Intermediary Effects of knowledge Management Strategy and Learning Orientation on Strategic Alignment and Firm Performance

2 authors:

Ra'ed (Moh'd Taisir) Masa'deh
University of Jordan, Aqaba, Jordan

Rifat O. Shannak
University of Jordan

Research Journal of International Studies
ISSN: 1453-212X Issue 24 (2012)

http://www.eurojournals.com/international_studies.htm

Intermediary Effects of knowledge Management Strategy and Learning Orientation on Strategic Alignment and Firm Performance

Ra'ed (Moh'd Taisir) Masa'deh
Assistant Professor of Management Information Systems
Faculty of Business, the University of Jordan, Amman, Jordan
E: mail r.masadeh@ju.edu.jo

Rifat O. Shannak
Associate Professor of Management Information Systems
Faculty of Business, University of Jordan, Amman, Jordan
E: mail rshannak@ju.edu.jo

Abstract

Prior research has attributed the lack of direct impact of IT investment on firm performance to knowledge management (KM) strategy and learning orientation. In this paper, we formulated and empirically tested their intermediary roles on the causal link between strategic alignment types and firm performance using subjective and objective measures on growth and innovation. Based on a sample of 160 (out of 200 listed) Jordanian public shareholding companies, our findings indicated that firms that aligned IT to realize business strategy as a productivity lever and simultaneously pursued explicit KM strategy and oriented their learning and work activities towards exploitation positively predicted accounting-based performance. Whereas firms that aligned IT to realize business strategy as an innovation lever and simultaneously pursued tacit KM strategy positively predicted market-based performance.

Keywords: Strategic alignment, knowledge management, learning orientation, firm performance, panel data

1. Introduction

Findings of empirical studies on the causal relationships between IT investments and firm performance are somewhat mixed (e.g. Hitt and Brynjolfsson 1996). This has been attributed largely to a lack of adequate measures of firm performance and notably, the lag effect of learning that takes organizations to make the needed changes to realize the values of IT and to learn how to explore IT (e.g. Daven and Kauffman 2000). Other researchers contend that it is inherently difficult to establish direct casual links without considering other factors that influence firm performance (e.g. Im et al. 2001). Nevertheless, most MIS research has identified strategic alignment as an important missing link (Henderson and Venkatraman 1993; Raymond and Croteau 2009; Sabherwal and Chan 2001). Brynjolfsson and Hitt (1998) called for more research into how IT can become more effective, specifically identifying the right mix of growth and innovation strategies, and the business processes and organizational structures that best complement IT investment.

Also the elusive link between strategic alignment and firm performance calls for further research into intermediate variables that convert alignment into increased firm performance. For example, Tanriverdi (2005) shows that firms with high knowledge management (KM) capability significantly improved their financial performance. KM capability coincides with the shift of emphasis from an insourcing strategy of innovation to an external, strategic partnership of managing and developing intellectual partnership; including co-petition with firms working with their competitors to exploit their existing assets and to explore new opportunities for better performance (e.g. Acur et al. 2012; Mohannak and Matthews 2011; Nambisan and Swahney 2007). Levinthal and March (1993, p. 105) stated that 'the basic problem confronting an organization is to engage in sufficient exploitation to ensure its current viability and, at the same time, to devote enough energy to exploration to ensure its future viability'. Gupta et al. (2006) argued that firms could either orientate their work and learning activities towards exploitation or exploration or simultaneously pursue exploitation and exploration strategies. Yet the question of how and the extent of which firms utilize IT to complement their learning orientations remains largely unexplored. Given the paucity of research on this topic, we present a causal model that quantitatively tests the impacts of strategic alignment types on firm performance, and the effects of intermediary variables comprising the firms' knowledge management (KM) strategies and learning orientations. The reminder of the paper is structured as follows. The coming section presents the theoretical background of the study, and then discusses the research model and hypotheses. The next section presents the methods and analyses employed. Discussion and implications of the analysis and results are explained. Finally, the limitations and conclusions drawn from the study are presented.

2. Theoretical Background

Several articles have been written about how IT affects firm performance (e.g. Brynjolfsson 1993; Dedrick et al. 2003). A major concern is how to assess the IT-related business value and organizational impacts. In general, there are two main approaches. The first approach examines the direct linkages between IT investment and organizational performance across economy, industry and firm. The second approach examines the indirect linkages between IT investment and firm performance by identifying important intermediaries. These two approaches often lead to conflicting results. Some research shows no significant correlation (Brynjolfsson 1993) between IT investment and firm performance, while other research indicates a positive relationship between the two (Rai et al. 1997). The challenge is not only to identify the vital factors that influence firm performance but also to build a credible causal series between IT and firm performance (Im et al. 2001). Most of the MIS research has identified IT-business strategic alignment as the missing link (Henderson and Venkatraman 1993; Masa'deh et al. 2008; Masa'deh et al. 2010; Sabherwal and Chan 2001), which has been an important concern to the business community and executives (Luftman 1996; Watson et al. 1997) as it not only helps firms to realize the potential benefits from investments in IT (Tallon and Pinsonneault, 2011; Tallon et al. 2000) but also to enhance business performance by harnessing the existing organizational and technological infrastructures (Croteau et al. 2001). Yet most of the research on strategic alignment seems to focusing predominantly on the antecedents rather than the intermediaries (e.g. Chan and Reich 2007).

2.1 IT-Business Strategic Alignment

The majority of research in both IS and management literature deploys the strategic alignment model (SAM) of Henderson and Venkatraman (1989), which suggests that firms invariably seeks to achieve alignment by building linkages among four strategic domains: business strategy, IT strategy, organizational infrastructure and processes, and IT infrastructure and processes. Two specific aspects of this model stand out most and have characterized the extant of literature on alignment. They are: the contingency and antecedents of alignment (e.g. Brown and Magill 1994; Johnson and Lederer 2010; Luftman and Brier 1999; Reich and Benbasat 1996, 2000); and the degree of strategic fit (e.g. Ho 1996; Kanellis et al. 1999; King 1978; Sabherwal and Chan 2001). Yet regardless of whether firms attain better alignment through better communication between IT and executives (Reich and Benbasat 2000), and/or better fit through effective deployment of IT managerial resources (Motjolopane and Brown 2004) and IT flexibility (Chung et al. 2003; Tallon and Kraemer 2003; Ness 2005), both aspects do not necessarily entail increased firm performance.

In this paper, we conceptualize IT-business strategic alignment along the continuum of productivity and innovation. The spectrum underscores the two fundamental concerns of a firm. Firms that utilize IT to realize their business strategy as a productivity lever concern harnessing IT solutions to enhance growth. Relatively, firms that utilize IT as an innovation lever concern leveraging and exploring IT capabilities to support innovation. We hope this conceptualization of strategic alignment will provide better insights into the conditions and consequences of alignment, and allow us to incorporate the intermediary variables that leverage the unique managerial resources and organizational assets of a firm to further complement alignment and importantly, to realize the IT investment into growth and innovation.

