# Knowledge management capability and organizational memory: a study of public sector agencies

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## Abstract

**Purpose** – The purpose of this paper is to explore organizational memory (OM) in three public agencies in a developing country context. Research suggests that knowledge management (KM) can build a nation's intellectual capital and improve the effectiveness of public sector management. Therefore, how knowledge is preserved is important.
**Design/methodology/approach** – The study targeted three large public institutions in Ghana. The study used a survey of 756 individuals in managerial and operational level positions in institutions to test the hypotheses in the study.
**Findings** – The findings confirm that knowledge management capability (KMC) has a positive and significant impact on OM. Knowledge acquisition and retention capabilities, in particular, are critical variables in building OM.
**Research limitations/implications** – The research relied on self-reports and so one cannot completely rule out social desirability and consistency biases. Using cross-sectional data also makes it difficult to make inferences about the causality.
**Practical implications** – Public agencies desirous of building their OM will need to build critical KMC and infrastructure.
**Originality/value** – This paper links KMC to OM in public institutions in an emerging country context.

**Keywords** Public sector management, Organizational memory
**Paper type** Research paper

## Introduction

This study explores organizational memory (OM) building in three public agencies in a developing country. Public sector organizations are increasingly focusing on knowledge management (KM) as a competence for delivering on their mission (Sandhawalia and Dalcher, 2011). It is important that any knowledge that is developed be retained for later use to be of any value. OM, the ability to remember and learn from experience, is an important asset (Gammelgaard and Ritter, 2005). Prior research suggests that an organization's knowledge and experience are stored in its memory (Walsh and Ungson, 1991; Fiedler and Welpe, 2010).

In an effort to identify valuable insights on OM in public agencies in one developing country, this research explores OM in three public institutions in Ghana. The objective is to provide a greater understanding of how public agencies can develop their OM. We base our understanding on how knowledge management capability (KMC) affects OM in public organizations. We use theories of KM (Cross and Baird, 2000), KMC (Gold *et al.*, 2001; Chiu and Chen, 2016) and the storage bin view of OM (Fiedler and Welpe, 2010; Walsh and Ungson, 1991) to develop hypotheses linking KMC to OM. We begin the manuscript with a

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review of the relevant literature that links KM to OM. We next describe the context of the study, the data set, measures and the methodology used to test the hypotheses. The section after that presents the results of our analysis. The empirical analysis relies on survey data gathered from three public agencies in Ghana. We then present the results of our analysis, discuss the implications of the results for KM and OM generally, and more specifically for memory building in the public sector in Ghana. We conclude the paper by addressing the limitations of the study and suggesting avenues for further research.

## Literature review

Public agencies in Ghana and Sub-Saharan Africa have embarked on service improvements and KM is becoming important in this respect (Acheampong, 2014). Although public sector KM is important, not much research exists on this topic generally (Chiu and Chen, 2016). Yet, many organizations in the public sector are knowledge-intensive organizations and poor KM practices might lead to high costs, loss of institutional memory, knowledge gaps and poor decision making (Luen and Al-Hawamdeh, 2001).

Most studies of KM focus on the private, not the public sector (Oluikpe, 2012; Ringel-Bickelmaier and Ringel, 2010), even though a greater understanding of KM issues in the public sector would be useful. For example, as De Angelis (2013) suggests, the public sector is influenced by a growing need for efficiency and customer focus. Wiig (1997) suggests that KM can build a nation's intellectual capital and improve the effectiveness of public and private decision making. Zhou and Gao (2007) suggest that KM in the public sector can enhance governments' competence and improve service quality. More importantly, findings from KM studies in the private sector may not apply to the public sector because of its unique context (Massaro *et al.*, 2015).

Existing research has highlighted the critical role of OM as a central system in the storage of knowledge produced in organizations (Kim, 1993). Research has broadened our understating of the characteristics and mechanisms of OM including how memory is acquired (Shrivastava and Schneider, 1984), retained (Gherardi, 2006) and how it is used (Martin de Holan and Phillips, 2004). In general, our understanding of how memory is developed may still be at the nascent stages (Olivera, 2000; Fiedler and Welpe, 2010) and research effort on KM and OM, in particular, may just be catching up with the practical recognition of their value (Rhoads *et al.*, 2007). Empirical research on OM in the public sector is limited, and more particularly research on Sub-Saharan Africa (Massaro *et al.*, 2015). The loss of OM in public agencies can affect their ability to advance their mission, deliver on programs effectively and engage in the sort of transformations that are necessary for dealing with new challenges. Any action that results in a loss of existing personnel results in loss of that organization's memory and learning capability (Dunham and Burt, 2011) and that makes the preservation of OM crucial. As Rusaw (2005) points out, the loss of OM in government can deplete the supply of mentors and coaches and an organization's problem-solving ability.

