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## MANAGEMENT | RESEARCH ARTICLE

# Knowledge management and business performance: Does innovation matter?

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**Abstract:** The purpose of this study was to assess the mediating effect of innovation in the relationship between knowledge management and business performance of SMEs in Rwanda. The study used a cross-sectional survey design to collect the data on a sample of 250 SMEs and bootstrap method was used to carry out mediation analysis. The findings revealed that innovation fully mediates the relationship between knowledge management and business performance of SMEs. The paper contributes to scholarly debate on the mediating role of innovation on the relationship between knowledge management and business performance of SMEs by providing evidence from a developing country. The results may help business owners of SMEs to adopt innovation as a conduit for knowledge management to boost their business performance.

**Subjects:** Entrepreneurship; Small Business Management; Social Entrepreneurship

**Keywords:** knowledge management; innovation; business performance; SMEs; Rwanda

### 1. Introduction

With the emergence of knowledge-based economy, knowledge is considered as the essential way to create wealth and prosperity and it is the important driving force for business success (Riege, 2007). Drucker (1985) argues that knowledge is a critical source of an organization's competitive

### ABOUT THE AUTHORS

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### PUBLIC INTEREST STATEMENT

The aim of this study was to examine the role of innovation in the mediation between knowledge management and business performance of Small and Medium Enterprises (SMEs) in Rwanda. In fact, SMEs are important for job creation and economic development of nations. However, many of those SMEs tend to perform poorly mainly due to lack of innovation. Various researchers suggest that for innovations to happen, knowledge ought to be effectively managed. This implies that it ought to be properly sought, shared and applied among SMEs' staff members. The study used a total number of 250 questionnaires administered to Rwandan manufacturing SMEs. The results showed that the knowledge management through staff capacity building, exposure to real world and experience sharing promotes innovation which, in turn, leads to enhanced performance levels of SMEs. Thus, owners of SMEs are encouraged to seek innovative solutions if they want their businesses to remain competitive.

advantage, while Liao, Fei, and Liu (2008) suggest that enterprises attempt to look for ways that strengthen the management of knowledge resources in order to cope with the company's challenges in competing environment for improved business performance. Knowledge management (KM) has increasingly become a topic of interest in all kinds of organizations due to the growing awareness of the importance of knowledge for the organization's prosperity and survival (Wang & Lin, 2013). That is why Durst and Edvardsson (2012) and Marra, Ho, and Edwards (2012) recommend that KM should be included in the SMEs' daily activities so that they become more successful and stay longer. Available research provides support for significant relationships between KM and business performance (e.g. Gholami, Asli, Nazari-Shirkouhi, & Noruzy, 2013; Hussain, Xiaoyu, Si, & Ahmed, 2011; Liu & Abdalla, 2013; Wei, Choy, & Chew, 2011).

However, KM no longer stands out as a sufficient factor that can lead to improved business performance in today's highly competitive environment where pressures for businesses to meet multiple customers' demands are a challenging task (Liao et al., 2008; Wang & Lin, 2013). Some studies suggest other factors that are needed to achieve business performance. Among them, a study conducted by Musahara, Akorli, and Rukamba (2014) on the performance of SMEs in Rwanda showed that there was a high rate of failure of those SMEs despite their owners being educated. In the same way, the annual reports compiled by MINICOM (2010), PSF (2008) and RDB (2012) on the state of SMEs in Rwanda indicated that SMEs were performing poorly despite using government facilities.

From the studies mentioned above, it was revealed that the poor performance and failure of Rwandan SMEs mainly derived from the "me-too" syndrome, that is, carrying out similar businesses and lacking innovation. According to Kuhn and Marisck (2010), innovation involves the transformation of an idea into a new product or service that meets and satisfies the needs and expectations of customers. Other studies (e.g. du Plessis, 2007; Huang & Li, 2009) also emphasize the vital role of innovation in business performance. Darroch (2005) supports the same view arguing that for a business to achieve better performance and remain competitive, knowledge needs to be managed not only effectively but also innovatively.

In further developments, knowledge-based theory (KBT) supports the idea that when knowledge is effectively managed, it creates distinctive capabilities which contribute to improved business performance through innovation (Grant, 1996; Leal-Rodríguez, Leal-Millán, Roldán-Salgueiro, & Ortega-Gutiérrez, 2013) and thus, superior business performance is achieved through effective KM that promotes innovation (Ben Zaied, Louati, & Affes, 2015; Damanpour, Walker, & Avellaneda, 2009). Other researchers like Barney (2007), Warriar (2009) and Nonaka (2007) equally assert that effective KM through knowledge acquisition, knowledge sharing and knowledge application contributes to creativity and innovation which serve to enhance business performance.

