT capabilities are also associated indirectly with the firm’s time savings from e-government use. Other results show that the use of e-government, search or transaction-oriented, is positively related to enhanced intelligence generation, new business development, and time savings. The paper provides empirical evidence about the positive effect of use of e-government services on the performance of firms. Results also support the positive effect of new business generated from e-government use and time savings. The relationship between use of e-government and profitability is also mediated by other variables. In general, mean scores show that the average level of use of e-government in our sample was still low. The study strongly implies that firms in Dubai should use e-government as an information source to enhance their market intelligence and build revenues. In addition, IT suppliers should emphasize e-government services that link firms to customers and collaborators, and facilitate access to key information resources. Government agencies should emphasize dissemination of e-government information services to improve business performance. The study provides some preliminary evidence about the criteria that businesses use to evaluate their adoption of e-government services. This could be valuable for governments in designing and implementing their e-government services. The findings might have policy implications for the implementation of Dubai e-government services.

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1. Introduction

The considerable success achieved with information and communications technologies within the private sector has influenced various stakeholders (including the government) to link up public sector services with the internet revolution (Barca & Cordella, 2004; Choudrie, Weerakkody, & Jones, 2005; Heeks, 2004; Kenway, 2004; Susman, 2001). E-government refers to government’s use of information technology (IT) applications to enhance the access and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities (McClure, 2000; Symonds, 2000; West, 2004). Governments have evolved from their first tentative steps publishing information online to developing sophisticated interactive and transactional capabilities across a broad range of services (Davison, Wagner, & Ma, 2005; Reddick, 2005). Most state governments today have moved beyond the static informational and bulletin-type web sites to offer a wide range of interactive services. A majority of local governments have also established a web presence and are on their way to providing interactive service delivery capabilities (Norris, Fletcher, & Holden, 2001).
E-government is now a permanent agenda item of local councils in the developed world (Davison et al., 2005; Medjahed, Rezgui, Bouguettaya, & Ouazzani, 2003; Thompson, 2002; Tian & Tianfield, 2003). Most have developed an e-government policy, including the delivery of services electronically. Decision-makers recognize the need to focus on cost reduction and efficiency by analyzing the real needs of citizens and businesses and computerizing simple and frequently used services (Accenture, 2004; Akman, Yazici, Mishra, & Arifoglu, 2005; Chadwick & May, 2003; Foley, 2005; Tung & Rieck, 2005). In general, the move towards the development of an e-government infrastructure highlights the scope for long-term savings and improved service quality levels, which could be achieved by the public sector through electronic delivery of services to its citizenry (Carter & Belanger, 2005; Gilbert, Balestrini, & Littleboy, 2004; Irani, Love, Elliman, Jones, & Themistocleous, 2005). Many policymakers and managers realize the potential of what e-government solutions can provide in terms of cost-cutting (Montagna, 2005; Ni & Ho, 2005; Zhang, Dawes, & Sarkis, 2005). The state and local markets for e-government products and services are expected to expand with a compound annual growth rate of 8% through 2009 and will amount to spending of US$64 billion in 2009 (Ericson, 2004).

E-government technologies can serve a variety of different ends: better delivery of government services to citizens (Choudrie et al., 2005; Navarra & Cornford, 2003), improved interactions with business and industry (Davison et al., 2005; Riemensneider & Mykytyn, 2000; Scavo & Shi, 1999), citizen empowerment through access to information (Marche & McNiven, 2003; Susman, 2001), or more efficient government management (Burn & Robins, 2001; Holiday & Yep, 2005). The resulting benefits can be less corruption (Wong & Welch, 2004), increased transparency (Davison et al., 2005; Slevin, 2000; Wong & Welch, 2004), greater convenience (Carter & Belanger, 2005; Ho, 2002; Morris & Moon, 2005; West, 2004), revenue growth (Irani et al., 2005; Moon, 2002), and/or cost reductions (Carter & Belanger, 2005; Moon & Norris, 2005).

It is important to examine the global scope of e-government (Bertot, McClure, & Owens, 1999; Evans & Yen, 2005; Haldenwang, 2004; Jaeger, 2003). The relative development of these technologies in various countries will have a significant impact on the ability of these governments to function well. Some countries have used their technological and educational abilities to create e-government structures (UNPAN, 2001; World Market Research Center, 2001; Zhang, 2002), while development has been slow in other countries that have the same resources because the citizens do not trust e-government structures (Pollard, 2003; Torres, Pina, & Acerate, 2005). Other developing countries are creating their technology, communication, and education base and will be moving towards an e-government system (Harris, 2001; Ke & Wei, 2004; Margetts & Dunleavy, 2002; Tung & Rieck, 2005).

An example of the potential impact of government electronic services on businesses is Dubai e-government portals, which allow citizens and businesses to access most government services from a single worldwide web site. Through the services, firms handle a variety of transactions, such as permits, licenses, registrations, etc. Additionally, companies and governmental agencies exchange information on many different issues, from employment to financial to trade data. Dubai is using IT to drive efforts both to accelerate decentralized public administration and at the same time to enhance government’s ability to oversee key activities. The concurrent pursuit of these two seemingly paradoxical objectives is, in turn, motivated by an explicit desire to modernize and make more competitive the Dubai economy. As a result, it is enjoying a healthy level of political and financial support. Dubai e-government initiatives can be best understood as vehicles intended to support economic development through an increasingly transparent and decentralized administration while at the same time providing the central government the information and ability to efficiently monitor and potentially steer economic activity at a more abstract level.

Many of these business-to-government interactions involve searching for information, conducting several, if not all, stages of these interactions online. Some of the potential advantages of such online interactions are time savings and, consequently, reduced opportunity costs for firms complying with government. Dubai e-government has reached the fourth stage in the project lifecycle of e-governance, according to the United Nations International Classification. Its ultimate objective is to offer fully integrated services through a single portal. Dubai e-government had reached the transactional stage of the project and is pushing towards the seamless integration stage which signifies total amalgamation between all government departments through the single portal. Dubai e-government went online with just 14 services in October 2001 and today there are close to 600 online services available. Its function is to standardize its contents and link them to the single portal.

