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Knowledge management and organisational resilience: Organisational innovation as a mediator in Uganda parastatals

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Abstract

Purpose – The purpose of this paper is to report the findings of the mediation effect of innovation in the relationship between knowledge management and organisational resilience.

Design/methodology/approach – The study adopts a cross-sectional design to collect data used to carry out mediation analysis.

Findings – Innovation had an effect on organisational resilience. Knowledge management did not have a direct effect on organisational resilience, except through the full mediation of innovation. This suggests that without organisational innovation, parastatal organisations may not improve their level of resilience.

Research limitations/implications – The sample size was small, covering only parastatals. The results may be different in the private sector. The study was cross-sectional which is limited to trace long-term effects of knowledge management and organisational innovation on organisational resilience. Therefore, a longitudinal study may be undertaken, subject to resource availability.

Practical implications – Managers in parastatals should carry out organisational innovations as a gateway for knowledge management to build organisational resilience.

Originality/value – The study generates empirical evidence on less studied phenomena in the parastatal sector. The evidence highlights the powerful influence of organisational innovation in building resilience based on knowledge management.

Keywords Uganda, Public administration, Knowledge management, Organizational innovation, Organizational resilience, Parastatals, Public sector organizations

Paper type Research paper

Introduction

Most organisations, whether private or public, are facing many strategic challenges in doing business that seem to affect their competitiveness, leading to reduced customer satisfaction with the product and service delivery (Hamel and Valikangas, 2003). As such, organisations are obliged to redesign strategies in a bid to avoid business failure. In other words, organisations need to adapt and increase their value to stakeholders, a phenomenon called organisational resilience (Hamel and Valikangas, 2003). Failure of organisations to become resilient may lead to loss of their vision, mission, and mandate (Lewis and Loebbaka, 2008; Scott, 2007). Organisations have become more vulnerable to failure thus creating the need for resilience, which is the ability to be proactive and/or reactive in coping with environmental demands and threats (Tarrant, 2010; Cho *et al.*, 2007; Stewart and O'Donnell, 2007; Hamel and Valikangas, 2003) in order to prevent decay and disuse (Scott, 2007). Tarrant (2010) suggests that organisational threats can be turned into opportunities by designing strategies to improve organisational competitiveness. These strategies can lead to high market share,

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reputation (value), high staff morale, and less chances of government intervention (Tarrant, 2010). In this vein, organisations should have capabilities, such as to make rapid design changes, offer quality services consistently, and deliver products quickly (e.g. O'Regan and Ghobadian, 2004). In an attempt to cope, organisations become, adaptable, competitive, and of value to society. Resilience has become imperative as organisations play a fundamental role (Tarrant, 2010; Hamel and Valikangas, 2003) in the life of society. Therefore, once organisations fail in their roles then society suffers the consequences. This implies that organisations should strive to remain strategically healthy so as to be useful to themselves and to society at large by building resilience (Scott, 2007). The key question, though, is why some organisations are not highly resilient.

Organisational resilience which has been qualitatively studied in the private sector (McManus, 2008) can be built based on knowledge management (McManus, 2008; Nonaka, 2007) through the mediation of organisational innovation (Christensen, 2006; O'Donnell, 2006). The importance of innovation has been emphasised by Christensen (1997) with a focus on the manufacturing sector where he uses the term disruptive "innovation" to advance the view that successful firms carry out innovations by identifying and responding to customers' needs, as well as reacting to competitors' strategies.

Knowledge management involves the acquisition, creation and use of information for change (Nonaka, 2007; Gloet, 2006) that can culminate in innovation (Nonaka and Takeuchi, 1995) and, ultimately, organisational resilience (Hamel and Valikangas, 2003).

The resource-based view theory advocates the accumulation of resources that can enhance competitiveness (Barney, 2007; Hodgson, 1998; Barney, 1991). The theory is not elaborate on how knowledge resources are managed and how such resources enhance innovation for resilience (Hodgson, 1998), largely because the theory has remained conceptual (Fahy, 2000).

Organisational innovation in this study is defined as a process through which new changes are introduced and implemented in structures (Christensen, 2006; OECD, 2005), processes (Christensen, 2006; OECD, 2005), competences (O'Regan and Ghobadian, 2004; Drejer, 2000). Studies of Cho *et al.* (2007), Stewart and O'Donnell (2007), Tan (2004), have implicitly stated that innovation contributes to building resilience.

Scholars like McManus (2008), Weeks (2008), Koene (2006) have examined organisational resilience with emphasis on adaptation of firms without a quantitative methodology of relating knowledge management to innovation, and organisational resilience. Indeed, McManus's (2008) study recommended further resilience studies using quantitative methodologies. A few studies have quantitatively examined resilience, though at community level (Paton, 2007) and individual level (Gillespie, 2007; Langvardt, 2007; Mallak, 1998). Notwithstanding the vitality of organisational innovation, some organisations fail to build dynamic capabilities to adjust or modify the work processes and structures (Chaharbaghi *et al.*, 2005; Nelson, 2003) which may affect the organisation's capacity to adapt.

Despite the contribution of various studies, the extent to which organisational innovation mediates the relationship between knowledge management and organisational resilience remains unclear, especially in the parastatal sector of

Uganda. Accordingly, the study examined the mediating effect of organisational innovation in the relationship between knowledge management and organisational resilience.

Hypotheses development

Knowledge management and organisational resilience: organisational innovation as a mediator

Various scholars have examined knowledge management as the system used to acquire, create, share, store, and use knowledge resources in order to enhance organisational competitiveness (e.g. Nonaka, 2007; Darroch, 2005; Nonaka and Takeuchi, 1995). As Nonaka (2007), Nonaka and Takeuchi (1995) and Darroch (2005) indicate, effective knowledge management may lead to a better organisation through certain innovations. We can describe a better organisation as one that is resilient since organisational resilience is defined as the ability of the organisation to adapt, provide competitive services, create organisational value (McManus, 2008; Cho *et al.*, 2007; Hamel and Valikangas, 2003; Moore and Moore, 2003).