Palepu (2001) suggests that it is important to develop strategies to promote the retention of institutional memory and experience that might be lost through rapid staff turnover especially in developing countries. Public agencies across Sub-Saharan Africa are suffering from a loss of personnel with years of experience due to all forms of attrition: an aging workforce, retirement, civil strife and in some countries the ravages of diseases such as HIV/AIDS (Chankova *et al.*, 2009), leading to a premature departure of experienced employees. The need for contextualizing KM studies arises because research on KM and OM conducted in the developed countries may not apply to Sub-Saharan Africa because of contextual differences such as culture and the stage of institutional development (Kiggundu *et al.*, 1983). Ohemeng (2010) suggests that policymakers need to consider the local environmental conditions and tailor policies that fit the environment. Unlike developed countries, developing countries lack strong institutions and the resources for developing the

infrastructure for building intellectual capital. Worse, political considerations, not necessarily efficiency, are often key factors in decision making in the public sector in developing countries (Massaro *et al.*, 2015).

Successive governments in Ghana have recognized that poor public sector performance undermined economic growth and governments have actively sort to improve performance in the public sector in Africa (Ayee, 2012). Part of the process of public sector reform in Ghana is the recognition that KM can be used to improve efficiency in policymaking and service delivery (Acheampong, 2014). There is some research on KM in the public sector in Ghana. For example, Acheampong and Kandadi (2008) found that public sector organizations are receptive toward the implementation of KM programs. The authors found that public sector employees generally display a positive knowledge culture that may be improved through enhanced working conditions and infrastructure and that the government is supportive of KM effort in the public sector. Despite this initial research, few, if any studies exist on the extent to which public sector organizations are presently prepared to build their intellectual capital base and institutional memory and this study fill some of that gap.

*Organizational memory*

The most commonly cited definition of OM is based on Walsh and Ungson (1991). The authors define OM as the aspect of an organization's history in which a firm's knowledge is captured, and stored so it becomes accessible in the future. Kim (1993, p. 43) notes that OM includes "everything that is contained in an organization that is somehow retrievable." Thus, "storage files of old invoices, letters, spreadsheet data stored in computers and the latest strategic plan, as well as what is in the minds of members" are part of OM. According to Hsiu-Fen (2015), OM exists at both the individual and organizational level. Memory at the individual level is manifested in special skills and learning experiences required to perform work in the organization. At the organizational level, memory is embedded in the documents, repositories, organizational routines, procedures and the culture of the organization (Camisón and Villar-López, 2011). Some researchers make a distinction between procedural and declarative memory (Lutz and White, 1986). Declarative memory refers to the memory of concepts, facts and events that can be found in organizational units, databases and intranet whereas procedural memory is reflected in organizational routines, formal written procedures and informal norms (Moorman and Miner, 1998).

The main purpose of OM is to acquire, retain and retrieve knowledge and expertise for practical application (Danskin *et al.*, 2005). Langenmayr (2016) lists three functions of OM: it allows organizations to understand the system's past and, in turn, the current reality facing it, frame future possibilities resulting from decisions in terms of consistency with the past and mediate between remembering and forgetting the system's previous decisions. OM plays a number of critical roles in organizations. First, OM is important in the learning process allowing organizations to avoid repeating past mistakes (Akgün *et al.*, 2012). Second, OM helps strategic decision making and innovation (Camisón and Villar-López, 2011), organizational learning (Cross and Baird, 2000) and provides new personnel with access to the expertise of older employees (Connolly, 2010). Finally, OM helps to lower the transaction costs associated with administrative work (Croasdell, 2001). Organizations may not remember the same way individuals do (Argyris and Schon, 1978), but OM may operate in the same fashion as individual memory because OM produces organizational personality (Moorman and Miner, 1998; Weick, 1979). OM transcends the individual level and organizations may be able to preserve the knowledge of the past despite the departure of key members (Rusaw, 2005).

The most common and intuitive view of OM is the storage bin view (Walsh and Ungson, 1991). Walsh and Ungson (1991) identified five different retention mechanisms of OM, what the authors call memory storage bins. These are the individual retention bins, made up of

individual recollections of what happened in the organization. Cultural retention bin composed of how members of the organization think, feel and perceive problems. The transformational bin or the business logic that guides the transformation of input in organizations. Structural bins or how organizations reflect and store information about the organizational environment. Ecological bins involving the actual physical or workplace ecology of an organization. Despite its popularity, the storage bin view has been criticized for being too focused on the functional utility of memory and for downplaying the possibility that memory may be socially constructed (Bernstein, 2004; Ackerman and Hadverson, 2000). This notwithstanding, the storage bin view remains the most intuitive and widely used measure of memory (Fiedler and Welpe, 2010) and it is used in this research.

