29P. Exploring the Impact of Knowledge Management Capabilities on Organizational Effectiveness

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Abstract
Research on knowledge management success often focuses on aggregate concepts of knowledge management capabilities when assessing their impact on organizational effectiveness. As such, little is known about the role of the individual resources that make up an organization's knowledge management capability and their impact on organizational effectiveness. To better understand these relationships, this study investigates a component model of knowledge management capabilities. Data collected from 189 managers and structural equation modeling are used to assess the research model. The results show that individual resources are differentially related to organizational effectiveness, with only some resources (e.g. organizational structure) having significant relationships vis-à-vis organizational effectiveness and others exhibiting null effects. Implications for practice and future research are discussed.

Keywords
Knowledge management, knowledge management capabilities, organizational effectiveness

1. Introduction
It has become apparent to many organizations that benefits, such as competitive advantage, are not only dependent on the successful deployment of tangible assets and natural resources but also on the effective management of knowledge (Lee & Sukoco, 2007). According to AMR Research, US organizations would have invested $73 billion on knowledge management software in 2007 and increase by almost 16% in 2008 (McGreevy, 2007). Much of this spending is driven by strategic imperatives that depend on the effective management of the knowledge resource (Lee & Sukoco, 2007).

Different resources make up the knowledge capability of an organization. These include technology infrastructure, organizational structure and organizational culture which are linked to an organization's knowledge infrastructure capability; and knowledge acquisition, knowledge conversion, knowledge application and knowledge protection which are linked to the organization's knowledge process capability (Alavi & Leidner, 2000; Gold et al., 2001). Taken together, these resources collectively determine the knowledge management capabilities of an organization which in turn have been linked to organizational effectiveness (Grant 1996; Gold, et al., 2001).
Although there is evidence that knowledge resources in combination lead to organizational effectiveness (Gold et al., 2001), it is likely that only some of these resources contribute directly to organizational performance on their own (Grant 1991). However, most of the prior research tends to focus on knowledge management capabilities as a collective. It is therefore not clear which of the knowledge resources contribute directly to organizational performance. A more detailed analysis of the links between individual resources and organizational performance can address this gap. Analysis at the resource-level may also better explain the impact of infrastructural capabilities such as organizational structure, culture, and technology on the organization’s bottom-line (Grant 1991) and help improve decision-making at the resource-level. It is therefore expected that this study will provide insights into the links between individual resources and organization performance. This will provide managers and researchers with a model for linking knowledge management resources to organization’s performance and indicate how organizations can enhance the success of their knowledge management initiatives through a more targeted approach to investment and implementation.

2. Literature Review

Gold et al. (2001) proposed a model that theorizes knowledge management capabilities as multidimensional concepts consisting of: (i) the process perspective which focuses on a set of processes, that is, knowledge process capabilities and (ii) the infrastructure perspective which focuses on enablers, that is, knowledge infrastructure capabilities (Alavi & Leidner, 2001; Lee & Choi, 2003; Stein & Zwass 1995). These capabilities are also composed of multiple dimensions: knowledge infrastructural capability comprises technology, organizational culture and organizational structure while knowledge process capability includes knowledge acquisition, knowledge conversion, knowledge application, and knowledge protection.

Research suggests these enablers and processes are necessary preconditions for effective knowledge management (Alavi & Leidner 2001; Davenport, Delong & Beers 1998). As such, most researchers using the Gold et al., model will depict knowledge infrastructure and knowledge process capabilities as higher-order constructs, when examining the links to outcomes such as organizational performance and knowledge management success (Chan & Chao 2008; Jennex & Olfman 2005; Laframboise, et al. 2007). For example, Gold et al. (2001) found that knowledge infrastructure capability and knowledge process capability are positively linked to organizational effectiveness (See Figure 1).

![Figure 1: Knowledge Management Capabilities Framework](Source: Gold et al., 2001, p193)
However, what is not clear is whether there are differential relationships (e.g. null or cancelling effects) between the individual dimensions of knowledge process capability and knowledge infrastructure capability, and organizational effectiveness. To address this question, this study examines a decomposed version of the Gold et al. (2001) model, and the relationships between organizational effectiveness and the individual enablers and processes that make up the knowledge management capabilities. The outcomes are expected to provide insight into which enablers and processes contribute to organizational effectiveness.