3. Research Conceptual Framework and Hypotheses Formulation

In this section, we formulate two sets of hypotheses. Essentially, we map out the causal links among the two types of alignment (productivity and innovation levers), and the four specific intermediary variables (two KM strategies and two learning orientations) and their impacts on firm performance in terms of growth (based on accounting based measures) and innovation (based on market-based measures).

3.1 Knowledge Management Strategies

Recent research (e.g. Jayasingam et al. 2012; Lee and Chen 2012) declared that knowledge management field is still evolving and yet has not achieved its maturity, and in turn needs more investigation. Initially, resource-based view of a firm generally classifies resources of a firm into tangible and intangible assets. Tangible assets include land and buildings, financial data and reports and so forth; and intangible assets include brands, reputation, customer and employee loyalty, distribution networks, the ability of managers to work together and so forth (Penrose 1959). In relation to KM, explicit strategy concerns establishing a systematic approach to better exploit the tangible assets which are available in databases, library collections, or files. The tacit knowledge strategy concerns the ways to instigate the right set of conditions that facilitate articulation of accumulated experience and skills of individuals (Nonaka and Takeuchi 1995). Firms that are better in managing their explicit and tacit knowledge could significantly influence the products and services that they offer to their customers (e.g. Ismail and Ahmad 2011; Gray and Durchikova 2006). Explicit KM strategy helps firms to better utilize their available assets, and to enlarge the product scopes for growth, for example. Whereas tacit KM strategy leads to increased innovation through identifying new markets and bring new products and services to the markets. Hence, a firm's KM strategy plays a vital part in supporting the creation, transfer and application of knowledge within and across firms (Venkitachalam and Busch 2012). By coupling with the right strategic alignment types, KM strategy can lead to both increased firm performance. We argue that for firms seeking alignment as a productivity/growth lever, an explicit KM strategy will help them to concentrate on re-using their existing rather than to develop new assets. Yet for firms seeking alignment as an innovation lever, firms have to encourage their managers to explore new ideas through creating suitable internal markets to encourage and incubate new ideas and/or forging external partnerships to increase its network capabilities.

With regards to IT, firms are increasingly using technologies such as groupware systems to enhance communication, activate employee potential, and speed up the integration of employee knowledge within and across the firm (Bhirud et al. 2005; Liu et al. 2001; Vasileiadou 2012). Although most firms emphasized that the bulk of knowledge required is available from within the firm, finding and leveraging such knowledge has proven to be problematic (Cranfield University 1998; Kalling 2003; Ledford and Berge 2008; Perrin 2012). Grant (1996a) argued that knowledge is created and stored by individuals, and firms should act as institutions to integrate this knowledge. Von Krogh (1998) defined knowledge management as a concept which identifies and leverages the collective knowledge in organizations to help them compete; whereas Laudon and Laudon (2012) defined it as a set of business processes developed in a firm in order to create, store, transfer, and apply knowledge. Choi and Lee (2003) suggest that explicit KM (relating to knowledge codification, acquisition and sharing in codified forms and documentation) and tacit KM (relating to the knowledge acquisition from experts and knowledge sharing by one-to-one connections) could lead to different firm performance. In general, explicit KM strategy can result in growth and productivity whereas tacit KM strategy is critical for innovation.

Tanriverdi (2005) incorporated the explicit and tacit element of KM into a single construct of KM capability, defined as the firm's ability to create, transfer, integrate, and leverage related knowledge through its business units. He used the KM capability as a reflective second-order construct comprising three first-order dimensions of strategic knowledge resources: product, customer, and managerial KM capability. Product KM capability not only cuts costs but also boosts the speed of new product and service developments. Firms that are capable of managing their customer knowledge (customer needs, purchase behaviours, and preferences) and managerial knowledge (knowing how to manage their employees, suppliers, and partners) enhance their performance. All three resources are said to complement each other, and so implementing only some of them could affect improvements in performance (Porter 1996). Tanriverdi and Venkatraman (2005) argued that organizations which seek to utilize knowledge for greater performance need to focus on knowledge resources and the processes that create, exploit, and renew them. Hence, the role of IT is one of informing and sharing knowledge, and notably promoting effective re-use of knowledge resources. Although some researchers (e.g. Marques and Simon 2006; Teece 1998; Wong and Wong 2011) found a causal link between KM strategy and financial firm performance, recent studies (e.g. Kianto and Waajakoski 2010; Holsapple and Wu 2008; 2011) indicated that the link between KM strategy and firm performance is not clear. For instance, Holsapple and Wu (2008) called for an empirical research to investigate if practicing superior KM performance could result higher profit ratios or lower cost ratios; besides a higher Tobin's q ratio. In addition, researchers (e.g. Eisenhardt and Santos 2002; Masa'deh et al. 2010; Perez-Lopez and Alegre 2012) have argued for examining the intermediary role performed by KM strategy between IT-strategic management and firm performance. In this regard, KM systems are seen as IT-based systems to improve the organizational process of knowledge creation, storage, transfer, and application (Alavi and Leidner 2001; Pentland 1995). Firms that use the KM systems as productivity lever will enhance their performance in terms of growth; and relatively firms that use the KM systems as innovation lever will enhance their performance in terms of innovation. Against this, we formulate the following hypotheses:

Hypothesis 1a: Firms that pursue strategic alignment as a productivity lever will improve their performance in terms of growth and productivity

Hypothesis 1b: Firms with an explicit KM strategy will enhance their performance in terms of growth

Hypothesis 1c: Firms with a tacit KM strategy will improve their performance in terms of innovation

3.2 Learning Orientation

The second intermediary variable relates to the learning orientation of a firm. Previous research on the impact of IT investment on firm performance has suggested that the lag effect of learning. It is likely that exploration-orientated firms are more disposed towards experimentation of IT and are more likely to invest in co-specialized assets for realizing the values of IT over time; whereas exploitation-oriented firms are less tolerant with uncertainty and are more likely to expect a faster return from IT investment. These two orientations have been the main foci for most studies on organizational learning and technological innovation. March (1991, p. 71) stated that exploitation 'includes such things as refinement, choice, production, efficiency, selection, implementation, execution', whereas exploration 'includes things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery, innovation'. The core of exploration strategy in organizational learning studies refers to learning achieved through activities of concerted variation, planned experimentation, and play (Baum et al. 2000); searching for new organizational norms, routines, structures, and systems (Nooteboom 2000); developing new knowledge (Levinthal and March 1993); and experimenting with new approaches towards technologies, business processes or markets (March 1991). Yet exploitation strategy has been captured by activities via local research, experiential refinement, and selection and reuse of existing routines (Levinthal and March 1993, Baum et al. 2000); and by applying, improving, and extending existing competences, technologies, processes and products (March 1991).