## Hypotheses

### *Knowledge management (KM), Knowledge management capability (KMC) and OM*

KM has been broadly defined as the systematic processes of acquiring, organizing, sustaining, applying, sharing and renewing all forms of knowledge (Choo, 2006). Two forms of knowledge have been identified in the literature – explicit and tacit knowledge (Nonaka and Takeuchi, 1995). Explicit knowledge (e.g. rules and procedures) is easy to transfer in codified form without a loss of integrity (Harvey, 2012). Conversely, tacit knowledge is personal, contextual and resides in the memory of actors. Goh (2002) suggest that organizations must have strategies for managing the acquisition and retrieval of both explicit and tacit knowledge. Organizations that develop and maintain KM processes can transform individual knowledge into organizational knowledge (Hsiu-Fen, 2015).

Organizations need both knowledge process and infrastructure capabilities to build OM. Process capabilities include those associated with knowledge acquisition, conversion, application and protection (Tseng, 2011) while infrastructural capability includes technology, structure and culture. Both process and infrastructural capabilities are important (Miranda *et al.*, 2011). Once developed these capabilities then allows an organization to manage its knowledge base, including its memory (Walsh and Ungson, 1991). Chuang (2004) defines KMC as the organization's ability to acquire, manage and use knowledge resources. KMC is conceptualized as a multidimensional construct with the following dimensions: knowledge acquisition; knowledge conversion; and knowledge application (Liao *et al.*, 2009). KMC has been decomposed into two major constructs: the knowledge infrastructure capability and knowledge process capability (Gold *et al.*, 2001; Chiu and Chen, 2016). Knowledge infrastructure includes structure, technology and culture (Gold *et al.*, 2001). Structural infrastructure refers to the physical layout and organization hierarchy. Information technology is an important KM infrastructural capability, enabling or supporting core knowledge activities such as knowledge creation, knowledge distribution and knowledge application (Gold *et al.*, 2001). The culture and collaborative climate among organizational members should affect an organization's ability to build its knowledge base (Gold *et al.*, 2001). KMC also includes process dimensions including an organization's capability for knowledge acquisition, storage, retention and retrieval (Gold *et al.*, 2001; Chiu and Chen, 2016; Tseng, 2011). In this research, following Chiu and Chen (2016), we apply the process capabilities of knowledge acquisition, storage, retention and retrieval as a means for assessing OM.

The capability-based construct of KMC is consistent with the resource-based framework in strategy research (Teece *et al.*, 1997). Capabilities are based on organizational routines and made up of an organizations' ability to assemble, integrate and deploy valuable resources (Grant, 1996), in this case, OM. This capability clearly requires organization-wide effort and top management commitment. Therefore, If KM is the acquisition, preservation and retrieval of organizational knowledge (Davenport and Prusak, 1998) and OM involves the mechanisms of bringing past knowledge to bear on the present (Stein, 1995), then KMC must be directly related to OM. Once produced, organizational knowledge becomes

embedded in the OM infrastructure of the organization and thereby becoming a distinct attribute of the organization (Martin de Holan and Phillips, 2004). Indeed, Karreman (2002) suggests that KM and the existence of technological and social systems for storing and retrieving knowledge actually validate the concept of OM.

Organizations need both knowledge process and infrastructure capabilities to build OM. Process capabilities include those associated with knowledge acquisition, conversion, application and protection (Tseng, 2011) while infrastructure mirror the bins described my Walsh and Ungson (1991). Goh (2002) suggest that organizations must have strategies for managing the acquisition and retrieval of both explicit and tacit knowledge.

Organizations can build OM by implementing KM systems (Danskin *et al.*, 2005; Gong and Greenwood, 2012). To understand how OM is built, therefore, requires that we search for methods that enable the organization to capture, retain and retrieve existing knowledge (Stein, 1995). Organizations that manage both their KM processes and related capabilities will facilitate their OM building effort through its collective KMC (Chiu and Chen, 2016). Therefore, an organization's capability to build knowledge and OM is important. However, not all organizations may be capable of doing this successfully. As Penrose (1959) suggests, the capacity to realize certain objectives is different from the willingness to pursue those particular objectives. More importantly, organizational capabilities are often associated with outcomes (Chiu and Chen, 2016). It would seem reasonable to assume that a capability for acquiring, storing, retaining and using knowledge would positively affect OM. Therefore:

*H1.* KMC has a significant and positive impact on OM.

*Knowledge acquisition capability*. A key capability of OM building is knowledge acquisition. Knowledge acquisition at an organizational level includes the activities of extracting, interpreting and transferring knowledge to improve existing organizational knowledge base (Liao *et al.*, 2009). At the individual level, knowledge acquisition can be accomplished by drawing from organizational knowledge repositories, learning from others and experience (Ryu *et al.*, 2005). Since organizational knowledge largely resides within individuals' memory, knowledge acquisition by learning from others plays an important role in individual knowledge acquisition (Waterman, 1985). Knowledge identification is a key part of knowledge acquisition and both internal and external sources can be a source for identification. Internal sources include work practices, reports and documents, while external sources include the data (Zack, 1999). In addition, technology, organizational structure, leadership and culture can aid information acquisition (Peachy and Hall, 2005).

