

## **STRATEGIC INFORMATION SYSTEMS INTEGRATION AND SUSTAINABLE COMPETITIVE ADVANTAGE**

**Leonard T Mwithiga** 

School of Business, University of Nairobi, Kenya

[leonard\\_mwithiga@yahoo.com](mailto:leonard_mwithiga@yahoo.com)

**James M Njihia**

School of Business, University of Nairobi, Kenya

**X. N. Iraki**

School of Business, University of Nairobi, Kenya

### **Abstract**

*Most researchers and industry practitioners have investigated Information systems competitive competencies that make up a firm's strategic framework to understand sustainable competitive advantage, yet the mechanisms through which organizations achieve repeated and sustained value from information systems has received scant attention. Through a series of theoretical literature review and industry experiences, the author proposes the use of Resource-Based Theory (RBT) coupled with Dynamic Capabilities framework in integrating information systems with sustainable competitive advantage. The Resource Based Theory (RBT) probes into the inner workings of a firm, suggesting that a firm's Information System assets and resources are a significant part of the basis of a firm's "rare" core competencies to compete successfully. 'Rarity' is seen as a critical pillar to competitive advantage. Using RBT and research in the economics, strategy, and Information System literatures, an initial "Framework of Sustainability" is proposed. The author also introduces the concept of Optimizable Resource Matrix (ORM) which posits that Information Systems assets and resources in themselves are not the bases of establishing "rarity", but are combined with other factors within the firm to create barriers to imitation. The need to generate sustained value is not just an IT specific problem, indeed commercial entities, are built to provide sustained shareholder value. A key implication from this paper is that "[...] firms cannot expect to "purchase" sustained competitive advantages in the open market.*

*Rather, such advantage must be found in rare, imperfectly mobile and non-substitutable resources already controlled by a firm” (Barney, 1991, p. 117), while incorporating the calculated effects of external and environmental factor analysis, hence the proposed “Optimizable Resource Matrix”*

*Keywords; Strategic information systems, sustainable competitive advantage, Resource based theory, Dynamic Capabilities theory, Optimizable Resource Matrix*

## **INTRODUCTION**

This paper tries to bridge the gap between theory and practice of information technology, within corporate and business world. Particular interest is paid to the subject of competitive advantage, and how information systems affects it. In order to discuss this topic the underpinning theories, such as Resource Based View and Dynamic capabilities framework are contextualized and synthesized. The main objective is to understand how corporations differentiate themselves in the marketplace in order to effectively compete as well as extract returns, and the role Strategic Information Systems can play in ensuring sustainability of that advantage. In order to complete this, literature on strategic theory and its economic reinforcements are reviewed from the leading schools of thought: resource-based theory, modern industrial organizational economics and strategy theories.

Piccoli & Ives (2005), Feeny, Ives & Piccoli (2003), posit that many businesses have created advantage with appropriate optimizable resource barriers to the slow erosion of market competitive parity. It is on this position that the author finds the academic and industry research motivation to revisit and further illuminate distinct research gap and concerns. Separately, Wiggins & Rueffli (2002), note that “RBT’s notions of asset rarity, and barriers to replication and substitution remain difficult to operationalize. In the context of Information systems, it remains even more difficult how practitioners would be able to construct, evidence and interconnect components of Information Systems into profitable business product portfolio, and effectively and analytically demonstrate the compounded positive effect to the firm’s strategic and sustainable competitive posture”.

Prescriptions on how firms differentiate themselves by developing core capabilities, is clearly theorized within the resource based theory and dynamic capabilities framework; however, what is missing is how these differentiators of advantage evolve within the black box called the firm. It would be useful and indeed an imperative for researchers and practitioners to explore the micro-forces within firms that fuels sustainability of core capabilities.

