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Does Knowledge Management Lead to Innovation? An Empirical Study on SMEs in Rwanda

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Abstract: The purpose of this study was to investigate whether knowledge management under its three dimensions of knowledge acquisition, knowledge sharing and responsiveness to knowledge lead to innovation in Rwandan SMEs. The study adopted a cross-sectional survey design to collect data used to examine that relationship. The results revealed that only knowledge sharing was found positive and significant predictor of innovation. This implies that effective knowledge management through knowledge sharing may lead to innovation.This study used a cross-sectional research design combined with a quantitative research approach. Future researchers could employ a longitudinal method to investigate any possibility of variations in the results. Qualitative studies could equally be used to supplement the quantitative findings. Lastly, this study focused on manufacturing SMEs only. Future research might focus on other types of businesses. Owners-managers of SMEs may sustain their competitive position and survive longer when knowledge is effectively and efficiently shared in order to increase their innovation capability. The study generated empirical evidence on less studied phenomena in the SMEs sector. The evidence highlighted the powerful influence of knowledge sharing in predicting innovation in SMEs.

Keywords: Knowledge acquisition, Knowledge sharing, Responsiveness to knowledge, Innovation, SMEs, Rwanda

1. Introduction

Small and Medium Enterprises (SMEs) are the engine of economic growth and poverty reduction in the world (Katua, 2014). More specifically, SMEs are known to have the power to create jobs in developed and developing countries (Abor and Quartey, 2010; Namusonge, 2014), contribute to economic growth by expanding the tax base and drive innovations (Kongolo, 2010). Given their economic importance, SMEs are supposed to provide innovative products and services that satisfy customers to remain competitive. Thus, with the increase of players in the market, businesses need to be unique and innovative to provide opportunities for new markets and new inventions (Kuhn and Marisck, 2010) and increase interest based on innovation to enhance growth (Birkinshaw, 2011; Clawson, 2009; Grant, 2010).

Previous scholars have come up with critical factors which are likely to influence innovation in SMEs. For instance, Tomlinson (2010), McKenzie et al. (2009) and Shefer and Frenkel (2005) linked innovation to firm size and age. Other studies associated innovation with such factors as government support and cooperation with academia (Ho and Yang, 2012), top management support and leadership style (De Tienne and Mallette, 2012) and organizational culture (Du Plessis, 2007). However, among the above mentioned studies, none of them has emphasized the importance of knowledge management as a contributing factor to innovation.

In light of the knowledge-based theory, Ben Zaied et al. (2015), Lichtenthaler (2009) and Damanpour et al. (2009) related knowledge resources to innovation, and argued that they determine the capacity of the firm to innovate. Further, Jorna (2006) noted that without knowledge, there could be no innovation. Similarly, Nonaka and Takeuchi (1995) argued that the presence of a set of knowledge allow a firm to innovate by bringing new products and processes, or improve the existing ones. Hence, effective management of that knowledge is needed. Knowledge management (KM) has been defined as the process of acquiring, storing, disseminating, sharing and using productive knowledge to improve the

performance of organizations (Augier and Teece, 2009; Kiessling et al.,2009; Darroch, 2003). Various scholars noted that KM is the best strategy to enhance the competition for any business since knowledge is a strategic resource that allows firms to obtain a higher level of competitiveness and innovation (Audretsch and Thurik , 2004; Corsoet al., 2003; Chirico, 2008). Forcadell and Guadamillas (2002) also highlighted the importance of KM for innovation and concluded that innovation is a goal whereas KM is a method.

Some studies have been conducted to show that KM contributes to innovation in SMEs. In this context, KM was related to the external acquisition and internal sharing (Zhou et al., 2007), employees training and effects of organizational culture (Valdez-Juárez et al., 2016). It should be noted that none of those studies has looked at KM through the constructs of knowledge acquisition, knowledge sharing and responsiveness to knowledge. Thus, the main purpose of this study is to examine the extent to which knowledge acquisition, knowledge sharing and responsiveness to knowledge predict innovation with focus on Rwandan SMEs.

