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# Turning Dust to Gold: How to increase inimitability of Enterprise System

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# Turning Dust to Gold: How to increase inimitability of Enterprise Systems

*Completed Research Paper*

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## Abstract

*There is an on-going debate over the long-term value propositions of enterprise systems (ES) for competitive advantage, with many arguing that ES have lost their potential to contribute to competitive advantage in the contemporary hyper-competitive markets. While acknowledging that an ES is a valuable, rare and non-substitutable resource that is common to all competitors, it is further questionable how ES contribute to competitive advantage. Using the fourth characteristic of the resource-based view, we investigate how inimitability of ES can contribute to competitiveness. Using qualitative evidence from nine case studies this study derives three conditions that facilitate ES to be inimitable.*

**Keywords:** Enterprise Systems, Inimitability, Competitive Advantage, Qualitative Research

## Introduction

Organizations have invested heavily into enterprise systems (ES) as a key information system resource to obtain operational efficiencies, data transparency, data and process integrity and profitability (Seddon et al. 2010). At the turn of the century, these systems were considered as one of the most strategic resources for an organization (Davenport 2013; Rosemann et al. 2000). These expensive ES initiatives were justified through business cases that highlighted how the aforementioned benefits translated into competitive advantage (Rivard et al. 2006). However, despite these advantages, high resource intensiveness, need for continuous vendor-driven upgrades and steep organizational learning requirements have been shown to restrain ES abilities in assisting organizations to achieve competitive advantage (Rajagopal 2002; Sedera et al. 2016). In addition, the complexity of ES meant that they lack flexibility necessary for dynamic markets. Scholars describe ES as 'liquid concrete,' recognizing its notorious inflexibility (Kharabe and Lyytinen 2012). As such, the long-term value propositions of ES for lifecycle-wide innovation and contributions to competitive advantage are becoming under increasing scrutiny in the contemporary business (Lokuge 2015).

Exacerbating the emerging damaging views of ES, there is a strong growth in new technologies like cloud computing, wearables, mobile, social media and business analytics (Nylén and Holmström 2015; Yoo et al. 2012). Compared to ES, these new technologies are easy to acquire, learn, deploy, use and can be easily managed (Walther et al. 2013). As such, these new technologies are gaining rapid popularity amongst organizations seeking new and inexpensive opportunities in hyper-competitive markets (Nylén and Holmström 2015). Moreover, these technologies purport to change the nature of information technologies (IT) in attaining competitive advantage (Lokuge 2015; Lokuge and Sedera 2016). As such, Sedera et al. (2016) evidence a sharp drop of ES investment and a rise of investment in new technologies. The advent of new technologies and the growth of consumerization of IT have facilitated new business models (Lokuge 2015; Lokuge and Sedera 2014a; Lokuge et al. 2016). Organizations such as Uber and Airbnb have taken maximum advantage of such social and technological changes to produce new business models. They epitomize optimized sense-and-respond abilities to serve their customers by developing, changing and then refining their customer facing IT portfolio in a rapid and cost effective manner (Avedillo et al. 2015).

For the traditional ES custodians to remain competitive against these mushrooming digital organizations, they must not only seek to use digital technologies (Avedillo et al. 2015), but must

strive to increase the value-propositions derived through their ES. However, the challenge for the traditional business is that their ES are complex and cumbersome, that changing them frequently can be costly and risky (Lokuge and Sedera 2014b; Srivardhana and Pawlowski 2007). Moreover, since the common core business processes are still operational through ES and ES cannot be decommissioned (Eden et al. 2012; Eden et al. 2014), any value from introducing new technologies can only be obtained through a clear amalgamation of ES and new technologies (Avedillo et al. 2015). Such examples of where organizations successfully incorporate ES and new technologies are now emerging. For example, IKEA launched an augmented reality catalog app that helps their customers to 'Try before they buy' products from home. Here, mobile and cloud technologies are amalgamated with their ES, where they hold the master product catalogues, stock levels and storage locations. The Starwood hotels introduced a keyless entry to their guests, where the app integrates with ES for customer, payment and location records.

For the proponents of ES there remain two challenges in its role in attaining competitive advantage: (i) ES must identify its unique contributions to competitive advantage and (ii) ES must demonstrate its role in the modern IT portfolio. The objective of this paper is to investigate how ES could provide competitive advantage to organizations and to understand the role of ES in the contemporary technology landscape... Though the potential of ES to continuously innovate and support competitive advantage is discussed individually (Strong and Volkoff 2010), scholars have called for research across disciplines to understand the advanced role of ES in the contemporary technology landscape in enabling competitive advantage (e.g., Gawer 2014; Sedera et al. 2016). More specifically, using the resource-based view (RBV), this study explores how ES provide competitive advantage on its own and with new technologies. The paper proceeds in the following manner. First, we present a summary of ES research within the theoretical assessment of RBV. Next, we present the methodological details of the qualitative approach, details of the multiple case-studies and a summary of the analysis approach. The findings section presents three specific conditions derived through a pattern matching techniques. The paper concludes with a summary of highlighting research findings, research and practical contributions and limitations.

## **Background**

ES has been studied extensively about the system success (Gable et al. 2008; Sedera 2006; Sedera and Tan 2005), the use of ES (Holland and Light 2001) and their innovation potential (Lokuge and Sedera 2014b; Rajagopal 2002; Srivardhana and Pawlowski 2007). There is an on-going debate around the topic of ES and its strategic value-proposition (e.g., Kharabe and Lyytinen 2012; Rajagopal 2002; Srivardhana and Pawlowski 2007). The embrace of ES revolutionized the existing business processes and introduced new practices to organizations (Davenport 2013; Karimi et al. 2007). This risky, complicated knowledge-intensive and resource-consuming process of implementing an ES is characterized as a radical change (Kraemmerand et al. 2003). A radical innovation comprise of characteristics such as technological uncertainty, technical inexperience, business inexperience and technology cost (Green et al. 1995). Considering these characteristics it is evident that the implementation of an enterprise system to an organization is a radical innovation (Lokuge and Sedera 2014b). However, due to cost and lack of expertise, organizations are unable to sustain the innovation potential of the ES. Srivardhana and Pawlowski (2007) investigate the relationships between ES related knowledge impacts and potential absorptive capacity for business process innovation. They highlight that ES are "enabling organizations to build new capabilities to create and deploy knowledge to improve business processes (Srivardhana and Pawlowski 2007, p. 65)." As such, in this research, rather than focusing on the knowledge capabilities of the ES (Sedera et al. 2003), the paper focus on the overall characteristics of ES as a resource that facilitates strategic value-proposition.