Organisations that strive to be resilient normally accumulate knowledge resources that are useful for enhancing organisational adaptation, value, and competitiveness. Just like knowledge is accumulated over time, competitiveness is built over time (Leonard and Sensiper, 1998). This means that as organisations learn and accumulate knowledge, the individuals gain the ability to develop better or new ways of organising business operations to improve competitiveness (Robinson *et al.*, 2006; Nelson, 2003; Ongaro, 2004), adaptation (Weeks, 2008), and value (Moore and Moore, 2003). In the same vein, Niu (2010) presents evidence for the association between knowledge management activities and organisational adaptation, though his study was based on high technology companies in China.

Tacit knowledge is accumulated through particular behaviours exhibited by individuals in the organisation, which behaviours are referred to as organisational routines (Dutrenit, 2004). These routines can be used to enhance organisational resilience (Ongaro, 2004; Nelson, 2003) but most likely through innovation of structures and processes (Ogbonna and Harris, 2003; Garcia-Morales *et al.*, 2006).

Leonard and Sensiper (1998) attempted to explain how tacit knowledge may be used for competitiveness through problem solving, problem finding, prediction and anticipation techniques (Andriopoulos and Lowe, 2000). In problem solving, the knower uses the expertise to examine dilemmas and map out solutions, for instance in serving the customer. This may indeed involve innovation of business operations as a way of building resilience (Matthews and Shulman, 2005). For problem finding, people are preoccupied by unusual (Amabile, 1997) ways of doing something rather than using the obvious and usual-this of course promotes competitiveness. In prediction and anticipation, one just imagines or dreams of a scenario (adventuring) that can be used to explain something and then the idea is concretised through trial and error until a perfect change or invention is produced – portfolioing (Andriopoulos and Lowe, 2000).

Knowledge can be shared through dialoguing over organisational weaknesses to make an organisation adaptable (Nonaka, 2007; Nelson, 2003; Nonaka and Takeuchi, 1995) to the environment and create organisational value (Moore and Moore, 2003). The organisation can proactively review its business routines through innovation

(Garcia-Morales *et al.*, 2006) to improve quality, productivity, efficiency, effectiveness, including introduction of new services and products (Basadur and Gelade, 2006; Ongaro, 2004; Mitki *et al.*, 1997). What is questionable though is the extent to which innovation influences organisational resilience, which this study sought to examine. This review reveals two hypotheses:

H_1. There is a significant relationship between knowledge management and organisational resilience.

H_2. There is a mediation effect of organisational innovation in the relationship between knowledge management and organisational resilience.

Knowledge management and organizational innovation

Organisations face environmental pressure to provide competitive services in order to satisfy their stakeholders. To achieve this, organisations are obliged to review and develop new structures and processes as some of the means of sustaining business (Li-Hua, 2007; Matthews and Shulman, 2005). Some scholars (e.g. Nonaka and Takeuchi, 1995) have advocated the need for useful knowledge that can be used to formulate and implement new structures and processes (Wilkinson *et al.*, 2001) for business excellence (Smith, 2005; Vanhaverbeke and Peeters, 2005).

Basing on the resource-based view of the firm, Edlund (2001) argues that the knowledge resources of an organisation built over time should be used to create and implement new organisational forms (structures, processes, and competences) of high strategic value. This is also supported by the finding of Robinson *et al.*'s (2006) that knowledge, embedded in human and social capital is important in building organisational adaptability. The role of knowledge in innovation is paramount but the extent of its contribution is least understood. Robinson *et al.* (2006) emphasised that a knowledge management strategy of acquisition, creation, sharing, memory (Nonaka, 2007; Gloet, 2006; Lopez *et al.*, 2005; Huber, 1991) and capture is critical for organisational innovation.

Researchers like Prahalad and Hamel (1990) indicated that tacit knowledge is preferable for building organisational core competences as it cannot be easily copied or imitated by competitors. Whereas competences can be developed at the individual level, Hodgson (1998) contends that competences can equally be built in the context of the organisation. Building core competences requires a system for generating and integrating knowledge (O'Regan and Ghobadian, 2004) that can be used to promote innovation in business structures and processes. Dutrenit (2004), a researcher in building technological capabilities, argues that there is no clear format of generating and linking knowledge competences to innovation of the organisation. Based on this review, we hereby state the following hypothesis:

H_3. There is a significant relationship between knowledge management and organisational innovation.

Organizational innovation and organisational resilience

Organisations that survive in business continuously undertake deliberate efforts to adjust and renew the design of business processes and structures, including core competences. Such organisations normally build capacities and capabilities through organisational learning to create knowledge (Garcia-Morales *et al.*, 2006) for adapting

(Großler *et al.*, 2006) to the changing business environment. This is what makes the organisation resilient. Organisational resilience is built based on the ability of the organisation to transform the way of doing business in a way that meets the demands of the environment under which it is operating (Chaharbaghi *et al.*, 2005). The need for transformation through innovation has been emphasised by O'Regan and Ghobadian (2011) in their study where one Chief Executive Officer reported how continuous innovation is important for the organisation's survival. A resilient organisation acquires knowledge from the environment in order to carry out innovations relevant for building resilience (Garcia-Morales *et al.*, 2006).

Some public organisations have become adaptable to the demands of customers by de-layering the hierarchical structures, redesigning the work processes, sometimes overhauling tasks performed by individuals, to suit the demand for better service delivery (Ongaro, 2004). This change requires innovation through which managers' craft and implement new structures, processes and competences. One wonders how innovative and resilient the parastatal organisations in Uganda are.

Organisations that seek to renew their structures and processes try to identify the push factors for change such as falling margins, high operating costs, declining quality and quantity, regulatory activity, among others (Pritchard and Armistead, 1999). In this vein, Christensen (1997) advocates for disruptive innovation as a revolutionary strategy to revamp the business. According to Christensen's (1997) concept of 'disruptive innovation' successful firms carry out innovations by identifying and responding to customers' needs, as well as reacting to competitors' strategies. Likewise, Christensen and Raynor (2003) state that managers need to carry out innovations by making strategic decisions on what products to develop, which customers to target, what processes to develop, how to avoid commoditisation, how to structure an organisation capable of disruptive growth, as well as strategic decisions regarding the implementation of leading and investing in disruptive growth. Similarly, other scholars have argued that resilient organisations must have the capability to design new business processes that are deemed fit for efficiency and effectiveness (e.g. Li-Hua, 2007; Deselnicu *et al.*, 2007).