Because e-government is still relatively underdeveloped in many Gulf State countries, and other Emirates in the UAE (except for Abu Dhabi), we explore the impact of electronic government on Dubai which currently offers a wide array of governmental e-services to the business public. Our research attempts to explore the strategic impact of e-government on business, particularly small business. We try to empirically address two basic issues: how are firms affected by the development of electronic government? And what is the strategic impact of e-government services on businesses?

Among all the constituencies that are affected by the development of electronic government, businesses represent one constituency that may experience significant benefits (Thompson, Rust, & Rhoda, 2005). In this study, we specifically examine web-based e-government services designed to interface with the business public. The paper is organized as follows: first, we present the conceptual framework of our model about the business value of e-government. Next, we discuss our research method and empirical results. We conclude with a discussion of our results, limitations and implications of our research.

2. Literature review, conceptual foundation, and hypotheses

The importance of e-government practices cannot be overstated, as it focuses the direction of government technology funding for future years (Evans & Yen, 2005). To that end, the goals the President of the United States has set forth for e-government are to increase the ease of access for citizens; to increase efficiency/effectiveness of government; and to increase government responsiveness to citizens (US Government Report, 2002). The United States Government organizes the opportunity categories to serve its citizens in a web-enabled manner into four groups. First is government to citizens. It focuses on the ability of the government and citizen to communicate information to each other in an efficient and electronic manner. Second is government to business. It focuses on the ability to reduce cost and gather better information and allows the government to purchase, pay invoices, and conduct business in a more cost-effective manner. Third is government to government, which strives to improve the efficiency of delivery when transacting information within itself or with other governments (West, 2004). Fourth is intra-government internal efficiency and effectiveness which focuses on delivery systems within the e-government (Marchionini, Samet, & Brandt, 2003; Moon, 2002). The focus in this paper is on search-oriented and transaction-oriented uses
of e-government—the two most meaningful applications of e-government to businesses (Reddick, 2004, 2005; Torres et al., 2005).

E-government is said, at the minimum, to expand and extend the ability of government organizations to serve their constituencies and to promote a host of other, mainly positive, benefits to both government and its citizens (Norris et al., 2001). A more enlightened view has begun in the ranks of government to treat the citizen like a consumer whose transaction satisfaction is important. This change in attitude is actually more efficient for the government, as well as for the citizen, as it allows the government to deal with the citizen one time instead of multiple times and allows the government to process information more efficiently and collect data while doing so. An important byproduct of this efficient transaction is customer/citizen satisfaction (Evans & Yen, 2005; Reddick, 2005).

All of the stated studies on e-government (and the studies that will be referenced in the following sections) are either US, EU, or East Asian based and may not be applicable to other parts of the world due to the existence of social, cultural, and economical differences (Akman et al., 2005; Bertot et al., 1999). Thompson et al. (2005) highlighted that their study was based on a sample of firms from three states of the United States; therefore, their results were limited by the specificity of this geographic context. They suggested that future research should consider the value of e-government in different settings. They proposed and tested a model about the business value of e-government to small firms. They measured two dimensions of e-government use (search-oriented and transaction-oriented), and they tested the effects of three types of e-government benefits on small firms' profitability. Against this backdrop, our study is thus undertaken in Dubai to test an e-government model suggested by Thompson et al. (2005) and to provide important results about its practice in a different setting, an emerging economy (Fig. 1). This research is also pertinent and timely as Dubai Government is aiming to become fully e-enabled by 2007 and beyond (Dubai e-government Report, 2005).

In this section, we find it best if we state study hypotheses as we review most literature and empirical findings on the effect of firm's use of e-government on the four dimensions of firm's IT capability, revenue expansion (intelligence generation and revenue generation), cost reduction (time savings from e-government), and profitability.

### 2.1 Information technology capability and e-government use

Many studies exist that suggest a direct relationship between IT capability and firms’ ability to acquire, deploy and leverage their IT resources to shape and support their business strategies and value chain activities (Choudrie et al., 2005; Reffat, 2003). Thompson et al. (2005) point out that IT capability is an important foundation for e-government use to search for information and conduct electronic transactions. They also add that IT capability provides firms with know-how to redesign their relationship with government and to envision benefits from this change. Studies also suggest that computer experience, company-supported training, and management knowledge improve the effectiveness of computer use and IT applications in small firms (Cragg & King, 1993; DeLone, 1988). In addition, firms' technological readiness (i.e. the level of sophistication of IT use and IT management) has been used to predict electronic data interchange adoption (Iacovou, Benbasat, & Dexter, 1995), and owners’ knowledge of IT has been positively related to the extent of use of e-services (Pollard, 2003). Thomas and Streib (2003) conclude that experienced Internet users will have a positive impact on citizen adoption of e-government. Others point out that IT capability is an important antecedent of organizational participation in business-to-business electronic markets and a significant factor on firms' substantive and procedural knowledge of how to do business online (Grewal, Comer, & Mehta, 2001). As a result of these studies, it is appropriate to state the first two hypotheses.

**H1.** There is a positive relationship between the IT capability of the firm and the firm's use of search-oriented e-government services.

**H2.** There is a positive relationship between the IT capability of the firm and the firm's use transaction-oriented e-government services.

#### 2.2 E-government use and firm’s revenue expansion

Ho (2002) indicates that there is a potential relationship between e-government initiatives and local managerial innovations. In their empirical study of business value of e-government, Thompson et al. (2005) conclude that search-oriented use of e-government is positively related to enhanced intelligence generation, new business development, and time savings. Studies show that the use of e-government services should enhance (positive relationship) the firm’s intelligence generation related issues. Thomas and Streib (2003) conclude that citizens who are able to get information they want over the Internet, have a positive outcome from using the Internet, often use government web sites, feel that interaction has been improved as a result of e-government will have a positive impact on Internet adoption. They also add that one of the most important variables is interaction. It results in improvements in citizen interaction with government because of the IT and Internet. As a result of these studies, it is appropriate to test the third hypothesis.