So far, there has been limited research on the mediating role of innovation in the relationship between KM and business performance (e.g. Alrubaiee, Alzubi, Hanandeh, & Ali, 2015; Nawaz, Hassan, & Shaukat, 2014; Nawab, Nazir, Zahid, & Fawad, 2015). Most of existing literature investigates the mediating role of innovation in the relationship between business performance and other factors, such as organizational learning (Kocoglu, Imamoglu, & Ince, 2011), manufacturing flexibility (Camisón & Villar López, 2010), retailers' strategic orientations (Medina & Rufin, 2009), personal mastery (García-Morales, Lloréns-Montesa, & Verdú-Joverb, 2007). Elsewhere, Mafabi, Munene, and Ntayi (2012) examined the mediating role of innovation between KM and organizational resilience. Therefore, the desire to understand the role of innovation in the relationship between KM and business performance of SMEs motivated this study.

The aim of this paper was to examine the mediating effect of innovation on the relationship between KM and business performance of SMEs. In the context of this paper, KM refers to knowledge acquisition, knowledge sharing and knowledge application, while innovation implies the processes of introducing new products and markets or improving the existing ones. As for business performance, it is viewed from the perspective of profits, sales growth and market share. This paper argues

that without effective KM there may not be any innovation, and without innovation, SMEs may not perform well. Hence, effective KM along with innovation can better explain the variances in business performance of SMEs.

The contribution of this paper is to add to a body of existing knowledge in the following ways: First, the paper contributes to scholarly debate on the mediating role of innovation in the relationship between KM and business performance of SMEs by providing evidence from a developing country, where there is not much research on the subject. Second, the paper enables scholars and practitioners to have a more definite and direct understanding of the implication of innovation in the association between KM and business performance of SMEs. Third, the paper provides more explanation for an outcome on how innovation transmits the effect of knowledge management to business performance.

## 2. Literature review

### 2.1. Overview of SMEs in Rwanda

SMEs in Rwanda are perceived by the government as a vital tool of development which can enable it to progress from its pre-genocide era to knowledge-based economy onward to industrialized economy. It is estimated that SMEs in Rwanda account for 98% of all businesses and contribute about half of all private sector workers (MINICOM, 2010). Rwanda has about 72,000 SMEs generating estimated tax revenues of Frw 4.9 billion (US\$7,500,000) per year (IPAR, 2012) and account for 30% of the GDP (RDB, 2014). In addition, around 40% of these SMEs are located in the capital city, Kigali (NISR, 2011).

The Government of Rwanda has crafted a series of initiatives aimed to improve the business environment such as facilitating registration and taxation procedures of new businesses, providing training regarding entrepreneurship and technical skills, advice and technical support to SMEs, and helping these SMEs to establish networking and facilitating financing mechanisms (MINICOM, 2010). The Government of Rwanda has also created an enabling policy environment for the participation of the private sector (Private Sector Federation), non-governmental organizations, and other development partners (DPs).

The main purpose of the Rwandan SME Policy is to provide a conducive environment through the provision of financial and technical support in the areas of marketing and value addition, thereby improving productivity of these SMEs (MINICOM, 2010). However, this sector has special challenges and factors which affect its business success. As a result, many SMEs do not reach their full potential and fail to grow, resulting in the loss of jobs and wealth for the areas in which they are based.

### 2.2. The concept of knowledge management

Knowledge management (KM) as a concept has become important because of the growing awareness of the importance of knowledge for the organization's prosperity and survival. As a result, knowledge has been identified with two fundamental characteristics, namely, tacit knowledge and explicit knowledge (Polanyi, 1966). According to Davenport and Prusak (2000), tacit knowledge involves the complex process of comprehension which may not be easy to understand because it is hard to digest. It is assessed in the form of capabilities, skills, and ideas which individuals may possess mentally. For Coulson-Thomas (2004), this type of knowledge can be transferred only by means of interactions with other people in the organization through experiences, practice, feelings, and attitudes among others. On the other hand, explicit knowledge means the information that can easily be articulated or codified, transferred, and shared to others (Davidson & Voss, 2002) in the form of manuals, fact sheets, pictures, charts, and diagrams (Nonaka, 1994).

KM has been operationally defined differently because of its multi-dimensional nature. For example, Chawla and Joshi (2010) referred to KM as the process of identifying and analyzing accessible knowledge that is needed to achieve organizational objectives. For Darroch (2003), KM involves

knowledge acquisition, knowledge dissemination and the utility of available knowledge. KM has also been examined as a process of acquiring, storing, understanding, sharing, implementing knowledge and all actions taken in the learning process in tandem with strategies of the organizations concerned (Kiessling, Richey, Meng, & Dabic, 2009). Further, Bhatti and Qureshi (2007) considered KM as efforts to explore the tacit and explicit knowledge of individuals, groups and organizations and to convert this treasure into organizational assets that are used by managers to make organizational decisions. From the above review, this study employed knowledge acquisition, knowledge sharing and knowledge application/responsiveness to knowledge as the constructs of KM.