Benner and Tushman (2002, p. 679) stated that 'exploitative innovations involve improvements in existing technological trajectory, whereas exploratory innovation involves a shift to a different technological trajectory'. He and Wong (2004, p. 483) termed exploitative innovation as 'technological innovation activities aimed at improving existing product-market domains', and exploratory innovation as 'technological innovation aimed at entering new product-market domains'. Gupta et al. (2006) argued that learning, improvement, and acquisition of new knowledge are fundamental to exploitation and exploration. Even though both strategies of exploitation and exploration are crucial for firms, they compete for scare resources and should make explicit and implicit choices between the two (March 1991). Levinthal and March (1993, p. 105) confirmed that 'an organization that engages exclusively in exploration will ordinarily suffer from the fact that it never gains the returns of its knowledge. An organization that engages exclusively in exploitation will ordinarily suffer from obsolescence'. Whereas, the explicit choices could be found in calculated decisions about alternative investments and competitive strategies, the implicit choices are hidden in many features of organizational forms and customs (March 1991). Moreover, costs and benefits vary between exploitation and exploration across time and space. Managers prefer to see more certain returns than less certain ones, resulting in the firm developing towards exploitation rather than exploration. He stated (March 1991, p.73) that 'compared to returns from exploitation, returns from exploration are systematically less certain, more remote in time and organizationally more distant from the locus of action and adaptation'. Therefore, tensions between exploitation and exploration do exist. These tensions can be attenuated when there is a match between the strategic types that firms pursue and their learning orientations, for example, an exploitation-orientated firm seeks alignment as a productivity lever, and an exploration-orientated counterpart seeks alignment as an innovation lever.

As to the relationship between exploitation and exploration with firm performance, the literature is not yet clear. Some researchers have argued that innovative (exploration) and superior quality of products and services (exploitation) offer firms a competitive advantage, whereby a company possesses certain intangible resources that a competitor can not copy or buy easily (Cho and Pucik 2005; Fink and Neumann 2009). This can be seen from the resource base view (RBV), which states that sustainable competitive advantage is caused by the inimitability, rarity, and non-tradability of intangible resources (Barney 1991). Broadly speaking, while innovation is defined as exploring something new which has not existed before, quality is seen as a dynamic threshold which firms have to meet to satisfy customers (Cho and Pucik 2005). Moreover, Cho and Pucik (2005) used return on assets (ROA), return on equity (ROE), and return on investment (ROI) as measures of profitability; and market-to-book value and Tobin's q ratio as metrics of market performance. They found that while exploitation had a direct effect on profitability performance, exploration had a direct relationship with market value. However, balancing innovation and quality is a challenge firms face, since March (1991) explained that exploration and exploitation are in competition for scarce resources which can maximize a firm's return. Against the above, we formulate the following hypotheses:

Hypothesis 2a: Firms that pursue strategic alignment as an innovation lever will improve their performance in terms of innovation

Hypothesis 2b: Exploration-orientated firms will improve their performance in terms of innovation

Hypothesis 2c: Exploitation-orientated firms will improve their performance in terms of productivity

4. Research Methods

4.1 Data Sources

This study comprised two data sources: the accounting and financial data (2000 to 2010) collected manually from annual reports of Jordanian public shareholding companies; and a questionnaire survey of 160 IT managers/executives of their respective companies. We chose the country of Jordan in response to calls for research in different countries and cultures (Chan et al. 2006). Because there was no official listing, we reviewed the Amman Stock Exchange and the Jordanian Securities Depository Center, and identified 200 firms in total. These firms comprised all Jordanian banking, insurance, services, and manufacture companies that had a registered website, and which engaged in business and IT activities. The survey was sent to all 200 firms. A total of 160 firms returned the survey, which gave a response rate of 80%. Before sending the survey out, we piloted the questionnaire items on three Jordanian managers and two MIS professors. Changes and modifications were then made accordingly.

4.2 Measures

The variables included in this study were constructed as follows. We collected both subjective and objective measures of firm performance comprising growth (accounting-based) and innovation (market-based) measures. In our survey, we asked IT managers/executives to assess their firms' performance in the financial year 2010/2011, by the extent to which the return on assets (ROA) and the cash flow to capital expenditure exceeded those of their competitors. We used ROA, as it correlated highly with other accounting-based measures such as return on equity (Delios and Beamish 1999), and return on investment (Johansson and Yip 1994; Busija et al. 1997). In relation to innovation, we used cash flow to capital expenditure (CFC) ratios as a proxy for market-based performance, which underlined a company's innovation effort (Bernstein 1993; Ravichandran and Lertwongsatien 2005). Although some researchers (e.g. Miller 1987) argued that subjective measurements are more valuable than objective measurements due to the lack of availability and reliability of accounting information as they could be manipulated by owners and management, we further tested our hypotheses with objective firm performance measures (2000 to 2010) using the dynamic panel generalized method of moment (GMM) technique.

The independent variables were measured using closed-end seven-point Likert-scale items, with scales ranging from 1= "strongly disagree" through 4= "neither agree nor disagree" to 7= "strongly agree". Dimensions of productivity lever and innovation lever were adapted from Burn and Szeto (2000). Productivity lever measured the extent to which IT was designed and implemented to support the company vision. Innovation lever measured the degree to which the company explored IT to produce new products and services. The explicit and tacit elements of the KM Strategy were based on the instruments developed by Choi and Lee (2003). Explicit KM strategy measured the extent to which the company relied upon knowledge codification, acquisition and knowledge sharing in codified forms and documentation. Tacit KM strategy measured the extent to which the company acquired knowledge from experts and knowledge sharing on one-to-one connections. The learning orientation (LO) measure was derived from Mom et al. (2007). The participants were asked to assess the extent to which the companies engaged in learning and work activities related to exploitation and exploration. Exploitation LO measured the extent to which the company engaged in existing routines. Exploration LO measured the extent to which managers engaged in works related to new organizational routines and activities. Further, in our hypothesis testing, we controlled for the number of employees, number of board of directors, industry, and location.

4.3 Dynamic Panel GMM Method

The generalized method of moments (GMM) has become a key estimation procedure in many areas of applied economics and finance since Hansen (1982) introduced it. Further, it can be considered as a generalization of other estimation methods such as least squares (LS), instrumental variables (IV) or maximum likelihood (ML). While the properties of the estimators of LS depend on the exogeneity of the regressors and the circularity of the residuals, those of IV and ML depend on the choice of the likelihood function. Thus, GMM is less likely to be misspecified and much more flexible since it only requires some assumptions about moment conditions (Chaussé, 2010). Also, most financial data such as stock returns are considered by heavy-tailed and skewed distributions, and as it does not enact any restriction on the distribution of the data, GMM denotes a decent method. Thus, once given data on the observable variables, the GMM technique finds values for the model parameters (Vogelsang, 2003). For more information and for those who are not familiar with the method, see Hansen (1982) and Hansen et al. (1996).

In analysing the panel data from 2000 to 2010, we used the method of GMM estimation. The GMM method is preferred to the standard difference approach in panel analysis because it deals with endogeneity in the data and offers robust measures, specifically when the estimated variables are highly persistent (Arellano and Bond 1991). Blundell and Bond (1998) stated that to address inconsistency problems due to censored data, the GMM estimator is the appropriate method.