Therefore, this paper is guided by the 'resource-based view of the firm' for identifying the characteristics of a resource and therein investigating ES as a resource that provide competitive advantage to the organization. Originally RBV was coined by Penrose (1959) where he posit that an organization is a bundle of resources that require continuous management. Then RBV concept was extended and promoted by Wernerfelt (1984), Prahalad and Hamel (1990) and Grant (1991). Barney (1991) provides a valuable extension to this school of thought and articulates the critical concepts of core competency and strategic intent of a resource. Rivard et al. (2006, p. 32) following Barney (1991) describe that "resources include assets, capabilities, processes, attributes, knowledge and know-how that are possessed by a firm and that can be used to formulate and implement competitive strategies." As such, ES can be viewed as a resource that organizations possess. As Grant (1991, p. 122) states "the types, the amounts of the resources available to the firm have an important bearing on what the firm

can do.” As such, the nature and the characteristics of a resource determine its ability to provide competitive advantage. RBV specifies that the strategic potential of a resource depends upon four properties such as value, inimitability, rare and non-substitutability (Barney 1991).

As Davenport (1998) states, the best practices introduced by the ES sweep all the messy practices and norms which an organization used to follow. Further, ES integrate organizational transaction processing activities, analyze data and report information across the organizational functions and processes (Klaus et al. 2000). Considering the ability of ES resource to reduce the weaknesses of the organizations, ES can be perceived as a valuable resource to the organization (Mahoney and Pandian 1992). ES are known to be expensive organizational-wide transaction processing software solutions that integrate and automate enterprise-wide business processes (Davenport 1998). ES require knowledge, expertise and skills for the implementation and management throughout the lifecycle (Sedera and Dey 2007; Sedera and Dey 2013). The continuous management of these large software is difficult and expensive (Chua and Khoo 2011). As such considering the cost factor, it is unlikely that ES are not considered as a rare resource (Barney 1991). ES integrate all the business processes and provide a holistic view of the organization (Klaus et al. 2000). The departments such as marketing, HR, finance, operations and warehouse get connected through a centralized database (Markus and Tanis 2000). The centralized database enables the integration and minimizes the data redundancies and duplications of business functions (Somers and Nelson 2003). The integration of business processes enables the business functions across the organization to be standardized (Samaranayake 2009). Further, ES enable real-time propagation of data across the departments (Bingi et al. 1999). These standardized systems are developed after extensive analysis of business practices across industries (Klaus et al. 2000). As such, it is highly unlikely that the value of these software are challenged and substituted. Further, in ES implementation, the accepted norm is the vanilla implementation where the vendors do not make major changes to the original ES solution (Vickers 2000). As such, according to RBV, the competitors can easily duplicate the solution (Mahoney and Pandian 1992), therefore, maintaining non-substitutability can be challenged. In addition, not only ES, any other system or resource cannot be rare, as such, the concept of rarity is obsolete. Further, ES are also available for all competitors as well. However, organizations such as IKEA, Starwood hotel are utilizing their ES to innovate and gain competitive advantage. We posit that organizations attain competitive advantage through ES by leveraging on the inimitability characteristic of ES. Inimitability in this research is defined as the uniqueness of a resource that competitors are not able to duplicate this asset perfectly (Peteraf 1993). As such, this research investigates the inimitability of ES in detail and gain insights into how organizations obtain competitive advantage through ES. Therefore, we derive and investigate the theoretical proposition:

*The inimitability of the enterprise system leads to competitive advantage*

However, it is important to note that we postulate that ES are valuable, rare and non-substitutable resources and these three properties are common to all competitors. Thus, we assert that the differentiating property of the ES that lead the organization to attain competitive advantage is the inimitability property.

## **Methodology**

The objective of this research is to understand the inimitability nature of the ES. Specifically, through the RBV theoretical lens, the research investigates the characteristics of ES that facilitate inimitability which leads to competitive advantage. A case study method was utilized as it allows the researchers to study the complexity of the phenomenon intensively using multiple means of data (Yin 2010). It further allows the researchers to capture the qualities, rationales and processes that followed for exploring the system use and related issue, that cannot be measured or quantified in terms of amount, frequency and intensity (Walsham 1993). For comparing the results across cases and specially for investigating a phenomenon such as competitive advantage, a multiple-case study method was considered appropriate (Eisenhardt 1989).

The question that this paper raises is on “why only some organizations succeed in attaining competitive advantage using ES?” In order to explore the answer to the aforementioned question, it was required that we select organizations that have succeeded in differentiating their ES and some others who are struggling to attain competitive advantage through their ES. The purposive sampling that was adhered in the study encouraged the inclusion of organizations that have utilized and explored ES using a wealth of characteristics. However, it was mandatory that all organizations must

have an ES that runs all their core businesses such as finance, sales, marketing, production planning and materials / service management. However, we did not differentiate the brand of ES (e.g., SAP and Oracle), the implementation partner, management approach and upgrading approach to understand how organizations introduce inimitability through the ES. The study sought organizations that had implemented ES more than three years ago (at the time of data collection). The 3-year time span is generally considered sufficient for the users to get familiar with the system and the organizations to reach the onward and upward phase (Markus and Tanis 2000; Swanson and Dans 2000). Since the innovation in the IT portfolio is not necessarily something that is evident from the outset, we decided to make field visits for a preliminary investigation. After visiting 11 companies, we identified 9 companies that we can further investigate identified herein as A1, A2, A3, A4, A5, A6, A7, A8 and A9<sup>1</sup>. The details of the 9 case organizations are detailed in Appendix 1.

It is important to obtain insights from multiple levels (e.g., executives, innovation initiators, users) in order to study the phenomenon. Therefore, data was gathered from chief information officer (CIO) and line-of-business (LOB) managers. The targeted CIO sample was appropriate as CIO are able to provide insights on behalf of the organization in relation to IT use and their projects (Ross and Feeny 1999). A CIO manages the information assets and develops and directs organizational strategic objectives through the IT portfolio (Grover et al. 1993) and also an expert on organizational policies, culture, initiatives and strategies (Ross and Feeny 1999). Further, we collected data from managers of the 9 case organizations as well. Each case organization was profiled using additional information gathered through the organization's website and annual reports and through general web searches of the organization's name. Consent was obtained from the CIO and managers for participation in the subsequent interviews. All the interviews were based on the same case protocol, which included interview guidelines with open-ended and semi-structured questions. This included questions about the users, processes ES and the characteristics of ES in each case organization.

