ANTECEDENTS OF SUSTAINABLE MANAGEMENT SUPPORT FOR IT-RELATED INITIATIVES

Acklesh Prasad
QUT Business School
acklesh.prasad@qut.edu.au

Peter Green
UQ Business School
p.green@business.uq.edu.au

Jon Heales
UQ Business School
j.heales@business.uq.edu.au

ABSTRACT

Having IT-related capabilities is not enough to secure value from the IT resources and survive in today's competitive environment. IT resources evolve dynamically and organisations must sustain their existing capabilities to continue to leverage value from their IT resources. Organisations' IT-related management capabilities are an important source of their competitive advantage. We suggest that organisations can sustain these capabilities through appropriate considerations of resources at the technology-use level. This study suggests that an appropriate organisational design relating to decision rights and work environment, and a congruent reward system can create a dynamic IT-usage environment. This environment will be a vital source of knowledge that could help organisations to sustain their IT-related management capabilities. Analysis of data collected from a field survey demonstrates that this dynamic IT-usage environment, a result of the synergy between complementary factors, helps organisations to sustain their IT-related management capabilities. This study adds an important dimension to understanding why some organisations continue to perform better with their IT resources than others. For practice, this study suggests that organisations need to consider a comprehensive approach to what constitutes their valuable resources.

Keywords

IT-capabilities, sustainable capabilities, human resources, resource-based view, dynamic capabilities

INTRODUCTION

Investment in information technology (IT) is important for businesses to survive in today's competitive environment. This situation is because IT resources are the key enabler of required business transformations to achieve or sustain competitive advantage. Organisations have made radical use of IT resources to achieve this feat. For example, organisations are engaging in IT-backed collaborative alliances to improve their business processes, and refine the overall product or service value chain. Thus, there is no doubt that investment is IT is a strategic necessity. IT resources on their own, however, cannot provide sustainable advantage because they are readily available to all organisations (Powell and Dent-Micallef, 1997). This means that in a competitive environment, the IT resources, per se, are unable to provide performance-differentiating benefits to a particular organization. Rather, the value of IT in organisations is contingent upon the way organisations' IT-related capabilities leverage their IT resources (Wade and Hulland, 2004). Organisations IT-related capabilities are their unique ways to leverage the IT resources that are difficult to mimic, substitute, and trade. These qualities enable these resources to achieve IT-related competitive advantage (Wade and Hulland, 2004). Much of these capabilities relate to the efforts of the management in making the IT-related decisions.

Prior research conceptualises and empirically validates organisations IT-related capabilities, and how these IT-related capabilities leverage the IT resources (e.g., Bharadwaj, Bharadwaj and Bendoly, 2007; Ray, Muhamma and Barney, 2005). These studies, however, by using the resource based view (Barney, 1991), suggest organisations IT-related capabilities that are a source of value at a point in time. IT resources, however, are dynamic, and new technologies become available at a rapid pace. This situation compels organisations to have a strategy of continuous investment in IT to sustain their operations in a competitive environment. Continuous

investment in IT resources requires continuous confidence in the enabling abilities of the IT resources. This means that organisations would need to sustain their ways of unique leveraging of the IT resources. This outcome is possible when organisations are able to sustain their existing IT-related capabilities. Sustainable IT-related capabilities take advantage of emerging IT-related opportunities that the modern IT resources will provide. This situation makes it imperative to understand the environment that helps organisations to sustain their IT-related capabilities.

Organisations human resource (HR) capabilities are one of their major sources of competitive advantage (Bailey, 1993). Sustainable HR capabilities ensure that organisations continue to capitalise on opportunities that the new IT resources provide and continue to enjoy IT-related competitive advantages. Understanding the conditions that sustain these HR capabilities, thus, is important. Successful utilisation of IT resources in organisations requires the fit of the acquired IT resources with various organisational factors (Kearns and Lederer, 2003; Oh and Pinsonnealt, 2007). Fit at the operational level of IT deployment is more important and requires significant organisational changes (Jeffers, Muhamma and Nault, 2008). These changes must occur with the complementary resources and the nature of changes should be difficult to imitate. Competitive advantage erodes quickly when organisational changes are easily imitable. Ad hoc organisational changes are easily imitable, but it may be difficult to imitate coordinated changes in related resources. This is because coordinated changes co-create higher-level resources that are not easily replicable (Teece, 2007). That is, understanding the fit and reorganisation of various resources creates unique higher-level resources. These resources are unique because they are the product of complex organisational learning, and the resultant synergy between the resources would be difficult to emulate. These higher-level resources provide the impetus for developing sustainable IT-related capabilities.

This study proposes that the factors of a decentralised organisational design relating to task allocation and teamwork, and a congruent reward system at the technology use level would create a higher-level resource of a dynamic IT-usage environment. This environment presents a forum of superior IT-related knowledge and understanding. Organisations would be able to sustain their IT-related HR capabilities within this environment. This situation is because this environment can integrate, build, and reconfigure internal and external competences to better address rapidly changing environments (Teece, Pisano and Shuen, 1997). This environment is a source of sustainable advantage because the coherence in a coordinated change is difficult to mimic.

This study tests this notion by understanding the relationship between the proposed higher-level IT-usage environment and two IT-related management capabilities of sustained top management commitment towards IT-related initiatives and sustained shared organisational knowledge between the IT and unit managers. Analysis of data collected through a field survey suggests that the proposed IT-usage environment contributes to sustaining the two IT-related management capabilities. This is an important body of knowledge as it extends our understanding of how organisations could sustain their IT-related management capabilities to continue to enjoy IT-related competitive advantage presented by the modern technologies. The rest of the paper progresses as follows. The next section presents the theoretical framework and develops the hypotheses. The sections following this present the research design, present and discuss the results, state the contributions and directions for future research, and highlight the limitations of the research.