## Strategy and Sustainable Competitive Advantage

Competitive advantages that seem to endure through both good and bad economic, political, and social times are highly prized by firms. The Resource Based Theory (RBT) School enjoined with the Dynamic Capabilities framework, is chosen as the theoretical basis for this paper, around which some distinctions are made with regard to often used words such as “ability” “competence” “capability,” “resources,” “assets” and “strategic architecture”. Although the RBV as a theoretical framework helps explain how firms achieve competitive advantage, this strategic approach does not adequately detail how firms achieve competitive advantage in the context of fast changing environments, notes Eisenhardt and Martin, (2000). Because resources are context based, their values depend on the characteristics of the given environment. Resources are relatively stickier than their environment, resource changes and adaptations often lag behind environmental changes (Teece et al 1997). Therefore, in rapidly changing markets, as is the period post the year 2000, a dominant focus on core resources creates rigidities that prevent firms from adapting their resources to the new competitive environment; (Leonard-Barton, 1992). Scholars thus extended the RBV further to the dynamic capability strategic perspective, stressing the critical role of capabilities to “integrate, build and reconfigure internal and external competencies to address rapidly changing environments” (Teece et al 1997). From this perspective, firms must adapt, integrate, and reconfigure their resources and competencies continuously in response to changing market conditions; however, entrenched organizational processes and routines, developed from previous paths and competence development, constrain those changes or adaptations (Teece et al 1997).

In summary, strategy formation is viewed as an analytical process placing the business within the context of the industry that it is in, and looking at how the organization can improve its competitive positioning within that industry, and thereby achieving superior customer and shareholders returns. In the strategic management literature the concept of Sustainable Competitive Advantage (SCA) is related to another concept – that of Strategic Positioning (SP). Porter (2001) names SP as a source of competitive advantage. According to Porter (2001), sustained profitability in firm performance is the only measure of economic value. He defines two fundamental factors that determine profitability: industry structure, which determines the profitability of the average competitor; and sustainable competitive advantage, which allows a company to outperform the average competitor. Sustainable Competitive Advantage (SCA) is an important concept in strategic management literature and it is gaining more and more popularity among researchers and practitioners. The term Sustainable Competitive Advantage (SCA) was proposed in Porter (1985), when he discussed the basic types of competitive strategies firms can follow (low cost, differentiation, and focus) to achieve SCA. Hoffman (2000)

in his work summarizes all previous works which deal with SCA. Based on the analysis of different perspectives found in the literature he proposed the following definition of SCA: “A Sustainable Competitive Advantage(SCA) is the prolonged benefit of implementing some unique value-creating strategy not simultaneously being implemented by any current or potential competitor, along with the inability to duplicate the benefits of this strategy.” Different authors name different sources of SCA. The most widespread theory explaining sources of competitive advantage is the “resource-based theory” (RBT).Day and Wensley (1998) present a framework to explain the link between the sources of advantage and performance outcomes. They named superior skills and superior resources as the main sources of competitive advantage. Later in resource based theory, these two main sources of advantage were called assets and capabilities respectively. Assets are the resource endowments the business has accumulated, and capabilities are the glue that keeps these assets together and enables them to be deployed advantageously. Capabilities differ from assets in that they cannot be given a monetary value, as can tangible plant and equipment, and are so deeply embedded in the organizational routines and practices that they cannot be traded or imitated, Dierkx and Cool (1989), and Day G. S., (1994).

## **SYNTHESIS OF THEORY**

### **Resource Based Theory**

Management literature suggests that a purely internal (competitive) approach may prove inadequate because issues of external (social) legitimacy and reputation are also extremely important Bowman & Faulkner, (2007). According to Long & Vickers-Koch (2005), each company needs to look inward to understand its own specific capabilities, and outward to identify its special opportunities in the world around it. Indeed, it has long been recognized that competitive advantage must be created within a broader scope of social legitimacy.