In view of this review, we formulated the following hypothesis:

H_4. There is a significant relationship between organisational innovation and organisational resilience.

Arising out of this literature review, we develop the model below to guide this study (see Figure 1).

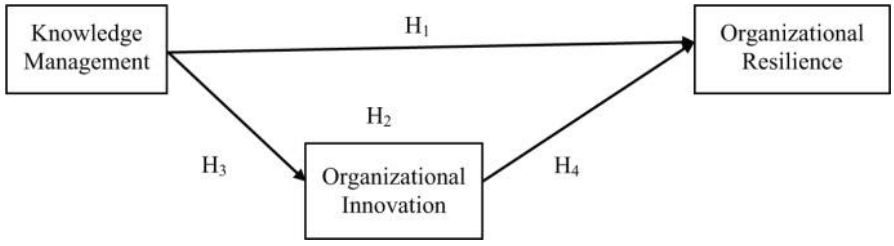


Figure 1.
Research model

Research method

The study was a quantitative cross sectional survey. For Young (2009) the quantitative design is suitable for constructing structural models through multivariate analysis that explain the study variables. The cross sectional design was preferred because of lack of control that would be required in the longitudinal design (Creswell, 2009; Sekaran, 2008) and yet we could use cross-sectional design to understand what has happened or been happening (Cooper and Schindler, 2006) about organisational resilience. A pilot study was done to pretest the instrument and identify the researchable constructs so as to refine the instrument. The results showed that the instrument was both reliable and valid.

Population and sample

The population consisted of parastatal organisations in Uganda. Parastatal organisations are very important institutions charged with public service delivery. Parastatals are formed to improve service delivery on behalf of government yet reports seem to suggest that parastatals are not of much value to society (Rondinelli, 2008). Organisations should strive to remain useful to society by providing competitive services lest they lose their vision, mission, and mandate (Basu, 2008). In other words, they should be resilient enough to cope with certain challenges. Organisational resilience – which has been qualitatively studied in private sector (McManus, 2008) – appears to be the least explored in the public sector. This study focussed on the public organisations, specifically parastatals in Uganda. A parastatal is any autonomous or semi-autonomous entity wholly or partially owned by government that operates under a Board of Directors (Kauzya, 2008). We carried out this study based on a sample of parastatal organisations. The sample size was determined on the basis of Yamane (1967) in Israel (1992) and Krejcie and Morgan (1970) cited in Sekaran (2008).

Basing on Yamane's formula we calculated the sample size for the study as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where n is the sample size, N is the population size, while e is the sampling error.

Therefore:

$$n = \frac{73}{1 + 73(0.05)^2}$$

$n = 62$

The researcher also referred to Krejcie and Morgan's table of determining the sample size for a study. There is no population size (N) of 73 so the researcher considered the N of 75 which has a corresponding sample size (n) of 63. The sample sizes derived from Yamane ($n = 62$) and Krejcie and Morgan's ($n = 63$) approaches are very close. Since Yamane's approach is exact, the researchers determined the sample size to be 62 parastatal organisations. Accordingly, the researchers randomly selected 62 out of 73 parastatal organisations that participated in the study.

For the unit of inquiry, we selected members of the senior management team in each parastatal organisation, because they occupy strategic positions (O'Regan and Ghobadian, 2004), to report about organisational resilience which is a strategic

function. It is believed that managers are in position to truly respond to questions about organisational attributes (Baer and Frese, 2003; Young, 2009). This belief was tested by Gibson and Birkinshaw (2004), as cited in Young (2009) who found a high correlation between data gathered from managers and that from employees at different levels in the organisational hierarchy.

To get the actual respondents, the researchers got a contact person and requested him/her to distribute questionnaires to his/ her senior colleagues in the organisation while ensuring as much representativeness of the senior management team as possible (Baer and Frese, 2003). The researchers targeted seven managers to be given questionnaires with a minimum response expectation of three respondents per organisation (Baer and Frese, 2003) and we actually got a total of 242 respondents who answered the questionnaires, though 235 questionnaires were found to be usable (see Appendix for respondent characteristics). To control for response bias, we used a sampling strategy advocated for by Glick (1985) cited in (Baer and Frese, 2003) where we contacted the same kind of managers in all the selected parastatal organisations. This is believed to hold the level of response bias fairly constant across the study organisations.

Measures

Through literature review and conceptualisation, we identified certain measures of knowledge management, innovation, and organisational resilience. These measures were the basis for setting the measurement scale in line with the principles of Sarantokos (1997). Each of these measures will be briefly considered next.

Knowledge management

There seems to be little consensus about the general understanding and measure of knowledge management as the concept has a multidimensional interpretation (Nonaka, 2007; Gloet, 2006). Nevertheless, knowledge management involves; knowledge creation, knowledge acquisition, knowledge sharing, and knowledge storage (Nonaka, 2007; Darroch, 2003), which we accordingly followed in developing our scales to suit the study context. While developing the scales, we made further reference to studies of Lopez *et al.* (2005), Darroch (2003), and Huber (1991), which highlight knowledge management behaviours. In the scales, we asked the respondents to indicate their level of agreement or disagreement with the behaviours of knowledge management prevailing in their organisations (see Appendix). We tested for reliability ($\alpha = 0.894$) and validity (total variance explained = 68.5 per cent).