**H3.** There is a positive relationship between the firm's use of e-government-services (search and transaction) and revenue expansion (intelligence generation and the amount of new businesses generated due to information in governmental web sites).

#### 2.3 E-government use and cost reduction

Many empirical studies of e-government users surveyed reported cost savings from using e-government services due to increased access and convenience (Ancarani, 2005; Rust, Moorman, & Dickson, 2002; Slater & Narver, 2000; Strader & Shaw, 2000). A study by the Australian government (Australian Government Report, 2005) suggests that some firms are also achieving a reduction in the direct cost of the service and the benefits from enhanced service levels represented by improved service quality, reduced turnaround times, and improved access to services and availability of new services. The study found that at least 45% of respondents estimated some level of actual cost savings per interaction using e-government compared to traditional channels. It is suggested
that searching for new business leads on governmental web sites may also lead to time savings because e-government web sites collapse information from many different sources (e.g. different agencies and contractors) into one site, facilitating sales generation. Thompson et al. (2005) suggest that the benefits of e-government services to the business public seem particularly relevant given the significant impact of government on firms' cost structure. Many empirical studies suggest that electronic commerce in general has a direct effect on cost-related factors faced by the firm (de Ruyter, Wetzels, & Kleijnen, 2000; Hazlett & Hill, 2003). These effects relate to decreasing intermediation costs (Fraser, Fraser, & McDonald, 2000), procurement costs (Litan & Rivlin, 2001), search costs (Bakos, 1997), labor and overhead costs (Strader & Shaw, 2000), and firm's overall cost (Thompson et al., 2005). Some stated that the main benefit of e-government use, for both governmental agencies and the public in general is cost efficiency (Edmiston, 2003; Ho, 2002; Jaeger, 2003). Thompson et al. (2005) found that e-government search-oriented use is positively associated with time savings that accrue from interacting with government online. The next hypothesis is related to testing the effect of e-government use and time savings.

H4. There is a positive relationship between the firm's use of e-government services (search and transaction) and cost reductions (the amount of time savings from e-government).

2.4. Information technology capability and firm's intelligence generation

Many studies/reports exist that suggest a relationship between IT capability and firms' intelligence generation. Some argue that e-government could change the paradigm of public service delivery at the local level (Akman et al., 2005; Council for Excellence in Government, 2003; Ho, 2002; Koh & Nam, 2005), indicating a potential relationship between e-government initiatives and local managerial innovations. More specifically, Thompson et al. (2005) conclude that there is a positive direct link between IT capability and firms' intelligence generation. The next hypothesis tests the effect of IT capability and intelligence generation.

H5. There is a positive relationship between the IT capability of the firm and the firm's generation of intelligence.

2.5. Information technology capability and profitability

There are conflicting results on the effect of IT capability and firm's profitability. Many studies/reports suggest a direct relationship between IT capability and firms' profitability (Bharadwaj, 2000; Bharadwaj, Sambamurthy, & Zmud, 2003; Hussin, King, & Cragg, 2002; Lang, 2002; Small Business Association, 2000). Other studies (Tippins & Sohi, 2003) show that organizational learning (i.e. the ability to acquire, disseminate and interpret information) is a missing link in the relationship between IT capability and organizational performance. They suggest that the positive impact of IT on firms' performance cannot be measured directly; firms use their IT capabilities to leverage organizational learning, which, in turn, leads to superior performance. Thompson et al. (2005) support these findings by observing a negative direct link between IT and firms' profitability. We will test this effect in the next hypothesis.

H6. There is a positive relationship between the IT capability of the firm and the firm's profitability.

2.6. Firm's revenue expansion and profitability

Empirical evidence has shown the influence of intelligence generation on organizational performance through several paths: relative product quality, new product success, sales growth, enhanced customer value, improvements in strategy consistency and workability, and ultimately, on superior profitability (Jaworski & Kohli, 1993; Pelham & Wilson, 1996; Slater & Narver, 2000). Studies also suggest that there might be indirect effects of use of e-government and intelligence generation. Thompson et al. (2005) suggest that the association between e-government use and firms' profitability occurs through intelligence generation. However, the relationship between new business development and firms' profitability was not significant. Electronic environments can help firms expand and develop new markets through intelligence generation (Fraser et al., 2000). Slater and Narver (2000) examine four dimensions of business intelligence (market-focused intelligence, intelligence obtained through inter-organizational collaboration, intelligence from experimentation, and intelligence from repetitive experience). They report a positive effect of these dimensions on the performance measures (sales growth, customer satisfaction, product quality, and new product success). Tippins and Sohi (2003) show that organizational learning improves firms' ability to deal with customers and competitors and is positively related to superior profitability. The next hypothesis will attempt to test these findings.

H7. There is a positive relationship between the firm's revenue expansion (business intelligence generation and new business from e-government) and the firm's profitability.

2.7. Firm's revenue expansion and cost reduction

In their empirical study, Thompson et al. (2005) do not find any evidence to suggest any effect of intelligence generation on reducing cost due to time savings. However, they find enough support to suggest a direct relationship between new businesses generated from using e-government and firm's time savings. The next hypothesis will test this effect of revenue expansion on cost reduction.

H8. There is a positive relationship between the firm's revenue expansion (business intelligence generation and new business from e-government) and the firm's cost reduction (time savings due to using e-government).

2.8. Firm's cost reduction and profitability

Time savings for using e-government come in different forms. For example, transaction usage of e-government might lead to reduction of time at government counters and organizations (Janssen, Rotthier, & Snijders, 2004; Kunstelj & Vintar, 2004; Zhang, 2002). Empirical study of business value of e-government in the States could not find any support for a direct relationship between firm's time savings and its profitability (Thompson et al., 2005). It is appropriate to test such relationship.

H9. There is a positive relationship between the amount of time savings in the firm's interactions with government and the firm's profitability.