Considering the dynamic panel data, the first basic model specified the effects of productivity lever, explicit KM strategy, and exploitation LO on accounting based performance, controlling for number of employees, number of board of directors, industry, and location effects.

$$PER\,it = A + \beta 1(PE)it + \beta 2(EK)it + \beta 3(XI)it + \beta 4(NE)it + \beta 5(NB)it + \beta 6(ND)it + \beta 7(LC)it + \varepsilon\,it$$

where: PER *it* = ROA of the *i*th firm in year *t*; PE *it* = Productivity lever for the *i*th firm in year *t*; EK *it* = Explicit knowledge management strategy for the *i*th firm in year *t*; XI *it* = Exploitation OL for the *i*th firm in year *t*; NE *it* = a dummy for number of employees; NB *it* = a dummy for number of board of directors; ND *it* = a dummy for industry; LC *it* = a dummy for location; ε *it* = an error term.

The second basic model specified the effects of innovation lever, tacit KM strategy, and exploration OL on market based performance, controlling for number of employees, number of board of directors, industry, and location.

$$PER\,it = A + \beta 1(IE)it + \beta 2(TK)it + \beta 3(XR)it + \beta 4(NE)it + \beta 5(NB)it + \beta 6(ND)it + \beta 7(LC)it + \varepsilon\,it$$

where: PER *it* = CFC of the *i*th firm in year *t*; IE *it* = Innovation lever for the *i*th firm in year *t*; EK *it* = Tacit knowledge management strategy for the *i*th firm in year *t*; XI *it* = Exploration OL for the *i*th firm in year *t*; NE *it* = a dummy for number of employees; NB *it* = a dummy for number of board of directors; ND *it* = a dummy for industry; LC *it* = a dummy for location; ε *it* = an error term.

By using the GMM estimation, we relied upon two specification tests: Arellano-Bond test that is robust to heteroskedasticity and autocorrelation with panels; and the Sargan test validity of the instruments. In order for the models to be accepted, the Sargan test has to be non-significant whereas the Arellano-Bond test significant.

5. Data Analysis and Results

With the subjective performance measures, we used Structural Equation Modelling (SEM) technique was to test the two sets of hypotheses. The tests were carried out using AMOS (Analysis of Moment Structures) software package version 6. For the objective performance measures, we used the dynamic panel GMM technique using statistical analysis software (STATA) version 10.

5.1 Structural Equation Modelling Results

SEM was divided into two sub-models: a measurement model and a structural model. The measurement model identified the relationships between the observed and unobserved variables; and the structural model defined relationships among the unobserved (i.e. latent) variables by specifying which latent variables directly or indirectly influence (i.e. cause) changes in other latent variables in the model (Byrne 2001). The SEM process consisted of two components: validating the measurement model and fitting the structural model. While the former was accomplished through confirmatory factor analysis, the latter was accomplished by path analysis with latent variables (Kline 2005).

5.2 Analysis of the Measurement Model

In order to validate the study scales, we assessed the quality of the measurement model – construct validity - for unidimensionality, reliability, convergent validity, and discriminant validity. Modifications were made to the original measurement model by omitting some multidimensional variables. The results of the measurement model are presented in the appendices A and B. Table A1 summarizes the standardized factor loadings, measures of reliabilities and validity for the final measurement model; while Table B1 presents the means, standard deviations, and intercorrelations of the final measurement model. As theorized, most of the research constructs are significantly correlated.

5.3 Unidimensionality

Several indices were used to assess the fit of each measurement model. The relative chi-square (chi-square/degrees of freedom) is one of the indices that requires three or less for an acceptable model (Kline 1998). Goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI) are used to measure how much of the variances and covariances the model jointly accounts for. Normed fit index (NFI) represents the improvement in fit of the hypothesized model over the null model. However because Bentler (1990) found that NFI underestimates fit in small samples, she proposed the comparative fit index (CFI). If GFI, AGFI, NFI and CFI values are above 0.90 then they are considered good and from 0.80-0.90 considered moderate (Bentler and Bonett 1980). The root mean square residual (RMSR) is another index that measures the average difference between the elements in the sample and hypothesized covariance matrices. Standardized RMSR should not be greater than 0.10 to be acceptable (Segars and Grover 1993). Indeed, the goodness of fit (CFI) index showed that all items loaded significantly on one underlying latent variable with good and moderate results.

5.4 Reliability

Reliability of the multi-item scale for every construct is measured by using Cronbach alphas; the values of all indicators or dimensional scales should be above the recommended value of 0.60 (Bagozzi and Yi 1988, Baker et al. 2002, Nunnally 1978), the composite reliability should be more than 0.60 (Bagozzi and Yi 1988). Cronbach's alpha values ranged from 0.88 to 0.93, composite reliability for the constructs ranged from 0.88 to 0.93 suggesting that the instrument is reliable.

5.5 Convergent and Discriminant Validity

Convergent validity was established by the high factor loadings and high significant levels for the indicator variable (Schwab, 1980). Therefore, convergent validity was supported by the standardized factor loadings, which are all above 0.50, and t-values ranged from 5.21 to 12.04. Discriminant validity was evaluated by the average variance extracted (AVE) which should be at least 0.50 (Bagozzi and Yi 1988). However, it is common for the estimate to be below 0.50 even when reliabilities are acceptable (Hatcher 1994, p.331). Indeed, AVE ranged from 0.39 to 0.62 indicating acceptable values. Since reliability tests, convergent and discriminant validities support the overall measurement quality, the measure is deemed adequate for testing the structural or path coefficient that estimates for hypothesized relationships of the study model.

5.6 Analysis of the Structural Model

Following the two-phase SEM technique, the measurement model results were used to test the structural model, including paths representing the proposed associations among research constructs. Table 1 shows the path coefficients. Further, the coefficient of determination for accounting performance and market-based performance were 0.90 and 0.92 respectively, indicating that the model significantly accounted for the variation of the performance in terms of growth and innovation.

Table 1: Summary SEM Results (Subjective Performance Measures)

Hypothesized Path	Standard Path Coefficient	t-Value	Empirical Evidence
H1a: Productivity Lever → Growth Performance	0.46***	2.2	Yes
H1b: Explicit KMS → Growth Performance	0.14*	1.7	Yes
H1c: Tacit KMS → Innovation Performance	0.20*	2.5	Yes
H2a: Innovation Lever → Innovation Performance	0.29***	3.6	Yes
H2b: Exploration LO → Innovation Performance	0.04	0.50	No
H2c: Exploitation LO → Growth Performance	0.16**	2.01	Yes

Note. KMS: knowledge management strategy; LO: learning orientation; * $p < .05$, ** $p < .01$ and *** $p < 0.001$.