Organizational innovation

Innovation can be measured in different ways depending on the interest of the researcher. Researchers who are interested in market performance may focus their measures on product innovation, market innovation, and technological innovation (Wang and Ahmed, 2004; OECD, 2005), while those studying organisational innovation, per se, may measure innovation in terms of process innovation, structural (strategic/administrative) innovation, and competence (behavioural) innovation (Christensen and Raynor, 2003; Wang and Ahmed, 2004; OECD, 2005; Christensen, 2006). In this study, we focused our measures of innovation on structural innovation, process innovation, and competence innovation because they are more critical in building adaptive capacity for the organisation to absorb shocks

(Christensen and Raynor, 2003; Christensen, 2006). Wang and Ahmed (2004) developed a reliable and valid Likert Scale (strongly disagree –strongly agree) instrument to measure innovation, focusing on behavior innovation, product innovation, process innovation, market innovation, and strategic innovation. The Cronbach's alpha for the constructs were above an acceptable level of 0.6 and the component factors converged into organisational innovation. Even Deselnicu *et al.* (2007) used the measures of Wang and Ahmed's (2004) based on a Likert scale (less extent-large extent) in their study of innovation and competitiveness. The researchers, therefore, with reference to these measures developed scales for this study, based on the extant literature and contextual reconceptualisation (Reunis, 2007; Sekaran, 2008) focusing structural innovation, process innovation, and competence innovation (see Appendix). We tested for reliability ($\alpha = 0.889$) and validity (total variance explained by three convergent factors = 69.1per cent).

Organisational resilience

There seems to be no universally accepted measure of organisational resilience (McManus, 2008; Cho *et al.*, 2007). The researchers unsuccessfully made all possible attempts to get extant, reliable and valid measures of organisational resilience. The solution then was to conceptualise and identify measures of organisational resilience with reference to the relevant theory and extant literature as recommended by Sekaran (2008) and Reunis (2007). In this study, we conceptualised organisational resilience to be measured in terms of: organisational adaptation (Weeks, 2008; Mitchell and Zdmud, 2006; Hamel and Valikangas, 2003); organisational competitiveness (Li-Hua, 2007; Deselnicu *et al.*, 2007; UNCTAD, 2005); and organisational value (Alford and O'Flynn, 2008; Moore and Khagram, 2004; Moore and Moore, 2003). These scholars believe that a resilient organisation is one that responds to the demands in the environment for survival (organisational adaptation), is efficient and effective at service delivery (organisational competitiveness), and makes itself reputable (organisational value). The scales of organisational resilience were developed on a Likert scale and tested for reliability ($\alpha = 0.893$) and validity (total variance explained by three convergent factors = 69.7 per cent). In the scales, the researchers made statements that required the respondents to indicate the extent to which certain resilience behaviors occur in their organisations (see Appendix).

Data collection

As already discussed in the sampling design, the process of data collection was as follows: The researchers identified a contact person in every organisation that was sampled who was contacted and briefed about the study with a request to allow the researcher collect the data from the organisation. Given the magnitude of the task of data collection, the researchers identified, trained, and worked with five research assistants to collect data. We collected data from December, 2009 to March, 2010 when we had collected data from at most 51 out of 62 organisations that had been contacted. This gave a response rate of 82.3 per cent of the targeted sample. This response rate was quite high for a purpose. Since the study population was relatively small, the researchers made maximum effort to get a high number of organisations to respond to the questionnaires since it was necessary to sample and raise a number of above 30 parastatals that were adequate for hypothesis testing (Field, 2006; Sekaran, 2008).

Data management

This involved editing data where we checked for completeness, consistency, and accuracy of responses. Based on these criteria, we determined the usefulness of the data for further processing. For instance, there were a few cases that were discarded upon realising that they were quite incomplete. After this check, we entered the data in the Statistical Package for Social Scientists (SPSS version 17) computer program for analysis. During data entry, we reverse coded all the negatively-worded scale items. We checked for missing values because, in most self- report studies, respondents have a tendency to skip providing responses to certain items in the questionnaire, either deliberately or in error. For either case, this creates missing values that are items to which no response was provided. Missing values must be identified and managed or else they affect multivariate analysis (Field, 2006; Hair *et al.*, 1998). We examined the pattern of the missing values and a few (07) cases that had missing values were discarded. After the analysis of missing values, the researchers retained 235 units of enquiry cases that were later on aggregated into 51 cases according to the unit of analysis, which was parastatal organisation. We tested for common method bias using Harmans' one-factor test and found limited method variance because the test extracted 17 factors (eigenvalues > 1, total variance $= 85.1$ per cent) where the first factor did not explain majority of the variance (Podsakoff *et al.*, 2003). We generated; descriptive statistics, correlations, and regressions. We tested for mediation of innovation using; the Sobel test on the basis of mediation principles of Baron and Kenny (1986), and the Medgraph of Jose (2008).

Results and discussion

The researchers sought to distinguish the type of parastatal organisations that were used to carry out the study. The researchers categorised the organisations in terms of ownership, age, size, and sector. The results in Tables I and II show that majority (88.2

Ownership	*F*	%	Age of org.	*f*	%
Fully owned by government	45	88.2	3-6 years	1	2.0
Partially owned by government	6	11.8	7-10 years	6	11.7
			11-14 years	11	21.6
			> 15 Years	33	64.7

Table I. Sample characteristics

Size of org. (no. of staff)	*F*	%	Sector	*f*	%
< 100	14	27.5	Finance	13	25.5
101-300	10	19.6	Education	11	21.6
301-500	5	9.8	Health	3	5.9
501-700	12	23.5	Environment	3	5.9
> 700	10	19.6	Agriculture	3	5.9
			Tourism	2	3.9
			Telecom	2	3.9
			Energy	6	11.8
			Transport	4	7.8
			Others	4	7.8

Table II. Sample characteristics

per cent) of organisations were fully owned by the government with only 11.8 per cent that were partially-owned. Full ownership in this study refers to the organisation where government has overall control of the functioning of that organisation, with exception of autonomous management and administration of the organisation. Partial ownership describes those organisations where government has limited interest by some share holding in such organisations. In the case of age of the study organisations, the majority (64.7 per cent) had existed for over 15 years, followed by 21.6 per cent which had been in existence between 11-14 years, 11.8 per cent had served between 7-10 years, with only 2 per cent that had lived between 3-6 years. The minimum age of the organisations studied were in line with the selection criterion of an organisation of three and above years to have been chosen for the study, as this is the time an organisation is expected to be undergoing or should have undergone certain reforms like innovations which was the interest of this study. Results about the size of the organisation reveal a fair distribution of the number of employees in different study organisations, that is: those that had less than 100 were 27.5 per cent; 501-700 were 23.5 per cent; and 101-300 were 19.8 per cent, with 9.8 per cent that had 301-500 employees. Generally, most of the organisations employed relatively large numbers of people, which is one of the characteristics of a parastatal. In analysing the sample distribution in the different sectors, we note that majority of the organisations studied were in the finance sector (25.5 per cent) and education sector (21.6 per cent). This implies that most parastatals in Uganda are set up to pursue the finance and, or economic objectives, including education objectives. Another set of the organisations were from the energy sector (11.8 per cent), with a relatively equal distribution of parastatals in health, environment, and agriculture (5.9 per cent), tourism and telecommunication (3.9 per cent), though those in transport sector and miscellaneous were a little more (7.8 per cent). Those in the miscellaneous sector category included standardisation; and the media, among others. Generally, we observe that the Government of Uganda has set up different parastatals in different sectors to provide specialised services. However, the majority are in the finance and education sectors.

