International Business Management 10 (3): 241-247, 2016
ISSN: 1993-5250

On the Relationship Between Procedural and Declarative Organizational Memory and their Effects on SME Performance

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Abstract: Although, knowledge integration has been theoretically conceptualized as a source of superior performance, very little attention is paid to investigate this relationship empirically especially in small and medium firms of developing countries. This study is designed to investigate the role of procedural memory (i.e., tacit knowledge) on the integration and development of declarative memory (i.e., explicit knowledge) and therefore the effects of these types of knowledge on SME performance on the platform of knowledge-based view. The 302 usable data was collected from corporate SMEs in Nigeria and thus the result was analyzed using partial least squares path modeling. The statistical data established the empirical evidence on the relationship between procedural and declarative knowledge as well as the effects of both of these forms of organizational knowledge or memory on performance. Consequently, the study concludes that SMEs' managers should invest in organizational knowledge for superior performance. Finally, the study suggested that future research may include other forms of knowledge assets and also take into cognizance with other components of performance.

Key words: Declarative knowledge, procedural knowledge, performance, knowledge-based view, SMEs

INTRODUCTION

Strategy scholars and researchers made efforts in developing frameworks and theories of firm resources and the capabilities they generated which give firms sustained competitive advantage over their competitors. One of the popular paradigms in this stream of research that explain how intangible resources determine performance which receives considerable attention is the resource-based view of the firm (Tippins and Sohi, 2003). The famous Resource-Based View (RBV) gave rise to other theories among which is a Knowledge-Based View (KBV) of the firm (Nieves and Haller, 2014; Nieves *et al*., 2014). While RBV posits that firms with heterogeneous intangible valuable, rareness, inimitable and non-substitutable resources have the potentials for achieving superior performance (Barney, 1991; Bridoux, 2003), KBV proposes that the competitive success is subject to the ability of a firm to integrate specialized knowledge assets that can create core competences (Pemberton and Stonehouse, 2000).

Thus, the mechanisms for this knowledge integration are direction (i.e., codifying tacit knowledge assets into explicit sets of rules and instructions) and organizational routines (i.e., set of activities which permit knowledge integration without communicating the knowledge) (Grant, 1996a). In essence, these resulted in two forms of organizational knowledge or memory such as explicit and tacit knowledge (Bollinger and Smith, 2001; King *et al*., 2008; Ruiz-Mercader *et al*., 2006; Tuomi, 1999) or declarative and procedural knowledge or memory as alternatively known (Akgun *et al*., 2008; Jimenez-Jimenez and Sanz-Valle, 2011; Kogut and Zander, 1992; Kyriakopoulos, 2011; Lum *et al*., 2012; Moorman and Miner, 1998; Nieves and Haller, 2014; King and Zeithalm, 2003).

Nevertheless, upon all the theoretical argument on the impact of knowledge integration on firm superior performance, still very little attention is paid to organizational memory (Chang and Cho, 2008). Consequently, the studies on the effect of such organizational knowledge on performance are generally scarce (Nieves *et al*., 2014; Tippins and Sohi, 2003) especially on SMEs in developing economies. Thus, this study drawn on Knowledge-Based View (KBV) to investigate the relationship between procedural and declarative organizational knowledge and their impact on SME performance in Nigerian context.

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Background and hypotheses

The concept of organizational memory: The Knowledge-Based View (KBV) absolutely regards knowledge as a key factor for competitive advantage, therefore the higher the investment in knowledge the greater the benefits will be for the firm (Reus *et al*., 2009). Since, knowledge-based resource is what gives firm the greatest ability of sustainable differentiation and therefore, competitive advantage (Dierickx and Cool, 1989; Lippman and Rumelt, 1982), the central assumption for KBV is that the critical input of the firm in production and primary sources of value is knowledge (Grant, 1996a). Miller (2002) recognized firm as a body that generate, integrate and distribute knowledge so as to compete and perform effectively. Consequently, the possession of the stocks of the organizational knowledge related with value is considered as uncommon or idiosyncratic assets that stand a good chance of generating performance (Ranft and Lord, 2002).