2.1 The Theoretical Model.
The resource-based view (RBV) offers a useful theoretical lens for understanding the relationship between IT assets and organizational performance. The RBV argues that "firms possess resources, a subset of which enables them to achieve competitive advantage, and a further subset which leads to superior long-term performance" (Wernerfelt 1984, p.108). However, the RBV does not have a single definition of the term 'resource' (Wade & Hulland 2004) with many researchers using the terms 'resources' and 'capabilities' interchangeably (Gold, et al. 2001; Sanchez, et al. 1996; Wade & Hulland 2004). Grant (1991) suggests that the term 'resource' refers to a basic unit of analysis that provides direct input to the production process while the term 'capability' represents an aggregation of resources or "the capacity for a team of resources to perform some task or activity" (p.119). As such, "resources are a source of a firm’s capabilities, [and] capabilities are the main source of its competitive advantage" (p. 119). Resources and capabilities therefore both contribute to an organization's bottom-line. Yet, few resources are productive on their own, and it is the overall capabilities that are the true drivers of the productivity (Grant 1991). The RBV therefore recognizes that while some resources on their own may lead to performance improvements, others do not. Thus, the challenge is for organizations to identify those resources that directly influence performance (Wade & Hulland 2004).

2.2 Knowledge Management Capabilities
Knowledge management supports the aggregation of resources into capabilities (Maier & Remus 2002). Knowledge management capabilities can be categorized into two broad types - knowledge infrastructure capability and knowledge process capability (Gold et al. 2001).

2.2.1 Knowledge Infrastructure Capability
The main dimensions of knowledge infrastructure capability are technology, organizational structure and organizational culture (Gold et al. 2001).

Technology. The technology component comprises the information technology (IT) systems that enable the integration of information and knowledge in organizations as well as the creation, transfer, storage and safe-keeping of an organization's knowledge resource. Although an appropriate technology infrastructure is essential for effective knowledge management, studies that examine the link between information technologies and measures of organizational effectiveness are often inconclusive. For example, Powell and Dent-Micaleff (1997) in their study of US firms, found that IT in and of itself did not enhance firm performance, but could increase performance when combined with other human and business assets that impact performance. Although it may be difficult to link IT directly to organizational effectiveness, research shows that when combined with other resources IT can enhance performance and lead to sustained advantage (Clemons & Row, 1991; Powell & Dent-Micaleff 1997; Seleim & Khalil 2007).
**Organizational Culture** is considered one of the most important factors impacting knowledge management (Davenport et al. 1998). When it comes to organizational performance, studies conclude that a strong organizational culture is a key determinant of performance (Hibbard 1998). Changes in corporate culture are also regarded as necessary for implementing knowledge management programs (Bhatt 2001); "the ability of an organization to learn, develop memory, and share knowledge is dependent on its culture" (Turban & Aronson 2001, p. 355). Thus, positive changes in culture are expected to impact organizational effectiveness and add momentum to other improvements taking place elsewhere in the organization (Richert 1999).

**Organizational Structure.** Knowledge management theorists largely conclude that changes in organization structure, such as moving from hierarchical to flatter networked forms, are essential for the effective transfer and creation of knowledge in the organization (Gold et al. 2001; Grant 1996; Nonaka, & Takeuchi 1995). Such changes by extension have been positively linked to improved outputs in both service and financial terms (Richert 1999). Taken altogether, it is expected that:

- H1: Technology is not related to organizational effectiveness
- H2: Organizational culture is positively related to organizational effectiveness
- H3: Organization structure is positively related to organizational effectiveness

### 2.2.2 Knowledge Process Capability

Gold et al. (2001) suggested that knowledge process capabilities are needed for leveraging the infrastructure capability. Four broad dimensions are identified - "acquiring knowledge, converting it into useful form, applying or using it, and protecting it" (p. 190).

**Knowledge Acquisition.** The term 'acquisition' refers to an organization's capability to identify, acquire and accumulate knowledge (Gold et al. 2001; Zahra & George 2002). Acquiring knowledge can involve several aspects including creation, sharing and dissemination. Knowledge acquisition reflects in part, a subset of an organization's absorptive capacity - more specifically, it can be viewed as a 'potential capacity' that reflects an organization's ability to use its knowledge to create advantage (Cohen & Levinthal 1990). When acquired knowledge is used appropriately, research shows a significant and positive link between knowledge acquisition and organizational performance (Lyles & Salk 1996; Seleim & Khalil 2007).