On the other hand, many suggest that the use of e-government services may improve business profitability directly or indirectly through either revenue expansion or cost reduction. As a result, the business value of e-government services is linked to intelligence generation, new business development and reduction in firms' compliance and opportunity costs (Thompson et al., 2005).
2.9. Business firms in Dubai and the effect of e-government

Since this study is the first empirical study of Dubai e-government, we will also report the means and standard deviations for each construct and item. Identification of the magnitude of the arithmetic means will have direct implications for Dubai e-government authorities, business firms in Dubai using the service, and foreign firms (potential businesses) that are considering Dubai as their future home, and who would like to utilize e-government services. As a word of caution, it should be kept in mind that low arithmetic means (close to 1) are positive (preferable), while high scores (close to 5) are negative (not preferable). We also asked respondents other simple questions to better understand the nature of their use of Dubai e-government.

3. Study methods

3.1. Sampling and data collection procedures

We (a team of student assistant researchers) acquired a list of firms from a commercial database (the Dubai Commercial Directory 2004–2005, issued by the Dubai Chambers of Commerce and Industry). The database contains all business establishments registered in Dubai. We called by phone a total of 19,467 companies selected randomly across all industrial classifications (this process took about 4 months). We needed to know first weather they have used the e-government features available in Dubai. From the list of companies called, a total of 4774 companies responded positively (24.53% of companies contacted). Another call was made few days later where we requested to talk to the person in charge to solicit his/her participation in the study. A total of 4110 companies accepted our invitation (86.09% of the companies who responded positively to our call). We sent to these companies questionnaires personally addressed to the top executive (by post or by e-mail). The questionnaire asked respondents to focus on their firms’ online interactions with Dubai government in the last 12 months. We received 1859 complete questionnaires (45.23% of those companies that accepted our invitation). Characteristics of respondents show that about 76% of firms employed less than 20 employees, 17% employed between 21 and 50 employees, while only 7% employed more than 50 employees. Participants belonged to different business and industrial categories (more than 85 categories). The major business categories were machinery and equipment, software, food industry, petroleum, clothing, consumer brands, technology industries, energy and utilities, telecommunications, automotive, healthcare, transport and logistics, retail and distribution, metal and mining, media, real estate, and banks. The average total annual sales of participating firms were US$345,000 and ranged from US$100,000 to more than US$12,000,000. The mean number of years of firms being in business was 6.9 years and ranged from 1 to 25 years.

3.2. Development of measures

For each scale, we computed its psychometric properties ($\chi^2$, comparative fit index (CFI), root mean square error of approximation (RMSEA), and Cronbach $\alpha$). These properties are suggested by many scholars to evaluate and test how good a scale construct is (Bentler & Wu, 1993; Bollen, 1989; Hair, Anderson, Tatham, & Black, 1998). For each construct, items, means, and standard deviations are provided in Appendix.

3.2.1. IT capability

IT capability scale is taken from previous research (Grewal et al., 2001; Thompson et al., 2005). The questions asked respondents to rate the degree to which they agree with each statements about their own firm, using a five-point Likert scale (ranging from strongly disagree (5) to strongly agree (1)).

3.2.2. E-government use

Direct measure of e-government use scales were borrowed from (Thompson et al., 2005). The scales were slightly modified for this study to be more appropriate for the environment of the study. For example, there are no taxes in Dubai; but instead there are government duties, fees, and customs. In addition, we deleted one item dealing with leases since it is not available in Dubai. We conducted an extensive interview with some e-government authorities (developers) in Dubai and some business firm executives using the services and some personnel in leading IT companies in Dubai. The scales were also used by others (Thompson et al., 2005). As a result, we identified eight categories of transaction-oriented use, in which firms interact with government to comply with regulations, submit requested information, or apply for specific governmental services. We also obtained nine categories of search-oriented use, in which firms use governmental web sites to search for information. A five-point Likert scale, ranging from never (5) to very often (1) is used to assess frequency of use.

3.2.3. Intelligence generation

The intelligence generation factor of the revenue expansion model is measured using the scale developed by Slater and Narver (2000) and used by Thompson et al. (2005) in their empirical study. A total of 10 items are used. A five-point Likert scale, ranging from never (5) to consistently (1) is used to assess frequency using e-government services to perform some activities related to intelligence generation.

3.2.4. New business development

New business development from use of e-government was measured using a scale developed by (Thompson et al., 2005) and used by others (Thompson et al., 2005). The four-item Likert scale asked respondents to rate the degree to which they agree with each statement. A five-point scale ranging from strongly disagree (5) to strongly agree (1) is used.

3.2.5. Cost reduction (time savings)

A scale developed by Thompson et al. (2005), time savings from use of e-government was measured by asking respondents to rate the extent to which their firms have saved time by using e-government services in five dimensions of interactions with government—strongly disagree (5) to strongly agree (1).

3.2.6. Firms’ profitability

Many authors reported significant positive correlations between subjective assessments of sales, ROA and return on sales and their respective objective values (Harris, 2001; Robinson & Pearce, 1988). Firms’ profitability was measured as the average of three items relative to firms’ stated objectives (five-point scale, ranging from worse (5) to better (1)): return on investments (ROI), return on assets (ROA) and cash flow from operations (Moorman & Rust, 1999; Pelham & Wilson, 1996; Thompson et al., 2005). In addition to subjective monetary measures, we also included some other non-monetary subjective measures. Many empirical quality-related studies have included other subjective items to measure business results (Badri et al., 2006; Baldrige National Quality Program, 2005). These items include customer satisfaction, overall performance...
compared to competition, and performance compared to the time before the introduction of Dubai e-government.

3.3. Effect of variables outside the structural model

We measured several control variables related to firms’ characteristics (e.g., size, age, relative selling prices, and operating costs) and market-level factors (Thompson et al., 2005). It is necessary to do so to investigate the effect of variables outside the structural model (Thompson et al., 2005). As a result, a linear regression of firms’ profitability on a set of control variables will be performed to investigate the effect of these variables outside the structural model. The market-level control variables used in this study are market dynamism, competitive intensity, service orientation, and number of employees. Market dynamism is modeled as the average of four variables (seven-point Likert scale): velocity (pace of opportunity flow in a given market); complexity (difficulty of capturing opportunities); ambiguity (the degree to which the key features of the environment are difficult to understand); and entropy (degree of unpredictability in the features of opportunity flow over time) (Davis & Eisenhardt, 2004). Competitive intensity refers to the degree of competition in the industry as perceived by competitors themselves (seven-point Likert scale) (Barnett, 1997). Service orientation is modeled as the average of three variables (seven-point Likert scale): “listening to and understanding the customer”, “anticipating customer needs”, and “giving high priority to customer satisfaction” (Humborg, Hoyer, & Fassnacht, 2002).