Rwandan SMEs were chosen for this study because, like in other developing countries, there is insufficient information on the factors that influence innovation. For instance, in Rwanda, there is almost no information database on SMEs and anecdotal evidence shows that most Rwandan SMEs tend to be 'copy-paste' businesses, which shows a low level of innovation. This study argues that SMEs need to start doing things differently if they are to remain successful in the current global environment. In order to achieve success, business owners ought to acquire more knowledge by exploring different horizons, improve the way information is shared among SMEs' employees and utilize that information to help attain business objectives.

This study seeks to make two contributions. First, it is expected to provide empirical evidence on the contribution of KM on innovation in SMEs from a developing country's perspective. Second, the paper is meant to provide new insights on the relationship between knowledge acquisition, knowledge sharing and responsiveness to knowledge, and innovation in SMEs.

This paper is divided into six sections. Apart from section 1 which is the introduction, section 2 explores the literature review while section 3 deals with research methodology. Section 4 focuses on the results while sections 5 and 6 are respectively about the discussion of results as well as the conclusion and research implications.

2. Literature Review and Hypotheses Development

2.1 Knowledge Management

Due to its multidimensional nature, KM is defined differently (Darroch, 2003).According to Chawla and Joshi (2010), KM is defined as the identification and analysis of available and required knowledge to achieve organizational objectives. For Darroch (2003), KM involves knowledge acquisition, knowledge dissemination and the use or responsiveness to knowledge. In Kiessling et al.'s (2009) view, KM is a process of acquiring, storing, understanding, sharing, implementing knowledge by the culture and strategies of the organizations. For the sake of this study, KM has been limited to three dimensions, namely knowledge acquisition, knowledge sharing and responsiveness to knowledge.

2.2. Innovation

There is no generally agreeable definition of innovation. According to the Oslo Manual (OECD, 2005), innovation is the implementation of a new or improved product, services, process and method of the firm's business practices, workplace organization or external relations. For Maravelakis et al. (2006), Mazzarol and Reboud (2008), organizational innovations are measured based on product, process and administrative innovations while McGrath (2001) measured organizational 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.

2.3. Knowledge Management and Innovation

The aim of this study was to examine the relationship between KM and innovation. In the ensuing paragraphs, it would help to explore how each of the dimensions of KM, that is, knowledge acquisition, knowledge sharing and responsiveness to knowledge, relates to innovation.

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2.3.1. Knowledge Acquisition and Innovation

According to Lin and Lee (2005), knowledge acquisition is the process of acquiring knowledge whether existing or new. In the context of SMEs, knowledge can be acquired internally or externally. Internally, SMEs can acquire knowledge using explicit knowledge from existing documents or tacit knowledge of its people (Wong and Aspinwall, 2004). Externally, SMEs can acquire knowledge by employing individuals with the required knowledge and by purchasing knowledge assets such as patents and research documents (Wong and Aspinwall, 2004). When there is the acquisition of new knowledge within the organization, the capacity of employees increases and they become able to transform it and generate the new one (Chen and Huang, 2009). Consequently, the stocks of knowledge increase and the business takes advantage of new opportunities by applying and exploiting knowledge, hence producing innovative results (Huang and Li, 2009; Argoteet al., 2003).