**Knowledge Conversion.** Knowledge that is captured from various sources needs to be converted to organizational knowledge for effective utilization within the business (Lee & Suh 2003). This conversion process, which takes place along the supply chain of data, information and knowledge, is transient in nature and so organizations must speedily convert data into information and information into organizational knowledge to maximize benefits from the conversion process (Bhatt 2001). It is expected that the knowledge conversion process could influence performance outcomes.

**Knowledge Application.** Bhatt (2001) states: "knowledge application means making knowledge more active and relevant for the firm in creating value" (pp.72-73). For organizations to create value they need to apply knowledge to their products and services by various means such as repackaging available knowledge, training and motivating people to think creatively, and utilizing people’s understanding of the company’s processes, products and services. For knowledge to impact organizational performance it has to be used to support the organization's processes. Hence, it is through knowledge utilization that acquired knowledge can be transformed from being a potential capability into a realized and dynamic
capability that impacts organizational performance (Cohen & Levinthal 1990; Seleim & Khalil 2007; Zahra & George 2002).

Knowledge Protection. Knowledge protection is often challenging as copyright laws that are intended to protect knowledge are limited in their treatment of the knowledge environment (Everard 2001). Notwithstanding such limitations, the knowledge protection process should not be abandoned or marginalized (Gold 2001). Moreover, since knowledge is crucial for competitive advantage, protecting knowledge is expected to create value for the organization (Lee & Sukoco 2007; Lieberskind 1996).

Taken altogether, it is expected that:

H4: Knowledge acquisition is positively related to organizational effectiveness
H5: Knowledge conversion is positively related to organizational effectiveness
H6: Knowledge application is positively related to organizational effectiveness
H7: Knowledge protection is positively related to organizational effectiveness

3. Methodology

Component models are sometimes used in research to examine complex structures at lower levels of detail. One such structure is the aggregate construct which typically consists of a multi-dimensional construct that is an algebraic composite of its dimensions (Law et al. 1998); thus changes in the dimensions lead to changes in the construct.

Knowledge infrastructure capability and knowledge process capability (Gold et al. 2001) are examples of aggregate constructs. Since the overall constructs are formed from their underlying dimensions, the dimensions need not be correlated. Inferences drawn at higher levels of analysis may therefore not apply at the level of the individual dimension (Law et al. 1998). For example, if there are opposing effects at the lower-level these may be overlooked if the analysis focuses on the higher-level. Component models address this problem by directly relating the individual dimensions to other constructs in the research model (Petter et al. 2007). Structural analysis of the research model will therefore focus the individual enablers and processes that make up a firm's knowledge capabilities and their impact on organizational effectiveness. This approach is expected to yield a better understanding of the relationships between the different capabilities and other constructs in the research model, in this case, organizational effectiveness.

3.1 The Sample

Data was collected by surveying students enrolled in Masters-level programs in Jamaica. Over 500 surveys were distributed; 189 (37.8%) usable responses from management-level staff were returned, with 86.8% from the service sector and 13.2% from manufacturing.

The measurement model consisted of multi-item constructs adapted from existing scales (Gold et al. 2001; Smith, et al., 2010): (i) knowledge infrastructure capability comprised technology, organizational structure, and organizational culture; (ii) knowledge process capability comprised knowledge acquisition, knowledge conversion, knowledge application, and knowledge protection; and (iii) organizational effectiveness. The three constructs were measured using 7-point Likert scales, anchored with 'Strongly Agree' and 'Strongly Disagree'.


3.2. Data Analysis and Results

PLS-Graph 3.0 was used to assess the research model and bootstrap estimation (with 200 resamples) used to determine the significance of the paths in the structural model. First, the measurement model was assessed. Ideally, item loadings should exceed 0.707; loadings of 0.60 are also acceptable (Chin 1998). The results showed that one item measuring knowledge acquisition returned a loading of 0.40; this item was therefore excluded. Item loadings for all other constructs ranged from 0.668 to 0.926, exceeding recommended thresholds. Composite reliabilities ranged from 0.918 to 0.963 and average variance extracted (AVE) ranged from 0.635 to 0.789, exceeding recommended cut-offs of 0.70 and 0.50 respectively (Chin 1998). Construct AVEs were also greater than the variance shared between the constructs satisfying the criteria for discriminant validity (Chin 1998).