Rhoads *et al.* (2007) observe that much of the knowledge in government organizations is tacit in nature. Since most of the knowledge that is lost through loss of personnel is tacit in nature, it is important that this knowledge is captured through a formal process of converting tacit into explicit knowledge. Such knowledge capture requires that formal interactions such as expert interviews, and documentation of lessons learned from situations be captured and made explicit in the form of reports or databases. To be effective, people involved in the process need to reflect on the tacit information that is being captured so that no idiosyncratic, as opposed to some collective, interpretations are made (Nonaka *et al.*, 2000). Since tacit knowledge is highly context specific and stored in individual minds, encouraging people to write down what they know (codification) may be one of the best ways of capturing this tacit knowledge (Zack, 1999). As Coldwell (2007) puts it, one way to stem the loss of OM is to interview the "keepers of the lore" and to memorialize what the keepers have to say. In other cases, organizations are beginning to use incentives such as compensation to access tacit knowledge. Davenport and Prusak (1998) note that the use of best practices and lessons learned can help make knowledge acquisition more efficient. Firms that have specific strategies and vision for knowledge acquisition are more likely to

pursue knowledge acquisition than those without explicit strategies (Probst *et al.*, 2000). Knowledge acquired must be stored to be of any use and OM, therefore, becomes the storehouse of any acquired knowledge. Therefore:

*H2.* Knowledge acquisition capability will have a significant and positive impact on OM.

*Knowledge storage capability*. Storage may be the holy grail of OM. Stein (1995) suggests that storage is perhaps the most important feature of KM and OM. Once information is collected and coded in some form, it has to be stored so it can be accessed to be of any value to an organization. Several mechanisms have been proposed as a means for storing organizational knowledge. These include physical locations, social systems in organizations, individuals, organizational culture, structure and archives (Walsh and Ungson, 1991). Simon (1991) points out that people are perhaps the most effective means of storing the organization's experience. However, no one particular individual is likely to be the sole repository of an organization's memory and networks of individuals can be a powerful medium of storage of the organization's explicit knowledge (Olivera, 2000).

Knowledge storage and OM are closely linked. In fact, El Sawy *et al.* (1986) defines memory as a hidden repository of details of past decisions and their perceived results, past surprises and the organization's responses, rules of thumb and other unwritten decisions that regulate current decisions and actions. Probst *et al.* (2000) similarly describe memory as a system of knowledge and skills that preserves and stores perceptions and experiences beyond the moment when they occur so that they used later. Knowledge can be stored in file systems, local networks, databases, e-mail and intranet systems. For ease of retrieval, stored knowledge needs to be structured (Franco and Mariano, 2007). Various impersonal bins such as computers and other artifacts are used to store explicit knowledge (Anand *et al.*, 1998). By definition, knowledge storage is at the heart of OM building. It would seem reasonable that organizations that develop their capabilities for storing knowledge would build OM. Therefore:

*H3.* Knowledge storage process will have a significant and positive impact on OM.

*Knowledge retention capability*. Knowledge retention refers to keeping possession of, not losing knowledge (DeLong, 2004). DeLong (2004) acknowledges that the terms "knowledge loss" and "knowledge retention" are not exact opposites because it is not possible for an organization to ever retain all of the knowledge that it could lose. Retention of knowledge has generally been looked at as a significant part of the KM practices in organizations (Arif *et al.*, 2009). Retention has also been described as an important part of building OM (Walsh and Ungson, 1991). As a part of KM, retention is concerned with making sure that the organization does not lose the knowledge held by knowledge workers who leave the organization. Moria (2011) suggests that there are three capabilities to knowledge retention. First, it is necessary to determine and prioritize what will be retained. Second is the active process of transferring knowledge; say from older employees or retirees into the organization. Finally, comes integration – how the transferred knowledge is integrated and embedded into organizations' processes. Liebowitz (2009) contends that knowledge retention consists of a wide range of tools, some easy and some hard to implement. According to the author, organizations can use intrinsic and extrinsic motivation to coax knowledge for retention or establish a two-way system of knowledge capture, where knowledge is not only passed down from the senior employee to the junior employee but also vice versa. If knowledge is not retained, organizations will not be able to learn from experience and will have to reinvent the wheel each time (Du Plessis and Boon, 2004). The end goal of any knowledge retention process is to have knowledge maintained in a form that makes it useful in the future and anything retained must end up in an

organization's memory. As DeLong (2004) puts it knowledge retention is "effectively the act of building organizational memory." Therefore:

*H4.* Knowledge retention capabilities have a significant and positive impact on OM.