Previous empirical studies supported the positive relationship between knowledge acquisition and innovation. For instance, Zhang et al. (2010) conducted a survey of 127 German firms and found out that the information acquired from Alliance partners affected knowledge creation of the organization, which in turn led to innovation. In their study, Tan and Nasurdin (2010) confirmed a positive and significant relationship between knowledge acquisition and technological innovation (process and product innovation) among manufacturing firms in Malaysia. Similarly, Valdez-Juárez et al. (2016) study results indicated that knowledge acquisition in SMEs had a positive influence on a higher level of innovation (i.e. product and process innovation) in Spain. Further support was provided by Kör and Maden (2013) study that revealed a positive relationship between knowledge acquisition and administrative and technical innovations in Turkish Service and High-Tech Firms. In the same way, the studies of Kale and Karaman (2012) and Nawaz et al. (2014) confirmed that the acquisition of knowledge led to new product development, product adaptations, and improvements in innovation processes. Mafabi et al.'s (2012) study also revealed a positive and significant relationship between knowledge acquisition and organizational innovation in Ugandan parastatals. The study conducted by Capon et al. (1992) in the US showed that acquiring new knowledge from other industries did not significantly affect a firm's ability to innovate. However, the same study found out that the money spent on R&D contributed to the generation of new ideas, which resulted in innovation.

Given that the existing literature on the relationship between knowledge acquisition and innovation showed mixed results, further research is necessary to clarify the relationship between knowledge acquisition and innovation as recommended by Githii (2014). Hence, this study was designed to examine that relationship in Rwandan SMEs, and the following hypothesis was formulated:
H_1: There is a positive relationship between knowledge acquisition and innovation.

2.3.2. Knowledge Sharing and Innovation

Knowledge sharing is the exchange of employees' knowledge, experiences and skills across the whole organization (Lin, 2007). Employees share knowledge by talking to their colleagues, by helping one another and by seeking the way to get something done better, more quickly and efficiently. When members of the organization share and exchange knowledge, the level of participation in learning and knowledge creation increases, which results in the development of innovative ideas (Chen and Huang, 2009; Yang and Wu, 2008; Zhi-honget al., 2008).

Some empirical studies conducted in different business areas confirmed the positive relationship between knowledge sharing and innovation. For instance, Al-Husseini and Elbeltagi (2015) investigated the effect of knowledge sharing on product innovation in Iraqi public higher education institutions.The results showed that knowledge sharing play a fundamental role in enhancing product innovation in the higher education sector. A similar study of Zohoori et al.(2013) explored the link between knowledge sharing and innovation in electronic industry of Iran. The results revealed significant effects of tacit and explicit knowledge sharing on the speed and quality of innovation. Nasiripour et al. (2013) study established the positive association between knowledge sharing and firm innovation capability in Isfahan R&D Scientific Small City (Iran). Tan and Nasurdin's (2010) study also showed a positive and significant relationship between knowledge sharing and technological innovation in Malaysian manufacturing firms. The study by Hu et al. (2009) on the international tourist hotels in Taiwan found a significant and strong relationship between knowledge sharing and service innovation. The study by Liao et al. (2007) on 170 Taiwanese firms revealed a positive and significant relationship between knowledge sharing and innovation.

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Given that the positive and significant relationship between knowledge sharing and innovation has been confirmed in different research settings, the researcher was motivated to examine the extent to which knowledge sharing influences innovation of SMEs in Rwandan context. Hence, the following hypothesis was proposed:
H_2: There is a positive relationship between knowledge sharing and innovation.

2.3.3. Responsiveness to Knowledge and Innovation

Responsiveness to knowledge is described as knowledge use or application. It refers to the firm's response to different types of information referred to that firm (Lee et al., 2013). Responsiveness to knowledge occurs when a firm acquires new knowledge regarding the customers' needs and responds immediately to that information. Dove (1999) noted that a firm's adaptation is manifested by the quality and timeliness of its response. Lee et al. (2013) argued that the faster a firm response to customer information results in the high level of customers' satisfaction.