THEORETICAL FRAMEWORK

The resource centric approach suggests an organisation as a bundle of resources (Barney, 1991). Organisations need to develop their competencies by identifying or developing performance differentiating resources, their capabilities. On such perspective, the resource-based view (RBV) of the firm establishes that a subset of these resources enables organisations to achieve competitive advantage and a further subset leads to superior long-term performance (Barney, 1991). That is, organisations unique resources are a source of their survival. In the context of IT resources, the RBV argument postulates that the IT-related capabilities explain IT-related performance differences across organisations. This notion of the RBV is especially pertinent because IT resources rarely have a direct influence on sustained business performance. Rather, information systems exert their influence on organisations with complementary relationship with other assets and capabilities (Clemons and Row, 1991). That is, organisations ability to source value from their IT resources is contingent upon their ability to leverage these resources in unique ways.

The IT-related capabilities embed with various business processes in an organisation, and are difficult to trade (Teece et al., 1997; Wade and Hulland, 2004). Value materialises from these capabilities because they differ across organisations and these differences may be long lasting (Mata, Fuerst and Barney, 1995; Teece et al., 1997). To achieve competitive advantage, capabilities must possess attributes of value, rareness, and appropriability (Amit and Schoemaker, 1993). Once a firm attains a competitive advantage, attributes of capabilities such as inimitability, non-substitutability, and immobility help sustain the attained advantage (Amit and Schoemaker, 1993). The RBV perspective emphasises that orgnisations must possess firm-specific capabilities to derive performance-differentiating value from other resources. The RBV,

however, does not explain the nature of the isolating and differentiating mechanisms that allow for these capabilities to be developed and sustained (Teece et al., 1997).

The dynamics capabilities framework (Teece, 2007; Teece et al., 1997) provides explanation on how organisations could develop and sustain their competencies. Organisations need to create an environment through re-organisation of their resources that provides imputes to sustaining an existing superior position. The re-organisation crates a dynamic set of resources that develop and enhance the organisations' capabilities (Teece, 2007). Dynamic capabilities are difficult-to-imitate combinations of organisational, functional and technological skills that establish the foundations upon which distinctive and difficult to imitate advantages can be built, maintained and enhanced (Teece et al., 1997). An organisation's capacity and ability to renew competencies is contingent upon their innovative responses, appropriately adapting, integrating, and reconfiguring internal and external organisational skills, resources, and functional competencies. This effort will ensure their sustained performance advantages (Teece et al., 1997).

Organisations past choices influence domains of competence, and at any given time, "organisations must follow a certain trajectory of competence development" (Teece et al., 1997 pg. 515). An organisation can displace market-oriented organisation because it can organise certain type of economic activities inside the firm in ways one cannot using markets (Coase, 1937). Competencies and capabilities, which are organising and getting things done internally, is the key component in sustaining performance advantages (Teece et al., 1997). This situation is because, internally, organisation takes place in a more multilateral fashion, with patterns of behavior and learning being orchestrated in a much more decentralised fashion (Teece et al., 1997).

Three dimensions, processes, paths, and positions are classes of factors that help determine organisations distinctive competence and dynamic capabilities (Teece et al., 1997). The essence of the competencies and capabilities are embedded in organisational processes of one kind or another, and these processes, through their evolutionary and co-evolutionary paths, explain the essence of a firm's dynamic capabilities and competitive advantage (Teece et al., 1997). Organisational processes have a level of coherence within them, and it is this coherence where their ability to develop and sustain capabilities exist. This situation is because it is difficult to replicate a cohesive set of inter-organisational linkages. Consistently, cohesion between a set of related factors creates a higher-level resource that can establish an environment to sustain existing IT-related capabilities. This is because there is a hierarchy of capabilities where general and broadly defined capabilities are formed from integration of more specialised capabilities (Grant, 2008). This integration is possible because of the existence of synergy between related resources. The RBV and the dynamic capabilities theoretical perspectives form the basis of this study's hypotheses presented in the next section.

HYPOTHESES DEVELOPMENT

The dynamic capabilities framework suggests that competence development and their sustainability are best achieved internally with re-organisation of certain paths, processes, and positions. These re-organisations create higher-level resources (environment) that are dynamic and unique. Organisations can develop new competences and sustain existing competencies with this environment. We suggest that re-organisation of three paths, processes, and positions create an environment - the dynamic IT-usage environment within which organisations can sustain their IT-related management capabilities. We discuss these three resources and the resultant competence development environment next.

Decentralised Organisational Design

The human resources are one of the organisations important resources, and their effective management can offer important benefits to organisations. That is, orgnisations human resources management (HRM) practices can help create a source of sustained performance advantage (Bailey, 1993). Effective HRM systems simultaneously exploit the potential for complementarities and synergies among HR practices (Arvanitis, 2005; Becker and Gerhart, 1996; Black and Lynch, 2001; Ichniowski, Shaw and Prennushi, 1997). These factors include employee skills and motivation, and organisational structures and designs, which provide employees with the ability to control how they perform their roles (Bailey, 1993). Appropriate organisational design, which involves the specification of decision rights, performance evaluation and compensation systems are important elements that establishes the complementary factors (Jensen and Meckling, 1992).

Organisations have general and specific knowledge (Hayek, 1945). Specific knowledge is difficult to convey, and is more costly to transfer. This is because the specific feature of a knowledge stems from the fact that individuals know more than they can state (Jensen and Meckling, 1992; Polanyi, 1966). People have limited capacity as information processors, and highly specific information is likely to reside at lower levels of the organisation (Hitt and Brynjolfsson, 1997). Decision rights should be collated with the necessary knowledge (Jensen and Meckling, 1992). This means that in an environment surrounded with IT resources, organisations should be structured so that the ‘actors’ with specific knowledge should have the decision rights. This situation puts the knowledge and people together, and performance is broadly associated with a work system that includes a decentralised decision making authority (Hitt and Brynjolfsson, 1997).