The idea that a core competence uniquely defines a firm, and was the source of value creation, is intuitively appealing. Managers in multi-business firms now conceive their firms as portfolios of competencies. Their role, therefore, was to nurture these competencies and deploy them into the businesses. According to Collis & Montgomery (2007), this perspective suggests a new, viable, and important role for CEO's that resonates with executives. In practice, however, these approaches often led to only partial solutions. In addition, the initial discussion left out much of the detail regarding how to develop a corporate strategy based on core competence. Thus, meaningful application of the core competence notion is difficult because of the generality of its level of analysis, and the absence of specific prescriptions. Collis & Montgomery, (2007), posits, “The external environment received little, if any, attention, and what we had learned

about industries and competitive analysis seemed to disappear from our collective psyche”. It is only been during the past decade that the resource-based view (RBV) of the firm has re-emerged, articulating the dynamic relationships among firm resources, capabilities, and competitive advantage. Its main merit is that it offered new insight into the issue of sustainability of competitive advantage.

### **Dynamic Capabilities Theory**

According to Grant (1997), the implications of RBT for strategic management are unclear for two reasons: (a) the various contributions lack a single integrating framework, and (b) little effort has been made to develop the practical implications of this theory. Bowman & Faulkner (1997) state that “although the firm’s unique resources help to explain why some firms outperform their rivals; this is only one part of the explanation.” They make the point that a firm may have great skills in producing a product for which there is little demand, so when assessing the value of a firm’s resources some account needs to be taken of the context within which the firm is operating. In order to address the above criticisms of RBT, we draw on the Dynamic Capabilities (DC) perspective of competitive advantage. DC seeks to bridge these gaps by adopting the process approach, which acts as a mediator between the core resources and the changing business environments. It assists a firm to adjust its mixture of resources to maintain sustainability of the firm's competitive advantage which otherwise might erode over time (Eisenhardt and Martin, 2000, Teece et al., (1997). The Dynamic Capability (DC) perspective extends RBT by emphasizing the importance of the continuous renewal of resources for improved firm performance , (Teece et al 1997, Eisenhardt and Martin, 2000). This perspective focuses on the rapid creation of situation-specific knowledge, which usually involves interaction between a firm's resources (Eisenhardt and Martin 2000). DC underscores the significance of organizational and strategic routines in firms. A firm's strategic routines must integrate, reconfigure, gain and release available resources to adapt to the changing external environment, (Teece et al 1997, Eisenhardt and Martin 2000).

### **Information System (IS) as a Strategic Resource**

Information system strategy is business-led and demand-oriented. It is concerned with exploiting information system either to support business strategies or create new strategic options. The latter is concerned with the ongoing strategic success of firms. Information systems strategy is defined as long-term directional plan on how to support or enable business/corporate strategy. Because of expansion of strategic management, strategy researchers and practitioners have shown increasing interest in the role of Information Systems

in strategy formulation, implementation, evolution and innovation, as well as in its impacts on financial performance. Frameworks for identifying strategic value opportunities have been developed, with measures for evaluating extent to which Information Systems can lead to competitive advantage (Sethi & King 1994). According to Feeny, Ives & Piccoli (2003), Information Systems can create competitive advantage through efficiency improvements and other forms of cost reductions, through new channels or channel domination, or through differentiation of product or service. Peppard and Ward (2004) writes the following; 'While investments in IT continue to make for both efficiency and effectiveness purposes, the Strategic Information Systems era is premised on management proactively seeking out opportunities for competitive advantage through IT, with approaches to information systems (IS) strategy formulation accommodating the requirement for both alignment of IT investments with corporate strategy and assessing the disruptive impact of technology and the options for its use in shaping business strategy'.

### **Strategic Information Systems and Sustainable Competitive Advantage**

Lawson and Samson (2001) explains that resources are strategic when they possess some specific characteristics, for example they are not easily imitated by competitors. Some scholars argue that Information Systems resources such as hardware or software cannot be a source of competitive advantage, hence form a sustainability framework, since they can be copied easily. For instance, Clemons and Row (1991) suggest that resources related to Information Systems cannot *per se* be sources of competitive advantage. They point out that Information Systems can lead to a sustainable competitive advantage when used to leverage differences in strategic resources. Strategic resources can create differences among firms and predict the competitive outcome of Strategic Information Systems. They understand strategic resources as those resources that represent a significant proportion of the firm's investments pool and are not freely available in a competitive market.