Some empirical studies have shown a positive relationship between responsiveness to knowledge and innovation. The study by Darroch and McNaughton (2002) examined the association between responsiveness to knowledge and innovation among 443 firms in New Zealand and found that being responsive to knowledge is a vital factor to boost innovation.The studies by Ju et al. (2006) and Amalia and Nugroho (2011) also revealed a direct effect of knowledge application on innovation measured by product and processes innovation. The study carried out by Madhoushi et al. (2011) on 164 Iranian SMEs found that effective knowledge application allowed organizational knowledge to be transformed into innovative products. Finally, the study by Lee et al. (2013) confirmed that an organization that is in a better position to respond to knowledge in time becomes innovative. From the above results, the following hypothesis was formulated:
H_3: There is a positive relationship between responsiveness to knowledge and innovation

3. Methodology

3.1. Research Method

The relationship between knowledge acquisition, knowledge sharing, responsiveness to knowledge and innovation was examined using a cross-sectional survey design. A face-to-face administered survey questionnaire was used for data collection and developed for measurement scales derived from previous empirical studies which were modified to adapt the study to the research context. It was subjected to a pilot study conducted on a sample of 80 SMEs and was found reliable. Then, the final instrument was used for the main data collection.

3.2. Population and Sample

The study population involved 377 manufacturing SMEs located in Kigali City Province as reported by the National Institute of Statistics of Rwanda (NISR, 2011), from which a sample size of 250 SMEs was drawn using Yamane (1967). Other scholars like Mafabi et al. (2012) used this approach successfully. A simple random sampling was drawn to select the respondents (SMEs). This study considered the business owners as the unit of inquiry because they occupied strategic positions in their respective businesses (O'Regan and Ghobadian, 2004) and were considered as the most knowledgeable people. To get diversified and relevant information about the business, the owner-manager and manager/ assistant owner (two persons) were selected as respondents in each SME. From a sample size of 250 SMEs, only 234 SMEs accepted to answer the questionnaire. The response rate was high (94%) because the face-to-face approach allowed interactions between the researchers and respondents and helped to improve quality and response rate. Table 1 presents the characteristics of the participants.

Regarding the business age, the results in Table1 indicate that the majority (42.8%) of businesses had been in existence between 6 and 10 years. This study considered three years and above as the minimum age of the business to be selected because this time was enough for its owner/ manager to know if it was performing well. The results about the size of the business revealed that the highest (90.6%) response belonged to the bracket of 10-30 employees followed by 5.1% in the bracket of 31-50 employees. The results imply that the majority of SMEs surveyed employed the staffs who were between 10 and 30. In general, most of SMEs employed a small number of people as it is one of the characteristics of SMEs. In examining the sample distribution in different industries, it was observed that the majority of SMEs surveyed were found in carpentry (32.9%) followed by welding (23.5%). This implies that manufacturing SMEs in Rwanda were dominated by carpentry and welding.

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Table 1: Sample characteristics

Variables	***F***	**%**
Business age		
From 3-5 years	91	39
From 6-10 years	100	42.8
Above 10 years	43	18.2
Business size (no of employees)		
From 10-30	212	90.6
From 31-50	12	5.1
From 51-70	4	1.7
Above 70	6	2.6
Industry type		
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

3.3. Measures

KM was measured in terms of knowledge acquisition, knowledge sharing and responsiveness to knowledge whereas innovation covered product innovation, process innovation, and market innovation. Measurement of KM and innovation were based on previous empirical studies and modified to suit the context of the study. In this study, the question items for KM were adapted from the instruments developed by Darroch (2005); Darroch (2003); Kamya (2010); Mafabi et al. (2012). Question items for innovation were generated and adapted from the instruments developed by Wang and Ahmed (2004); OECD (2005) and Mafabi et al. (2012) studies. All item scales were anchored on a six- point Likert scale and all constructs were tested for reliability and the alpha coefficients were above 0.7 cut-off point recommended by Neuman (2006) and Nunnally (1978), thus reliable.

3.4. Control Variables

The age of business and type of industry were included in the hierarchical regression models as control variables. These variables were controlled because, in some cases, they are given preferential treatment by government policy (Briggs, 2009) for instance food processing industries, exploitation of natural resource and agri-business. It is also expected that the more the age of business is increasing the more the business has the capability to invest in innovation.