The contribution of a motivated workforce will be limited if jobs are structured, or programmed in such a way that employees do not have the opportunity to use their skills to refine ways of doing their tasks (Bailey, 1993). This situation is especially pertinent in today's IT-driven business processes. Individuals ability to learn and discover ways to refine their contributions is contingent upon the degree of freedom they have to manipulate their IT tools. Of course, this manipulation would be within the required organisational controls. Employees would perform better if accorded the freedom to establish a synergy between their skills and the used IT tools. A decentralised organisational design is conducive for the establishment of this synergy. This decentralised structure forms an important element of the suggested dynamic IT-usage environment.

A Teamwork Oriented Organisational Design

IT resources have the powerful capacity to enable people to work efficiently in teams (Rockart and Short, 1989). IT facilitate the move away from traditional hierarchy to an open organisation that promotes a team-based structure (Powell, Lovallo and Caringal, 2006). That is, an IT-based communication and collaboration infrastructure tames the rigid hierarchy and allows individuals to communicate and collaborate freely laterally and horizontally. This situation makes it important for organisations to promote an environment that encourages employees to interact and adopt a team-based approach. As work-based IT becomes more common, organisational performance may become increasingly affected by organisations capacity to manage the team-based approaches (Nolan and Croson, 1995). HRM practices that encourage participation amongst employees, and allows them to improve how they perform their work can also contribute to sustained performance (Huselid, 1995). Such initiatives include cross-functional teams, job rotation, and quality circles (Huselid, 1995). This team-based environment fuses the

tacit knowledge of the workers to their associated business processes. Overall, a decentralised form of organisational design associated with task allocation and team-based organisation is critical to ensure a better synergy between tasks and the human resources. Such a design promotes employees with greater autonomy with their task, and nurtures an environment that allows participation amongst employees to improve on how they perform their tasks. This study considers these two dimensions of human resource related organisational design issues as important in establishing the suggested dynamic IT-usage environment.

A Congruent Incentive System

Decentralised organisational design associated with task allocation and team-based organisation promotes better use of operational level tacit knowledge. Such design structures, however, can also exacerbate agency problems (Jensen and Meckling, 1992). In the absence of appropriate incentive systems, workers may not necessarily use their decision-making capacity in the best interest of the organisation (Hitt and Brynjolfsson, 1997). Appropriate incentive systems align the employees' goals to those of the organisation. Employees would seek appropriate compensation for their will to share knowledge. Organisations work policies should not be analysed in isolation, but as part of a coherent incentive system (Baker, Gibbons and Murphy, 2002). This coherent system must recognise the perceived efforts of the employees in the suggested organisational design, and ensure reward that is consistent with these efforts. Misaligned reward schemes would disturb the freedom-based work culture, and would confine employees' efforts to share and apply their tact knowledge. Thus, a congruent incentive system is an important element of the dynamic IT-usage environment.

The Constitution of the Dynamic IT-Usage Environment

The synergy between organisational designs and reward systems is important for organisations efficient use of IT resources. The dynamic IT-usage environment recognises the importance of the users of the technology from the outset, and it rewards them for their appropriate learning and sharing initiatives. The relationship between the learning, sharing, and rewarding actions will be recursive in such an environment. The product of the recursion will be a rich pool of current and specific IT-related knowledge. The benefits and challenges experienced at the IT-usage level are the key resources to ensure sustained and positive commitment to IT from tactical and strategic management. Essentially, the suggested environment means the operational level management is the custodian of specific IT-related information as it represents the end-users. Operational management would share this information at the decision making level. This situation has two-fold benefits. First, the decision makers would acquire a better understanding of the fit of the IT resources to the various business processes, and second, the end-users would gain an appreciation of their efforts of fitting the IT resources to the business processes. This accommodation will motivate the end-users, who will attempt to leverage better their IT resources. This process is a recursive one of learning and sharing of information within the dynamic IT-usage environment. The result is a unique dynamic capability with the ability to sustain the IT-related mangment capabilities. The dynamic IT-usage environment is a more resourceful and dynamic capability than the individual resources that form the platform. This environment enables organisations to identify opportunities through consistent appreciation of the importance of the end-users in the IT resource utilisation process. Consistent with the above arguments, this study suggests that:

Hypothesis 1a (H1a): A decentralised organisational design will positively contribute to the establishment of a dynamic IT-usage environment.

Hypothesis 1b (H1b): A team-based work environment will positively contribute to the establishment of a dynamic IT-usage environment.

Hypothesis 1c (H1c): A congruent reward system will positively contribute to the establishment of a dynamic IT-usage environment.

Sustaining Top Management Commitment with a Dynamic IT-Usage Environment

Management support for organisations' IT requirements is a critical factor in ensuring optimum leveraging of the acquired IT resources. Top management commitment to IT-related initiatives means that they should act as business visionaries, and support and articulate the need for IT, and communicate its functionality within the context of organisations strategy, structure and systems (Henderson and Venkatraman, 1993). Top management commitment enhances the success of IT resources by making these resources available, supporting and guiding the IS functions, integrating IT with business strategies and processes, and ensuring continuity in IT investments over time (Powell and Dent-Micallef, 1997; Wade and Hulland, 2004). Lack of such support may see the IS resources having little effect on performance, even when substantial investments are made to acquire or develop such resources (Wade and Hulland, 2004). This situation is because this lack of support will create lags between the perceived ideal time to acquire the resources and the actual commitment towards IT-related decisions. The result would be a less than optimum fit of the IT resources to the business processes. Top management may initially develop competencies to make decisions that would result in a better fit of the IT

resources to the business processes, but the evolving nature of the IT resources means that mechanisms should be in place to sustain this important IT-related competencies.