### **Optimizable Resource Matrix**

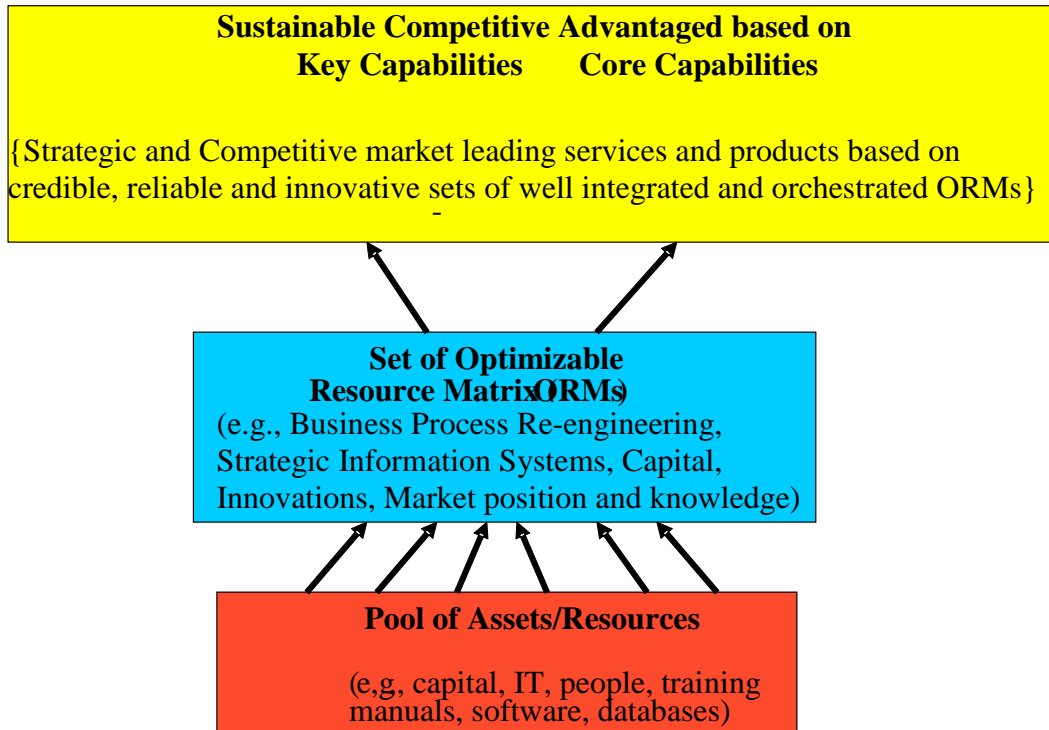
The search for sustainable competitive advantage in the market place is a daunting task for many managers. In order to address this challenge a proposition is advanced, that is built on the combinational ability of resources, where an assumption is made to the effect that when resources are combined optimally, they create a positive multiplier effect to the outcome. Thereof the Optimizable Resource Matrix (ORM) is proposed. ORM could be the combinations of the following independent variables (1) Assets (e.g. IS assets), (2) People (e.g. IS skilled staff), and (3) Processes (IS Business processes); that firms can use to transform inputs to

outputs. ORMs can be viewed as a configuration or network of assets or resources, which in turn implies that there can be specific relationships between the assets or resources. Many of these configurations would be a blend of 'hard' tangible assets (such as buildings, equipment, people, training manuals) and 'soft' intangible assets (such as how well teams work together and the relationships between the people in those teams, or the internal culture) which simply cannot be easily recreated by another firm. ORMs may not be factor inputs (in an economic sense) like tangible and intangible assets; they can be complex combinations of assets, people, and processes that firms can use to transform somewhat inert resources and assets into unique outputs such as products and services. ORMs would exist within the firm's interactions and may even depend critically on particular individuals. When combined with the Strategic Alignment model, by Henderson & Venkatraman (1993), finely-honed ORMs can be a source of sustainable competitive advantage. They would enable a firm to take the same factor inputs as rivals and convert them into products and services, either with greater efficiency in the process or greater quality in the output. While assets or resources would be the source of a firm's set of ORMs, ORMs themselves could be the main source of its sustainable competitive advantage.