### **2.3. The concept of innovation**

There is no generally agreeable definition of innovation. According to the Oslo Manual (OECD, 2005), innovation is the implementation of a new organizational method in business practices, workplace organization, or external relations. According to Kuhn and Marisck (2010), innovation is the process of translating an idea or discovery into a good or service that makes value to meet and satisfy the needs and expectations of customers. Similarly, Crossan and Apaydin (2010) state that innovation is the creation, adaptation and utilization of a value added, novelty in business and manufacturing domains, renewal and expansion of a product, services and markets, making of new ways of product development and establishing new management system. For Maravelakis, Bilalis, Antoniadis, Jones, and Moustakis (2006), Mazzarol and Reboud (2008), organizational innovations are measured based on product, process and administrative innovations, while McGrath (2001) measured innovation using product, process and market innovations. In this study, only three constructs of innovation have been used, namely product innovation, process innovation, and market innovation.

### **2.4. Knowledge management and business performance**

KM is considered to be the best strategy that businesses can use to improve their competition level (Audretsch & Thurik, 2004) since knowledge is a strategic resource that allows them to obtain a higher level of competitiveness and innovation (Chirico, 2008). KBT advocates that competitive advantage of the firm comes from intangible assets, such as firm-specific knowledge (explicit knowledge), the tacit knowledge of its people and the ability to apply knowledge resources (Bontis, 2002; De Carolis, 2002; Gehani, 2002). Besides, Barney (2007) argues that knowledge leads to performance improvement when it is well managed. KBT suggests that KM practices, such as knowledge acquisition, knowledge creation, knowledge sharing, knowledge storage and knowledge implementation play a vital role in achieving superior performance (Soderberg & Holden, 2002; Spender, 1996). Thus, businesses that strive to remain competitive ought to put more effort on the management of their knowledge resources that are necessary to increase their profits, sales growth, and market share. Furthermore, scholars, like Seba and Rowley (2010) and Zack, McKeen, and Singh (2009) reported that firms that use suitable KM practices enhance their capabilities, resulting in improved business performance.

Previous empirical studies have investigated the relationship between KM and business performance. For instance, Wang and Lin (2013) confirmed that knowledge management orientation played positive roles in promoting organizational performance in China. The study of Noruzi, Dalfard, Azhdari, Nazari-Shirkouhi, and Rezazadeh (2013) revealed that KM positively influenced the performance of manufacturing firms. Further, the study of Roland (2006) showed that for an organization to achieve and maintain a high level of performance, it ought to develop efficient mechanisms for creating, transferring and integrating knowledge.

In the context of SMEs, Gholami et al. (2013) reported a significant relationship between KM and business performance. In this case, knowledge sharing had higher factor loading compared with other KM practices. At the same time, financial performance had higher factor compared with other organizational performance components. Researchers, like Liu and Abdalla (2013), Wei et al. (2011), and Hussain et al. (2011) on the other hand, have demonstrated that KM influenced positively and significantly the performance of SMEs industry. Nevertheless, as stated by Durst and Edvardsson (2012) and Marra et al. (2012), the benefits of KM adoption are not fully exploited by SMEs in developing countries, particularly in Rwanda. What is questionable though is the extent to which KM

influences business performance of SMEs in Rwanda. This was the subject of this study and it has led to the formulation of the following hypothesis:

H1: There is a significant relationship between knowledge management and business performance in SMEs.

### **2.5. Innovation and business performance**

Owing to the current levels of intense competition and turbulent business environment, SMEs need to monitor their competitive edges vis-à-vis their competitors through rapid innovations. This partly explains why innovations are more vital to business performance levels. According to du Plessis (2007) and Huang and Li (2009), innovations have significant influence on organizations' performance, survival and competitiveness. Similarly, Kuratko, Ireland, Covin, and Hornsby (2005) argues that innovations provide firms with a strategic orientation to achieve sustainable competitive advantage.

Previous researchers have tested the association between innovations and business performance and have found significant positive relationships. For instance, Jiménez-Jiménez and Sanz-Valle (2011) study revealed that business performance depended on the number of innovations, the nature of those innovations and the firm resources invested in the innovations. While, the study of Ar and Baki (2011) found that product and process innovations led to superior performance where performance was measured by sales, market share and profitability. In that study, product innovations were found to have stronger predictor power in performance than process innovations.

The positive and significant relationships between innovations and business performance were also found in SMEs industry within different business sectors. Another study done by Hajar (2015) examined the relationship between innovation and performance of wooden furniture manufacturing SMEs in Indonesia. The study found a positive and significant effect between innovation and the firm's performance. Similarly, Rhee, Park, and Lee (2010) showed that firms with inclinations to innovations were able to face changes in the competitive environments and obtained superior performance (e.g. South Korean SMEs). In the same line, Terziovski's (2010) study found that innovation culture and strategy represented key drivers to the performance of manufacturing SMEs in Australia.

Other studies on the effect of innovation on business performance came up with similar or slightly different results. For instance, Rosli and Sidek's (2013) study revealed a positive impact of product and process innovations on firms' performance in manufacturing sector in Malaysia but no direct relationship between market innovations and firms' performance were established. Salim and Sulaiman (2011) focused on ICT companies in Malaysia and confirmed the same results. Yet, another study done in Kenya, Ndalira, Ngugi, and Chepkulei (2013) revealed that innovations influenced the growth of garment SMEs. It also showed that the tendency of owners to engage in new ideas and creative processes resulted in new products and processes which had great influence on the performance of SMEs.