The suggested dynamic IT-usage environment with a closely-knit workforce would provide top management with continued assurance that the particular IT initiative is beneficial to the organisation as a whole. This means that the dynamic IT-usage environment would act as the ideal knowledge base of top management. Interaction from this environment would galvanise management commitment, and sustains and increments that commitment from which IT management, including IS planning, would benefit (Karimi, Bhattacherjee, Gupta and Somers, 2000). Effective IT management requires a coordinated effort in planning, organising, controlling, and directing the deployment of IT within organisations (Karimi et al., 2000). The role of the top management in promoting this coordination is crucial. A dynamic environment, by demonstrating a consistent IT-related vision, acts as an important catalyst sophisticating and reaffirming this IT management role. The dynamic environment will ensure that the top management has an overarching vision of the potential of IT-related resources. This vision can sustain top management commitment to ensure longevity and enrichment of their commitment. Thus, the dynamic IT-usage environment would act as the ideal catalyst to sustain top management commitment towards IT-related initiatives. Consistent with the above arguments this study suggests that:

Hypothesis 2 (H2): A dynamic IT-usage environment will sustain top management commitment towards IT-related initiatives.

Sustaining Shared Organisational Knowledge with a Dynamic IT-Usage Environment

The concept of shared organisational knowledge relates to the level of mutual understanding between the IT managers and the business unit managers on the fit of the IT resources to the business processes. This concept calls for an equitable understanding on the nature of the business processes by the IT managers and on the nature of IT resources required by the business unit managers. This nature of understanding is a unique competency that would be difficult to imitate by competing organisations. This shared organisational knowledge between unit and IT managers determines the strategic use of IT (Boynton, Zmud and Jacobs, 1994; Ray et al., 2005). An organisation's use of IT is influenced by the presence of a mosaic of IT-related knowledge that binds its IT and line managers (Boynton et al., 1994). Shared knowledge is an IT managerial capability that influences how the IT resources support the business processes.

A major component of the firm's IT capacity is represented by the combination of IT and business-related knowledge possessed and exchanged amongst the IT and line managers (Ray et al., 2005). This IT-related management capability enhances the performance of specific processes (Jeffers et al., 2008; Ray et al., 2005). This capability also leads to increased operational and service performance of the IS groups (Nelson and Cooprider, 1996). Shared knowledge between these managers also influences IT assimilation (Armstrong and Sambamurthy, 1999), and it also influences the level of IT-business alignment (Reich and Benbasat, 2000). These attributes make the common understanding between the IT managers and the business unit managers on IT an important capability that needs to be sustained. This sustained capability will ensure that these managers would be able to foresee the fit between the modern IT resources to their existing processes. This outcome is critical for continuous

modernisation of the business processes, an important requirement in today's turbulent business environment.

The suggested dynamic IT-usage environment can contribute to sustaining this understanding between the IT and business unit managers. This environment will provide middle management with the assurance of appreciation by the end-users for the introduced technology. This assurance ensures visibility of IT initiatives (Earl, 1989). This visible IT appreciation is important for management to realise the potential of IT in their organisation, and will become an essential driver for a proactive IT-adoption environment. As organisations move towards greater IT sophistication, the assimilative capability of different types of management becomes essential. This is because an appropriate mix of business and IT executives helps ensure strategic alignment, a balanced portfolio of IT investments, and close coordination of business and IT in the organisation. A dynamic IT-usage environment ensures visibility of flow of benefits from initiation of an IT-related project and appreciation of IT by the end-users at the process level. This visibility is an important vehicle to ensure sustained congruence in the vision of unit and IT management on the role of the adopted technology. This visibility can eliminate individual unit-based values and promote a common vision of benefits of IT to the firm. The learning resulting from the interaction within the environment develops a capability of a sustainable level of unique understanding between the users and the managers of technology. The dynamism of the environment will ensure visibility of the benefits, which will continue to stimulate proactive sharing of a common vision by unit and IT managers. A dynamic IT-usage environment is a vibrant and congruent environment of potential IT usage. This environment is an important and effective tool within mid-level management in sharing IT-related benefits. Consistent with the above arguments this study proposes that:

Hypothesis 3 (H3): A dynamic IT-usage environment will sustain the level of shared knowledge between IT and unit managers.

Figure 1 presents the research model developed in the previous discussion. Note that the dynamic end-user environment is a formative higher order construct using the repeated measures concept (Chin, Marcolin and Newsted, 2003).

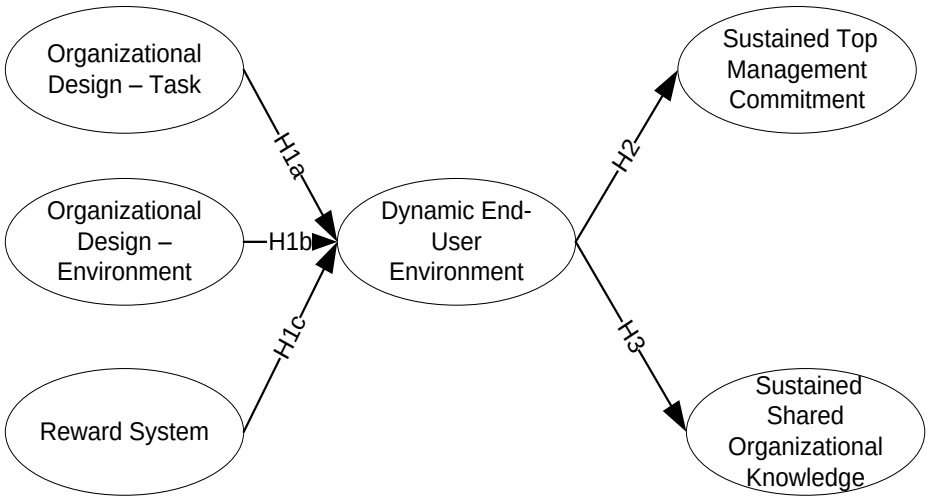

Figure 1: Research Model

RESEARCH DESIGN

This study employed a survey research methodology to collect data to test the proposed research model. This field survey allows data collection from a broad area, and it is the best way to reach geographically dispersed contacts. This effort is important to give adequate external validity to the findings of a study.