*Knowledge retrieval.* Knowledge retrieval is the process by which an individual who needs the knowledge locates it and accesses that knowledge. However, there is a reason to suggest that getting access to stored knowledge may not be easy. Gammelgaard and Ritter (2005, p. 133) list three barriers to knowledge retrieval: fragmentation, overload and de-contextualization. First, fragmentation occurs when knowledge is dispersed throughout the organization and thus "unknown" to the individual employee. Second, is information overload. Too much information becomes a problem. Finally, are situations where it is difficult to understand retrieved knowledge. Organizations need to develop the capabilities of storing knowledge in a form that makes it easy to be retrieved. Gammelgaard and Ritter (2005) suggest that knowledge that is codified may be easier to retrieve and because individual memory is the least codified, it is the most difficult to retrieve. Codified knowledge in databases may be easier to retrieve because technology reduces the individual effort needed to retrieve information. Social capital is another source of knowledge retrieval. High social capital allows efficient retrieval because the sender and receiver share common code and understanding. Finally, there are communities of practice. According to Wenger *et al.* (2002, p. 4), communities of practice or groups of people who share a concern, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis are a means for knowledge retrieval. OM is robust when individuals can automatically retrieve knowledge when they need it (Walsh and Ungson, 1991) and organizations that have the capabilities to make knowledge retrieval accessible when needed would have a robust OM. Therefore:

*H5.* Knowledge retrieval capabilities have a significant and positive impact on OM.

## Data and methods

### *Study context and data set*

We chose the public sector agencies for the study for at least three reasons. First, because the public service is the largest employer in Ghana. Public sector employment in the country in 2015 was 52.24 percent of the labor force (GSS, 2016). Second, KM has been identified as one key area for improving service delivery in the public sector in Ghana (Acheampong, 2014). Finally, because the Government of Ghana has embarked on a program of public sector improvement, a greater understanding of how prepared public agencies are to manage knowledge and memory has practical implications.

To examine how KMC shapes OM in these agencies, we collected survey data from employees in three large agencies in the country. To test our hypotheses, we developed a set of questions measured on a five-point Likert-type scale the scales were anchored from where "1 = strongly disagree" to "5 = strongly agree." The items were based on existing research but the survey was a new instrument developed for the present study to enhance the simplicity and clarity of the items. We used Cronbach's (1970) $\alpha$ coefficient to determine the internal validity of our measures. All the coefficients $\alpha$'s are higher than the recommended threshold of 0.70 for exploratory research (Nunnally, 1978).

We approached three of the largest public agencies in Ghana for voluntary participation in the study and all three consented on condition that we did not disclose their names because of the sensitive nature of their work. These agencies are concerned with security services and revenue generation and have offices across every region in the country. All three agencies use knowledge and information as to their primary input for organizational performance. Participation in the study was voluntary; we guaranteed the confidentiality of

all responses and assured respondents that this was not a government-sanctioned study. Two of the researchers distributed the questionnaires throughout the agencies in the region housing the administrative headquarters of all three of these agencies. The researchers personally hand-delivered 950 questionnaires to the branches and HQ of these agencies after seeking approval from senior officials in the agencies. The researchers picked up the completed questionnaires in tranches each week for a month. We received 653 questionnaires within the first four weeks. The data collection lasted for two months. In the end, we received 756 usable questionnaires yielding a response rate of 79 percent. Our response rate was satisfactory but to determine whether there was some non-response bias, we tested for non-response bias by pooling two groups of respondents. A sample of 30 early and 30 late respondents were compared on *t*-tests on the key variables (*p*-values are 0.142 and 0.165). The results indicated that there was significant non-response bias in this study (Armstrong and Overton, 1977).

*Measures*

Following Spector's (1987) recommendations, we provided clear instructions at the beginning of the questionnaire to avoid ambiguity and provide a common frame of reference for respondents. The instructions stressed the fact the study was focused on internally generated knowledge and specified the nature of knowledge we were measuring. These included administrative records, all published information including manuals, and project-related documents and knowledge of the staff.

*Knowledge acquisition*. Based on prior research (Walsh and Ungson, 1991) we generated a list of items measuring the organization's effort to capture the knowledge assets of its current, experienced and older employees. A seven-item scale was developed to measure knowledge acquisition. We calculated the mean of the items to build a composite measure of knowledge acquisition capability ($\alpha = 0.76$).

*Knowledge storage*. The storage of knowledge assets is an important component of OM process (Cross and Baird, 2000). To assess this, an eight-item scale was developed to measure knowledge storage. We calculated the mean of the eight items to build a composite measure of knowledge retrieval ($\alpha = 0.86$).

*Knowledge retention*. We developed a six-item scale to measure knowledge retention. We calculated the mean of the six items to build a composite measure of knowledge retention ($\alpha = 0.80$).