### **Data Analysis**

The analysis in the research is a deductive approach where the derived propositions limits the focus and allowed focusing on specific empirical data to validate the proposition (Sarker and Lee 2008). Further, the analysis of negative or challenged cases allows the researcher to explore in-depth and identify anomalies (Lokuge 2015). The interviews were recorded, transcribed and were analyzed to formulate categories and codes. During this process, the data was analyzed to ensure that the categories were exhaustive, included all relevant items and were mutually exclusive, so that no single item could be coded in more than one category. The inimitability of the ES was coded as high and low considering: (i) the level of localization of the ES and (ii) the extent to which the localization is ambiguous to the competitors. If both are high, the inimitability of the ES is considered as high and if both are low the inimitability of the ES is considered as low. First, separate tables were created for each case that described nature of the project and the characteristics that supported competitive advantage. Segments of the transcripts that testified each characteristic were then identified. The segments were investigated thoroughly to identify the conditions and their associated consequences. These results were then organized in a continuum to build a logical concept. The resulting concepts are presented in figures. Due to page limitations, the tables and the codes are not presented. Each case was compared in pairs to identify the similarities and differences between them.

### **Findings**

The objective of this study is to understand how organizations differentiate the value propositions of ES, that they become competitive. From a historical standpoint, almost all ES were considered as a strategic asset (Davenport 2013), when they were first implemented. As such, the role of ES can be justified as valuable, rare and non-substitutable and in this research the objective is to investigate how the *inimitability* can be attained using ES. As such, the questions that we sought to answer through this research included: (i) what are the core business and strategic directions, motivations and objectives of the organization? (ii) what are the value propositions of ES? and (iii) what are the benefits sourced through ES?

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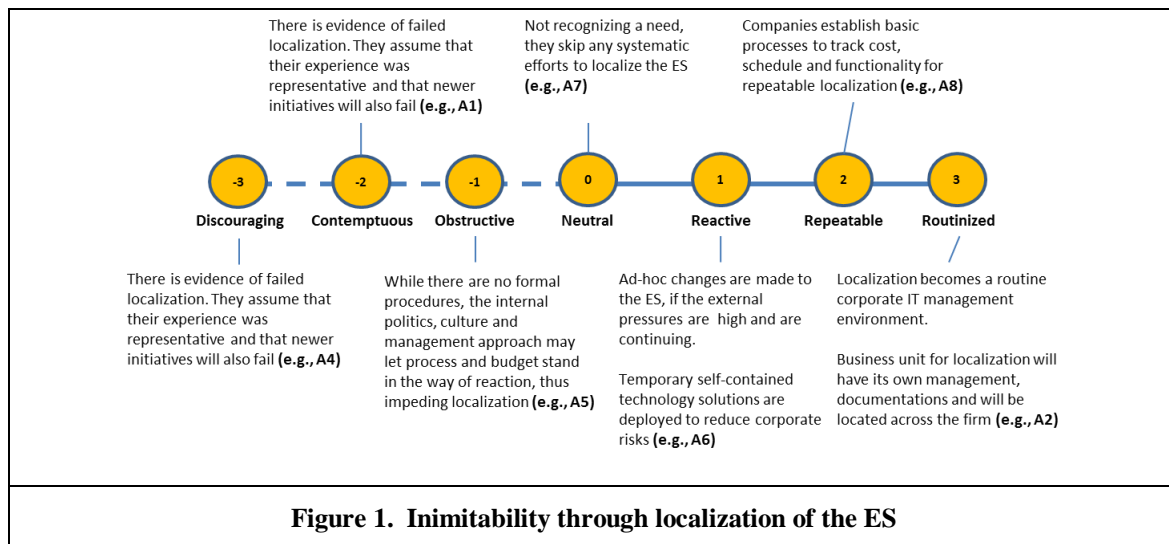
<sup>1</sup> Due to the confidentiality agreements signed between the organization and the university, pseudo-names are given.

The findings highlighted that the brand of the software or the implementation partner of the ES had less to do with their ability to attain competitive advantage. For example, A2 had implemented AS/400 as their ES. In A1 the implementations were carried out by reputable global implementation partners, while in A2 the implementation was done by local implementation consultants. Moreover, the brand of the software, the number of individual applications in the ES and the implementation partner did not make any difference for these organizations for attaining competitive advantage. Furthermore, it was found that companies rarely are satisfied with the speed and the specificity of new software features and functions developed by their ES software vendors.

The focus of the ES too was different across the organizations. For some, it (the ES) was the *main* resource that assists the organization to manage their costs in an effective manner. As such, they regularly initiated projects within the organization to minimize costs. This changes the attitude of the organization in using ES *now only* to “keep the lights on,” and focuses on how such core activities can be done more effectively. As such, these organizations focused on process efficiencies – rather than providing value through creating new business models. This is some-what contradictory to the established views about ES, which argued that ES is difficult to learn and change, and that organizations take years to stabilize and optimize their ES after any major change. Furthermore, there was heavy reliance on the software vendors to keep the ES inimitable through upgrades and business process improvement initiatives. The organizations had thought to have attained some degree of inimitability, albeit for a short time, such characteristics disappeared over time. Overall, we found A4, A6, A7, A9 to have ES with strong inimitability, A3, A5, A8 with moderate inimitability and A1, A2 to have low inimitability. The high, medium low is an interpretive assessment that two independent researchers made based in relation to the time and effort required for a competitor of the organization to attain the same (if not better) solution.

The analysis of data highlighted that organizations seek inimitability through the following mechanisms. Herein, we do not simply identify the *factor* that is important. Rather we place each *condition* on a continuum. In doing so, we highlight that the factors are identified not as binary, rather journey that organizations can engage in relation to a specific objective (e.g., a project, module). The three conditions that facilitate inimitability are: (i) localization of the ES increases inimitability, (ii) augmenting the functional capabilities of ES increases inimitability and (iii) open innovation channels assist inimitability

### Condition 1: Localizing the Enterprise System



The first important factor for attaining inimitability through ES is about degree of localization. The term localization here captures the meaning of the process of making the ES adjustable for the circumstances that are unique to the organization and its territorial boundaries. In the phrase above, the term ‘localization’ can be replaced with ‘internalization’ or even ‘customization.’ However, customization acts pertaining to one-off technical features do not add inimitability. The traditional view of the ES is that they provide standardization, centralized management and integrated view of the business. Most organizations received these benefits through the adoption of ES applications. On the other hand, ES are accused of being too rigid and fail to accommodate the unique, local

opportunities and needs of the organizations. It is also argued that organizations are now mature enough to attain localization, without compromising standardization.