5.7 Dynamic Panel System GMM Results

The results of a system GMM estimator are presented in the appendices C and D. Table C1 presents the estimation results obtained from the system GMM estimator, using the ROA measure of accounting-based performance; and Table D1 shows the system GMM outcomes by using CFC as a proxy of market-based performance. In addition, while productivity lever, explicit KM strategy, and exploration learning orientation exhibited significant coefficients with ROA, innovation lever was the only variable that affected the market-based performance whereas tacit KM strategy and exploration learning orientation did not. In addition, the explicit KM strategy was found to be related to ROA. The coefficients of the control variables namely number of employments, number of board of directors, and industry were not statistically significant, indicating that these variables did not have much influence on growth.

Table 2: Summary Results of Study Hypotheses from System GMM

Hypothesized Path	t-Value	Empirical Evidence
H1a: Productivity Lever → Growth Performance	2.41**	Yes
H1b: Explicit KM strategy → Growth Performance	-1.75	No
H1c: Tacit KM strategy→ Innovation Performance	-0.75	No
H2a: Innovation Lever → Innovation Performance	1.94**	Yes
H2b: Exploration LO → Innovation Performance	-0.60	No
H2c: Exploitation LO → Growth Performance	2.40**	Yes

Note: KMS: knowledge management strategy; LO: learning orientation; * $p < .05$, ** $p < .01$ and *** $p < 0.001$.

Further, the validity of the instruments used in this study was evaluated with two different statistics: The Sargan test of the over-identifying restrictions; and the Arellano-Bond test for zero autocorrelation in first-different errors. As can be shown in Tables C1 and D1, Sargan test was accepted since p-values were 0.12 and 0.68 respectively; Arellano-Bond test was significantly negative when we used the CFC as a metric of innovation performance at 0.05 levels, whereas Arellano-Bond test was not significant with the growth performance. Therefore, in part neither the Sargan test nor the Arellano-Bond test rejects the validity of the instrument used.

Furthermore, Table 2 indicates the GMM estimations for the relationships between productivity lever, explicit KM strategy, exploitation LO and accounting performance; and the associations between innovation lever, tacit KM strategy, exploration LO and market performance.

6. Discussion and Implications

Earlier researches (e.g. Brynjolfsson and Hitt 1998) were unable to show the importance of IT investments because of the inadequate data on IT investments, small sample sizes, and the lagged effect of recognizing the financial benefits from investing hugely in IT. Therefore, some scholars (e.g. Chan and Reich 2007) who explained the lagged as a result of a missing alignment between IT and business management; and in turn called for further investigations between such alignment and knowledge management strategies. In addition, since it is important for firms learn how to exploit and explore their resources and capabilities (Benner and Tushman 2002), this paper contributes to recent literature and management practices by conceptualizing and empirically confirmed explaining how strategic alignment types, knowledge management strategies, organizational learning affect a firm's performance.

Table (1) indicates the path coefficient and t-value of each proposed path. The first research goal was to develop and test a model by using SEM technique to examining the relationships among several contextual variables (productivity lever, explicit KM strategy, exploitation learning orientation) on growth performance; and (innovation lever, tacit KM strategy, exploration learning orientation) on innovation performance.

Consistent with Keskin (2005), explicit and tacit knowledge management strategies were found to be positively and significantly correlated with subjective firm performance. Further, Darroch (2005) found that firms with knowledge management capabilities more likely to use their resources efficiently and in turn will be more innovative and do better. Therefore, (H1b) and (H1c) were supported strongly. Although we found productivity lever and innovation lever to be directly and positively correlated with growth and innovation performance respectively which support (H1a, H2a); exploitation learning orientation had a significant and a positive association with growth performance, whereas exploration learning orientation was not correlated to innovation performance. Indeed, Cho and Pucik (2005) found a significant relationship between quality as a driver of exploitation and profitability performance. Therefore, while (H2c) was supported, (H2b) was not. A possible explanation is that Jordanian IT-managers are not mindful of the importance of exploring new organizational norms, routines, and systems, or experimenting with new approaches towards technologies, business processes or markets. Thus, more research is required to understand how managers' exploration activities affect firm performance, and further validate the study construct.

The second research objective was to examine how the contextual variables affect firm performance by using the estimation method of system GMM for the dynamic panel data. As can be seen in Table (2), productivity lever, explicit knowledge management strategy, and exploitation learning orientation were found to be linked to the growth based-performance. Thus, (H1a), (H1b), and (H2c) were supported and in line with the above SEM results. In addition, considering IT as an innovation lever (H2a) was found to be correlated significantly with innovation performance; while exploration learning orientation (H2b) was not supported as indicated by the SEM results. Surprisingly, although great attention was made by several researchers like (Keskin 2005) regarding the association between tacit knowledge and firm performance, the GMM found no relationship indicating that (H1c) was not supported. The lack of a significant relation between tacit-oriented and market performance could be due to the lack of IT managers' knowledge acquisition from experts and knowledge sharing by one-to-one connections; or top IT management do not recognise the importance and value of such association. Thus, more research is needed to clarify and explain the lack of support of (H1c, H2b) bearing in mind that the research field based on the country of Jordan, thus, the cultural context could be a confounding factor.

7. Limitations and Conclusions

There are obvious limitations of the present study. The first limitation is the use of the same informant for our independent, intermediary, and dependent variables. Multiple respondents could be preferred even though we tried to ask the senior personnel to answer the questionnaire and using objective performance measures to complement the subjective measures. Another limitation is the testing of the conceptual model was based on the cross-sectional survey data. Further, longitudinal investigations will be required to examine how the model unfolds over time (e.g. Sabherwal and Chan 2001).

To sum up, the motivation of our study was to determine the impact of several contextual variables (productivity lever, explicit KM strategy, exploitation learning orientation) on accounting performance; and (innovation lever, tacit KM strategy, exploration learning orientation) on market performance. A theoretical model was proposed and empirical testing was completed using a sample of 160 Jordanian public shareholding firms. Our findings increase our understanding of the usage of IT as productivity and innovation levers. Further, this study suggests that IT managers should pay special attention not only to acquisition knowledge from experts but also to the firms' learning orientations.

References

[1] Acur, N., Kandermir, D., and Boer, H. (2012). "Strategic Alignment and New Product Development: Drivers and Performance Effects," Journal of Product Innovation Management (29:2), pp. 304-318.

[2] Alavi, M., and Leidner, D. (2001). "Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues," MIS Quarterly (25:1), pp. 107-136.

[3] Arellano, M. and Bond, S. (1991). "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," Review of Economic Studies (58), pp. 277-297.

[4] Argote, L., and Ingram, P. (2000). "Knowledge Transfer: A Basis for Competitive Advantage in Firms. Organizational Behavior and Human," Decision Processes (82:1), pp.150-169.

[5] Bagozzi, R., and Yi, Y. (1988). "On the Evaluation of Structural Evaluation Models," Journal of the Academy of Marketing Science (16:1), pp. 74-94.

[6] Baker, J., Parasuraman, A., Grewal, D., and Voss, G. (2002). "The Influence of Multiple Store Environment Cues on Perceived Merchandise Value and Patronage Intentions," Journal of Marketing (66:2), pp. 120-141.