*Knowledge retrieval*. Based on a review of the literature, we developed an eight-item scale to measure knowledge retrieval. We calculated the mean of the eight items to build a composite measure of knowledge retrieval ($\alpha = 0.88$).

*Knowledge management capability*. We calculated the mean of the four capabilities into a KMC variable (total KMC measure).

*Organizational memory*

Following Fiedler and Welpe (2010), we adopted the storage bin view in this research. We measured OM using Walsh and Ungson's (1991) storage bin dimensions of OM.

*Culture dimension*. A seven-item scale was developed to measure the culture dimension. For example, respondents were asked to indicate to what degree they agreed that the organization values the sharing of expertise among employees. We calculated the mean of these seven items and built a composite measure of culture. The internal reliability of this measure ($\alpha = 0.83$).

*Individual bin*. Based on previous research (Lin, 2015), a three-item scale was developed to measure individual bin. For example, respondents were asked to indicate their agreement on whether their organization encourages them to write down the key things they discover

while working. We calculated the mean of these three items and built a composite measure of the individual bin. The internal reliability of this measure ($\alpha = 0.74$).

*Structure bin*. A three-item scale was developed to measure structure bin following (Fredrickson, 1986). For example, we asked respondents to indicate the extent to which they agree that seniority plays a role when it comes to documenting key events. We calculated the mean of these four items and built a composite measure of structure. The internal reliability of this measure ($\alpha = 0.72$).

*Logic/transformation*. A five-item scale was developed to measure logic/transformation. For example, we asked respondents to indicate the extent to which they agree to the statement that databases are clearly indexed for ease of reference. We calculated the mean of these five items and built a composite measure of organizational logic. The internal reliability of this measure ($\alpha = 0.82$).

*Ecology bin*. A five-item scale was developed to measure ecology bin. The ecology bin includes "the physical structure of an organization and the workplace ecology of an organization encodes and thus reveals a good deal of information about the organization" (Walsh and Ungson, 1991, p. 66). For example, we asked respondents to indicate the extent to which they agree that there are archives where their organizations store resources for later use. We calculated the mean of these five items and built a composite measure of ecology. The internal reliability of this measure ($\alpha = 0.71$).

*Overall OM measure*. We calculated the mean of the five OM retention bins into a composite, total OM measure.

Tenure has been shown to influence employee behavior and we included it as a control in our study (Finkelstein and Hambrick, 1996). We also controlled for the educational level, and type of agency because some agencies may have a more developed KMC system than others. Finally, we controlled for gender and position. In total, 34 percent of the respondents were female and 66 percent were male. The mean participant age was 39.86, (SD = 8.61). The overall mean job experience was 14.22 years (SD = 8.14). The average respondent had some college or university education. Table I provides a summary of the descriptive statistics. Table II presents a summary of the correlations between the variables.

| Variables | Mean | SD |
|---|---|---|
| Culture | 2.1666 | 0.51254 |
| Physical environment | 2.5096 | 0.53885 |
| Structure | 2.2480 | 0.61171 |
| Individual | 2.2826 | 0.63819 |
| Logic | 2.3175 | 0.57063 |
| Organizational memory | 2.3049 | 0.45270 |
| Acquisition capability | 2.2513 | 0.50422 |
| Storage capability | 2.3951 | 0.54480 |
| Retention capability | 2.4189 | 0.55814 |
| Retrieval capability | 2.1762 | 0.54181 |
| KM capability | 2.3104 | 0.45925 |
| Age | 39.866 | 8.6194 |
| Gender[a] | 0.333 | 0.4717 |
| Experience | 14.228 | 8.1430 |
| Education | 3.407 | 1.2919 |
| Status | 3.262 | 0.9033 |
| Ministry | 1.787 | 0.7828 |

**Note:** [a]Male = 0, Female = 1

**Table I.**
Descriptive statistics

| | Acquisition | Storage | Retention | Retrieval | KMC | OM | Age | Gender | Education | Status | Experience |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acquisition | | | | | | | | | | | |
| Storage | 0.572** | | | | | | | | | | |
| Retention | 0.522** | 0.821** | | | | | | | | | |
| Retrieval | 0.555** | 0.679** | 0.674** | | | | | | | | |
| KMC | 0.766** | 0.903** | 0.889** | 0.853** | | | | | | | |
| OM | 0.798** | 0.687** | 0.673** | 0.666** | 0.823** | | | | | | |
| Age | −0.014 | 0.074* | 0.116** | 0.081* | 0.077* | 0.016 | | | | | |
| Gender | −0.068 | −0.102** | −0.070 | −0.052 | −0.085* | −0.080* | −0.105** | | | | |
| Education | −0.125** | −0.036 | −0.015 | −0.046 | −0.063 | −0.119** | 0.106** | −0.028 | | | |
| Status | −0.017 | −0.047 | −0.056 | −0.096** | −0.064 | −0.041 | −0.405** | 0.071 | −0.189** | | |
| Experience | 0.013 | 0.077* | 0.107** | 0.091* | 0.086* | 0.007 | 0.846** | −0.042 | −0.046 | −0.372** | |
| Ministry | −0.166** | −0.232** | −0.220** | −0.159** | −0.228** | −0.129** | −0.049 | 0.199** | 0.108** | −0.020 | −0.192** |