Organizations that are successful in creating an inimitable ES in our data sample were able to create a *high degree of localization* that accommodates their local business needs. The term localization does not simply refer to the geographical locations that the organization operates in. In addition and perhaps more importantly, it captures how organization uses the ES for the unique requirements. Overall, high degree of localization, which demonstrated high degree of inimitability, made organizations face business challenges effectively by reacting quickly and effectively (competitiveness).

A2 was acknowledged globally for their innovation, presented an extreme case. The ES of A2 was an AS/400 system that was developed and installed over 20 years ago. Their degree of localization can be assessed as 'routinized.' They argued that the internal core business processes of their AS/400 were served adequately and no upgrades or extensions were done for the past 7 years.

*"Our systems are old. Fundamentally, we have not changed much in the systems. But we have given localized systems to all our sub-divisions. They can request local modifications through their IT guy to my team and we consider each request and implement it. It is a fully de-centralized system to consider tokens [requests], but managed centrally"* – CIO of A2

The LOB managers at A2 considered that the enterprise system supports their business activities and allow them to be competitive.

*"Today, if we want to beat the competitors, we have to personalize our product offers... and service offers too. People will not just buy an insurance policy. They buy the whole experience. Our department [claims] has introduced heaps of apps that work with the AS400. These ideas came from the department itself"* – LOB Sales and Claims Manager

At the other extreme, A4 presented a case of very low localization. They maintain a single global instance of SAP with no room for any localization.

*"Our instructions are clear. Changes can be suggested once a year and that is all. Even then, unless the change request must be related to all departments"* – CIO of A4

The constrained localization of the SAP system in A4 causes challenges to the competitiveness of several areas in the organization including sales, marketing and logistics. The marketing manager of A4 summarizes their concerns.

*"Our competitors can introduce many products, sales, marketing and advertising campaigns. We cannot do anything like that. Already our market share has dropped to 50% in some areas, you know we used to have the complete monopoly"* – LOB Brand manager

While the extremes of localization of the ES may be rare and introducing such high degree of localization would perhaps complicate the technology landscape, it clearly influences inimitability. In the analysis of these organizations, it was highlighted that despite having an 'up-to-date' ES and access to required skills, organizations find it difficult to introduce new technologies effectively due to low degree of localization. The ES inherently is inflexible and a more localized ES solution would provide organizations with competitive advantage (or when lacking, compromised competitiveness). As such, our evidences show a strong positive relationship between the high degree of localization of the ES and with high level of competitiveness. Mapping the findings of the 9 cases, we derive Figure 1 that outlines the continuum of localization of the ES.

### **Condition 2: Augmenting the functional capabilities of ES**

The data analyzed in this research revealed that the functions and capabilities inherited with ES do not necessarily lead to competitive advantage in the long-run. While all case organizations acknowledge how ES provided valuable functional capabilities that ultimately led to competitive advantage, many struggle to justify their continuous reliance of the ES as a source of functional potency for competitiveness in hyper competitive environments. More broadly, the data analysis revealed that there were two salient catalysts that determined the sources of functional augmentation in ES: (i) vendor push strategies observed through upgrades and enhancements and (ii) augmentation of ES capabilities through new technologies.

For example, A5 followed the typical SAP road map for upgrades and modifications and aligned its functional enhancement strategy with vendor-push approach. They argued that their system is robust and have optimized compliance.

*“It is much less risky when you follow the [SAP’s] road map. We have all the patches, all up-to-date”*  
– CIO of A5

However, the state of stability described at A5 by its CIO of “keeping the lights on,” did not seem to provide competitive advantage to the LOBs that compete directly with their competitors.

*“Yes, we have a good SAP system. It does not have any errors .... We can’t take SAP to the maintenance sites...We still use prints and diagrams for our work. Our competitors are all carrying tablets that are connected to SAP. SAP doesn’t have that... they built it”* – LOB of A5

A7 had similar pessimistic views of how ES’s functional capabilities are providing them with unique competitive advantage.

*“What you get with SAP is there [available] for everyone. So what’s the unique proposition?”* – CIO of A7

In the sample, there were several organizations that had resisted even their mandatory upgrades suggested by the ES vendors. For example, both A3 and A8 ignored the mandatory upgrades recommended by SAP AG. A3 argued that the value propositions through such software upgrades are minimal and decided to withheld all SAP upgrades till 2020 (despite losing their software warranties).

*“I cannot say that we run SAP at 100%...I think if we can get 90%, or even 80% that’s fine. Instead of worrying about getting it 100%, we focus on trying to help business with what they want to do...with small changes that SAP cannot do”* – CIO of A3

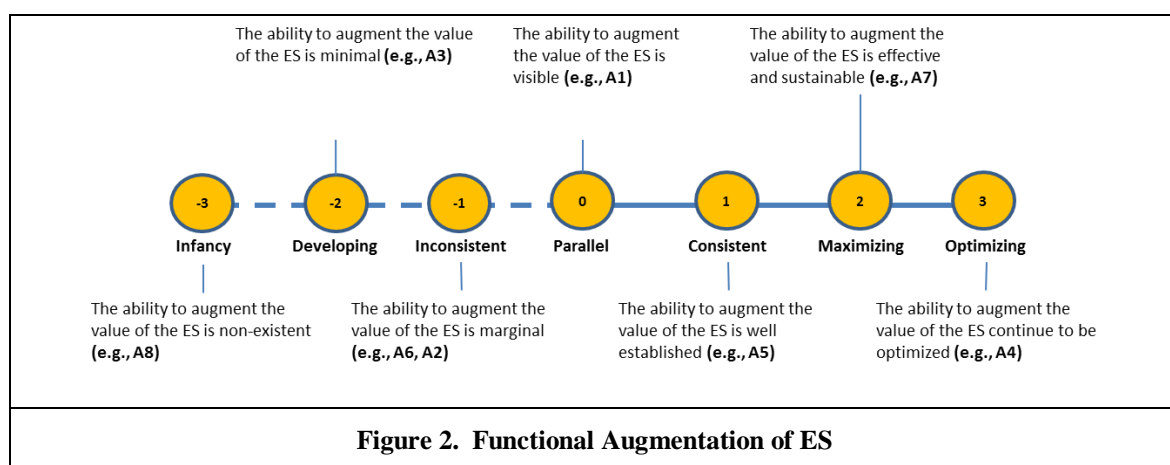
Similarly, A8 imposed a temporary freeze on SAP upgrades after they assessed their level of ‘maturity’ is adequate and “satisfactory.”