The zero order correlation in Table III was used to establish whether or not there were associations (Field, 2006) between the study variables as hypothesised from the literature review.

Knowledge management and organizational resilience

The study further examined the relationship between knowledge management and organisational resilience and the results indeed reveal that the relationship between knowledge management and organisational resilience is fairly strong, positive, and significant ($r = 0.464$, $p < 0.01$). This finding provides support for hypothesis H_1 that there is a significant relationship between knowledge management and organisational

Table III.
Zero order correlation between knowledge management, innovation, and organizational resilience

	Mean	SD	1	2	3
1. Organisational resilience	3.361	0.376	–		
2. Innovation	3.684	0.401	0.631*	–	
3. Knowledge management	3.857	0.423	0.464*	0.574**	–

Note: *$p < 0.01$ (two-tailed)

resilience, that is, management of knowledge in the organisation is associated with the building of organisational resilience. This assertion is in line with previous studies, which state that building knowledge capability is related to the improvement of organisational competitiveness (Stewart and O'Donnell, 2007; Dutrenit, 2004), organisations acquire and accumulate knowledge resources over time, and progressively use them to add value to business activities (Robinson *et al.*, 2006; Ongaro, 2004).

Knowledge management and organizational innovation

The findings have revealed that there is a strong positive and significant relationship between knowledge management and organisational innovation ($r = 0.574$, $p < 0.01$). The finding accordingly supports H_3 that there is a significant relationship between knowledge management and innovation. This finding suggests, as others (Robinson *et al.*, 2006; Nonaka, 2007) have found out, that changes in knowledge management are positively associated with changes in innovation, implying that when an organisation improves the knowledge it possesses, this might lead to certain innovations, for instance, in structures, processes, and or core competences. Robinson *et al.* (2006) have argued that a knowledge management strategy of acquisition, creation, sharing, memory (Nonaka, 2007; Gloet, 2006; Lopez *et al.*, 2005; Huber, 1991) is critical for organisational innovation-suggesting an association between knowledge management and organisational innovation.

Organisational innovation and organisational resilience

The findings have further revealed that there is a strong positive and significant relationship between organisational innovation and organisational resilience ($r = 0.631$, $p < 0.01$). The finding lends support to H_4 that there is a significant relationship between innovation and organisational resilience. The message here is that parastatal organisations may become resilient depending on the level of organisational innovation accomplished. This finding is in line with Hamel and Valikangas (2003) who state that organisational resilience requires innovation. Having analysed the correlations between the variables, the researchers further tested for the predictive power of knowledge management and organisational innovation on organisational resilience.

Regression of organisational resilience on knowledge management and organisational innovation

The hierarchical regression analysis that determines the contribution of each predictor variable in the regression (Field, 2006; Garson, 2010) was used. The regression coefficients are used as indicators whether or not the contribution of each variable is significant, which further tests the validity of the hypotheses. The overall contribution of the variables is indicated by the variance explained (R^2).The hierarchical regression was used to test for the extent to which knowledge management and organisational innovation explain the variance in organisational resilience in a bid to get further evidence for support of hypotheses. The results of the hierarchical regression are presented in Table IV.

The regression results in Table IV indicate that 42.5 per cent of the variance in organisational resilience is explained by knowledge management and innovation

($R^2 = 0.425$, $p < 0.05$). In analysing the model results, we note that in model 1, the control variables of age of organisation and size of the organisation contribute an insignificant explanatory power of 2.5 per cent ($R^2 = 0.025$, $p > 0.05$) of 42.5 per cent total variance explained. We used the control variables of organisational age and organisational size as the important factors (Lih-Bin and Hock-Hai, 2009) in this study to determine whether or not they had an effect on the level of organisational resilience. The regression results also indicate that organisational age ($\beta = 0.085$, $p > 0.05$) and organisational size ($\beta = 0. - 086$, $p > 0.05$) as control variables do not have a statistically significant relationship with organisational resilience. This, therefore, may imply that age and size of parastatals in Uganda do not have an effect on organisational resilience. This seems to suggest that organisational resilience in Uganda parastatals can occur, regardless of age or size of the parastatal. A similar study by Lih-Bin and Hock-Hai (2009) also found no statistically significant relationship between organisational age, size, and organisational resilience in organisations in Singapore.

In model 2, innovation contributes the predictive power of 38.4 per cent ($\Delta R^2 = 0.384$, $p < 0.05$) of 42.5 per cent total variance explained. Model 2 also reveals a statistically significant relationship between innovation and organisational resilience ($\beta = 0.567$, $p < 0.05$), providing evidence that innovation is significantly and positively related to organisational resilience. This finding further supports H_4 that there is a significant relationship between innovation and organisational resilience. We can therefore state that organisational innovation, among other factors, can explain to a certain extent the variance that may occur in the level of organisational resilience in parastatal organisations in Uganda. This is related to a previous study of Ongaro (2004) who stated that some public organisations have become adaptable to the demands of customers by delayering the hierarchical structures, redesigning the work processes, sometimes overhauling tasks performed by individuals to suit the demand for better service delivery.

In model 3, when knowledge management was entered in the regression, it added a very small predictive power of 1.6 per cent ($\Delta R^2 = 0.016$, $p < 0.05$). Besides the small contribution of knowledge management to the variance explained in organisational resilience, the results also indicate an insignificant relationship between knowledge management and organisational resilience ($\beta = 0.157$, $p > 0.05$). This finding therefore does not lend further support for H_1 which propounded that there is a significant relationship between knowledge management and organisational resilience.