Lastly, Ndesaulwa (2016) conducted a literature survey to investigate the relationships between innovation and business performance of SMEs. After an extensive review of several studies on innovation and SMEs performance, he concluded that very few empirical data were observable in Africa, let alone in Rwanda. Thus, he recommended further research to explore these relationships. Based on this background, this study was initiated to investigate the relationships in Rwanda where there is dearth of research in this area and it is hypothesized as follows:

H2: There is a significant relationship between innovation and business performance in SMEs.

## 2.6. Knowledge management and innovations

In KBT, Ben Zaied et al. (2015) and Damanpour et al. (2009) associated knowledge resources to innovation and argued that these resources determine the capacity of the firm to innovate. Similarly, Wilson (2007) stated that innovation is the transformation of knowledge into new products, practices, and processes and services. Hence, the influence of KM through acquisition, sharing, and application of innovation is acknowledged in the cited literature. To be specific, knowledge acquisition is the process of obtaining knowledge that is available somewhere and it refers to the use of existing knowledge or capturing new knowledge (Lin & Lee, 2005).

Internally, the company can acquire knowledge using explicit knowledge from existing documents or the tacit knowledge of its people into its repositories. Externally, Wong and Aspinwall (2004) argue that a business can acquire knowledge by employing individuals with the required knowledge and by purchasing knowledge assets, such as patents and research documents. Besides, a close relationship with customers may allow business managers to have a direct and faster knowledge flow and this may help them to improve their ability to capture the customers' knowledge, competitors' actions and behavior, market trends, and other developments (Wong & Aspinwall, 2004).

It is important to emphasize that when there is acquisition of new knowledge within the company, the capacity of the employees' increases and they become more able to transform the new knowledge and generate the new ideas (Chen & Huang, 2009). Consequently, the stocks of knowledge increase and the business takes advantage of new opportunities by applying and exploiting acquired knowledge to produce innovative results (Huang & Li, 2009). Scholars confirmed the relationship between knowledge acquisition and innovation. For instance, Zhang, Shu, Jiang, and Malter (2010) found that the information acquired from alliance partners affects knowledge creation of the organization, which in turn leads to innovations. Tan and Nasurdin (2010) confirmed a positive and significant relationship between knowledge acquisition and technological innovation (process and product innovation). Mafabi et al. (2012) study also revealed a positive and significant relationship between knowledge acquisition and organizational innovation.

It can be stated that knowledge sharing is the exchange of knowledge, experiences and skills across the whole organization (Lin, 2007). Members of the organization share and exchange knowledge, prompting their level of participation to increase. This contributes to the development of innovative ideas (Chen & Huang, 2009). Thus, a positive association can be assumed between knowledge sharing and innovation. Lastly, knowledge application (responsiveness to knowledge) is very necessary. It is the utilization of acquired knowledge to make useful decisions regarding business (Alavi & Tiwana, 2002). Therefore, knowledge application can stimulate innovative activities.

Factual evidences adduced from several studies have found a positive and significant relationship between KM and innovation. For instance, Xu, Houssin, Caillaud, and Gardoni (2010) study revealed that the way knowledge is managed determines the success of innovations in businesses. Further, Amalia and Nugroho (2011) confirmed that effective KM process through knowledge creation, storage, distribution and application contributes to innovation in the firm. Whereas, Tan and Nasurdin (2010) as well as Mhosen & Khadem's (2010) studies revealed a positive relationship between the effectiveness of acquisition, sharing and application of knowledge and product innovation.

Available data obtained from some empirical studies have examined the above-mentioned associations in the SMEs. For instance, Alegre, Sengupta, and Lapiedra (2011) found a positive and significant relationship between KM and innovations in high-technology SMEs industry. This was supported by the study of Price, Stoica, and Boncella (2013) who revealed that KM process supports innovation in SMEs. Guzmán, Serna, and de Lema (2012) found similar results in Mexican SMEs. However, Molnar, Nguyen, Homolka, and Macdonald (2011) and Durst and Edvardsson (2012) noted that research on

KM application in SMEs, particularly in developing countries, are few. That is why Tee, Oon, Kuek, and Chua (2012) suggested more research to enrich the empirical studies on the relationships between KM and innovation in SMEs. Due to limited research on the subject, there was a need to investigate this relationship in Rwandan SMEs. From here, the following hypothesis was formulated:

H3: Knowledge management and innovation are positively related in Rwandan SMEs.

### 2.7. Knowledge management, innovation and business performance

Some researchers have identified a gap in the innovation field, especially in the determination of the critical factors that have a direct effect on innovation to improve business performance (Camisón & Villar López, 2010). That is why Darroch (2005) recommended to the managers with the desire to increase their business performance to pursue innovations in order to remain competitive since they are operating in a changing environment. In this regard, scholars confirmed that the achievement of superior business performance requires that effective KM leads to innovation. For instance, Warrior (2009) and Nonaka (2007) argued that effective KM through knowledge acquisition, knowledge sharing and application is very important because it comes to support management decision-making to enhance business performance and increase the capacity for creativity and innovation.