*“At best it [SAP] is satisfactory. We don’t want to get all upgrades. We have a stable [SAP] system. We now have to giving value”* – CIO of A8

Instead of focusing on ES upgrades, at the time of data collection, both A8 and A3 have initiated several operational, customer-focused, functionally focused and value-adding initiatives using a range of new technologies such as mobile, analytics and cloud technologies. Such initiatives were driven by the market pull (necessity) and employed ES as the foundation to draw data and business rules to new technologies to develop seemingly simple and inexpensive systems. For example, A3 deployed several mobile apps for truck route optimization which drew master data from the ES.

*“The mobile app that we developed draws master data from SAP’s on customer and material and maps against the google maps for the drivers to see the optimal travel route. It takes into account the dangerous goods routes, traffic, customer addresses and the capacity of the truck”* – CIO of A3

The functional augmentation of ES too can be depicted using seven levels depicted in Figure 2.



Supporting this view of integrating ES and other technologies, literature argues that when considering resource inimitability it is best that one looks beyond the individual inimitability of each resource and



extract it to the inimitability of a collection of resources at a higher level (Barney 1991). As such, according to Morgan et al. (2006, p. 625) “*RBV theory posits that it is the inimitability of the mix of resources used to conceive and implement a competitive strategy that is theoretically important in determining firm performance outcomes.*” Further, through the integration of resources organizations are able to augment the functionalities and are able to counteract the deficiencies in the ES. Of the nine cases investigated in this study, eight organizations engaged in such value-adding initiatives using ES as the foundation and a combination of digital technologies like cloud and mobile. The case respondents universally agreed with the importance of answering to the needs of the market to remain competitive. However, most cases highlighted that the vendor driven initiatives are “*too slow,*” “*too expensive*” and “*reactive.*”

A3 for example highlighted the high cost associated with ES even in making a small change.

“*There is too much cost associated with SAP. It is not worthwhile to touch SAP, unless you are talking about a big project*” – CIO of A3

During the course of our interactions, A3 successfully engaged in introducing several mobile apps and cloud solutions which were described as “*cost effective*” and “*easy to use*” by the CIO of A3.

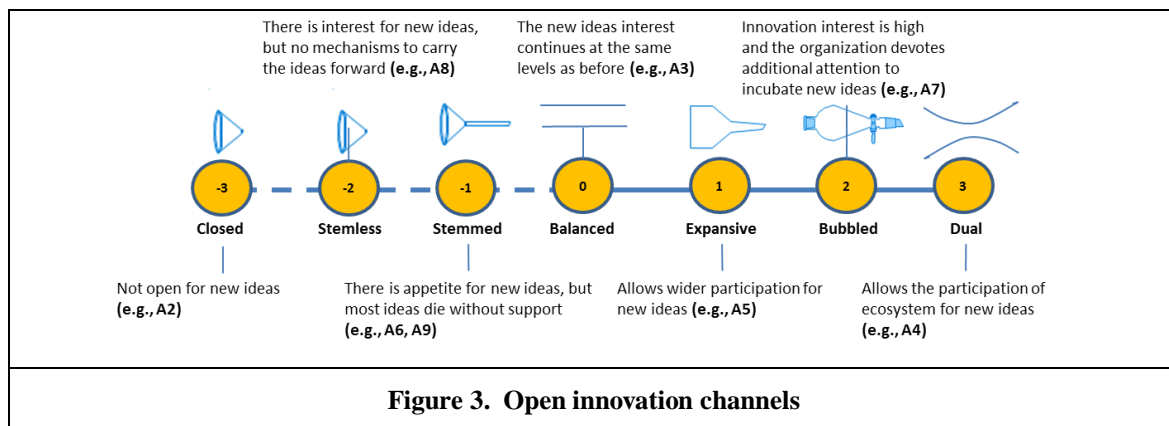
“*It is sometimes easy to whip-up a mobile app than making a solution through SAP. We have to have the SAP backbone, but work can be done through other ways now.*” – CIO of A3

In a similar manner, A6 managed to introduce inimitability by coupling their ES with a cloud solution that transcend to process efficiencies and cost savings.

“*The cloud replicates what SAP does... it [the cloud] has all Master records and we simply display them using the data in the cloud*” – CIO of A6

Our observations found that the meaning of ES functional augmentation is unique to each organization. Of the two catalysts of functional augmentation – vendor push and market pull – while both can play a vital role in attaining inimitability, through market pull organizations tend to focus on amalgamating digital technologies with ES.

### Condition 3: Opening innovation channels



The third condition is derived through the data that relates to inimitability is the way that new ideas are canvassed by the organization in relation to the ES. The traditional view of managing an ES takes an insular perspective that prohibits changes to the ES, unless they are imperative (Eden et al. 2014). There is an established view amongst practitioners and academics that implementing ‘vanilla’ (without making changes to the original configuration of the software) is the best for long-term sustainability of an ES. Such views contradict to the inimitability value propositions. Moreover, making changes to ES are discouraged through global templates and centralized management structures (Sedera 2016). Overall, there is less room for the organization to innovate with ES (Sedera et al. 2016; Tan et al. 2016). While the prevailing view discourages innovation, innovation is considered as the lifeblood of the modern organizations (Lokuge 2015; Lokuge and Sedera 2016). Moreover, the possibility of integrating digital technologies with ES means that there is a growing potential to open innovation channels through employees, vendors, consultants and also through the broader partnerships (Nuwangi et al. 2012; Nuwangi et al. 2014). Such openness will facilitate new ideas that will increase inimitability of the ES.

The analysis of data highlighted how the sample organizations approached multiple innovation channels to facilitate inimitability. For example, A2 developed effective insurance claim management in conjunction with the natural disaster management department.