[7] Barney, J. (1991). "Firm Resources and Sustained Competitive Advantage," Journal of Management (17:1), pp. 99-120.

[8] Baum, J., Li, S., and Usher, J. (2000). "Making the Next Move: How Experiential and Vicarious Learning Shape the Locations of Chain's Acquisitions," Administrative Science Quarterly (45), pp. 766-801.

[9] Benner, M., and Tushman, M. (2002). "Process Management and Technological Innovation: A Longitudinal Study of the Photography and Paint Industries," Administrative Science Quarterly (47), pp. 676-706.
[10] Bentler, P. (1988). Causal Modeling via Structural Equation Systems, New York: Plenum.
[11] Bentler, P. (1990). "Comparative Fit Indexes in Structural Models," Psychological Bulletin (107), 1990, pp. 238-246.
[12] Bentler, P., and Bonett, D. (1980). "Significance Tests and Goodness-of-fit in the Analysis of Covariance Structures," Psychological Bulletin (88), November, pp. 588-606.
[13] Bernstein, L. (1993). Financial Statement Analysis: Theory, Application, and Interpretation, Homewood: Irwin.
[14] Bhirud, S., Rodrigues, L., and Desai, P. (2005). "Knowledge Sharing in KM: A Case Study in Indian Software Subsidiary," Journal of Knowledge Management Practice.
[15] Blundell, R. and Bond, S. (1998). "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," Journal of Econometrics (87), pp. 115-143.
[16] Brynjolfsson, E. (1993). "The Productivity Paradox of Information Technology: Review and Assessment," Communications of the ACM (36:12), pp. 67-77.
[17] Brynjolfsson, E., and Hitt, L. (1998). "Beyond the Productivity Paradox: Computers are the Catalyst for Bigger Changes," Communications of the ACM (41:8), pp. 49-56.
[18] Burn, J.M., and Szeto, C. (2000). "A Comparison of the Views of Business and IT Management on Success Factors for Strategic Alignment," Information and Management (37:4), pp. 197-216.
[19] Busija, E., O'Neill, H., and Zeithamal, C. (1997). "Diversification Strategy, Entry Mode, and Performance: Evidence of Choice and Constraints," Strategic Management Journal (18:4), pp. 321-327.
[20] Byrne, B. (2001). Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming, Lawrence Erlbaum Associates, Mahwah: New Jersey, London.
[21] Chan, Y. and Reich, B. (2007). "IT Alignment: What Have We Learned," Journal of Information Technology (22:4), pp. 297-315.
[22] Chan, Y., Sabherwal, R., and Thatcher, J. (2006). "Antecedents and Outcomes of Strategic IS Alignment: An Empirical Investigation," IEEE Transactions on Engineering Management (53:1), pp. 27- 47.
[23] Chaussé, P. (2010). "Computing Generalized Method of Moments and Generalized Empirical Likelihood with R," Journal of Statistical Software (34:11), pp. 1-36.
[24] Cho, H., and Pucik, V. (2005). "Relationship between Innovativeness, Quality, Growth, Profitability, and Market Value," Strategic Management Journal (26), pp. 555-575.
[25] Choi, B., and Lee, H. (2003). "An Empirical Investigation of KM Styles and their Effect on Corporate Performance," Information & Management (40), pp. 403-417.
[26] Croteau, A.M., Bergeron, F., and Raymond, L. (2001). "Business Strategy and Technological Deployment: Fit and Performance," Information System and Management (6:4).
[27] Davenport, T., and Prusak, L. (1998). Working Knowledge: How Organizations Manage What They Know, Harvard Business School Press.
[28] Darroch, J. (2005). "Knowledge Management, Innovation and Firm Performance," Journal of Knowledge Management (9:3), pp. 101-115.
[29] Daven, F. D., and Kauffman, R. J. (2000). "Discovering Potential and Realizing Value from Information Technology Investment," Journal of Management Information Systems (16:4), pp. 121 – 143.
[30] Dedrick, J., Gurbaxani, V., and Kraemer, K. (2003). "Information Technology and Economic Performance: A Critical Review of the Empirical Evidence," ACM Computing Survey (35:1), pp. 1-28.

[31] Delios, A., and Beamish, P. (1999). “Ownership Strategy and Japanese Firms: Transactional, Institutional, and Experience Influences,” Strategic Management Journal (20:10), pp. 915-933.
[32] Dess, G., and Robinson, R. (1984). “Measuring Organizational Performance in the Absence of Objective Measures: The Case of the Privately-Held Firm and Conglomerate Business Unit,” Strategic Management Journal (5:3), pp. 265-273.
[33] Earl, J. (1993). “Experience in Strategic Information Systems Planning,” MIS Quarterly (17:1), pp.1-24.
[34] Eisenhardt, K. M., and Santos, F. M. (2002). “Knowledge- Based View: A New Theory of Strategy?”, in Handbook of Strategy and Management, A. Pettigrew, H. Thomas, and R. Whittington (Eds.), Sage Publications, London.
[35] Fink, L. and Neumann, S. (2009). “Exploring the Perceived Business Value of the Flexibility Enabled by Information Technology Infrastructure,” Information & Management (46), pp. 90-99.
[36] Grant, R. M. (1996). “Toward a Knowledge-Based Theory of the Firm,” Strategic Management Journal (17), Winter Special Issue, pp. 109-122.
[37] Gray, P. H., and Durcikova, A. (2006). “The Role of Knowledge Repositories in Technical Support Environments: Speed versus Learning in User Performance,” Journal of Management Information Systems, (22:3), pp. 159-190.
[38] Gupta, A., Smith, K., and Shalley, C. (2006). “The Interplay between Exploration and Exploitation,” Academy of Management Journal (49:4), pp. 693-706.
[39] Hansen, L. (1982). “Large Sample Properties of Generalized Method of Moments Estimators,” Econometrica (50), pp.1029-1054.
[40] Hansen, LP; Heaton, J; and Yaron, A. (1996). “Finit-Sample Properties of Some Alternative GMM Estimators," Journal of Business and Economic Statistics (14), pp. 262-280.
[41] Hatcher, L. (1994). A Step-by-Step Approach to Using the SAS System for Factor Analysis and Structural Equation Modeling, Cary, NC: SAS Institute.
[42] He, Z., and Wong, P. (2004). “Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis,” Organization Science (15), pp. 481-494.
[43] Henderson, J.C., and Venkatraman, N. (1989). Strategic Alignment: A Framework for Strategic Information Technology Management, Working Paper.
[44] Henderson, J.C., and Venkatraman, N. (1993). “Strategic Alignment: Leveraging Information Technology for Transforming Organizations,” IBM Systems Journal (32:1), pp. 4-16.
[45] Hitt, L., and Brynjolfsson, E. (1996). “Productivity, Profit, and Consumer Welfare: Three Different Measures of Information Technology Value,” MIS Quarterly (20:2), pp.121-142.
[46] Ho, C. (1996). “Information Technology Implementation Strategies for Manufacturing Organizations: A Strategic Alignment Approach,” International Journal of Operations & Production Management (16:7), pp. 77-100.
[47] Holsapple, C., and Wu, J. (2008). “In Search of a Missing Link,” Knowledge Management Research and Practice (6:1), pp. 31-41.
[48] Holsapple, C., and Wu, J. (2011). “An Elusive Antecedents of Superior Firm Performance: The Knowledge Management Factor,” Decision Support Systems (52), pp. 271-283.
[49] Im, K.S., Dow, K.E., and Grover V. (2001). “Research Report: A Reexamination of IT Investment and the Market Value of the Firm-An Event Study Methodology,” Information Systems Research (12:1), pp. 103-117.
[50] Ismail, S., and Ahmad, M. (2011). "Agent-Mediated Knowledge Management: An Exploratory Review for Research in Knowing the Knower," Journal of Knowledge Management Practice (12:1).
[51] Jansen, J. (2005). Ambidextrous Organizations: A Multiple-level Study of Absorptive Capacity, Exploratory and Exploitative Innovation, and Performance, Unpublished Dissertation.