Basing on KBT, Leal-Rodríguez et al. (2013) stated that when knowledge is effectively managed in different levels of the organization, it leads to the capabilities that are unique which in turn contribute to better performance through innovation. To support this, the study of Nawaz et al. (2014) found that KM practices (i.e. knowledge acquisition, knowledge dissemination and responsiveness to knowledge) contribute to increased sales through new product development, adaptations and improvements in innovation. The study by Nawab et al. (2015) also revealed that knowledge management processes have an indirect significant impact on business performance through innovation in banking industry whereas Alrubaiee et al. (2015) confirmed the same results in telecommunication and information technology industry.

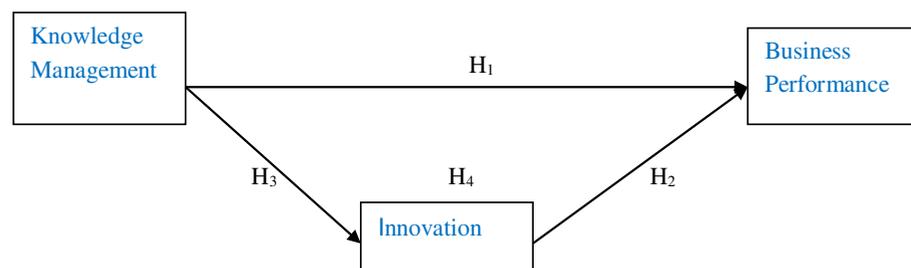
Other scholars, such as Chen and Huang (2012) and Schiuma, Andreeva, and Kianto (2012) demonstrated a significant indirect effect of KM, where KM supported by IT facilitates the generation of innovation which results in increased business performance of SMEs in the technology sector. Elsewhere, the study by Mafabi et al. (2012) revealed a full mediation of innovation between knowledge management and organizational resilience in parastatals. The above discussion shows that the mediating role of innovation is least investigated in SMEs. From here, the following hypothesis was formulated:

H4: Innovation mediates the relationship between knowledge management and business performance in SMEs

From the literature review developed above, the model below was developed to guide this study (see Figure 1).

Figure 1. Research model.

Source: Literature review.



### 3. Research method

#### 3.1. Research design

The study used a cross-sectional survey design. The data collection was conducted in the period of two months running from July to August 2014 to investigate the mediating role of innovation in the relationship between KM and business performance of SMEs situated in Kigali City Province. The choice is because Kigali is the capital of the country and the commercial town where most of the business activities take place and the majority of businesses are SMEs.

#### 3.2. Population and sample size

The study population consisted of 377 manufacturing SMEs located in Kigali City Province (NISR, 2011). Using Yamane's (1967) mathematical formula for determining sample size, the corresponding sample size is 195 SMEs. However, this size was adjusted to 250 SMEs to take into account non-response bias as recommended by Miller and Smith (1983). The SMEs were selected using simple random sampling methods. To avoid one person response bias, the owner-manager and manager or assistant owner (two persons) were selected in each SME. Two-hundred and thirty four out of the 250 SMEs participated in this study, giving a response rate of 94%. The high response rate is attributed to the face-to-face approach employed. The sample characteristics as presented in Appendix 1 reveals that, the majority of SMEs surveyed employed between 10 and 30 workers and the majority (42.8%) of the businesses were in the bracket of 6–10 years in operation. It is worth noting that this study considered three (3) years and above as the minimum age of the business to be selected because this time was enough for a business owner/manager to know if his/her business is performing well or not. In examining the industry type, majority of SMEs surveyed were in carpentry (32.9%).

#### 3.3. Operationalization and measurement of variables

The independent variable for this study is knowledge management; the dependent variable is business performance, while the mediator is innovation. These variables were all measured using item scales developed by previous scholars drawn from existing literature. Some modifications were made where necessary to suit the Rwandan study context.

Knowledge management was measured in terms of knowledge acquisition, knowledge sharing and responsiveness to knowledge. Here, the purpose was to ask the respondents to indicate the way knowledge is managed in their respective businesses. The question items for KM were adapted from the instruments developed by Darroch (2005, 2003); Kanya (2010) and Mafabi et al. (2012). The items for knowledge acquisition and sharing were anchored on six-point Likert scale ranging from 1 = "Never to less than a quarter of the time" to 6 = "Always Without fail". Whereas, the items for responsiveness to knowledge, the items were anchored on six-point Likert scale varying from 1 = "completely disagree, without doubt" to 6 = "Agree completely".