*“With the department, we launched a mobile app to report claims of natural disasters. It takes our customer and product master data from SAP and uses with a mobile platform”* – CIO of A2

Similarly, A2 combined with A8 and developed a mobile app to provide mobile alerts, geospatial information, in the cloud to record and assess any natural disasters.

*“It was a great merger [between A2 and A8]. We had the process know-how, they had the technology. When you marry the two, we had a great product at the end”* – CIO of A2

To the contrary, A4 did not seek any partnerships for innovation and maintained a strong centralized management approach that relied only on the ES vendor. The observations of how the case organizations made their ES inimitable are captured using seven innovation funnels in Figure 3. The funnels exemplify the way new configuration ideas are brought into the organization, their incubation and their development as innovative projects. The innovation funnels can be identified from being totally closed for new ideas at one end to having a dual opening for innovation at the other.

Based on our observations, A2 was the most successful in opening for new ideas and is considered as a thought-leader in digital innovations. Similarly, A8, A6, A9 and A3 had received either national or international awards for digital initiatives. A common facet with all successful organizations was their short incubation periods. Further, A2 provided year-end bonuses to staff from where new ideas were originated. This creates a cultural shift and provides a natural environment for innovation. A9 encouraged innovative idea generation by making new technologies available to management and operational staff members. For example, a collection of new technologies including several Google glasses were made available to staff as accessories to create a ‘play-and-suggest’ environment. Further, there are some lessons to be learnt from unsuccessful businesses as well. A4 has a centralized global SAP system that does not allow changes to their ES, unless commissioned by the head office (as such a “closed funnel”). A5 on the other hand, welcomes new ideas and changes to their ES are done periodically. As such, the enthusiasm from project sponsors diminishes over time. For example, a group of engineers suggested ways to improve wind-power generator maintenance through a GPS-enabled, cloud-based, mobile access system that connects to SAP master records. The proof of concept process took nearly 11 months, at which point the thought-leaders had lost the enthusiasm to participate. In summary, our evidence suggest that organizations with (i) wider entries to the innovation channels, (ii) robust incubators with long line of ideas and (iii) short innovation processes can formulate inimitable ES.

## Conclusion

This research contributes directly to RBV and ES. It began with the premise that an ES struggling to provide competitive advantage in the contemporary business world. We argued that the premises of RBV in considering ES as *valuable*, *rare* and *non-substitutable* are challenged, given that organizations of similar caliber have adopted ES decades ago. Akin to RBV, we then argued that *inimitability* is a possible mechanism that ES can continue to add competitive value to organizations. Following the theoretical foundations of RBV, we devised this research to understand how organizations pursue inimitability. We gathered data from 9 case organizations. For organizations to take full advantage of their ES making it inimitable and thereby making them competitive, our research derived three specific strategies: (i) how organizations should promote localization of their ES to attain inimitable ES, (ii) how organizations should augment the functionalities of the ES through the amalgamation of digital technologies and (ii) how organizations should be open to new ideas from internal and external business ecosystem members. The study findings derived three continua for each of the aforementioned factors by providing evidence from the sample organizations. For the academics, we expand a facet of research by providing theoretically sound extensions on inimitability. The popularity of RBV in business and information systems disciplines means that the findings of this study are cross-disciplinary. The prescriptive, evidenced-based conditions and continua derived herein will provide the practitioners a mechanism to assess their current state of attaining inimitability. However, the conditions derived in this research do not provide a panacea for all organizations creating an inimitable ES. However, the conceptual footprint embedded in each of the three conditions will allow a systematic assessment of their own characteristics and successfully engage in creating an inimitable ES. Therefore, these three conditions will assist organizations to choose the approach suitable to their requirements and ambitions.

## Appendix 1: Details of the case organizations

Appendix 1: Summary of the case organizations			
Case	Details of the organization	Roles	Hours
A1	A1 is a dairy products producer in Australia operates as a subsidiary of a global dairy provider. Their major competitors are the two biggest grocery chains in Australia. A1 implemented their SAP system in 2003. Four years since the implementation, in 2008, the organization upgraded their SAP to SAP 4.2. They also implemented the SAP's Supply Chain Management system that provided them with functionalities such as Advance Planning and Optimizing and Supplier Network Planning.	CIO, LOB Managers	8
A2	A2 is a South Asian life and general insurance providers. They have implemented AS400 ES for managing all the core business activities and employ a centralized management approach. They have not upgraded their system for some time. Apart from their ES, A2 uses mobile technologies and analytics for introducing novel experiences for their customers. A2 has around six strong competitors. They heavily depend on ES as well as new technologies for innovation.	CIO, LOB Managers	5
A3	A3 is an Australian logistics company that operates in 50 countries. A3 has implemented their SAP system and employs a centralized global template to manage its SAP system. A3 recognizes the importance of localization of IT products and encourages country-specific solutions to be developed and adopted.	CIO, Director of Logistics	11
A4	A4 is a manufacturing organization that produce health and nutrition products. Currently A4 has over 1000 key product lines. However, in the mid-1990s A4 possessed nearly 20,000 unique products and services. The diversity of the products led A4 to face issues with quality assurance, timely development of products and issues pertaining to supply and demand management. However, by mid-1990, the company decided to limit the 'localization' of products and only to maintain a set of core products. They highlighted quality control, fierce market competition from local and global competition as the rationale to limit products and services. In 1996 MULTI implemented a SAP system using a reputed vendor organization. The company employs a semi-centralized management approach in managing the SAP system, where the Asia-Pacific management of SAP is facilitated through a group of dedicated staff in Australia.	CIO, Brand Manager	4
A5	A5 is an Australian company that explores and builds gas fields, produces and sells integrated coal seam gas (CSG) and generates electricity. They implemented SAP few years ago using the same SAP blue print of the giant company. The company employs a semi-centralized management approach in managing the SAP system, where the main controlling of Asia-Pacific region is located in Malaysia.	CIO, Technical Consultants	12
A6	A6 is a farming company in Australia. They attempt to advance their farming practices through investing in new technologies and encouraging innovation. FARM implemented their ES as their core system. The current IT portfolio includes, Business Intelligence, analytics and mobile solutions. The company employs a centralized management approach in managing the SAP system.	CIO, Technical Consultants	12
A7	A7 is an Australian community care provider. This company provides health care for individuals, families and communities across Australia. The company has rapidly expanded and diversified their capabilities to meet the needs of the customers. To manage the employees, volunteers and other assets they have an Oracle system implemented. Apart from the Oracle system, they have implemented mobile technologies and analytics solutions for introducing innovative solutions.	CIO, Manager	6
A8	A8 is a South Asian telecommunications company. They deliver advanced mobile telephony and high speed mobile broadband services to a subscriber-base in excess of nearly 8 million customers. A8 uses SAP and it is currently managed by a dedicated IT staff at the local office led by an experienced CIO. Apart from SAP they also have mobile technologies and analytics technologies used in their IT portfolio for providing innovative solutions for the customers.	CIO, BI Lead	4
A9	A9 is a public company established under the Transport Act. The objective of A9 is to manage the road network effectively. Their objective is to achieve ongoing reductions in the number and severity of road crashes and to manage the cost of road maintaining and cost of development and manage and improve the effectiveness and efficiency of the transport system. The company employs a centralized management approach in managing the Oracle system.	CIO, BI Dept. Head, BI Analysts	11