3.4. Analysis

A linear regression of firms’ profitability on a set of control variables was performed to investigate the effect of variables outside the structural model (service orientation, competitive intensity, number of employees, and market dynamism) that might affect firms’ profitability. The effects of these four variables were statistically partialled from the data to remove their influence from the entire system of variables. Table 1 provides some initial results obtained by our study. We note that all four variables, service orientation, competitive intensity, number of employees, and market dynamism, have significant relationships with profitability (it should be noted that in Thompson et al.’s (2005) study, number of employees and market dynamism had a marginally significant relationship with profitability).

Path analysis (McDonald, 1996) is utilized to test of causal relationships hypothesized using LISREL (Jöreskog & Sörbom, 1989). Our objective was to form composites for each construct by reducing the total number of parameters to be estimated. As a result, we captured the essence of the underlying meaning of each construct (Bagozzi & Heatherton, 1994; Thompson et al., 2005). Other researchers tested several models with different construct links (Bharadwaj, 2000; Bharadwaj, Bharadwaj, & Konsynsk, Thompson et al., 2005; Tippins & Sohi, 2003). We also tested several models in which we used several scenarios with regard to the nature of links between the dimensions of IT capability, e-government use (transaction and search-oriented use), revenue expansion (intelligence generation and new business development), cost reduction (time savings), and firms’ profitability. Some models were fully restrictive while others were less restrictive on the nature of direct and indirect effects of constructs on each other. We used the maximum likelihood method to compute the goodness-of-fit of models tested.

3.5. Confirmatory factor analysis

We used LISREL and employed confirmatory factor analysis (CFA) to assess the factor structure of each of our latent constructs. Unlike the study of Thompson et al. (2005), our results indicated adequate levels of fit for all constructs used in the model. Analysis of IT capability, e-government use, new business development, time savings, and intelligence generation provided acceptable results with regard to goodness-of-fit indices. Cronbach’s α ranged from 0.82 (e-government transaction-oriented use) to 0.94 (firm’s profitability) which are above the minimum of 0.70 suggested by Nunnally and Bernstein (1994).

It should be noted that Thompson et al. (2005) used three items subjective monetary measures for profitability; as a result, they could not estimate CFA indices. The convergent validity of the two dimensions of e-government use was assessed by the overall goodness-of-fit and variable loadings of a two-factor model. The scale seems to capture the latent factor well since the loadings of the items were high. The final results from the CFA for the two-factor e-government use model indicated adequate goodness-of-fit. Correlations among the constructs did not suggest problems of discriminant validity.

4. Results

Compared to all models tested, the model shown in Fig. 2 provides the best representation of the effects of Dubai e-government use (Chi-square or $\chi^2=10.27$; $p=0.056$; CFI=0.98; and RMSE=0.049). It meets joint cut off criteria suggested by Hu and Bentler (1999). Since our model of e-government use is a slight modification of the Thompson et al. (2005) model, it is appropriate to point out the related results for each hypothesis of their study too.

4.1. IT capability and e-government use

As seen in Fig. 2, firms’ IT capability has a positive and significant association with both the search-oriented use of e-government ($\beta=0.428$, $p=0.000$) and the transaction-oriented e-government ($\beta=0.314$, $p=0.009$) as hypothesized by the first and second hypotheses. Thus, H1 and H2 are supported. Thompson et al. (2005) failed to realize significant association between firm’s IT capability and its transaction-oriented use of e-government.

4.2. E-government use and revenue expansion

The search-oriented use dimension of e-government use has a positive significant relationship with both intelligence generation ($\beta=0.493$, $p=0.000$) and new business generated from e-government ($\beta=0.542$, $p=0.000$). However, there is no evidence for significant effect of the transaction-oriented dimension of e-government on either of the two factors comprising revenue expansion. Therefore, H3 is partially supported.

4.3. E-government use and cost reduction

Both the search-oriented use and the transaction-use of e-government have positive and significant relationships with cost reduction due to time savings realized by such uses ($\beta=0.607$, $p=0.000$ and $\beta=0.303$, $p=0.037$, respectively). Thus, H4 is fully

| Table 1: Regression analysis where the dependent variable is firm's profitability |
|----------------------------------|----------------|----------------|----------------|----------------|
| Service orientation | Competitive intensity | No. of employees | Market dynamism |
| $\beta$ | $-0.426$ | $-0.495$ | $-0.481$ |
| $t$ | $-3.88$ | $-3.81$ | $-3.86$ |
| $p$ | 0.001 | 0.003 | 0.006 | 0.004 |
supported. Thompson et al. (2005) failed to realize significant association between the transactions-oriented use of e-government and time savings.

4.4. Information technology capability and firm’s intelligence generation

Consistent with Thompson et al. (2005) findings, the firm’s IT capability has positive and significant association with intelligence generation ($\beta=0.446, p=0.000$). Thus, H5 is supported.

4.5. Information technology capability and firm’s profitability

Unlike Thompson et al.’s (2005) findings, we found that IT capabilities of the firm do have some positive and significant relationship with firm’s profitability ($\beta=0.251, p=0.028$). Thus, H6 is supported.

4.6. Revenue expansion and profitability

Intelligence generation has positive and significant effect on profitability ($\beta=0.406, p=0.000$). Similarly, new business from e-government also has a positive significant relationship with profitability ($\beta=0.404, p=0.000$). Therefore, H7 is supported. Our results also support the indirect effect of e-government use (weather search and the transaction) through revenue expansion on profitability.

4.7. Revenue expansion and cost reduction

As shown in Fig. 2, our analysis realized significant relationships between intelligence generation and new business development, and time savings. As a result, H8 is supported. Thompson et al. (2005) also found positive and significant association between new business development and time savings.