To the best of our knowledge, the concept of sustainable IT-related capabilities is not explored well in prior literature. This situation meant we had to develop and validate the measurement items relating to the two sustainable IT-related capabilities. The instrument validation process included measurement item generation with field interviews and examination of extant literature,

pre-test with sorting by judges, expert evaluation, final sorting, and a pilot test. Sorting of the pool of measurement items was conducted using the steps suggested by Moore and Benbasat (1991) using eight faculty colleagues with interest and familiarity in IT-related business value research. We measured the judges' inter-rater reliability using the Cohen's Kappa (κ). The kappa scores indicated that the inter-rater reliability for all except one pair of judges are within the full agreement range (κ = 0.60 – 0.80) or within the almost perfect agreement (κ = 0.81 – 1.00). The excepted pair has a kappa of 0.570 (moderate agreement). Faculty and visiting Professors participated in the expert evaluation. Industry validation (pilot test) of the research instrument was conducted using a sample of contacts from the sampling frame. Preliminary exploratory factor analysis showed adequate discriminant and convergent validity of the measures, suggesting the measures were suitable to measure the constructs. The fully validated survey instrument was then used to collect data on the measures of the constructs. Table 1 provides details on the final measures of the constructs.

We obtained the contact details of the Australian public and private companies from the ORBIS database. The ORBIS database is a publication of Bureau van Dijk Electronic Publishing (BvDEP). This database provides comprehensive information, including contact details, on the public and private companies worldwide. A after careful evaluation of the database for inter-company relationships, we selected 2215 firms to form the sampling frame of this study. The selection of the firms was purposeful to the extent to avoid sending more than one survey package to the target contacts. This situation was possible because a target contact (the company secretary) would normally manage a position in a parent and related subsidiary companies. We did not consider any other purpose-based factors in the construction of our sampling frame. Dillman's (2007) methodology was closely followed in developing and administrating the mail

and online version of the research instrument. This methodology included the initial delivery of survey package and requesting the contacts to complete the survey, and two follow-ups on the initial request. At the end of data collection, progressively, this study achieved a response rate of 13.16 percent (216 responses). This response rate is comparable with other studies with senior executives as the contacts (e.g., Jeffers et al., 2008; Ray et al., 2005). Contacts from thirteen major industries responded to the survey, with a significant number of completed surveys received from the large and medium firms, with an average of 617 employees per firm. The Chief Financial Officers, the Directors of Management Information System, and the Chief Information Officers mainly responded to the survey request. Table 2 a and 2b presents the demographic details of the contacts that responded and their associated organisation.

Construct	**Items**
Organisational Design - Task	The operational level management set the pace of the work. The operational level management schedule work. The operational level management distributes work among the workers. The operational level management decides how the tasks should be accomplished. The operational level management deals with difficult situations in their work environment.
Organisational Design - Environment	The operational level management deals with customers in routine situations and/or their problems and complaints. Our business units use “self-managing teams” very heavily. Our business units use “employee involvement groups” very heavily.
Reward System	Our organisation has an equitable incentive based reward system. Our organisation provides group incentives. Our organisation has performance-based promotion. Our organisation promotes team building. Our organisation promotes teamwork.
Sustained Top Management Commitment	Over the last five years: Our top executives have continually indicated their commitment to IT. Our top executives have continually championed IT within the organisation.
Sustained Shared Organisational Knowledge Between Unit and IT Managers	Over the last five years: Our IT management team was continually informed about the business operations of each unit. Our IT management team was continually about the business strategies of each unit. Each unit’s management team continued to strongly recognise IT as a competitive weapon. Each unit’s management team continued to strongly recognise IT as a tool to increase productivity of clerical employees. Each unit’s management team continued to strongly recognise IT as a tool to increase productivity of professional employees.

Table 1. Measurement Items

Industry Sector	No of Responses
Agriculture	7
Banking/Finance	20
Construction	14
Education	5
Health Care	6
Hospitality/Tourism/Travel	13
Media/Entertainment/Publishing	5
Mining	20
Professional Service	5
Real Estate	8
Retail/Wholesale/Distribution	55
Telecommunications	3
Transportation/Logistics	18
Others	37

Table 2a – Industry Sector Representation of the Respondents

Position	Number of Responses
Managing Director	3
Chief Executive Officer	7
General Manager	9
Chief Financial Officer	90
Chief Operating Officer	5
Branch//Division Manager	6
Business Analyst	5
Team Leader	10
Director of MIS	45
Chief Information Officer	34
Others	2

Table 2b Demographics of Contacts Position

We performed a number of diagnostics checks on the survey data. Test of non-response bias with first and the last thirty responses for all measures showed no significant differences on any of the variables ($p<0.05$). Test of multiple-method bias (online and mail survey) also did not find any significant differences in any of the measures. Harman's single-factor test examined common methods variance, where all the items were subject to exploratory factor analysis (EFA). More than one factor emerged from un-rotated factor solutions, and more than one factor explained majority of the variance, suggesting common methods variance was not an issue. A small number of responses contained missing data, and Little's MCAR test yielded data to be missing

completely at random (p=0.354). Maximum likelihood estimation (MLE), implemented by the EM (expectation maximization) algorithm in the SPSS Missing Values option imputed the missing data. Table 3 presents the descriptive data for all the measures.