In the words of Grant (1996a), the most fundamental role of the firm is the integration of specialized knowledge that resides within the individual, organizational members and this forms the basis of organizational capabilities. Hence, such heterogeneous knowledge and capabilities they generated for a firm are the primary sources of sustained performance (Grant, 1996b). This form of knowledge is what has been described as organizational knowledge or memory. The organizational memory could be traced from the research by Walsh and Ungson (1991) who sees memory as a faculty of acquiring, retaining and recalling past things which is primarily associated with individuals. These researchers also noted that there is general belief that the acquisition, retention as well as the retrieval of the experience and knowledge from repositories (i.e., memory) subsequently influence individual behavior. Even though, the aforesaid definition is mainly concern with individuals, some researchers were of the view that such memory also reside in supra-individual collectivities. For example, Walsh and Ungson (1991) reported that 'Loftus and Loftus' in their book titled 'Human Memory: The processing of Information' viewed memory as kind of repository that can be possessed by both humans and other number of things in which information may be retained for some period of time.

Walsh and Ungson (1991) further argued that even though an organization can exist independently from particular individuals, it should be recognized that such individuals acquire information for solving problems and making decisions in an organization. However, as individuals differ in understanding problems and solutions, organizational interpretation became necessarily important through sharing individuals understandings. Thus, through this sharing process such information and knowledge transcends individual level and organization preserved past knowledge even when key individual members of an organization leave (Todorova and Durisin, 2007; Walsh and Ungson, 1991).

However, the role of firm's employees as primary source of performance has been widely acknowledged in the previous literature (Huselid, 1995; Lado and Wilson, 1994; Pfeffer, 1995) but it has been argued that when knowledge is located within individual employees other than structures and routines, the tendency of losing such knowledge is much higher due to employees turnover (Nieves *et al*., 2014). Therefore, it is necessarily important for the firm to integrate such knowledge resided in individuals into organizational knowledge-based. As such this knowledge became the attribute of the firm and did not represent competences and capabilities held by individual employees (Nieves *et al*., 2014). Consequently, this knowledge is therefore, the principal sources of performance as it is a firm's specific asset rather than a property of any individual staff (Deeds and Decarolis, 1999).

Kogut and Zander (1992) identified two forms of firm's knowledge; these include declarative and procedural knowledge. As a result, a large number of researchers testified the existence of both declarative and procedural as dimensions of organizational memory or knowledge (Akgun *et al*., 2008; Jimenez-Jimenez and Sanz-Valle, 2011; Kyriakopoulos, 2011; Lum *et al*., 2012; Moorman and Miner, 1998; Nieves and Haller, 2014; King and Zeithalm, 2003). However, previous researchers mostly considered declarative and procedural memory as distinct categories of organizational knowledge (Bollinger and Smith, 2001; Camerer and Hogarth, 1999; King *et al*., 2008; Ruiz-Mercader *et al*., 2006; Tuomi, 1999).

Declarative and procedural knowledge: Organizational memory as collection of the firm's knowledge (Zahra and George, 2002), consists of declarative knowledge which is based on factual information and procedural skills and know-how which are necessary for the acquiring and managing declarative knowledge (Thornhill, 2006). While the former considered as know-what and an explicit knowledge, the later is seen as tacit or 'how to' knowledge (Hitt *et al*., 2000; Mascha, 2001). However, both declarative and procedural knowledge are reported to have significant effect on performance in the previous studies (Nieves *et al*., 2014; Tippins and Sohi, 2003). More so, each of these variables has been theoretically posited to have a correlation with one another. Grant (1996a) argued that one of the mechanisms of knowledge

integration is the direction (i.e., codifying tacit knowledge assets into explicit sets of rules and instructions). In this sense, Grant (1996a) referred this mechanism as the process of integrating tacit knowledge (procedural) into explicit knowledge (declarative). Hence, a set of procedural memory or knowledge will impact on declarative knowledge.

Besides, scholars like Alves (2005) observed that declarative knowledge is an essential stepping stone for the application of the procedural knowledge. Moreover, Sun *et al.* (2005), extensively discussed on how declarative and procedural knowledge develop alongside each other and the influence of the development of one another in what they have described as top-down approach (i.e., the influence of declarative knowledge on the development of procedural knowledge) and bottom-up approach (i.e., the influence of procedural knowledge in the development of declarative knowledge). Hence, based on the above discussion, the present study hypothesizes that:

- H_1: procedural knowledge is positively related to declarative knowledge

Organizational memory and performance: The current literature provides the empirical evidences of the significant relationship between both dimensions of organizational knowledge and firm performance (Akgun *et al.*, 2008; Nieves *et al.*, 2014) in both small and big corporate organizations. Nevertheless, most of the studies on organizational memory were conducted in the developed world and mostly on single industries. Consequently, more empirical evidence are needed to explore further the effects of both declarative and procedural knowledge on the performance of multi-industry firms especially in developing economies.