4.8. Time savings from e-government and profitability

Unlike the findings of Thompson et al. (2005), we show evidence of a relationship between time savings from e-government use and firms’ profitability ($\beta=0.262, p=0.047$). Hence, H9 is supported.

4.9. Descriptive findings of business results of Dubai e-government

Descriptive statistics (means and standard deviations) of respondents’ opinions are provided in Appendix. Results show that on average, firms that use Dubai e-government services enjoy acceptable levels of IT readiness and capability (average of 2.14). Even though, most items related to the search-oriented use of Dubai e-government are popular amongst firms in Dubai, there are several items that respondent’s felt were not adequately addressed by Dubai e-government, “online courses/classes”, “financing programs”, “labor market information”, “marketing opportunities”, and “business mentoring/coaching” with averages of 4.36, 4.17, 4.03, 3.95, and 3.88, respectively. In addition, firms in Dubai feel that two specific items related to transaction-oriented are also not utilized, “requesting government loans” with mean of 4.66, and “biding on contracting opportunities” with mean of 3.89. Averages of items on both revenue expansion factors of intelligence generation and new business development are indicative of the fact that Dubai e-government is in its infancy and more efforts are needed to develop it. All items on the new business development dimension have high average scores (above 4.0), which is indicative of the fact of they need to be taken seriously in the efforts for fully developing the Dubai e-government system. On the intelligence generation dimension, many important aspects have scores above the mid point of 2.5 (8 out of 10 items). The four items that are mostly not utilized are “developing information-sharing relationships”, “allocating resources to identifying and understanding new marketing opportunities”, “tracking and analyzing competitors’ actions”, and “entering into joint ventures and alliances” with averages of 3.51, 3.27, 3.22, and 2.99, respectively. The items related to time savings as a result of using Dubai e-government enjoy acceptable average scores (all below 2.5). However, items of the profitability dimension show unfavorable results (with the best being only 2.82). These high scores reflect that firms do not feel that e-government is helping them realize their full profitability potential.

5. Discussion

The model posed allows us to analyze and better understand the dimensions and determinants of the business value of e-government for firms using it, and how they contribute to its...
profitability. In general terms, the results indicate support for the relationship between firm’s IT capability, e-government use, revenue expansion, cost reduction, and profitability.

Our findings confirm previous studies that firm’s IT capability support business activities (Thompson et al., 2005). Firms’ IT capability provide basic infrastructure where firms use e-government services to search for information or to perform transactions depend on. Positive relationships between IT capability and e-government use mean that firms with higher IT capability have a higher usage of e-government services. Our study provides additional support that the foundation of all e-government readiness is based on IT capability.

Results also indicate that IT capability has positive effect on intelligence generation. Firms with better knowledge and technological capabilities could present key opportunities for firms to be more innovative in capitalizing on this service, and improving their organizational learning. Results also reflect the fact that governments face greater pressure to provide higher quality services directly to citizens in innovative ways (Hazlett & Hill, 2003).

We also found a positive link between IT capability and firm profitability. We provide evidence that IT capability positively affects profitability directly and indirectly (through other variables) depending on how IT is utilized to leverage organizational learning. Our result does not support other findings that the effect is indirect only (Thompson et al., 2005; Tippins & Sohi, 2003). One reason for this variation might be that previous studies concentrated only on small firms in developed countries. This variation might provide additional incentive to replicate such studies in other environmental settings.

Our findings indicate that only search-oriented use of e-government is positively associated with intelligence generation, new business development, and time savings. This finding reflects that firms using e-government services effectively could gain some strategic benefits.

Fig. 2 also shows that search-oriented use of e-government also affects profitability indirectly through intelligence generation. This result supports other findings that improvements in the firm's ability to generate market-focused intelligence by searching effectively for information about customers, competitors and industry, potential business partners, external leveraging, and inter-organizational learning (Thompson et al., 2005). Our results also confirm that effective search-oriented uses of e-government could provide firms with the opportunity of gaining more time savings which is an aspect of cost reduction.

Unlike the study conducted by Thompson et al. (2005), our findings show significant effects of time savings on firms’ profitability. Results demonstrate that both revenue expansion (intelligence generation and new businesses) and cost reduction (time savings) have strong positive effects on firm performance and profitability. Again, the reason of such variation might be due to our sample, and due to using both subjective financial and non-financial measures in the profitability scale.

6. Implications and conclusions

The differences between some of our findings and other empirical studies with regard to the effects of IT on the e-government transaction-oriented uses and on the firms’ profitability might suggest the need for more empirical research that would focus on small, medium, and large organizations. Future research should also try to focus on other categorization of business (i.e., business type or industry).

Our results suggest, the strategic value of IT is related to how companies use their IT capabilities to generate knowledge, develop new businesses, and save time. New empirical evidence is needed to test these relationships and test other indirect effects. In addition, the future research might attempt to use “performance or results” rather than “profitability” as an outcome. Such consideration might allow researchers to model “performance or results” as multi-factored construct containing both quantitative and subjective data. As Thompson et al. (2005) suggest, the relationship between IT capability and profitability might be better explained if the measures of actual use of IT, rather than investments in IT are used. Our study used self-reported data to test our hypotheses. Future research might assess the impact of e-government on objective performance indicators. It will be also helpful if future studies could test and refine the model framework to better understand the business value of e-government projects.

Our study contributes to e-government research by modifying and testing a previously proposed model of government-to-business relationships. The study supports the call made by the authors of the original model and other authors that additional empirical researches in different settings and environments are needed to better understand and measure the business value of e-government services.

In summary, results show that strategic advancements of Dubai e-government are helping firms to conduct more electronic business to government interactions and obtain significant improvements in performance through both revenue expansion and cost reduction. An implication for Dubai e-government authorities should be to develop their system to result in shorter administrative turnaround times for administrative processes and inquiries.