Variable	Dependent variable: organisational resilience		
	Model 1	Model 2	Model 3
Organisational age	0.065	0.078	0.085
Organizational size	0.137	−0.084	−0.086
Organizational innovation		0.657*	0.567*
Knowledge management			0.157
F	0.612	30.503*	1.324
R^2	0.025	0.409	0.425
ΔR^2		0.384	0.016

Note: $N = 51$ *$p < 0.01$

Table IV.
Hierarchical regression analysis: organizational resilience

In this case, and in as far as this study is concerned, the relationship between between knowledge management and organisational resilience is not significant, even when the zero order results indicate a significant relationship ($r = 0.464, p < 0.05$). Of course, as Field (2006) states, we do not rely on correlation coefficients to prove hypotheses but at least on regression coefficients. The regression results seem to suggest that knowledge management in the presence of organisational innovation appears not be significantly related to organisational resilience, but innovation is, implying that knowledge management is important only if innovations are carried out based on the knowledge that is acquired, created, stored, shared, and used to build adaptive capacity in the organisation. This assertion is supported by Nonaka (2007) who argues that knowledge created is useful through certain innovations. Even Zack *et al.* (2009) in their exploratory study found an insignificant relationship between knowledge management and financial performance (criterion variable) but the relationship between knowledge management and organisational performance (mediator) was significant, indicating that knowledge management may not influence directly the criterion variable but probably through certain mediators. In the case of Zack *et al.* (2009), the mediator was organisational performance, and in our case the mediator is innovation. The mediation factor aside, the dark side of knowledge management (Chua, 2009) may also explain the insignificant relationship between knowledge management and organisational resilience. According to Chua (2009) knowledge management initiatives may be stifled by factors (dark side of knowledge management) like: the competence trap (failure to recognise new ideas for new challenges); reduced problem-solving ability; weak social network (dogmatism and social alienation); and lack of knowledge management objectives, especially objectives for renewing the organisation. With regard to these factors, we argue that parastatals in Uganda seem to be on the dark side of knowledge management in as far as a direct relationship between knowledge management and organisational resilience is concerned.

Testing for mediation

In most cases of social science research, researchers get interested in testing for a causal relationship that may be believed to occur between three variables in the study. Mediation is deemed to occur if the predictor variable accounts for a certain variance in the mediator variable, which is also believed to account for the variance in the criterion variable. In other words, the mediator variable transforms the effect of the predictor variable onto the criterion variable (Baron and Kenny, 1986). The action of a mediator processes the stimuli of the independent variable to cause a response in the dependent variable (Woodworth's 1928; S-O-R model cited in Baron and Kenny, 1986). There are certain conditions that must met for mediation to be considered to have occurred. According to Baron and Kenny (1986) and Kenny *et al.* (1998), mediation occurs if: variations in the independent variable significantly account for variance in the presumed mediator; variations in the mediator significantly account for variance in the dependent variable; variations in the independent variable significantly account for variance in the dependent variable; the effect of the independent variable on the dependent variable significantly reduces when the mediator is included in the third equation.

In relation to this study, mediation was investigated about the mediating effect of organisational innovation in the relationship between knowledge management and organisational resilience. This investigation was undertaken by testing the hypothesis

that: There is a mediation effect of organisational innovation in the relationship between knowledge management and organisational resilience. In order to test for the hypothesis, mediation conditions were analysed by running regression models and the results are presented in Table V.

The results in model 1, which is the regression of organisational innovation (mediator) on knowledge management (predictor) show that the relationship between knowledge management and innovation is significant ($\beta = 0.574$, $p < 0.01$). Results of model 2, which is a regression of organisational resilience (criterion variable) on knowledge management also reveal a significant relationship between knowledge management and organisational resilience ($\beta = 0.464$, $p < 0.01$). Likewise, the results in model 3, which is the regression of organisational resilience on both knowledge management and organisational innovation, indicate that while organisational innovation has a significant effect on organisational resilience ($\beta = 0.544$, $p < 0.05$), the effect of knowledge management on organisational resilience reduces and becomes insignificant ($\beta = 0.152$, $p > 0.05$).

Overall, the regression results support the conditions for mediation to be realised. Therefore, according to Baron and Kenny (1986) and Kenny *et al.* (1998), organisational innovation mediates the relationship between knowledge management and organisational resilience. However, the significance of the mediation effect is not yet tested and may require other tests like the Sobel' *z*-test. Accordingly, the researchers employed the Medgraph (mediation testing) technique of Jose (2008), which requires a computation of correlation coefficients of the three variables in the mediation relationship including the unstandardised regression coefficients which were in-put into the Medgraph that produced the results below. Through the Medgraph, we discover whether mediation is full or partial, Sobel' *z*-value is significant or not, and whether Baron and Kenny's mediation conditions are met or not. The technique also calculates the direct and indirect effects of the predictor variable onto the criterion variable, including the index ratio which is the Indirect to Total ratio. The Medgraph output computes the total effect of the path, which is the correlation between the independent variable (IV) and the dependent variable (DV), the direct effect-the effect that remains to be carried by the IV to the DV after the inclusion of the mediator, the indirect effect is the effect of the IV to the DV that goes through the mediator (Jose, 2008). The results of the Sobel test are in the Appendix).