Next, the structural model was examined. The research model accounted for 0.754 of the variance for organizational effectiveness. Of the knowledge infrastructural capabilities, only organizational structure ($\beta=0.209; p \leq 0.05$) was related to organizational effectiveness; technology ($\beta=-0.003$) was not expected to be significant. Hypotheses H1 and H3 were supported. Contrary to expectation, organizational culture was not significant ($\beta=0.055$); H2 was therefore not supported. For knowledge process capability, three processes were positively related to organizational effectiveness: knowledge acquisition ($\beta=0.146; p \leq 0.05$), knowledge application ($\beta=0.412; p \leq 0.001$), and knowledge protection ($\beta=0.148; p \leq 0.05$). Hypotheses H4, H6 and H7 were supported. Knowledge conversion capability was not significant ($\beta=0.025$); H5 was therefore not supported.

4. Discussion

Consistent with prior research, the study results provided good support for the research model, accounting for 0.754 of the variance for organizational effectiveness (Gold et al. 2001). Of the three infrastructural capabilities, only organizational structure had a significant impact on organizational effectiveness; neither technology nor organizational culture had an impact on organizational effectiveness. However, organizations cannot afford to neglect these enablers since they support processes, such as knowledge application, that directly impact organizational effectiveness (Van den Bosch et al. 1999).

For knowledge process capability, knowledge acquisition, knowledge application and knowledge protection also impacted organizational effectiveness, but not knowledge conversion. However, without adequate conversion organizations will not be able to use their knowledge effectively; hence, this process cannot be ignored, even if it does not contribute directly to organizational effectiveness.

Taken together, the results suggest that although the individual dimensions that make up the knowledge capabilities collectively determine the knowledge management construct, all are not directly linked to organizational effectiveness. This is consistent with the RBV which suggests that a subset of an organization's capabilities and resources contributes directly to performance (Grant 1991). For example, Seleim and Khalil (2007) found that of five knowledge processes studied only knowledge application was directly linked to organizational performance. So although, an organization's overall knowledge capabilities may have potential to directly impact performance, in some cases the role of certain resources may be more indirect through their impact on other factors linked to performance (Gold et al. 2001; Wade & Hulland 2004).
These results have several implications for managing an organization's knowledge capabilities. For example, research suggests appropriate investments in knowledge management can enhance organizational performance. However this study shows that not all of the capabilities are significant contributors. Although resources and processes such as technology, culture and knowledge conversion are necessary for effective knowledge management, they did not impact firm performance directly. However, firms can ill afford to neglect these resources and processes as they work in combination with and support other resources and processes, such as knowledge acquisition and knowledge application that can contribute directly to organizational success (Van den Bosch et al. 1999).

Second, this research showed that inferences about an overall capability do not necessarily apply when it comes to individual enablers and processes, and the impact of individual enablers and processes on organization effectiveness differs for each capability. As a result, the combination of resources that is most effective for one organization is likely to differ from that of others. Since there are no 'silver-bullet' combinations of resources that enable organizational effectiveness, it is incumbent on managers not only to recognize that all the enablers and processes are important, but to identify for their organization which enablers and processes are most salient for organizational performance, and to leverage these accordingly.

5. Conclusion
The literature suggests knowledge management capabilities impact organizational effectiveness. However, there has been little elaboration of the relationships at the component level vis-à-vis organizational effectiveness. This study addresses this gap by assessing a component model of knowledge management capabilities. The aim was to provide insights into the interrelationships between particular enablers and processes and organizational effectiveness that can help organizations identify more targeted strategies when it comes to investments in and deployment of the knowledge resource.

The results show that although the individual enablers and processes collectively determine an organization's overall knowledge management capability which, in turn is related to organizational effectiveness (Gold et al. 2001), all are not directly linked to organizational effectiveness. The component model therefore offers insights into the relationships that cannot be inferred when constructs are assessed as aggregates in the research model.

The findings of this study suggest a number of avenues for future work. First, the results suggest different relationships exist between the enablers and processes, and organizational effectiveness. Different organizations may also have different combinations of enablers and processes that yield similar outcomes. For example, in this study while organizational structure was linked to organizational effectiveness, culture was not; however the same may not apply to other organizations. Further research is therefore needed to better understand the differences between organizations when it comes to the links between particular knowledge management resources and organizational effectiveness.

The literature also calls for further research into the links between knowledge capabilities and organizational effectiveness (Jennex & Olfman 2005). This study addresses this call by examining the links between individual dimensions of knowledge capabilities and organizational effectiveness. Other success factors such as user satisfaction and perceived benefits should also be explored.
References