3.5. Data Management

The survey data was recorded, checked, cleaned and labeled using a quantitative analysis software package (SPSS) adopted for Windows version 18. This study used a face-to-face approach in data collection and thus no missing values were observed. The 468 units of inquiry were aggregated into 234 SMEs. The assumptions of parametric tests were run. Specifically, regarding normality test, the bell-shaped histogram confirmed that data were normally distributed. Field (2005) also noted that if the assumption of linearity between IV and the DV is met, the plot of residuals against predicted score will also be linear. Therefore, the normal Q-Q plot results revealed a fairly straight line showing that the data were linear. In order to test homogeneity, a scatter plot was drawn plotting the residuals against the dependent variable.The results of the scatter plots showed that the points were dispersed around zero and there was no other clear trend in the distribution, implying that homogeneity assumption was met. Multicollinearity exists if there is a high correlation between independent variables when regressed against each other. It was tested using tolerance value and Variance Inflation Factor (VIF) (Pallant, 2005). The results revealed tolerance values ranging from .665 and above which were supported by VIF values below 10. Thus, there is non-multicollinearity among the study variables.

3.6. Reliability test

Reliability refers to the degree to which the instrument produces consistent findings over time which is determined by internal consistency of items that are used to measure variables-internal reliability (Saunders et al, 2007; Sekaran, 2008).

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In other words, an instrument is reliable in case it produces the same results whenever is repeated. Reliability test indicates the extent to which it is without bias or error free and hence ensures consistent measurement across time and the various items in the instrument. Therefore, internal consistency refers to the degree to which the items that make up the scale are all measuring the same underlying attribute (Field, 2009). In the current study, Cronbach's alpha was employed to determine the internal consistency of the 6-likert scales used to measure the items of the study variables.

Reliability analysis was performed to evaluate the reliability of the data obtained through questionnaires distributed to respondents. Data was reliable because all Cronbach's alpha coefficients were above 0.7 cut- off point recommended by Neuman (2006) and Nunnally (1978) as indicated in Table 2 below.

Table 2: The reliability test results

Study variables	**Cronbach's alpha coefficients**
Dependent variable: Innovation	0.740
Independent variables:	
Knowledge acquisition	0.792
Knowledge sharing	0.736
Responsiveness to knowledge	0.754

4. Empirical Results

Descriptive statistics were produced and Pearson correlation was run to examine if relationships existed between the study variables. Further, hierarchical regressions were computed to establish the predictive power of the independent variables (knowledge acquisition, knowledge sharing, and knowledge application/responsiveness) on dependent variable (innovation) under study.

4.1. Correlations

A zero order correlation was performed to test whether or not associations existed between the study variables as hypothesized from the literature review. The correlation results are presented in Table 3 below.

Table 3: Zero order correlations matrix

Variable	**Means**	**St. dev**	**1**	**2**	**3**	**4**
Knowledge acquisition (1)	3.55	.40	1			
Knowledge sharing (2)	3.75	.49	.465**	1		
Responsiveness to knowledge (3)	4.02	.48	.490**	.297**	1	
Innovation (4)	3.82	.35	.193**	.514**	.170**	1

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

The results in Table 3 show a positive and significant relationship between innovation and knowledge acquisition ($r = .193$, $p < 0.01$), innovation and knowledge sharing ($r = .514$, $p < 0.01$) and innovation and responsiveness to knowledge ($r = .170$, $p < 0.01$) respectively.

4.2. Hierarchical Regression

Hierarchical regression was further performed to predict innovation using knowledge acquisition, sharing, and knowledge application/responsiveness. The regression results are presented in Table 4.