Measures	Mean	Minimum	Maximum	Std. Deviation	Skewness	Kurtosis
ODT1	5.03	1	7	1.45	-1.01	1.15
ODT2	5.11	1	7	1.48	-1.06	1.00
ODT3	5.32	1	7	1.55	-1.03	0.95
ODT4	4.96	1	7	1.53	-0.80	0.45
ODT5	4.87	1	7	1.34	-1.61	3.91
ODE1	5.01	1	7	1.61	-1.51	2.57
ODE2	4.89	1	7	1.84	-0.82	-0.05
ODE3	4.32	1	7	1.74	-0.63	-0.28
REW1	3.84	1	7	2.05	-0.54	-0.85
REW2	3.79	1	7	2.22	-0.26	-1.17
REW3	5.10	1	7	1.82	-0.92	0.18
REW4	5.46	1	7	1.39	-1.56	4.22
REW5	5.85	1	7	1.29	-1.74	5.25
TMC1	5.13	1	7	1.72	-1.31	1.69
TMC2	5.02	1	7	1.89	-0.99	0.34
SOK1	4.59	1	7	1.72	-1.31	1.69
SOK2	4.86	1	7	1.89	-0.99	0.34
SOK3	4.60	1	7	1.73	-0.95	0.67
SOK4	4.77	1	7	1.72	-1.64	2.70
SOK5	4.86	1	7	1.61	-1.76	3.51
REW - Reward Systems, ODE- Organisational Design - Environment, ODT - Organisational Design - Task, SOK – Sustained Shared Organisational Knowledge, TMC – Sustained Top Management Commitment						

Table 3. Descriptive Statistics of Measures

RESULTS

Assessment of the Measurement Properties of the Model

There has been a substantial increase in the use of both covariance-based and component-based structural equation modelling (SEM) techniques in IS research (Chin, 1998). Recent literature provides rigorous debate on the benefits of covariance-based and component-based SEM techniques (e.g., Brown and Chin, 2004; Chin, 1988; Chin, 1998; Chin et al., 2003; Chin and Newsted, 1999; Hulland, 1999; Marcoulides, Chin and Saunders, 2009; Marcoulides and

Saunders, 2006; Qureshi and Compeau, 2009; Wetzels, Odekerken-Schroder and van Oppen, 2009). This debate reveals that the use of partial least squares (PLS) has been gaining interest and use amongst the IS researchers (Chin et al., 2003; Marcoulides et al., 2009; Marcoulides and Saunders, 2006). PLS's popularity stems from its ability to model latent constructs under conditions of non-normality and with small to medium sample sizes.

Being a components-based SEM technique, PLS models the theoretical relationships amongst latent variables (structural path) and the relationship between latent variables and its indicators (measurement paths). Rather than assuming equal weights for all indicators of a scale, the PLS algorithm allows for each indicator to vary in how much it contributes to the composite score of the latent variable (Chin et al., 2003). This situation means that the weaker relationships between the indicators and latent constructs have a lower weighting. This varied weighting also carries through to the estimation of the structural model. PLS, thus, is a preferable technique when compared with single-item regression, which assumes error-free measurement, and summated regression, which assumes equal-weighted measurement.

This study uses PLS for data analysis for the following reasons. First, for application and prediction, a PLS approach is often more suitable (Chin et al., 2003). Under this approach, this study assumes that all the measured variance is useful variance and subject to explanation. Because the approach estimates the latent variables as exact linear combinations of the observed measures, it avoids the indeterminacy problem and provides an exact definition of component scores (Chin et al., 2003).

Second, while there is little agreement on what is an ideal sample size, PLS can work with a small sample size (Chin et al., 2003). As a standard rule of thumb the sample size can be equal to or larger than ten times the number of indicators for the scale with the largest number of

formative (i.e., causal) indicators, or ten times the largest number of structural paths directed at a particular construct in the structural model (Chin and Newsted, 1999). A weaker rule of thumb is a multiplier of five instead of ten times the largest number of structural paths directed at a particular construct in the structural model (Tabachnik and Fidell, 2007).

Third, the approximation of second-order factors occurs using various procedures. One of the easiest to implement is the approach of repeated indicators, known as the hierarchical component model. In this approach, a second-order factor is a direct measurement of the observed variables for all the first order factors. While this approach repeats the number of manifest variables used, the model can be estimated by the standard PLS algorithm. In this study, the Dynamic IT-Usage Environment is a second order factor created by combining three first order factors of two aspects of organisational design and incentive systems. PLS is ideal for the generation of this second-order factor. The PLS product-indicator approach represents a one-step technique that requires no additional specification of parameter constraints or assumptions of multivariate normality (Chin et al., 2003). Finally, PLS places minimal demands on measurement scales, and distributional assumptions (Chin et al., 2003; Falk and Miller, 1992; Fornell, Bookstein and November, 1982; Marcoulides et al., 2009; Marcoulides and Saunders, 2006)

Confirmatory factor analysis (CFA) evaluated the factor lodgings for the constructs, and showed that the measures load highly only on their designated constructs. All measurement items have a factor loading above the rule of thumb of a loading of 0.70, indicating at least 50% of the variance in the manifest variable is accounted for by the construct (Hair, Anderson, Tatham and Black, 2008). Cross-loadings analysis revealed the manifest variables load highly only on the desired latent variable. Table 4 presents the factor loadings and cross loadings for all the measures.