When applied to the firm's physical production technology, these 'new organizational processes' would govern the efficiency of the firm's activities. The "inwardness" of ORMs would make them less detectable by competitors and therefore helps strengthen the firm's barriers to competitive erosion, unlike the firm's capabilities which are deployed in the marketplace daily. ORMs would by their nature not be "isolated" within and from the firm, but can in themselves be "acted upon" by social and economic forces. The ORM construct provides this author with a conceptual toolset to investigate a firm's efforts to build distinctive competence. A key finding from this paper is that IT assets may not *per se* possess properties of rarity. Building from the detailed discussion herein, therefore, it may be possible to present a robust and pragmatic framework, that starts with a pool of assets, such as People, IT, Capital, then aggregates them through some unique internal processes to create a new product proposition that is valuable, rare, immobile, and one that cannot be easily substituted by competition. The result of later process is indeed a set of ORM. This ORM when institutionalized within a firm, would create 'core and key competences'. Below is a conceptual model which firms would use their IT assets with a combination of business processes, human action, and functionally integrated project initiatives to develop barriers to "replicability" when producing new products, services and channels, in the market place.

Figure 1. Proposed Conceptual Model

**The combination of Assets into ORM and their effect to Core and Key Capabilities**



**CONCLUSION AND WAY FORWARD**

Based upon an extensive scan of the pertinent literature in economics, business strategy, IT and industry experiences, this paper provides a contributory framework based upon the precepts of Resource Based Theory and Dynamic Capability theory which firms can use to better understand the complex internal processes and relationships that drive the key and core capabilities of a firm, with particular reference to those processes and relationships emanating in, and around, Information Systems. Resource Based Theory suggests that, in a firm’s search for sustainability of competitive advantage, a better start would be to look internally, rather than focus its major, or all its, attention on the external environment, asserts Piccoli & Ives (2005), Feeny, Ives & Piccoli (2003). The internal of a firm is made up of resources that can be classified as ‘assets’, ‘people’ and ‘processes’. The drive to uniquely optimize these resources is what forms the ingredients of a sustainable competitive advantage framework.

The two major contributions of this paper are: (1) the introduction of “optimizability” of assets in the form of Optimizable Resource Matrix (ORMs), which introduces the notion that



assets such as Information System stocks are essentially inert until combined with other processes, assets, and resources within the firm; and (2) provide a basis for the proposition of a “Framework of Sustainability” to be based upon the research evidence. In the building of ORM, and among other variables, the role of People is key. Apart from the skills and competences that People bring on the ORM equation another important imperative that has the potential to redefine and sustain competitive advantage, especially depending on how the social complexities and their related fabrics are handled, is organizational routines. Embedded between People, Process and Assets are the social organizational routines that bind and orchestrate unique sets of internal pool of competencies and potentials. The ability to identify and redefine these social complexities within a company, is what drives its values, behaviors, culture, relationships, professional ethics and the strong sense of collective purpose. Therefore social complexities once identified must be sharpened and properly guided to align with the overall strategy. Thereof they form one of the most sustainable competitive ‘rarity’ because it is impossible to replicate them in any other company.

This paper is essentially based on literature reviews and industry experiences, it therefore follows that an empirical study needs to be conducted to calibrate quantitatively and qualitatively the effect of Strategic Information Systems on Sustainable Competitive advantage, and pragmatically provide companies with implementable toolsets that they can be used in their respective workplaces. In essence the conceptual model and the corresponding ‘Framework of Sustainability’ presented herein needs to be tested using appropriate philosophical principles and accredited research methodologies.

This paper has provided an overall view of the fitness of strategic information system into the sustainable competitive advantage space, nevertheless, future research should target specific industry sectors and geographies, in order to bring out factors related to context and situational analysis. Industry sectors such as Fast Moving Consumer Goods (FMCG) and Financial Services provide good candidates for in-depth investigations. A comparative analysis between African based practices, European based experiences, Asian based imperatives and American based practices would provide future researchers and practitioners with fertile grounds for unearthing valuable knowledge sets around the subject.