The results in Table 4 indicate that in Model 1, the control variables (age of business and type of industry) have an explanatory power of 4.7%. In model 2, knowledge acquisition accounted for 3.5% variance in innovation ($\Delta R^2 = .035$, $p < 0.01$) causing a statistically significant standardized coefficient ($\beta = .188$, $p < 0.05$). This finding supports H_1 that there is a positive relationship between knowledge acquisition and innovation. In Model 3, knowledge sharing was introduced in the regression model and it contributed an additional 21.1% variance in innovation ($\Delta R^2 = .211$, $p < 0.01$) resulting in a statistically significant standardized coefficient ($\beta = .522$, $p < 0.01$). This finding supports H_2 that there is a positive relationship between knowledge sharing and innovation. When knowledge application was introduced in Model 4, it made an insignificant additional 0.1% variance in innovation ($\Delta R^2 = .001$, $p < 0.01$), resulting in a statistically

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non-significant standardized coefficient (β = .025, p > .05). This finding, therefore, does not lend support for H_3 which suggested that there is a positive relationship between knowledge application and innovation. Overall, after the introduction of all constructs of KM in the regression model, the regression results show that only knowledge sharing predicts innovation while knowledge acquisition and responsiveness become insignificant in Rwandan manufacturing SMEs.

Table 4: Hierarchical regression results –knowledge acquisition, knowledge sharing and responsiveness to knowledge

	Model 1			**Model 2**			**Model 3**			**Model 4**		
	B	**SE**	**Beta**	**B**	**SE**	**Beta**	**B**	**SE**	**Beta**	**B**	**SE**	**Beta**
Constant												
Age of business	.012	.004	.185*	.012	.004	.185*	.010	.004	.151	.010	.004	.147
Type of industry	.029	.011	.167	.027	.011	.158	.019	.010	.109	.019	.010	.109
Knowlegde acquisition				.165	.056	.188*	-.047	.055	-.053	.057	.061	.065
Knowledge sharing							.372	.045	.522**	.371	.045	.520
Responsiveness to knowledge										.018	.047	.025
R			.217			.287			.542			.542
R^2			.047			.082			.293			.294
Adj R^2			.037			.070			.281			.278
R^2 Change			.047			.035			.211			.001
F Change			5.725			6.878			23.777			18.982
Sig F change			.004			.000			.000			.000
Durbin- Watson												1.639

*Significant at the .001 level (p< .01); *. Significant at the .005 level (p< .05)*
Dependent variable – Innovation

5. Discussion of Results

The results on H_1 indicate that when knowledge acquisition and innovationare only considered**,** the relationship is positive and significant. However, when knowledge sharing is introduced as per the hypothesized model, the relationship between knowledge acquisition and innovation ceases to be significant. This implies that knowledge acquired from short courses, training seminars, conferences, exhibition sessions, employing qualified people and working as a team is not significant enough to stimulate innovation. Thus, owner-managers of Rwandan SMEs ought to look for ways to improve the situation. They can, for instance, reinforce external network and ensure constant communication with company stakeholders such as customers, suppliers, competitors, professionals and experts. This result is in contradiction with those of Darroch and McNaughton (2002); Miller et al.(2007); Tan and Nasurdin (2010), where knowledge acquisition was found to be a vital factor for innovation.

The results on H_2 imply that there is a significant relationship between knowledge sharing and innovation. This is true because when employees exchange their knowledge and experiences while working and when knowledgeable staff share their ideas with normal staff through discussions or meetings, there is an increase in information sharing which can result in a generation of new ideas that can lead to the firm's ability to innovate. Knowledge is power and becomes useful for the company when it is shared. That is why the owners of Rwandan manufacturing SMEs ought to improve knowledge sharing by giving value to new ideas or suggestions from employees. For instance, the firm's innovative capability is likely to increase when the employees' wishes and expectations, the company's goals and best practices, and the latest updates from outside are shared among employees.