[52] Jayasingam, S., Ansari, M., Ramayah, T., and Jantan, M. (2012). "Knowledge Management Practices and Performance: Are they Truly Linked?," Knowledge Management Research & Practice, pp. 1-10.
[53] Johansson, J., and Yip, G. (1994). “Exploiting Globalization Potential: U.S. and Japanese Strategies,” Strategic Management Journal (15:8), pp. 579-601.
[54] Johnson, A., and Lederer, A. (2010). “CEO/CIO Mutual Understanding, *Strategic Alignment*, and the Contribution of IS to the Organization,” Information & Management (47:3), pp. 138-149.
[55] Kalling, T. (2003). "Knowledge Management and the Occasional Links with Performance," Journal of Knowledge Management (7:3), pp. 67-81.
[56] Keats, B., and Hitt, M. (1988). “A Casual Model of Linkages among Environmental Dimensions, Macro Organizational Characteristics, and Performance,” Academy of Management Journal (31:3), pp. 570-598.
[57] Keskin, H. (2005). “The Relationships between Explicit and Tacit Oriented KM Strategy, and Firm Performance,” The Journal of American Academy of Business, Cambridge (7:1), pp.169-175.
[58] Kianto, A., and Waajakoski, J. (2010). "Linking Social Capital to Organizational Growth," Knowledge Management Research & Practice (8), pp. 4-14.
[59] Klein, K., Dansereau, F., and Hall, R. (1994). “**Levels Issues in Theory Development, Data Collection, and Analysis,”** Academy of Management Review (19:2), pp. 195-229.
[60] Kline, R. (1998). Principles and Practice of Structural Equation Modeling, New York.
[61] Kline, R. (2005). Principles and Practice of Structural Equation Modeling, New York.
[62] Laudon, K., and Laudon, J. (2012). Management Information Systems: Managing the Digital Firm, 12th Edition, Pearson, England.
[63] Ledford, B., and Berge, Z. (2008). "A Framework for Tacit Knowledge Transfer in a Virtual Team Environment," Journal of Knowledge Management Practice (9:2).
[64] Lee, M., and Chen, T. (2012). "Revealing Research Themes and Trends in Knowledge Management: From 1995 to 2010," Knowledge-Based Systems (28), pp. 47-58.
[65] Levinthal, D., and March, J. (1993). “The Myopia of Learning,” Strategic Management Journal (14), pp. 95-112.
[66] Liu, P., Yang, S., and Chen, W. (2001). “The Study of the Implementation of KM and its Effects on Increasing the Competition,” Journal of Management (2:1), pp. 59-74.
[67] Luftman, J. (1996). Competing in the Information Age: Practical Applications of the Strategic Alignment Model, Oxford University Press, New York.
[68] March, J. (1991). “Exploration and Exploitation in Organizational Learning,” Organization Science (2), pp. 71-87.
[69] Marques, D., and Simon, F. (2006). "The Effect of Knowledge Management Practices on Firm Performance," Journal of Knowledge Management (10:3), pp. 143-156.
[70] Masa'deh, R., Hunaiti, Z., and Bani Yaseen, A. (2008). “An Integrative Model Linking IT-Business Strategic Alignment and Firm Performance: The Mediating Role of Pursuing Innovation and Knowledge [70] Management Strategies,” International Business Information Management Association (IBIMA) Journal (2:24), pp. 180-187.
[71] Masa'deh, R., Shannak, R., Almajali, D., and Dahalin, Z. (2010). “An Empirical Study of Antecedents and IT-Business Strategic Alignment in Jordanian Public Shareholding Firms: A Structural Equation Modelling Approach,” In Proceedings of the Annual International Conference on Infocomm Technologies in Competitive Strategies (ICT), Singapore, pp. 1-9.
[72] McCormack, B., and Hill, E. (1997). Conducting a Survey: The SPSS Workbook, International Thomson Business Press, London.
[73] Miller, D. (1987). “Strategy Making and Structure: Analysis and Implications for Performance,” Academy of Management Journal (30:1), pp. 7-32.