**Notes:** *,**Correlation significant at the 0.05 and 0.01 levels, respectively (two-tailed)

**Table II.**
Correlation matrix

## Data analysis and results

Table I provides descriptive statistics. All dependent and independent variables have means slightly lower than the midpoint of 2.5, except physical environment, which has a mean at the midpoint. Table II presents the correlation between the variables. The table shows that all independent variables (KMC, acquisition capacity, storage capacity, retention capacity and retrieval capacity) are positively correlated with the dependent variable of OM. The results in Table II show that the control variables age, status and experience, are not significantly correlated with OM indicating these control variables had no influence on OM. Education and agency had a significant correlation with OM ($p < 0.05$ level).

We used ordinary least squares (OLS) regression to test the proposed hypotheses. OLS regression is commonly used to investigate the effect of independent variables on a dependent variable. Following Lin (2008), we run separate OLS regressions by entering one KM component at a time along with control variables, resulting in five regression models, which are presented in Table III. This procedure allowed us to test the effect of KM on OM in overall (Model 1 in Table III for *H1*) and for each component of KM (Models 2–5 in Table III for *H2–H5*). Our results show a high correlation between KMC components. Therefore, we employed two tests for multicollinearity. First, we calculated the variance inflation factor (VIF) and all control variables had VIF of less than five, indicating that multicollinearity is not a significant issue in our case. Second, our Durbin–Watson test result was 1.801, showing that multicollinearity was not a serious problem. We used Levene's test to check the assumption of homogeneity of variance. The result of 0.912 supports our assumption of the homogeneity of variance of the model.

### *Results*

The first regression model (Model 1 in Table III) is the test for *H1*, which is about whether the composite KMC has any significant and positive effect on OM. The results present support for *H1*, ($p < 0.001$). The results are robust with the control variables included in the analysis (Adjusted $R^2$ is 0.688, $p < 0.001$). Out of the control variables, only education and experience are significant and negative. Model 2 in Table III presents the test results for *H2*. The results present support for *H2*, as the coefficient for acquisition is significant ($p < 001$). Model 3 in Table III presents the test results for *H3* (the effect of knowledge storage on OM). The results present support for *H3*, indicating the effect of knowledge storage on OM is significant and

| | Model 1 OM | Model 2 OM | Model 3 OM | Model 4 OM | Model 5 OM |
|---|---|---|---|---|---|
| Constant | 0.507 (5.162)*** | 0.671 (6.402)*** | 1.120 (9.191)*** | 1.275 (10.544)*** | 1.245 (10.059)*** |
| KMC | 0.822 (39.690)*** | | | | |
| Acquisition | | 0.712 (35.45)*** | | | |
| Storage | | | 0.573 (25.492)*** | | |
| Retention | | | | 0.551 (24.812)*** | |
| Retrieval | | | | | 0.551 (24.008)*** |
| Age | 0.001 (0.683) | 0.006 (2.570)** | 0.002 (0.772) | 0.001 (0.037) | 0.004 (1.384) |
| Gender | −0.021 (−1.041) | −0.016 (−0.733) | −0.014 (−0.549) | −0.039 (−1.469) | −0.038 (−1.431) |
| Education | −0.3 (−3.945)*** | −.015 (−1.855)* | −0.041 (−4.185)*** | −0.045 (−4.552)*** | −0.036 (−3.643)*** |
| Experience | −0.005 (−2.181)** | −0.006 (−2.575)** | −0.006 (−1.863)* | −0.005 (−1.688)* | −0.007 (−2.435)** |
| Ministry | 0.033 (2.588)** | −0.004 (−0.300) | 0.016 (0.986) | 0.014 (0.812) | −0.016 (−0.955) |
| Status | −0.012 (−1.043) | −0.016 (−1.289) | −0.025 (−1.697)* | −0.029 (−1.931)* | −0.007 (−0.493) |
| *F*-value | 239.389*** | 191.911*** | 101.465*** | 96.373*** | 90.522*** |
| $R^2$ | 0.691 | 0.642 | 0.487 | 0.474 | 0.459 |
| Adj. $R^2$ | 0.688 | 0.639 | 0.482 | 0.469 | 0.454 |

**Notes:** *,**,***Significant at 0.05, 0.01 and 0.001 levels, respectively

**Table III.** OLS regression test results for the effects of the components of the knowledge management capability on organization memory

positive ($p < 0.001$). Model 4 in Table III presents test results for *H4* ($p < 0.001$). Model 5 in Table III presents the test results for *H5*. The results present support for *H5*, indicating the effect of knowledge retrieval is significant and positive on OM ($p < 0.001$).