## References

- Avedillo, J.G., Begonha, D., and Peyracchia, A. 2015. "Two Ways to Modernize It Systems for the Digital Era," in: *Insights & Publications*. <http://www.mckinsey.com/>; McKinsey & Company.
- Barney, J. 1991. "Firm Resources and Sustained Competitive Advantage," *Journal of Management* (17:1), pp 99-120.
- Bingi, P., Sharma, M.K., and Godla, J.K. 1999. "Critical Issues Affecting an Erp Implementation," *Information Systems Management* (16:3), pp 7-14.
- Chua, C.E.H., and Khoo, H.M. 2011. "How Organizations Motivate Users to Participate in Support Upgrades of Customized Packaged Software," *Information & Management* (48:8), pp 328-335.
- Davenport, T.H. 1998. "Putting the Enterprise into the Enterprise System," *Harvard Business Review* (76:4), pp 121-131.
- Davenport, T.H. 2013. *Process Innovation: Reengineering Work through Information Technology*. Harvard Business Press.
- Eden, R., Sedera, D., and Tan, F. 2012. "Archival Analysis of Enterprise Resource Planning Systems: The Current State and Future Directions," *International Conference on Information Systems*, Orlando Florida, USA: AIS Electronic Library (AISeL).
- Eden, R., Sedera, D., and Tan, F. 2014. "Sustaining the Momentum: Archival Analysis of Enterprise Resource Planning Systems (2006–2012)," *Communications of the Association for Information Systems* (35:3), pp 39-82.
- Eisenhardt, K.M. 1989. "Building Theories from Case Study Research," *Academy of Management Review* (14:4), pp 532-550.
- Gable, G.G., Sedera, D., and Chan, T. 2008. "Re-Conceptualizing Information System Success: The Is-Impact Measurement Model," *Journal of the Association for Information Systems* (9:7), pp 377-408.
- Gawer, A. 2014. "Bridging Differing Perspectives on Technological Platforms: Toward an Integrative Framework," *Research Policy* (43:7), pp 1239-1249.
- Grant, R. 1991. "The Resource-Based Theory of Competitive Advantage: Implications for Strategy Formulation," *California Management Review* (33:3), pp 114-135.
- Green, S.G., Gavin, M.B., and Aiman-Smith, L. 1995. "Assessing a Multidimensional Measure of Radical Technological Innovation," *IEEE Transactions on Engineering Management* (42:3), pp 203-214.
- Grover, V., Jeong, S.-R., Kettinger, W.J., and Lee, C.C. 1993. "The Chief Information Officer: A Study of Managerial Roles," *Journal of Management Information Systems* (10:2), pp 107-130.
- Holland, C.P., and Light, B. 2001. "A Stage Maturity Model for Enterprise Resource Planning Systems Use," *ACM SIGMIS Database* (32:2), pp 34-45.
- Karimi, J., Somers, T.M., and Bhattacharjee, A. 2007. "The Impact of Erp Implementation on Business Process Outcomes: A Factor-Based Study," *Journal of Management Information Systems* (24:1), pp 101-134.
- Kharabe, A., and Lyytinen, K.J. 2012. "Is Implementing Erp Like Pouring Concrete into a Company? Impact of Enterprise Systems on Organizational Agility," in: *Thirty Third International Conference on Information Systems (ICIS 2012)*. Orlando
- Klaus, H., Rosemann, M., and Gable, G. 2000. "What Is Erp?," *Information Systems Frontiers* (2:2), pp 141-162.
- Kraemmerand, P., Møller, C., and Boer, H. 2003. "Erp Implementation: An Integrated Process of Radical Change and Continuous Learning," *Production Planning & Control* (14:4), pp 338-348.
- Lokuge, K.S.P. 2015. "Agile Innovation: Innovating with Enterprise Systems." Queensland University of Technology.
- Lokuge, S., and Sedera, D. 2014a. "Deriving Information Systems Innovation Execution Mechanisms," *Australasian Conference on Information Systems (ACIS 2014)*, Auckland, New Zealand: AIS Library.
- Lokuge, S., and Sedera, D. 2014b. "Enterprise Systems Lifecycle-Wide Innovation," *Americas Conference on Information Systems (AMCIS 2014)*, Savannah, Georgia: AIS Library.
- Lokuge, S., and Sedera, D. 2016. "Is Your It Eco-System Ready to Facilitate Organizational Innovation? Deriving an It Eco-System Readiness Measurement Model," *The International Conference on Information Systems (ICIS2016)*, Dublin, Ireland: AIS.
- Lokuge, S., Sedera, D., and Grover, V. 2016. "Thinking inside the Box: Five Organizational Strategies Enabled through Information Systems," *Pacific Asia Conference on Information Systems (PACIS 2016)*, Chiayi, Taiwan: AIS.
- Mahoney, J.T., and Pandian, J.R. 1992. "The Resource-Based View within the Conversation of Strategic Management," *Strategic Management Journal* (13:5), pp 363-380.
- Markus, L., and Tanis, C. 2000. "The Enterprise Systems Experience - from Adoption to Success," in: *Framing the Domains of It Management: Projecting the Future through the Past*, R.W. Zmud (ed.). Cincinnati, OH: Pinnaflex Educational Resources, Inc, pp. 173-207.
- Morgan, N.A., Vorhies, D.W., and Schlegelmilch, B.B. 2006. "Resource-Performance Relationships in Industrial Export Ventures: The Role of Resource Inimitability and Substitutability," *Industrial Marketing Management* (35:5), pp 621-633.
- Nuwangi, S.M., Sedera, D., and Murphy, G. 2012. "Multi-Level Knowledge Transfer in Software Development Outsourcing Projects: The Agency Theory View," in: *International Conference on Information Systems*. Orlando, Florida.