The significance of the relationship between knowledge sharing and innovation was supported by Hu et al. (2009) who argued that a firm can achieve a high level of innovation when it develops a positive knowledge sharing behavior within

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the company. Likewise, the findings of Nasiripour et al. (2013), Aulawiet al. (2009) and Yang and Wu (2008) revealed a positive and significant relationship between knowledge sharing and innovation whereas Nawab et al. (2015) found that knowledge sharing contributed to the enhancement of innovation in the banking industry. The study conducted by Lin (2007) further indicated that large and small companies that have achieved the high level of innovation capability are those that supported the implementation of knowledge sharing. Furthermore, the results of qualitative research conducted by Dyer and Nobeoko (2000) revealed that Toyota became a big automotive industry due to the success in knowledge sharing among its employees.

Contrary to previous studies, some other research on knowledge sharing and innovation generated completely different results. A case in point is Wuryaningrat's (2013) research which showed a negative effect of knowledge sharing on innovation capabilities of SMEs at Yogyakarta, Indonesia. He argued that the research results difference be due to the weaknesses of SMEs such as inadequate financial resources, less information, and market access. Liao et al. (2006) emphasized that knowledge sharing affects innovation through absorptive capacity while Senduk's (2014) study results supported Wuryaningrat's (2013) and Liao et al.'s (2007) arguments that knowledge sharing is a learning process that requires time to achieve innovation, especially in small-scale businesses.

The results on H_3 show that there is an insignificant relationship between responsiveness to knowledge and innovation in Rwandan SMEs. This indicates that the way these SMEs respond to their employees' concerns, to their customers' needs and changes in technology does not create significant positive changes in innovation. Therefore, it is crucial for owner-managers of these SMEs to identify the constraints that hamper the application of new knowledge and seek ways to overcome them. In fact, when the new knowledge is applied, employees are likely to become able to develop new products using the newest technologies, which may result in the firm's competitive position. This study finding contradicts that of Tan and Nasurdin (2010), Amalia and Nugroho (2011), Lee et al.(2013) and Madhoushi et al.(2011) in which responsiveness to knowledge was found to be an important factor for innovation.

6. Conclusion and managerial implications

The purpose of this study was to investigate whether knowledge acquisition, knowledge sharing and responsiveness to knowledge as the dimensions of knowledge management can contribute to innovation in Rwandan SMEs. Correlation analysis was run to test the associations between the study variables and all correlation coefficients were found positive and significant. Hierarchical regression was also employed to examine the power of knowledge acquisition, knowledge sharing and responsiveness to knowledge in predicting innovation. The study results revealed that only knowledge sharing was found positive and significant predictor of innovation whereas the effect of knowledge acquisition and responsiveness to knowledge on innovation was not significant. This means that knowledge sharing through the exchange of employees' knowledge and experiences as well as the exchange of new ideas from discussions with knowledgeable staffs may lead to new or improved products, processes, and markets.

The contribution of this study consists of providing additional empirical evidence on the power of knowledge sharing to predict innovation in SMEs. In fact, Rwandan SMEs may sustain their competitive position and survive longer when knowledge is effectively and efficiently shared to increase their innovation capability.

The practical implications of the results from this study are that manufacturing SMEs' owners and decision-makers may consider them as a valuable tool to use to understand better the importance of knowledge sharing in making their businesses more innovative regarding products, processes and markets. Therefore, it is important for SMEs to invest and focus on knowledge sharing activities when setting their strategies as this would create a platform for innovation and increased business performance. As the value of knowledge and social network are the main elements of knowledge sharing in SMEs, they ought to be reinforced. Although knowledge acquisition and responsiveness to knowledge were found insignificant in this study, SMEs could seek ways to improve them because they are critical factors to boost innovation which is the main strength for SMEs' survival. Elsewhere, this study finding could help policy makers to formulate sound policies regarding the promotion of innovation in Rwandan SMEs. The finding might also be a wake-up call for future researchers who are interested in the success of SMEs in Rwanda.

This study used a cross-sectional research design combined with a quantitative research approach.Future researchers could employ a longitudinal method to investigate any possibility of variations in the results. Qualitative studies could

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equally be used to supplement the quantitative findings. Lastly, this study focused on manufacturing SMEs only.Future research might focus on other types of businesses.

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