Business performance is considered as a complex, multi-dimensional construct and it is context driven (Richard, Devinney, Yip, & Johnson, 2009). Business performance has been widely studied but there is no full consensus among academic researchers about the measures to be used. This study examined business performance in terms of profits (Tavitiyaman, Zhang, & Qu, 2012), sales growth (Richard et al., 2009), and market share (Bagorogoza & Waal, 2010; Marques, Narangajavana, & Simon, 2005) as these are considered to be very critical indicators for performance of SMEs. Profits are necessary for business survival (Uyar, 2009; Waweru & Ngugi, 2014) and the presence of profits indicates that SMEs are sound and profitable to the stakeholders. Ahmad (2014) as well as Maduekwe and Kamala (2016) asserted that sales growth is likely to be the most suitable business performance indicator on which business owners of SMEs ought to attach high value. It allows them to know the evolution of their sales and plan for future sales and set sales targets. Market share can also be used as a yardstick to measure business performance (Cho & Pucik, 2005). It shows the trend for the current situation, future opportunities or problems so that the business owners may plan accordingly (Farris, Bendle, Pfeifer, & Reibstein, 2010). Items were generated using the works of different scholars, including Odeng (2011), Apolot (2012) and Wang (2007). The items scales were modified and

anchored on six-point Likert scale ranging from 1 = “completely disagree, without doubt” to 6 = “Agree completely, without any doubt”.

Innovation was measured using the instrument used by Wang and Ahmed (2004), OECD (2005) and Mafabi et al. (2012); specific dimensions covered product, process and market innovation because they are more important in building business performance in SMEs. This implies that for business to remain competitive in the changing environment it needs to introduce new products or improve the existing ones, update its production processes and seek new approaches to enter and exploit new or existing markets to attract new customers and maintain the existing ones. The items were anchored on six-point Likert scale ranging from 1 = “Never to less than a quarter of the time” to 6 = “Always Without fail”. The questionnaire was validated through expert interviews and a panel of practitioners. All the variables registered content validity index of greater than 0.80.

The items measuring the study variables were anchored on a six-point scale to allow respondents to be more thoughtful, precise and reduce response bias through the provision of a wide range of possible answers. Eliminating the middle-point provided a better measure of the intensity of participants’ attitudes or opinions (Adelson & McCoach, 2010; Reid, 1990). More specifically, this study examined the mediating effect of innovation on the relationship between knowledge management and business performance of SMEs. In this regard, the respondents were expected to make precise choices from the alternative responses, hence rendering the middle category irrelevant when a five-point scale is used. Further, a six-point scale was chosen to increase response variability.

### **3.4. Data analysis**

Quantitative data were recorded, checked, and cleaned using SPSS v19 to yield composite scores of each scale and were used for statistical analysis. As this study used face-to-face administered questionnaire, hardly any missing value was observed at all. The eight identified outliers were due to data entry errors and were replaced with correct values. The 468 units of inquiry were aggregated into 234 SMEs. The assumptions of parametric tests were run and confirmed. Descriptive analyses were run using SPSS, while the hypotheses were tested using Structural Equation Modeling (SEM) with the aid of AMOS software version 21™. Tests for mediation were conducted in this study to establish the nature of mediation, and the extent to which innovation influences the association between knowledge management and business performance.

Specifically, bootstrap analysis was performed to test mediation as recommended by Preacher and Hayes (2008). The bootstrap approach was chosen to assess the significance level of the mediation effect (Preacher & Hayes, 2008) because it has high statistical power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Therefore, two models were specified—Model 1 excluded the mediator variable (innovation) and Model 2 included the mediator variable. After which, the models were compared in order to select the one that fit the data better using the criteria proposed by Morgan and Hunt (1994). The criteria included model fit indices, percentage of hypothesized number of significant paths, and the  $R^2$  as indicated by the square multiple correlation. The model with a better fit was then utilized for further analyses to test the mediation effect.

### **3.5. Reliability test**

Cronbach’s alpha was used to verify reliability. The Cronbach’s alpha values for KM, innovation and business performance range 0.82, 0.74, and 0.86, respectively. These are above the threshold of 0.70 by Nunnally (1978).

### **3.6. Validity test**

Confirmatory factor analysis was used to test for convergent validity. All items belonging to the final models for KM, innovation and business performance are statistically significant, with a standardized factor loading greater than 0.50 loaded on one factor as recommended by Hair, Black, Babin, and Anderson (2010). Thus, indicating convergent validity. To assess the discriminant validity, correlations among constructs were compared with their respective construct reliabilities as

**Table 1. Means, standard deviations, and zero-order correlations**

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
KA[1]	3.55	0.40	1											
RKN[2]	4.02	0.48	0.490**	1										
KS[3]	3.75	0.49	0.465**	0.297**	1									
KM[4]	3.77	0.36	0.807**	0.770**	0.767**	1								
PRDI[5]	3.82	0.43	0.330**	0.453**	0.494**	0.554**	1							
PRCI[6]	3.88	0.44	0.094	-0.013	0.342**	0.186**	0.352**	1						
MARKI[7]	3.76	0.50	0.038	-0.023	0.350**	0.164*	0.345**	0.421**	1					
INNOV[8]	3.82	0.35	0.193**	0.170**	0.514**	0.385**	0.724**	0.768**	0.795**	1				
PROFI[9]	4.22	0.39	0.071	0.092	0.135*	0.130*	0.067	0.243**	0.275**	0.261**	1			
SAGR[10]	4.19	0.45	-0.004	-0.145*	0.067	-0.036	0.011	0.310**	0.375**	0.314**	0.608**	1		
MASH[11]	4.12	0.44	0.121	-0.061	0.184**	0.102	0.183**	0.255**	0.450**	0.397**	0.494**	0.642**	1	
BP[12]	4.22	0.30	0.189**	0.051	0.262**	0.214**	0.198**	0.355**	0.426**	0.434**	0.796**	0.822**	0.807**	1

Notes: KA—knowledge acquisition, KS—knowledge sharing, RKN—responsiveness to knowledge, KM—knowledge management, PRDI—product innovation, PRCI—process innovation, MARKI—market innovation, INNOV—innovation, PROFIT—profit, SAGR—sales growth, MASH—market share, BP—business performance.