## Discussion and conclusion

Our test results indicate that KMC and its components have significant effects on OM. All dependent and independent variables have means slightly lower than the midpoint of 2.5, except physical environment, which has a mean at the midpoint. This means the respondents' answers for questions for independent and dependent variables were slightly toward "strongly disagree." This implies that respondents believe there is room for improvement in KMC and OM components in the agencies we studied. Structure and individual variables have the highest standard deviation, suggesting they captured a wider variety of the answers from the respondents. We found that the participants' education level, a control variable, was negatively associated with OM. One possible explanation may be that respondents that are more educated have a higher threshold for what they consider as developed OM structures and capabilities.

## Theoretical implications

The study contributes to the existing literature in a number of ways. First, the study responds to calls for diversifying research in KM to Africa. Massaro *et al.* (2015) note that Sub-Saharan Africa is a completely neglected area when it comes to studies on KM in public sector organizations. This is important, given that results of studies from developed country public institutions may not apply to Ghana and Sub-Saharan Africa (Massaro *et al.*, 2015). Second, the findings build on and extend the literature on KM and OM. The results of the study support earlier Fiedler and Welpe, 2010). Most studies of OM are conceptual studies and this research extends the limited empirical tests of OM generally, and more specifically in public agencies (see Fiedler and Welpe, 2010 for a notable exception). Third, the finding that knowledge acquisition and retention variables add the most contribution to the study is consistent with existing research. Prior research has documented that knowledge acquisition is the first critical task in building OM (Waterman, 1985; Probst *et al.*, 2000). The contribution of knowledge retention in explaining memory also validates the critical role knowledge retention plays in memory (Gioia and Poole, 1984).

Finally, a focus on public agencies, especially in a developing country, is important considering their size and important role in basic service delivery. A focus on public sector reform, with the goal to make the public sector more efficient and effective, is now widespread in Ghana and elsewhere in Africa (Ayee, 2012). This study builds on extends the limited knowledge base on KM in Ghana and Sub-Saharan Africa and can become a benchmark for studies on building an intellectual base and OM for the public sector in Ghana and similar countries of Sub-Saharan Africa.

## Practical implications

There are some implications of the study for Ghana and perhaps Sub-Saharan Africa. First, the study, to our knowledge, is the first to explore the links between OM and KM in Ghana. The data from the descriptive statistics indicate that the agencies we studied had just about below-average capabilities and structures for memory building. This means that there is room for improvement in developing the structures and processes associated with building OM. Agencies desirous of building their OM will need to adopt a capabilities-based approach. Capabilities range from the most basic to sophisticated IT infrastructure. Public agencies in the resource-starved environments may want to start developing their capacity for building OM by focusing on doing the least costly things first. For example, the

adequacy of storage boxes, files and folders that are properly cataloged, preserved and stored and easily accessible can all be done at minimum cost, compared to the acquisition of sophisticated electronic data management systems. Although rudimentary, such low-tech approaches may be vital in resource-starved environments of Ghana and Sub-Saharan Africa. Developing the infrastructure for KM in the four vital areas of knowledge acquisition, retention, storage and retrieval would go a long way in building OM.

Second, As Ashkenas (2013) observed, having an explicit strategy for building memory will be useful. Public agencies need to put in place KM strategies aimed at developing the capability for building their OM. It would be helpful for governments to include KMC as an integral part of their general drive to improve public sector efficiency. In addition to KM components, our tests found that the respondent's educational level, a control variable, was consistently significant across the five models. Finally, because OM is not static, it is important that public agencies upgrade their memory building process over time. As Nielsen (2006, p. 63) notes "dynamic capabilities are seen as an integrated set of KM activities that changes, renews and exploits knowledge-based resources of the company."

## Limitations and future studies

The study has a number of limitations that need to be taken into account in interpreting the study results. First, we relied on self-reports as is often the case with studies on OM (e.g. Fiedler and Welpe, 2010). Although previous research supports the reliability and validity of self-reported measures (Rogelberg *et al.*, 2001), we cannot completely rule out social desirability and consistency biases in the present study. Second, we used a cross-sectional research design and the use of cross-sectional, single-source data should be considered a limitation of this study (Jakobsen and Jensen, 2015). Finally, our study focused on a limited number of agencies in a particular context and both limit the generalizability of the results. Future studies that examine how these agencies build on OM over time will be interesting as capabilities need to be dynamic (Teece *et al.*, 1997; Nielsen, 2006). Also, because OM is associated with performance outcomes (Kmieciak and Michna, 2018), future studies should link OM to performance outcomes in the public sector.

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