	Dependent variables		
	Innovation	Organizational resilience	
Variables	Model 1	Model 2	Model 3
Knowledge management	0.574**		
Knowledge management		0.464**	
Knowledge management			0.152
Organizational innovation			0.544*
B	0.471	0.410	0.134
			0.587
SE *b*	0.096	0.112	0.119
			0.146

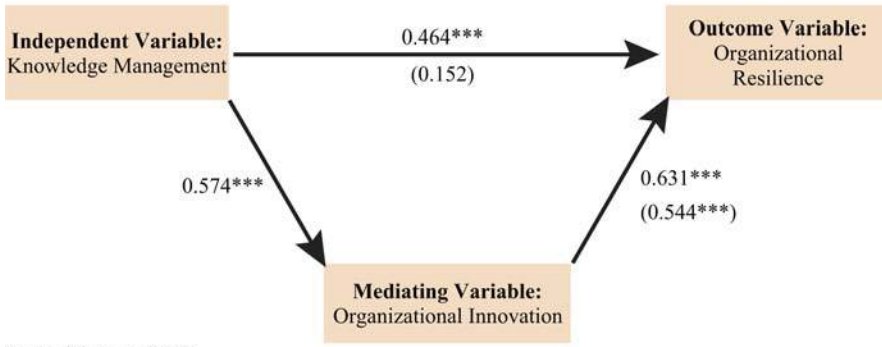
Notes: $n = 51$; *$p < 0.05$; **$p < 0.01$

Table V.
Regression analysis: mediation effect of organizational innovation

The results in Figure 2 indicate a significant mediation effect of organisational innovation between knowledge management and organisational resilience ($z = 3.11$, $p < 0.01$). The significant z-value provides evidence of support for H_2 that there is a significant mediating effect of innovation between knowledge management and organisational resilience. The results further show the index ratio of 67.2 per cent with full mediation effect of innovation. This implies that variations in knowledge management affect the variations in organisational innovation which subsequently and wholly cause changes in organisational resilience. According to Jose (2008), the index ratio of above 50 per cent normally indicates full mediation, although we should actually look at the change in coefficients arising from the third regression equation, and note whether the change is significant or not. If the change is not significant like in our case, then there is full mediation probably because the mediator (innovation) takes over the whole effect of knowledge management onto organisational resilience since knowledge management ceases to carry any effect ($\beta = 0.152$, $p > 0.01$) to the criterion variable (Baron and Kenny, 1986; Jose, 2008). Despite the fact that the Medgraph indicates whether the mediation is full or partial, Jose does not explain the balance of the percentage of the index ratio in the case of full mediation. For instance, in this study we got results of full mediation, as explained above where the index ratio is 67.2 per cent, leaving 32.8 per cent unaccounted for. In this case, let us presume that if there were other mediating factor(s) in the model, they would probably account for this 32.8 per cent balance of mediation.

Type of Mediation	
Jose	Full
Baron & Kenny	Significant
Sobel z-value	3.109761 *p*0.001872
Standardized coefficient of Knowledge Management on Organizational Resilience	
Total:	0.464
Direct:	0.152
Indirect:	0.312
Indirect to Total ratio:	0.672

Mediation path for knowledge management and organizational resilience



Note: *** $p < 0.001$

Figure 2.
Sobel test results

Based on this study, we can state that without organisational innovation in parastatal organisations in Uganda, knowledge management may not influence organisational resilience. This is in line with other studies like Hamel and Valikangas (2003) and O'Donnell(2006) who contended that organisational resilience is built through innovation. Organisational innovation then appears to be a strong mediator in relationships that explain organisational resilience. Innovation, we can argue is critical in building adaptive capacity, which is significant in making the organisation resilient (McManus, 2008). Just like Zack *et al.* (2009) reported that in cases of full mediation, the predicator variable loses the power to influence the criterion variable except through the mediator. The findings of this study have demonstrated similar phenomena like the study of Zack *et al.* (2009), except that in our case we found full mediation of innovation between knowledge management and organisational resilience unlike the study of Zack *et al.* that established the full mediation of organisational performance in the relationship between knowledge management and financial performance.

Conclusion and implications

This study examined the mediating effect of organisational innovation in the relationship between knowledge management and organisational resilience. The findings of this study reveal some lessons that contribute to the debate of knowledge management and criterion variables like performance or innovation, in our case organisational resilience. One key lesson is that without organisational innovation which builds adaptive capacity, Uganda parastatals may not become resilient enough to resist shocks, offer better services, and create public value. The study has proved that knowledge management, per se, cannot influence resilience behaviours in Uganda parastatals-implying that knowledge resources that are acquired, created, shared, stored must be used (see Nonaka, 2007; Darroch, 2005) to improve organisational structures, processes, and competences, in order to make parastatals resilient (see Hamel and Valikangas, 2003; O'Donnel, 2006). Another learning point is that knowledge management remains a critical factor for innovation to influence certain outcomes like resilience simply because knowledge resources are required for innovation. Overall, we find that knowledge management does not have a direct influence on organisational resilience except through organisational innovation. The main contribution of this study is the proof that innovation is a powerful mediator in the relationship between knowledge management and organisational resilience. As such, parastatal organisations in Uganda have limited organisational resilience, to some extent due to limited use of knowledge resources, and limited organisational innovation diffusion.

The practical implications of this study are that: managers of parastatals should build resilience by designing effective knowledge management systems that generate knowledge resources with specific knowledge management strategic objectives; and use knowledge resources to produce innovations. The managers should carry out knowledge management audits in a bid to determine knowledge management return on investment. This may help parastatal organisations to measure the value addition of knowledge management activities in these organisations. There is need for these parastatals to appoint Chief Knowledge Officers who should be responsible for managing the knowledge management system in the organisation. Furthermore, managers should design organisational innovation programmes with clear objectives on ideation and diffusion, and continuously build and improve adaptive capacity. They should also design, execute and evaluate organisational resilience programmes which

may have objectives like, to cope with more internal and external demands, improve the level of competitiveness, or increase organisational value. These objectives can be used to determine the level of organisational resilience.

Parastatals should avoid falling into the dark side of knowledge management because this would render knowledge management useless, hence poor innovations and ultimately weak organisational resilience. This dark side involves, as already discussed; the competence trap (failure to recognise new ideas for new challenges), reduced problem-solving ability, weak social network (dogmatism and social alienation), and lack of knowledge management objectives, especially objectives for renewing the organisation. Government and development partners can support knowledge management and organisational innovation programs that seek to enhance organisational resilience in parastatals.