\*Correlation is significant at the 0.05 level (2-tailed).

\*\*Correlation is significant at the 0.01 level (2-tailed).

recommended by Hair et al. (2010). The results show that the construct’s reliabilities were greater than the correlation coefficients. Hence, indicating the measurement scales’ ability to discriminate between measures that are supposed to be different.

#### 4. Empirical results

##### 4.1. Correlations

A zero-order correlation was conducted to test the associations between the study variables in the hypotheses. Table 1 indicates that knowledge management has a positive and significant relationship with innovation ( $r = 0.385, p < 0.01$ ); hence, lending support to H3. It is also evident that positive and significant relationships between innovation and business performance ( $r = 0.434; p < 0.01$ ) and between knowledge management and business performance ( $r = 0.214, p < 0.01$ ) existed in SMEs; and this supports H2 and H1, respectively.

##### 4.2. Testing for mediation

Mediation test was investigated about the mediating effect of innovation in the relationship between knowledge management and business performance. The investigation was undertaken by testing the hypothesis that: “Innovation mediates the relationship between knowledge management and business performance of SMEs”. Therefore, two models were specified to establish the one with a better fit to test the study hypothesis. Model 1 was specified without the mediator variable (innovation), while Model 2 included the mediator variable. Basing on the accept/reject criteria recommended by Morgan and Hunt (1994), Model 2 was selected. Table 2 presents the results of the competing models.

After identifying a model with a better fit, a bootstrap procedure by Preacher and Hayes (2008) was used to test for mediation effects of innovation on the relationship between knowledge management and business performance. The results are presented in Tables 3 and 4.

**Table 2. Structural model results for competing models**

Model elements	Model 1 (excluding innovation)	Model 2 (with innovation)
<i>Model fit</i>		
CMIN( $\chi^2$ )	17.491	5.083
df	5	2
CMIN/df	3.498	2.541
P-value	0.004	0.112
RMSEA	0.104	0.072
GFI	0.970	0.989
CFI	0.883	0.964
IFI	0.767	0.966
NFI	0.851	0.945
<i>Standardized parameter estimates</i>		
KM—INNOV	–	0.308**
INNOV—BP	–	0.388**
KM—BP	0.074*	–0.046
Businage—BP	0.053	0.005
SMC	33%	53%
% of significant paths	50%	50%

\* $p < 0.05$ .

\*\* $p < 0.001$ .

**Table 3. Total, direct and indirect effects**

	Knowledge management	Innovation
<i>Standardized total effects</i>		
Innovation	0.308***	-
Business performance	0.074*	0.388***
<i>Standardized direct effects</i>		
Innovation	0.308***	-
Business performance	-0.046	0.388***
<i>Standardized indirect effects</i>		
Business performance	0.120***	-

\* $p < 0.05$ .

\*\*\* $p < 0.001$ .

**Table 4. Bootstrapping mediation results**

Parameter	Point estimate	SE	Lower bounds	Upper bounds	p-value	z-value
KM → BP	0.120	0.037	0.059	0.202	0.001	3.243

Note: KM = knowledge management, BP = business performance.

The results in Table 3 show that there was a significant direct effect of knowledge management (KM) on business performance (BP) with  $\beta = 0.074$ , there was a significant direct effect of knowledge management (KM) on innovation (INNOV) with  $\beta = 0.308$  and there was a significant direct effect of innovation (INNOV) on business performance (BP) with  $\beta = 0.388$ . However, when controlling for innovation (INNOV) as a mediator, the direct effect of knowledge management (KM) on business performance (BP) dropped from  $\beta = 0.074$  to  $\beta = -0.046$  and became insignificant, thus confirming a full mediation effect. H4 was therefore, accepted implying that innovation mediates the relationship between knowledge management and business performance. The bootstrap results (Table 4) confirm significant mediation effect of innovation on the relationship between knowledge management and business performance ( $z = 3.243$ ,  $p < 0.01$ ; lower bounds = 0.059; upper bounds = 0.202). The significant z-value provides also evidence of support for hypothesis H4 that innovation mediates the relationship between knowledge management and business performance.