[74] Mohannak K., and Matthews, J. (2011). "Managing Specialised Knowledge in IT Technopreneurial Firms: Evidence from Australian SMES," Journal of Knowledge Management Practice (12:4).
[75] Mom, T.J.M., Bosch, F.A.J. van den, and Volberda, H.W. (2007). Investigating Managers' Exploration and Exploitation Activities: The Influence of Top-Down, Bottom-up, and Horizontal Knowledge Inflows, Unpublished Work.
[76] Nambisan, S., and Sawhney, M. (2007). The Global Brain, Wharton School Publishing.
[77] Nonaka, I., and Takeuchi, H. (1995). The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation, Oxford University Press, New York.
[78] Nooteboom, B. (2000). Learning and Innovation in Organizations and Economies, London.
[79] Nunnally, J. (1978). Psychometric Theory, McGraw-Hill, New York.
[80] O'Reilly, C., and Tushman, M. (2004). "The Ambidextrous Organization," Harvard Business Review (82), pp. 74-81.
[81] Penrose, E. (1959). The Theory of the Growth of the Firm, Oxford University Press.
[82] Pentland, B. (1995). "Information Systems and Organizational Learning: The Social Epistemology of Organizational Knowledge Systems," Accounting, Management and Information Technologies (5:1), pp. 1-21.
[83] Perez-Lopez, S., and Alegre, J. (2012). "Information Technology Competency, Knowledge Processes and Firm Performance," Industrial Management & Data Systems (112:4).
[84] Perrin, A. (2012). "The Practices of Knowledge Management in Lafarge," Journal of Knowledge Management (16:2).
[85] Porter, M. (1996). "What is strategy?," Harvard Business Review, pp.61-78.
[86] Rai, A., Patnayakuni, R., and Patnayakuni, N. (1997). "Technology Investment and Business Performance," Communications of the ACM (40:7), pp. 89-97.
[87] Ravichandran, T., and Lertwongsatien, C. (2005). Journal of Management Information Systems (21:4), pp. 237-276.
[88] Raymond, L., and Croteau, A. (2009). "Manufacturing Strategy and Business Strategy in Medium-Sized Enterprises: Performance Effects of Strategic Alignment," IEEE Transactions on Engineering Management (56:2), pp. 192-202.
[89] Reich, B.H., and Benbasat, I. (2000). "Factors that Influence the Social Dimensions of Alignment between Business and Information Technology Objectives," Management Information Systems Quarterly (24:1), pp. 81-113.
[90] Sabherwal, R., and Chan, Y. (2001). "Alignment between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders," Information Systems Research (12:1), pp. 11-33.
[91] Schwab, D.P. (1980). "Construct Validity in Organizational Behavior," in L.L. Cummings and B.M. Staw (Eds.), Research in Organizational Behavior (2), pp. 3-43.
[92] Segars, A., and Grover, V. (1993). "Re-Examining Perceived Ease of Use and Usefulness: A Confirmatory Factor Analysis," MIS Quarterly (17:4), pp. 517-525.
[93] Tallon, P., and Pinsonneault, A. (2011). "Competing Perspectives on the Link between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model," MIS Quarterly (35:2), pp. 463-486.
[94] Tallon, P., Kraemer, K., and Gurbaxani, V. (2000). "Executives' Perceptions of the Business Value of Information Technology: A process-Oriented Approach," Journal of Management Information Systems (16:4), pp. 145-173.
[95] Tanriverdi, H. (2005). "Information Technology Relatedness, Knowledge Management Capability and Performance of Multibusiness Firms," MIS Quarterly (29:2), pp. 311-334.
[96] Tanriverdi, H., and Venkatraman, N. (2005). "Knowledge Relatedness and Performance of Multibusiness Firms," Strategic Management Journal (26), pp. 97-119.
[97] Teece, D. J. (1998). "Capturing Value from Knowledge Assets: The New Economy, Markets for Know-How and Intangible Assets," California Management Review (40:3), pp. 55-79.

[98] Vasileiadou, E. (2012). "Research Teams as Complex Systems: Implications for Knowledge Management," Knowledge Management Research & Practice, pp. 1-10.
[99] Venkitachalam, K., and Busch, P. (2012). "Tacit Knowledge: Review and Possible Research Directions," Journal of Knowledge Management (16:2).
[100] Vogelsang, T. (2003). “Testing in GMM Models without Truncation,” Advances in Econometrics (17).
[101] Von krogh, G. (1998). “Care in Knowledge Creation,” California Management Review (40:3), pp. 133-153.
[102] Watson, R.T., Kelly, G.G., Gilliers, R.D., and Brancheau, J.C. (1997). “Key Issues in Information Systems Management: An International Perspective,” Journal of Management Information Systems (13:4), pp. 91-115.
[103] Wong, W., and Wong, K. (2011). "Supply Chain Management, Knowledge Management Capability, and their Linkages towards Firm Performance," Business Process Management Journal (17:6), pp. 940-964.
[104] Zajac, E., Kraatz M., and Bresser, R. (2000). “Modeling the Dynamics of Strategic Fit: A Normative Approach to Strategic Change,” Strategic Management Journal (21:4), pp. 429-453.

Appendices

Appendix A

Table A1:Properties of the Final Measurement Model

Construct and Indicators	Standard Loading	t-Value	CFI	Cronbach Alpha	Composite Reliability	Average Variance Extracted
Explicit KM Strategy			**0.92**	**0.75**	**0.89**	**0.39**
A1	0.650	***				
A2	0.617	6.42				
A3	0.670	6.87				
A4	0.710	7.19				
Tacit KM Strategy			**0.97**	**0.81**	**0.91**	**0.50**
A5	0.793	***				
A6	0.797	10.06				
A7	0.719	8.95				
A8	0.589	7.15				
Exploitation LO			**0.87**	**0.78**	**0.88**	**0.43**
A9	0.576	***				
A10	0.819	6.97				
A11	0.523	5.21				
A12	0.831	7.01				
A13	0.624	5.93				
Exploration LO			**1.00**	**0.75**	**0.91**	**0.61**
A16	0.824	***				
A17	0.832	10.58				
A18	0.780	10.00				
Productivity Lever			**1.00**	**0.89**	**0.93**	**0.62**
A23	0.784	***				
A24	0.911	12.04				
A25	0.881	11.79				
Innovation Lever			**1.00**	**0.87**	**0.92**	**0.59**
A26	0.77	***				
A27	0.82	10.37				
A28	0.89	10.86				

Appendix B

Table B1: Means, Standard Deviations, and Intercorrelations

		Means	S.D.	1	2	3	4	5	6	7	8
1	Explicit KM strategy	5.1552	1.17284	(0.75)							
2	Tacit K strategy	5.0822	1.20147	.719**	(0.81)						
3	Exploitation LO	4.9572	1.01726	.285**	.334**	(0.78)					
4	Exploration LO	4.4369	1.06849	.340**	.392**	.583**	(0.75)				
5	Productivity Lever	4.9342	1.46031	.460**	.417**	.301**	.291**	(0.89)			
6	Innovation Lever	4.8279	1.39343	.377**	.343**	.314**	.308**	.497**	(0.87)		
7	Growth P	4.4934	1.70312	.236**	.167*	.176**	.034	.264**	.241**	(0.86)	
8	Innovation P	4.4276	1.58992	.328**	.206*	.168**	.097	.253**	.308**	.770**	(0.86)

Note: LO: learning orientations; performance; coefficient alpha reported on the diagonal; N = 160; *p < 0.05, ** p < 0.01.

Appendix C

Table C1. System GMM Results

Variable	Coefficient	P-value	Significant
Productivity Lever	7114*	0.016	Yes
Explicit Knowledge Management Strategy	-1121	0.079	Yes
Exploitation Learning Orientation	5681*	0.016	Yes
Number of Employees	0.66	0.512	No
Number of Board of Directors	2.02	0.625	No
Industry	2014	0.434	No
Location	-14403	0.046	Yes
Sargan Test	(14) 20.40	0.12	Yes
Arellano-Bond test (1)	[-1.53]	0.12	No
Arellano-Bond test (2)	[-0.64]	0.51	No

Note: Dependant variable: ROA
t-Values in square brackets and degree of freedom in round brackets.

Appendix D

Table D1: System GMM Results

Variable	Coefficient	P-value	Significant
Innovation Lever	14362	0.05	Yes
Tacit Knowledge Management Strategy	-9888	0.45	No
Exploration Learning Orientation	-16113	0.55	No
Number of Employees	438	0.26	No
Number of Board of Directors	5098	0.04	Yes
Industry	-68994	0.04	Yes
Location	-121793	0.27	No
Sargan Test	(14) 10.98	0.68	Yes
Arellano-Bond test (1)	[-2.26]	0.02	Yes
Arellano-Bond test (2)	[-0.25]	0.80	No

Note: Dependant variable: CFC; t-Values in square brackets and degree of freedom in round brackets