For the researchers, research in Uganda about knowledge management, organisational innovation and organisational resilience is still growing, calling for researchers to design studies in these areas, especially in the public sector. For instance researchers can investigate knowledge management and organisational performance, innovation performance, and the relationship between organisational climate and organisational resilience. The study was limited by design. First, the study was cross sectional focusing on snapshot perceptions, which could probably not provide quite realistic occurrences of study variables. This may necessitate follow-up studies in a longitudinal design to capture the trend of results. Second, the sample for this study was small, calling for an expanded public sector study or by comparison with the private sector to examine the level of organisational resilience in both sectors. The small sample size may have affected the statistical power of the regression model and this may have caused the full mediation instead of partial mediation of innovation where knowledge management may have had some significant influence to organisational resilience. Anyhow, the study makes a contribution to organisational resilience studies (with explanatory factors of knowledge management and organisational innovation) that seem to be gaining interest among academia. For purposes of external validity, we recommend that researchers should carry out a similar study in comparable state-owned institutions in other countries to determine whether or not similar results may be found.

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Further reading

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Appendix

Sex	*f*	%	Age	*f*	%
Male	159	67.9	25-30	41	17.7
Female	75	32.1	31-36	52	22.4
			37-42	61	26.3
			43-48	37	15.9
			49-54	28	12.1
			Over 54	13	5.6

Table AI. Respondent characteristics

Education	*f*	%	Length of service	*f*	%
Certificate	2	0.9	1-3	70	29.8
Diploma	12	5.1	4-6	50	21.3
Degree	51	21.7	7-9	31	13.2
Professional qualification	32	13.6	10-12	36	15.3
Postgraduate qualification	30	12.8	Over 12	48	20.4
Masters	98	41.7			
PhD	10	4.3			

Table AII. Respondent characteristics

A	Knowledge acquisition					
KA1	We acquire knowledge through team work	1	2	3	4	5
KA2	We can locate the source of information that we need	1	2	3	4	5
KA3	We do not learn from our successes for future reference ®	1	2	3	4	5
KA4	We gain knowledge from consultancy reports	1	2	3	4	5
KA5	We employ people deemed to have the expertise we need	1	2	3	4	5
B	Knowledge creation					
KC1	We train our staff	1	2	3	4	5
KC2	Our staff do not generate useful ideas out of performance mistakes ®	1	2	3	4	5
KC3	We brainstorm to generate useful ideas for our organisation	1	2	3	4	5
KC4	We do research for our organisation	1	2	3	4	5
C	Knowledge sharing					
KS1	We do not conduct regular meetings to exchange experiences ®	1	2	3	4	5
KS2	Some of our staff discuss issues with professional associations	1	2	3	4	5
KS3	We use newsletters to disseminate information	1	2	3	4	5
KS4	We exchange information with stakeholders	1	2	3	4	5
KS5	Knowledgeable staff share their ideas with other staff	1	2	3	4	5
D	Knowledge storage					
KST1	We have a system for keeping information	1	2	3	4	5
KST2	We have a system for retrieving information	1	2	3	4	5
KST3	Our staff have access to information required	1	2	3	4	5
KST4	Staff can access information on-line	1	2	3	4	5
KST5	We update our knowledge databases	1	2	3	4	5

Table AIII. Knowledge management scale

Note: 1 = I strongly disagree; 2 = I disagree; 3 = I am not sure; 4 = I agree; 5 = I strongly agree

A	Structural innovation					
SI1	We redesign different strategies to meet our objectives	1	2	3	4	5
SI2	We review the functions of departments in our organization	1	2	3	4	5
SI3	We do not review performance plans in our organization ®	1	2	3	4	5
SI4	We improve our systems of handling organization risks	1	2	3	4	5
SI5	We review our programmes	1	2	3	4	5
SI6	We have failed to improve on the time our customers take to get served ®	1	2	3	4	5
SI7	We review the job descriptions of different jobs in our organisation	1	2	3	4	5
SI8	We have failed to improve the methods of delivering our services ®	1	2	3	4	5
B	Process innovation					
PI1	We redesign the flow of work by the use of information communication technology	1	2	3	4	5
PI2	We design the internet to deliver our services	1	2	3	4	5
PI3	We do not improve the internet to deliver our services ®	1	2	3	4	5
PI4	We change the flow of work by eliminating certain activities	1	2	3	4	5
PI5	We change the flow of work by merging certain activities	1	2	3	4	5
C	Competence innovation					
CI1	We improve our leadership behaviours	1	2	3	4	5
CI2	We do not improve our customer service behaviours ®	1	2	3	4	5
CI3	We improve our conduct of handling information resources	1	2	3	4	5
CI4	We make new networks for our organization	1	2	3	4	5
CI5	We improve our task performance behaviours	1	2	3	4	5
CI6	We change our behavior of handling organizational resources	1	2	3	4	5

Note: 1 = I strongly disagree; 2 = I disagree; 3 = I am not sure; 4 = I agree; 5 = I strongly agree

Table AIV. Organisational innovation scale

A	Organisational adaptation					
OA1	Our services conform to the regulatory standards	1	2	3	4	5
OA2	We have put our assets to good use	1	2	3	4	5
OA3	We have made service delivery is flexible	1	2	3	4	5
OA4	We have maintained our reputation	1	2	3	4	5
OA5	Our service delivery is in line with our customers' needs	1	2	3	4	5
OA6	Our organization has failed to overcome a number of challenges ®	1	2	3	4	5
OA7	We have coped with the political interests in our organisation	1	2	3	4	5
B	Organisational competitiveness					
OC1	We can sustain our operations with limited funding	1	2	3	4	5
OC 2	We serve our customers in a short time	1	2	3	4	5
OC 3	Our customers can easily access our services	1	2	3	4	5
OC 4	We can succeed in service delivery amidst resource constraints	1	2	3	4	5
OC 5	We achieve our set targets	1	2	3	4	5
OC 6	Our organization is result oriented	1	2	3	4	5
C	Organizational value	1	2	3	4	5
OV1	Our cost control is satisfactory	1	2	3	4	5
OV2	Our stakeholders are satisfied with our operations	1	2	3	4	5
OV3	The people we serve are not satisfied with our service delivery ®	1	2	3	4	5
OV4	Our staff are satisfied with the organization	1	2	3	4	5
OV5	There are minimum complaints over the use of our services	1	2	3	4	5
OV6	Most people wish to work with our organisation	1	2	3	4	5
OV7	Funding organizations are willing to fund our operations	1	2	3	4	5

Table AV.
Organisational resilience scale

Note: 1 = Not at all; 2 = To some extent; 3 = I am not sure; 4 = To a large extent; 5 = To a great extent

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