A key finding in this study is the support that IT capability is an ability driver for firms to effectively use and utilize e-government services. It might be worthwhile for Dubai e-government to perform its own survey to better understand the IT readiness of business and industry firms in Dubai. An important issue to be considered is firm’s willingness to use technology, which Parasuraman (2000) terms “technology readiness”. For e-government readiness, Jutla, Bodorik, and Dhaliwal (2002) suggest six categories of e-business readiness metrics and measures to be used for assessing how a country is performing in terms of providing a positive e-business readiness climate. Education and training are essential to ensure that citizens have the necessary digital literacy to be able to take full advantage of the services offered by e-government (Deloitte Research, 2003; Gil-Garcia & Pardo, 2005; Moon & Norris, 2005; Norris & Moon, 2005; Reddick, 2004). Dubai e-government authorities should realize that one of the main purposes behind the introduction of e-government services is to facilitate firms to increase their IT sophistication; and hence, to provide them with a higher level of convenience in their interaction with government.

Our results reflect the role of government in general, in promoting organizational learning in the business community. They play an active role on making firms well educated in their ability to improve their performance and sustain their competitive advantage. Dubai e-government could play a vital role to induce organizational learning by providing total and integrative search- and transaction-oriented services.

Even though, there are many studies that suggest how e-government reduces cost for governmental agencies (Evans & Yen, 2005; Input, 2002; Lee, Tan, & Trimi, 2005; West, 2002), our research also relates to the issue of the direct impact of e-government use on firms’ cost reductions strategies. In addition, search-oriented uses affect cost reductions indirectly also through developing new business. In addition to reducing costs, e-government use could expand revenue also through intelligence generation and new business development. Business firms should not overlook the impact of e-government use on revenue and cost.
Thus, the Dubai e-government authorities are in the position to rigorously campaign the perceived benefits (and cost savings) from the adoption of e-government services to potential firms in Dubai. Receptivity towards e-government services comes about when the new system is perceived as more beneficial than the paper-based system it supersedes, hence offering relative advantage to potential organizations.

Our study investigated the robustness of Thompson et al.’s (2005) finding that e-government services were linked to better profitability primarily through revenue gains, via intelligence generation only. Our results of larger business firms suggest that e-government services were also linked to better profitability via developing new business too. As a result, the benefits from e-government services result from firm’s ability to expand business (Thompson et al., 2005), and its ability to increase efficiency. Hence, an important implication arises for business users in Dubai of e-government services. They should consider e-government services as a revenue expansion tool as well as a cost reduction opportunity.

An implication for Dubai e-government suppliers is that they should develop their web sites in an integrative way to help business firms compete in the market based on revenue and cost. Vital determinants of e-government uses include business perceptions of response times, navigability of the web site, download time, fulfillment of service promised, timely updating of information; site effectiveness and functionality (Al-Kibsi, Boer, Moursched, & Rea, 2001; Layne & Lee, 2001; Ma, Chung, & Thorson, 2005; Saxena, 2005; Stowers, 1999).

If the strategic plan of Dubai e-government calls for enhancing the economic performance of the private sector, then it should provide business-centered services that collect information regularly on business expectations and perceptions with regard to e-government services.

For Dubai e-government, future research might compare the differences in perceptions of citizens who use government web sites to private sector web site users. Are there public perceptions of quality differences between these two sectors? Another area of future research would be to conduct a focus group asking e-citizens if a particular government has supplied what they were demanding, which would allude to connections between supply and demand for e-government. In addition, Zemke and Connellan (2001) point out that “e-service masters” in the private sector not only learn from their customers, they also synthesize their understanding of customers’ wants, needs, and expectations into unique, clever, and sometimes highly innovative solutions. Therefore, those responsible for creating and providing e-government services in Dubai should be familiar with best practice in the private sector, not least because this will inform the citizen’s expectations of electronic public services. In this context, developing e-government services may function as an indirect way to improve business performance (Thompson et al., 2005).

More specifically for Dubai e-government authorities, the average level of use of e-government in our sample was still low. Such unfavorable mean scores of many items in our model lead us to believe that it is essential for Dubai e-government authorities to regularly investigate what kinds of factors influence consumer attitudes and behaviors towards e-services they provide. They face several other challenges in their transition towards total e-government services. These challenges include security, accessibility, coordination and collaboration, and citizen awareness and confidence. Many authors suggest that educating citizens about e-government and raising their confidence about the quality of these services is a challenge that should be addressed seriously before designing and planning e-government services (Fang, 2002; Margaretts & Dunleavy, 2002; Reffat, 2003; West, 2004).

To better address issues, we asked respondents several other questions. Overall, users think e-government makes it easier to stay informed. Not as many agree that it makes transactions easier, but this might be partially due to current experience levels. Fewer businesses have used transactional services search oriented ones; and thus, more efforts are needed on developing more user-friendly transactional services. Interestingly though, satisfaction with e-government is higher among users who have used it for transactional purposes than among those who have used it for information alone. The point here might be that exposure to e-government is very important. Dubai Government has a job to do in educating its citizens about their offerings. As an example, when we first contacted the firms to participate in our study about the development of e-government in Dubai, about (73%) of those contacted declined to participate as they did not feel qualified to discuss Dubai e-government services. Thus, Dubai e-government authorities have to promote its services aggressively. It has to invest more strongly in building its marketing competency.

Nevertheless, for Dubai e-government, our findings are encouraging, as they support the governments’ motives for introducing e-government services and provide a good reason for increasing the provision of additional and improved e-government services. The study provides some preliminary evidence about the criteria that businesses use to evaluate their adoption of e-government services. This could be valuable for governments in designing and implementing their e-government services. The findings might have policy implications for the implementation of Dubai e-government services. Understanding adoption factors can extend their knowledge of users’ decision-making and lead to better strategies. Our research provides a starting point for government seeking ways to improve citizens’ acceptance of e-government services.