However, this study posits that each organizational memory's dimension can affect performance directly. Firstly, declarative memory as memory or knowledge of facts, concepts, events or prepositions which is more general and applicable to a wide variety of situations (Nieves and Haller, 2014) can be applied in various domains and enable individuals to analyze new problems and observed their causes and effect and draw a conclusion on the basis of past events in order to choose the most appropriate possible response to the problems (Keskin, 2009). Nieves *et al.* (2014) also held that declarative knowledge enhance the ability of the firm to capture and harness many environmental opportunities and improve the chances of correctly interpreting such opportunities and respond to them appropriately. Consequently, this study proposes that:

- H_2: declarative knowledge is positively related to firm performance

On the other hand, procedural knowledge is more rigid and concerned with the realm of specific skills, routines, process and procedures (Nieves and Haller, 2014; Tippins and Sohi, 2003). In this sense, procedural knowledge is linked to specific domains and more of routines and processes which can possibly affect the firm's specific activities toward grabbing opportunities such as new technology, new innovation and new product which are the sources competitive advantage and performance. Thus, the present study hypothesizes that:

- H_3: procedural knowledge is positively related to firm performance

MATERIALS AND METHODS

Design, data collection and procedure: This study was designed as a quantitative approach which engaged in hypotheses testing of the causal relationship between predictors and criterion variables which is commonly known as causal research (Sekaran and Bougie, 2013). Generally, organizational researchers drawing on quantitative research often Employ Survey Method as it is considered the most appropriate for collecting information on predetermined instruments that yield statistical data on large sample for the purpose of generalizing (Creswell, 2003). And lastly, the study adopted a cross-sectional method to collect data over a single period of time.

The 302 usable data collected on the Nigerian firms which are categorized as formal SMEs under the classification of Nigerian national policy on MSMEs (SMER, 2009). Initially, a sample of 321 was drawn from the total population of 1,956 firms using Dillman (2007) formula for determining sample size. However, based on the Salkind's view for adjusting sample size by 40-50% which is commonly use in survey research (Bartlett *et al.*, 2001), this study adjusted the sample size by 50% which arrived at 482, out of which on 302 were collected as usable for the purpose of this study. The data was collected through a self-administered questionnaire. And finally, the data was analyzed by structural equation modeling of the partial least squares model using SmartPLS2 variance based statistical package.

Variables and measures: Firm performance is the ability of the firm to achieve sales and profitability targets as well as non-financial perspectives in relation to competitors. In

this study, performance is measured by profitability, sales growth, return on investment and other non-financial indicators using subjective performance measures. To measure of all the components of performance, eights items were adapted from the research by Spillan and Parnell (2006).

Organizational memory as the information and knowledge acquired by an organization as well as the processes of acquiring, storing and retrieving it by the members of the organization is operationalized as declarative and procedural knowledge. While the former concerned with the knowledge of facts, concepts, events or prepositions which is more general and applicable to a wide variety of situations, the later concerned with the realm of specific skills, routines, process and procedures which is embodied in organizational routines. To measure these types of knowledge, eight items were adapted from the research by Nieves and Haller (2014). As such, four items used to measure each of the declarative and procedural knowledge.

RESULTS

Measurement model: To confirm the reliability and validity of the constructs of this study, measurement model analysis was performed initially. From the result generated as shown in Table 1, the factor loadings of all indicators ranged between 0.751 and 0.858 which is above the threshold of 0.708. The next column represents the Average Variance Extracted (AVE), these values ranged from 0.614-0.662 which is above the threshold of 0.50 for all constructs and this indicates that each of the variables explains more than half of the variance of its factors as such the convergent validity has been achieved (Bagozzi *et al*., 1991; Gefen *et al*., 2000; Hair *et al*., 2014). Similarly, the last values shown in Table 1 are for Composite Reliability (CR) analysis, the values of which ranged from 0.854-0.927 and this indicates that all the constructs have above critical value of 0.70. Consequently, these results proved that the reliability analysis at both indicator or factor and construct levels as well as convergent validity have been achieved for all variables (Hair *et al*., 2014).

Finally, Table 2 represents the discriminant validity of the constructs. The diagonal values shown in Table 2, represent the square root of each construct's AVE as seen from Table 1, the value of each construct is above its correlation with any other construct and thus this indicates the distinctiveness of each and every construct of this model (Fornell and Larcker, 1981).