## 5. Discussion of results

This study investigated and tested the mediating effect of innovation on the association between KM and business performance of SMEs in Rwanda. The findings indicate that the mediating effect of innovation on the relationship between KM and business performance satisfies the conditions for mediation as recommended by Baron and Kenny (1986) and confirmed by Preacher and Hayes (2008). The results reveal that innovation fully mediates the relationship between KM and business performance. This finding suggests that variations in knowledge management affect variations in innovation, which subsequently and wholly cause changes in business performance. This statement is not far from Hair et al. (2010) who stated that in case of full mediation, the predictor variable loses its power to influence the criterion variable except through a mediator. This finding indicates that, business performance of SMEs may not be influenced by knowledge management unless it passes through innovation. Hence, to achieve a superior business performance in terms of profits, sales growth and market share, owner-managers have to introduce new or improve existing products, processes and markets by the means of effective knowledge acquisition, knowledge sharing and knowledge application.

This finding arguably links well with the KBT which postulates that when knowledge is effectively managed, it creates unique capabilities which contribute to improved business performance through innovation (Grant, 1996; Leal-Rodríguez et al., 2013). Other scholars whose conclusions are similar

to the study findings include Chen and Huang (2012) and Schiuma et al. (2012) who established a significant indirect effect of KM, suggesting that KM supported by IT facilitates the generation of innovation, which result in increased business performance of SMEs in the technology sector. The similar findings were found by the study of Mafabi et al. (2012), except that the full mediation of innovation was between knowledge management and organizational resilience in parastatals. Based on the findings from this study, it can be noted that without innovation in Rwandan SMEs, KM on its own cannot directly influence business performance of SMEs. Implying that without innovation, owner managers of SMEs may not achieve improved business performance. This discussion confirms that the presence of innovation acts wholly as a conduit in the relationship between knowledge management and business performance. The contribution of KM to business performance is accomplished through innovation. Thus, innovation is a true mediator of the relationship between KM and business performance of SMEs. Hence, H4 is supported.

## 6. Conclusion and implications

This study examined the mediating effect of innovation in the relationship between KM and business performance. The findings of this study led to two main conclusions as follows. Firstly, innovation acts wholly as a conduit in the relationship between KM and business performance levels. The study has proven that KM, on itself, cannot influence business performance of SMEs in Rwanda, implying that knowledge resources that are acquired, shared and applied must be used to improve the quality of products, production processes and markets in order to achieve improved business performance. Secondly, KM remains a fundamental factor that promotes SMEs innovations. This is true because the generation of new ideas is through proper management of knowledge which is a seed of innovations. Overall, this study indicated that KM does not have a direct effect on business performance except through innovation. This study emphasizes the power of innovation in the relationship between knowledge management as an antecedent to business performance. The main contribution of this research is to provide evidence that innovation is an effective mediator in the relationship between KM and business performance of SMEs. As such, SMEs in Rwanda may show poor business performance, to some extent, because of limited utilization of knowledge resources. The findings of this study may also contribute to the existing literature on KM and business performance levels.

The practical implications of this study are that owner-managers of manufacturing SMEs should pay keen interest in translating their available knowledge resources into the development of new products, processes, and markets to improve on their business performance levels. This can be achieved by utilizing well qualified staff, motivating, and empowering employees through short courses and enabling them to attend seminars, conferences, and exhibitions to acquire new knowledge. Besides, knowledge sharing culture within an enterprise should be strengthened and the new knowledge should be utilized to enhance innovative activities for better business performance.

In this connection, it would be prudent for policy-makers (ministries in charge of SMEs, government agencies, and stakeholders) to implement the findings of this study that should help them to formulate sound policies and support program which are necessary to boost the performance of SMEs. This study provides important information on business performance of SMEs in a developing country, like Rwanda, particularly for academic researchers working in higher learning institutions and those involved in promoting the Rwandan business sector.

This research is not without its limitations. First, this study has used a cross-sectional survey design to collect quantitative data and is thus limited to a particular time of measurement. It is highly recommended that future studies on the subject employ a longitudinal method to compare any long-term variations in the results. Alternatively, qualitative studies could be conducted to supplement the quantitative findings because through methodological triangulation, it may be possible to gain a better understanding of the mediating effect of innovations on the relationship between KM and business performance.

Second, the focus of this study was on manufacturing SMEs in the urban region rather than the rural settings. The findings might not be the same in the SMEs located in rural areas. Besides, urban SMEs have many business opportunities than SMEs in rural areas such as access to some infrastructure facilities, training and advisory services and finance, among others. Therefore, the mediation model might be applied in the rural region to test reliability and validity. Future researchers may also wish to examine other types of businesses in the country.

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## Appendix 1

### Sample characteristics

	F	%
<i>Business size (no of employees)</i>		
From 10 to 30	212	90.6
From 31 to 50	12	5.1
From 51 to 70	4	1.7
Above 70	6	2.6
<i>Business age</i>		
From 3 to 5 years	91	39
From 6 to 10 years	100	42.8
Above 10 years	43	18.2
<i>Industry type</i>		
Carpentry	77	32.9
Welding	55	23.5
Manufacture of leather products	11	4.7
Food processing	31	13.2
Pottery and construction materials	20	8.5
Manufacture of household materials	20	8.5
Miscellaneous products	20	8.5



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