Appendix. Constructs, items, and the corresponding means and standard deviations

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT capability construct</td>
<td>2.14</td>
<td>1.13</td>
</tr>
<tr>
<td>Has strong IT planning capabilities</td>
<td>2.15</td>
<td>1.15</td>
</tr>
<tr>
<td>Has strong technical support staff</td>
<td>2.11</td>
<td>1.12</td>
</tr>
<tr>
<td>Has an understanding of possible benefits of IT applications</td>
<td>2.12</td>
<td>1.23</td>
</tr>
<tr>
<td>Has adequate knowledge about information technology</td>
<td>2.17</td>
<td>1.21</td>
</tr>
<tr>
<td>Is experienced with IT</td>
<td>2.12</td>
<td>1.16</td>
</tr>
<tr>
<td>Gives high importance to strategic use of IT</td>
<td>2.14</td>
<td>1.17</td>
</tr>
<tr>
<td>E-government transaction-oriented use</td>
<td>2.41</td>
<td>1.11</td>
</tr>
<tr>
<td>Obtain/renew professional licenses</td>
<td>2.15</td>
<td>1.16</td>
</tr>
<tr>
<td>Obtain/renew business licenses</td>
<td>2.15</td>
<td>1.07</td>
</tr>
<tr>
<td>Obtain/renew permits and registrations</td>
<td>2.13</td>
<td>1.09</td>
</tr>
<tr>
<td>Pay fines</td>
<td>1.13</td>
<td>0.95</td>
</tr>
<tr>
<td>File and pay government fees/customs/duties</td>
<td>2.22</td>
<td>1.21</td>
</tr>
<tr>
<td>Bid on contracting opportunities</td>
<td>3.89</td>
<td>1.35</td>
</tr>
<tr>
<td>Submit required government reports</td>
<td>2.16</td>
<td>1.14</td>
</tr>
<tr>
<td>Request a government loan</td>
<td>4.66</td>
<td>1.21</td>
</tr>
<tr>
<td>E-government search-oriented use</td>
<td>3.20</td>
<td>1.22</td>
</tr>
<tr>
<td>Trade publications, statistics, taxes, online libraries, laws and regulations, international trade and economic/industry reports</td>
<td>2.07</td>
<td>1.11</td>
</tr>
<tr>
<td>Business location (infrastructure and other resources available in a specific region)</td>
<td>2.43</td>
<td>1.14</td>
</tr>
<tr>
<td>Assistance on complying with local, state and federal regulations (licenses, permits and registrations, international trade, etc.)</td>
<td>1.47</td>
<td>0.08</td>
</tr>
<tr>
<td>Business mentoring/coaching (assistance in starting and expanding the business, training, and counseling in business matters)</td>
<td>3.88</td>
<td>1.13</td>
</tr>
<tr>
<td>Financing programs</td>
<td>4.17</td>
<td>1.32</td>
</tr>
<tr>
<td>Technological assistance and training programs (searching for technology/product development partnerships, etc.)</td>
<td>2.45</td>
<td>1.13</td>
</tr>
</tbody>
</table>
Appendix. (Continued)

<table>
<thead>
<tr>
<th>Constructs and courses</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online classes/courses</td>
<td>4.36</td>
<td>1.36</td>
</tr>
<tr>
<td>Marketing opportunities such as business online networks/contractors lists</td>
<td>3.95</td>
<td>1.21</td>
</tr>
<tr>
<td>Labor market information (submitting job orders, searching for qualified applicants)</td>
<td>4.03</td>
<td>1.24</td>
</tr>
<tr>
<td>Intelligible generation</td>
<td>2.89</td>
<td>1.15</td>
</tr>
<tr>
<td>Benchmarks key processes for improving customer satisfaction</td>
<td>2.64</td>
<td>1.14</td>
</tr>
<tr>
<td>Tracks and analyzes competitor actions</td>
<td>3.22</td>
<td>1.12</td>
</tr>
<tr>
<td>Allocates resources to identifying and understanding new market opportunities</td>
<td>2.99</td>
<td>1.25</td>
</tr>
<tr>
<td>Attempts to develop new ways of looking at customers and their needs</td>
<td>2.61</td>
<td>1.21</td>
</tr>
<tr>
<td>Systematically collects information about customer needs</td>
<td>2.94</td>
<td>1.22</td>
</tr>
<tr>
<td>Sends employees to seminars or short courses to bring back old ideas to the organization</td>
<td>2.14</td>
<td>1.24</td>
</tr>
<tr>
<td>Benchmarks key operating processes</td>
<td>2.63</td>
<td>1.16</td>
</tr>
<tr>
<td>Arranges seminars and classes to educate employees about important concepts and processes</td>
<td>2.12</td>
<td>1.11</td>
</tr>
<tr>
<td>Enters into joint ventures and alliances</td>
<td>3.27</td>
<td>1.07</td>
</tr>
<tr>
<td>Develops information-sharing relationships</td>
<td>3.51</td>
<td>1.03</td>
</tr>
</tbody>
</table>

New business development

| New business development                                                                 | 4.28 | 1.15               |
| We have sold to customers whose contact information was found through buyer-supplier lists posted in governmental web sites | 4.22 | 1.23               |
| We have closed business contracts whose leads were found searching governmental web sites | 4.35 | 1.25               |
| We have developed sales that were initiated through information available in governmental web sites | 4.16 | 1.22               |
| We have identified new business partners through information in government web sites | 4.40 | 1.26               |

Time savings resulting from using Dubai e-government services

| Time savings resulting from using Dubai e-government services                         | 1.15 | 0.77               |
| Searching for general business information (laws and regulations, financial, market, and technology information) on governmental web sites | 2.45 | 1.06               |
| Locating governmental agencies, forms, and applications using governmental web sites   | 1.33 | 1.13               |
| Filling out forms and submitting information online through governmental web sites    | 1.18 | 0.08               |
| Conducting the actual transactions with government online                              | 1.23 | 0.09               |

Profitability measures—how the firm is performing relative to its stated objectives

| Profitability measures—how the firm is performing relative to its stated objectives     | 3.32 | 1.21               |
| Return on investments                                                                  | 3.84 | 1.14               |
| Return on assets                                                                       | 3.66 | 1.12               |
| Cash flow from operations                                                               | 3.82 | 1.22               |
| Customer satisfaction                                                                  | 2.78 | 1.15               |
| Overall performance compared to competition                                            | 2.82 | 1.15               |
| Overall performance compared to the time before using Dubai e-government                | 2.99 | 1.23               |

References


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