- Nuwangi, S.M., Sedera, D., Srivastava, S.C., and Murphy, G. 2014. "Intra-Organizational Information Asymmetry in Offshore Isd Outsourcing," *VINE: The journal of information and knowledge management systems* (44:1), pp 94-120.
- Nylén, D., and Holmström, J. 2015. "Digital Innovation Strategy: A Framework for Diagnosing and Improving Digital Product and Service Innovation," *Business Horizons* (58:1), pp 57-67.
- Penrose, E.T. 1959. *The Theory of the Growth Of the Firm*. New York: Sharpe.
- Peteraf, M.A. 1993. "The Cornerstones of Competitive Advantage: A Resource-Based View," *Strategic Management Journal* (14:3), pp 179-191.
- Prahalad, C.K., and Hamel, G. 1990. "The Core Competence of the Corporation," *Harvard Business Review* (68:3), pp 79-91.
- Rajagopal, P. 2002. "An Innovation—Diffusion View of Implementation of Enterprise Resource Planning (Erp) Systems and Development of a Research Model," *Information & Management* (40:2), pp 87-114.
- Rivard, S., Raymond, L., and Verreault, D. 2006. "Resource-Based View and Competitive Strategy: An Integrated Model of the Contribution of Information Technology to Firm Performance," *The Journal of Strategic Information Systems* (15:1), pp 29-50.
- Rosemann, M., Sedera, W., and Sedera, D. 2000. "Industry-Oriented Education in Enterprise Systems," *Australasian Conference on Information Systems*, Brisbane, Australia: AIS.
- Ross, J.W., and Feeny, D.F. 1999. *The Evolving Role of the Cio*. Center for Information Systems Research, Sloan School of Management, Massachusetts Institute of Technology.
- Samaranayake, P. 2009. "Business Process Integration, Automation and Optimization in Erp: Integrated Approach Using Enhanced Process Models," *Business Process Management Journal* (15:4), pp 504–526.
- Sarker, S., and Lee, A.S. 2008. "A Case Study of Business Process Reengineering Failure," in: *Business Process Transformation*, V. Grover and L. Markus (eds.). p. 251.
- Seddon, P.B., Calvert, C., and Yang, S. 2010. "A Multi-Project Model of Key Factors Affecting Organizational Benefits from Enterprise Systems," *MIS Quarterly* (34:2), pp 305-328.
- Sedera, D. 2006. "Enterprise Systems Success Measurement Model," in: *School of Information Systems*. Brisbane: Queensland University of Technology, p. 456.
- Sedera, D. 2016. "Does Size Matter? The Implications of Firm Size on Enterprise Systems Success," *Australasian Journal of Information Systems* (20), pp 1-25.
- Sedera, D., and Dey, S. 2007. "Everyone Is Different! Exploring the Issues and Problems with Erp Enabled Shared Service Initiatives," *Americas Conference on Information Systems*, KeyStone, Colorado: AIS, p. 361.
- Sedera, D., and Dey, S. 2013. "User Expertise in Contemporary Information Systems: Conceptualization, Measurement and Application," *Information & Management* (50:8), pp 621–637
- Sedera, D., Gable, G., and Chan, T. 2003. "Knowledge Management for Erp Success," *Proceedings of the 7<sup>th</sup> Pacific Asia Conference on Information Systems* J. Hanisch, D. Falconer, S. Horrocks and M. Hillier (eds.), Adelaide, Australia: Association for Information Systems, pp. 1405-1420.
- Sedera, D., Lokuge, S., Grover, V., Sarker, S., and Sarker, S. 2016. "Innovating with Enterprise Systems and Digital Platforms: A Contingent Resource-Based Theory View," *Information & Management* (53:3), pp 366–379.
- Sedera, D., and Tan, F. 2005. "User Satisfaction: An Overarching Measure of Enterprise System Success," *10<sup>th</sup> Pacific Asian Conference on Information Systems (PACIS 2005)*, Bangkok, Thailand.
- Somers, T.M., and Nelson, K.G. 2003. "The Impact of Strategy and Integration Mechanisms on Enterprise System Value: Empirical Evidence from Manufacturing Firms," *European Journal of Operational Research* (146:2), pp 315-338.
- Srivardhana, T., and Pawlowski, S.D. 2007. "Erp Systems as an Enabler of Sustained Business Process Innovation: A Knowledge-Based View," *The Journal of Strategic Information Systems* (16:1), pp 51-69.
- Strong, D.M., and Volkoff, O. 2010. "Understanding Organization–Enterprise System Fit: A Path to Theorizing the Information Technology Artifact," *MIS Quarterly* (34:4), pp 731-756.
- Swanson, E.B., and Dans, E. 2000. "System Life Expectancy and the Maintenance Effort: Exploring Their Equilibration," *MIS Quarterly* (24:2), pp 277-297.
- Tan, F.T.C., Tan, B., Wang, W., and Sedera, D. 2016. "Management Innovation for It-Enabled Operational Agility: An Interdependencies Perspective," *Information & Management* (54:3), pp 292-303.
- Vickers, V. 2000. "The Real Erp Fast Track: Forget Roi and Go Vanilla!," *Enterprise Systems Journal* (15:5), pp 46-49.
- Walsham, G. 1993. *Interpreting Information Systems in Organizations*. Chichester: Wiley & Sons.
- Walther, S., Sedera, D., Sarker, S., and Eymann, T. 2013. "Evaluating Operational Cloud Enterprise System Success: An Organizational Perspective," *European Conference on Information Systems (ECIS 2013)*, Utrecht, p. 16.
- Wernerfelt, B. 1984. "A Resources-Based View of the Firm," *Strategic Management Journal* (5:2), pp 171–180.
- Yin, R.K. 2010. *Qualitative Research from Start to Finish*. New York: Guilford Press.
- Yoo, Y., Boland Jr, R.J., Lyytinen, K., and Majchrzak, A. 2012. "Organizing for Innovation in the Digitized World," *Organization Science* (23:5), pp 1398-1408.