	ODE	ODT	REW	SOK	TMC
ODE1	**0.842**	0.349	0.190	0.139	0.082
ODE2	**0.933**	0.326	0.381	0.176	0.149
ODE3	**0.891**	0.406	0.365	0.255	0.235
ODT1	0.491	**0.806**	0.365	0.255	0.235
ODT2	0.463	**0.763**	0.124	0.054	0.051
ODT3	0.352	**0.809**	0.145	0.134	0.168
ODT4	0.398	**0.847**	0.155	0.119	0.072
ODT5	0.431	**0.787**	0.098	0.141	0.091
REW1	0.206	0.145	**0.701**	0.245	0.260
REW2	0.364	0.255	**0.915**	0.339	0.259
REW3	0.180	0.146	**0.719**	0.299	0.316
REW4	0.340	0.228	**0.924**	0.367	0.273
REW5	0.357	0.253	**0.892**	0.384	0.215
SOK1	0.112	0.107	0.296	**0.751**	0.446
SOK2	0.192	0.188	0.314	**0.791**	0.440
SOK3	0.151	0.159	0.324	**0.835**	0.463
SOK4	0.194	0.155	0.338	**0.835**	0.238
SOK5	0.224	0.183	0.350	**0.892**	0.393
TMC1	0.114	0.111	0.286	0.368	**0.896**
TMC2	0.204	0.198	0.284	0.379	**0.939**
REW - Reward Systems, ODE- Organisational Design - Environment, ODT - Organisational Design - Task, SOK – Sustained Shared Organisational Knowledge, TMC – Sustained Top Management Commitment					

Table 4. Factor Loadings and Cross Loadings

	AVE	CRO	COM	REW	ODE	ODT	SOK	TMC
REW	**0.72**	**0.90**	**0.93**	**0.85**				
ODE	**0.64**	**0.71**	**0.84**	0.35	**0.80**			
ODT	**0.66**	**0.88**	**0.91**	0.25	0.69	**0.51**		
SOK	**0.68**	**0.88**	**0.91**	0.40	0.22	0.21	**0.82**	
TMC	**0.84**	**0.82**	**0.92**	0.31	0.18	0.18	0.64	**0.92**
REW - Reward Systems, ODE- Organisational Design - Environment, ODT - Organisational Design - Task, SOK – Sustained Shared Organisational Knowledge, TMC – Sustained Top Management Commitment, AVE - Average Variance Extracted, CRO - Cronbach's Alpha, COM - Composite Reliability								

Table 4. Assessment of the Measurement Model

Table 4 presents the results measurement model assessment, including Cronbach's alpha, average variance extracted, composite readability, and inter-construct correlations. The alpha coefficient of all constructs is higher than 0.70 (Nunnally, 1978). The more accurate composite reliability for each construct, which avoids the assumption of equal weightings, is above 0.80. The average variance extracted for each construct is above 0.50. The square root of average variance extracted for each construct, which represents the average association of each construct to its measures, is higher than the correlations between the constructs. This suggests that each construct closely relates to its own measures than to the measures of other constructs. Analysis of convergent and discriminant validities showed consistent results. Overall, this result supports the convergent and discriminant validity of the construct, and paves the way for assessment of the structural properties of the data.

Assessment of the Structural Properties of the Model

Figure 2 provides the result of the assessment of the structural properties of the model. This study uses a hierarchical approach to establish the higher order factor of dynamic end-user environment. In this approach, a second-order factor is a direct measurement of the observed variables for all the first order factors. The results indicate that organisation design – task, organisation design - environment, and reward systems contribute significantly in the formation of a higher-level dynamic IT-usage environment (REW – 0.498, ODT – 0.410, and ODE – 0.355). The path coefficients of the three lower level factors are significant at $p<0.001$ level. The results also demonstrate positive association between sustained top management commitment to IT-related initiatives and the dynamic end-user environment. There is also a significant positive association between sustained shared organisational knowledge and the dynamic IT-usage environment. Thus, the data supports all hypotheses (H1 – H3).