Structural model: The structural model is presented in Table 3. As seen in Table 3, the hypothesized relationships between the independents variables and between the independents and the dependent variables are all presented. To analyze the structural equation as in the case of measurement model analysis, all the independents and the dependents variables were incorporated into a single model and performed the analysis at once. From the result generated and presented in Table 2, procedural knowledge is positively related to declarative knowledge (β = 0.720, $p<0.01$) as such hypotheses 1 is thereby supported. On the other hand, declarative knowledge is positively related to performance (β = 0.368, $p<0.01$) in this sense the hypotheses 2 is also supported.

Similarly, procedural knowledge positively affects firm performance (β = 0.521, $p<0.01$), consequently, hypotheses 3 is also supported. In sum, all the hypothesized relationships of this study are strongly supported empirically. However, on the predictive power

Table 1: Measurement information: reliability and convergent validity (n = 302)

Constructs	Items	Loadings	AVE	CR
Declarative knowledge	DK01	0.826	0.662	0.854
	DK02	0.844		
	DK04	0.769		
Procedural knowledge	PK01	0.755	0.614	0.864
	PK02	0.820		
	PK03	0.806		
	PK04	0.751		
Firm performance	FP01	0.799	0.646	0.927
	FP02	0.858		
	FP03	0.855		
	FP04	0.773		
	FP05	0.766		
	FP06	0.813		
	FP08	0.753		

Two items which are DK03 and FP07 were deleted from the analysis in order to fit the model

Table 2: Measurement information: discriminant validity (n = 302)

Constructs	1	2	3
Declarative knowledge	0.813	-	-
Procedural knowledge	0.720	0.784	-
Firm performance	0.552	0.521	0.803

The bolded diagonal values correspond to the square root of the AVE of the construct

Table 3: Hypothesized model: beta, standard error and t-statistics (n = 302)

Hypotheses	Relationships	Beta	SE	t-values
H_1	Procedural knowledge→Declarative knowledge	0.720	0.034	20.931***
H_2	Declarative knowledge→Firm performance	0.368	0.077	4.791***
H_3	Procedural knowledge→Firm performance	0.521	0.052	9.993***

***p<0.01

of the model (R^2), the result shows R^2 value of 0.52 of the predictive power between procedural and declarative knowledge that is to say, procedural knowledge explained 52% variance in declarative knowledge. On the other hand, the model analysis shows R^2 value of 0.34 between exogenous and endogenous constructs. Thus, the declarative and procedural knowledge explained 34% variance in firm performance.

DISCUSSION

This study investigated the effects of procedural, organizational knowledge on the development of declarative organizational knowledge as well the effects of these forms of knowledge or memory on SME performance. The study drawn on knowledge-based view (Grant, 1996a) to investigate such relationships. The statistical data established empirical evidence on the significant contribution of procedural knowledge on the development of declarative knowledge. Even though a similar finding is difficult to be found in the currently available literature, there is a strong theoretical conceptualization of this relationship. As mentioned earlier in this research, Grant (1996a) maintained that one of the mechanisms of knowledge integration is direction (i.e., codifying tacit knowledge assets into explicit sets of rules and instructions) as such this tacit knowledge is the procedural knowledge and skill which gives life to the declarative (i.e., explicit) knowledge.

Similarly, the analysis established that there are also significant relationships between both declarative and procedural knowledge or memory and SME performance. As such, the empirical analysis supported all the hypothesized relationships. However, the results on the significant effects of declarative and procedural knowledge on performance is not that surprising as previous studies found similar relationships (Nieves *et al*., 2014; Tippins and Sohi, 2003), even though in different context and on different concept of performance.

CONCLUSION

The study concludes that procedural knowledge contributed to the development of declarative knowledge and also both of these forms of knowledge or memory are significantly related to the performance of small and medium firms. Therefore, SMEs managers ought to invest in knowledge integration so as to inculcate superior performance for their firms.

LIMITATIONS

Not with standing, as it is with many empirical studies, the study has some major limitations which could be addressed in the future research. One of the major limitations of this study is that the study concerned with only organizational memory as a form of knowledge assets thereby overlooking other forms knowledge resources such as intellectual capitals. Hence, the future study may consider including other forms of knowledge assets in the analysis. Similarly, in the present innovative competition, measuring single dimension of performance may not be enough to ascertain the actual position of the firm competitive success, therefore, future research may consider studying different components of performance such as innovative and product development performance.

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