An important aspect in any research work is the research methodologies employed and the underpinning philosophies. While this paper has mentioned aspects of quantitative based methodologies, it is considered a better option to adopt mixed research methodology in future. Mixed research methods are based on the central premise that neither a quantitative or qualitative methods can provide a better understanding of a research problem on their own, but the best way is to combine these methods in practice. However, a mixed methods research

requires not only the use of multiple methods, but also that quantitative and qualitative approaches and findings need to be properly integrated and actually complement each other (Rocco et al., 2003; Bryman, 2007; Fidel, 2008).

Finally while the study has underscored the relevance of the 'internal' in the generation of ORMs, it does not negate or undervalue the need for the 'external'. Indeed future research needs to unravel the effect and impact of external environmental factors, so as to help in the explanation of external causality and how these can be 'internalized' to create 'internal causality ambiguity' within the firm. Internal causality ambiguity is a key ingredient of sustainable competitive advantage that strategic information systems can enable and competitively sustain superior firm performance, where firm performance is taken as one of the key and foundational variable for sustainable competitive advantage. Therefore a comprehensive research work on the calibrated effect of Information Technology Integration to Firm Performance would be one of the suggested next step(s), from this paper.

## REFERENCES

- Barney, J.B. (1995), 'Looking Inside for Competitive Advantage,' *Academy of Management Executive*, Vol. 9, Issue 4, pp. 49-61.
- Barney, J.B. (2001), 'Resource-Based Theories of Competitive Advantage: A Ten-Year Retrospective on the Resource-Based View,' *Journal of Management*, Vol. 27, No. 6, pp. 643-650.
- Barney, J. B. & Hesterly, W.S. (2010). *Strategic management and competitive advantage. Concepts.*
- Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research*,
- Clemons, E.K. and Row, M.C. (1992), 'Information Technology and Industrial Cooperation: The Changing Economics of Coordination and Ownership,' *Journal of Management Information Systems*, Vol. 9, No. 2, pp. 9-28.
- Clemons, E.K. and Row, M.C. (1991), 'Sustaining IT Advantage: The Role of Structural Differences,' *MIS Quarterly*, Vol. 15, No. 3, pp. 275-292.
- Clemons, E.K. and Row, M.C. (1990), 'Strategic Information Technology Investments: Guidelines for Decision-Making,' *Journal of Management Information Systems*, Vol. 7, No. 2, pp. 9-28.
- Eisenhardt, K.M. and Martin, J.A. (2000), 'Dynamic Capabilities: What Are They?,' *Strategic Management Journal*, Vol. 21, Issue 10/11, pp. 1105-1121.
- Feeny, D.F. and Willcocks, L.P. (1998), 'Re-Designing the IS Function around Core Capabilities,' *Long Range Planning*, Vol. 31, No. 3, pp. 354-367.
- Feeny, D.F. and Willcocks, L.P. (1998), 'Core IS Capabilities for Exploiting Information Technology,' *Sloan Management Review*, Vol. 39, No. 3, pp. 9-21.
- Fidel, R. (2008). Are we there yet?: mixed methods research in library and information science. *Library & Information Science Research*, 30, pp. 265-272
- Grant, R. (1997), 'The Knowledge-Based View of the Firm: Implications for Management Practice,' *Long Range Planning*, Vol. 30, No. 3, pp. 450-454.
- Henderson, J. and Venkatraman, N. (1993), 'Strategic Alignment: Leveraging Information Technology for Transforming Organizations,' *IBM Systems Journal*, Vol. 32, No. 1, pp. 4-16.

Piccoli, G. and Ives, B. (2005) 'Review: IS-Dependent Strategic Initiatives and Sustained Competitive Advantage: A Review and Synthesis of the Literature,' MIS Quarterly, Vol. 29.

Porter, M.E. (1980) *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, New York: The Free Press.

Rocco, T.S., Bliss, L.A., Gallagher, S. and Perez-Prado, A. (2003). Taking the next step: mixed methods research in organisational systems. *Information Technology, Learning, and Performance Journal*, 21 (1), pp. 19-29.