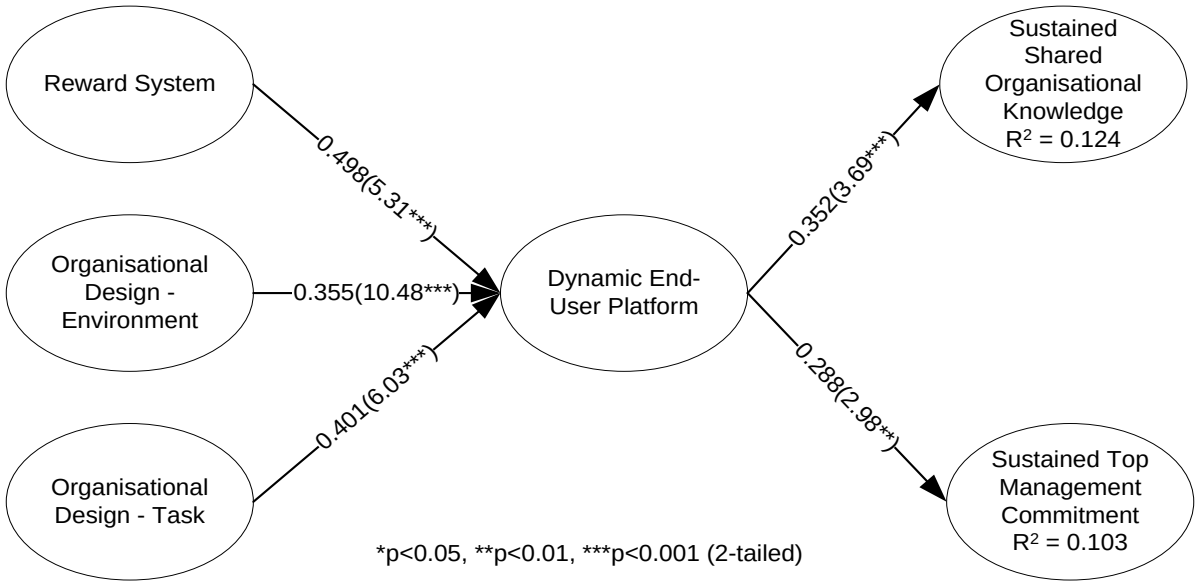

Figure 2: Structural Model

DISCUSSION

Organisations' IT-related capabilities are the source of their IT-related business value (Mata et al., 1995; Wade and Hulland, 2004). Organisations invest in the evolving IT resources, which continually provide new opportunities and challenges. This situation makes it important to understand the factors that help organisations to sustain their IT-related capabilities. This understanding is important because sustainable IT-related capabilities will be able to continue to source value from their IT resources and help organisations to achieve or maintain their competitive position. IT-related capabilities are organisational resources that are not easily imitable. Organisations human resources are important providers of their IT-related capabilities at various levels of the organisational hierarchy.

This study suggested that organisations would be able to sustain their IT-related capabilities in the presence of a dynamic IT-usage environment. This environment is the product of a synergy between structures of a decentralised organisational design, a teamwork based design, and a

congruent reward system. The results suggest that these structures contribute to a dynamic IT-usage environment. This outcome is consistent with hypothesis 1a, 1b, and 1c.

This study's results suggest that a dynamic end-user environment can continually stimulate middle and senior management thoughts and commitment on how best to leverage the IT resources to maximise their business value. Hypothesis 2 and 3 suggested that organisations' management IT-related capabilities could be sustained within a dynamic IT-usage environment. Continuous management support and understanding for IT-related initiatives ensures a good fit between their evolving IT resources and their business strategies. This support serves as the foundation for effective utilization of IT resources. Management efforts in identifying appropriate IT resources and recognizing the avenues to develop their IT-related capabilities to leverage the IT resources is important for organisations to survive in today's competitive environment.

The results support that a dynamic end-user environment provides the vision necessary to sustain management commitment for IT-related initiatives by demonstrating the continued benefits of IT resources. Much of organisational knowledge resides at the lower level of the organisational hierarchy. This is because organisations consume most of the IT resources at the business process level, managed by lower level management and employees. Nurturing and capitalizing of this knowledge will ensure proactive decisions regarding acquisition, implementation, and building IT-related capabilities. This effort will require breaking the traditional barriers, the internal walls between users and providers of technology, and an appropriate cultural shift. Making coordinated changes in a number of complementary factors can help organisations tap into this important knowledge. The results of this change are unique higher-level resources, in this study's case, a dynamic end-user environment. This environment has shown to afford

sustained support to existing organisational capabilities. The data confirms hypothesis 2 and 3 and shows that organisations that are able to identify the synergy between related resources and create a dynamic IT-usage environment are to sustain their IT-related competencies.

This study's dynamic capabilities-based model provides a better approach to understanding how organisations value-generating resources and capabilities can be developed and sustained. This approach relates organisations dynamic resource utilisation efforts to their sustainable IT-promoting capabilities. The result of this understanding is a direct and agile path to understanding the ways in which organisations can continue to secure IT-related competitive benefits. Theoretically, this study extends the resource-related approach to understanding how IT can contribute to business value by introducing a dynamic component to this framework. This sustainable resource-based model provides an opportunity to attain a deeper level of understanding on why some organisations perform better with their IT resources compared to others. This understanding is important in an environment where there are continuous reservations on the value of IT to organisations (e.g., Carr, 2003).

IMPLICATIONS, LIMITATIONS, AND CONCLUSIONS

Establishing a successful organisational design is a complex process. Deriving value from organisational resources may not only occur at individual resource level, but also at the higher levels. Developing higher-level resources and capabilities requires a deeper level of understanding of organisations processes, resources, and designs. This study presents one such combination of factors that is a catalyst for sustaining organisations IT-related capabilities. This effort requires the need to understand the synergy between the complementary factors at the IT resource consumption level. Future research can capitalise on this important theoretical extension in a resource-centric approach to IT business value research. Decision makers may need to adopt

a comprehensive approach in their quest to leverage the most from their IT resources. A holistic view of what constitutes important resources is necessary, as some resources may not provide incremental benefit on their own. Rather, some of these resources may be valuable through their complementary relationship with other resources. This study successfully demonstrates one such combination in the form of a dynamic end-user environment that can sustain organisations existing IT-related capabilities.

The interpretation of the results of this study should be in light of a number of limitations. A response rate of 13.16% is at the lower end of an acceptable range. We, however, did manage to solicit responses from 216 contacts and detailed diagnostics of data did not reveal any issues on data quality and representativeness of the sample. The valid responses comfortably met the required dataset for assessing the structural model using a components based SEM tool. This study used a cross-sectional research design, and showed some important associations between different organisational resources. This means that the sustainability of this study's findings is limited. A longitudinal study would address the question of causality and sustainability. This study only considered a certain number of organisational resources, but did demonstrate that perhaps all organisational resources, either on their own or in association with other resources may prove to be beneficial in realizing IT-related benefits. This understanding presents a promising avenue for future research to consider other organisational resources in different contexts.

Acquiring and managing IT resources continues to consume sustainable financial resources. There are also continuous questioned raised about the value of IT resources in organisations and whether in fact they matter. This environment requires organisations to develop their IT-related capabilities to demonstrate incremental value from their IT resources. Organisations will have to

think radically to obtain unique understanding of the fit between IT and their business processes. This study provides some insights on potential ways to obtain that understanding and ensure sustainable commitment in leveraging the IT resources.

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