THE INFLUENCE OF ORGANIZATIONAL INFRASTRUCTURE ON ORGANIZATIONAL EFFECTIVENESS IN THE CONSTRUCTION INDUSTRY.

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Abstract

Purpose – In view of the widespread cross-referencing between knowledge management (KM) and organizational effectiveness, expectations would be that there is not much left to be explored since research strands have looked in this direction. However, an exception is the synchronous study of organizational infrastructure as a KM tool and organizational effectiveness, the subject of this study in the construction industry context.

Design/Methodology/Approach – This study adopted the survey methodology with a structured questionnaire distributed to Construction/Project managers, Knowledge management specialists, Quantity Surveyors, Architects and Site Engineers, all of them from the Ghanaian construction industry. Dooley (2001), posited this approach as having the ability to enhance results generalization.

Findings – The study revealed that the managerial construct as an item of organizational infrastructure, had the highest impact, with a mean value of 3.9947, on organizational effectiveness, keenly followed by technological and social aspects of organizational infrastructure with mean values of 3.9652 and 3.7604 respectively.

Research limitations/Implications – The study would have benefitted from a case study, so as to collect useful long-term data to better appreciate how organizational effectiveness is influenced by changes in variables under their distinctive constructs.

Practical Implications – Firms in industries such as manufacturing, finance and information technology, also stand to gain, as the findings are not prescriptive in nature and allow inferences to be made in relation to such firms taking into consideration their unique characteristics and the environments in which they operate.

Originality/value - The identified managerial, technological and social aspect organizational infrastructure constructs will advance the effectiveness of the KM process as well as organization performance.

Keywords: Organizational Infrastructure, Knowledge Management, Organizational effectiveness, Construction Industry.

1.0 Introduction

According to the Economics Times (2016), infrastructure is believed to add efficiency and pace to any nation's progress. The assertion that infrastructure is the lifeline of a country should not be underestimated. In today's fast-growing industries, knowledge, as an essential asset, is widely recognized as a primary resource augmenting the competitive advantage of an organization (Goh 2002; Armbrecht et al. 2001). According to Nonaka and Takeuchi. (1995), Smith et al. (2005) and Alwis and Hartmann (2008), private and public organizations are finding ways to assimilate the knowledge possessed by its members knowledge and develop strategies to optimize the use of their resources, especially knowledge. Organizations are becoming more knowledge-intensive, making Knowledge Management (KM) a key activity in the knowledge economy era.

KM can be seen as a continuous and dynamic set of practices and processes embedded in groups and individuals as well as physical structures. At any point in time, these groups and individuals may be engaged in various phases of KM process/activities (Pawlowski and Bick, 2012; Pirkkalainen and Pawlowski, 2014). KM, therefore, is viewed as a sequence of events and activities creating, storing, transferring and applying knowledge, all resulting in KM outcomes (Eaves, 2014).

According to Arafa (2015), for any industry to witness considerable progress, it absolutely relies upon how its knowledge is managed, including knowledge produced from the scholarly circles and cooperative research and existing information that the organization already holds as scholarly capital. Knowledge management has always been a challenge to the construction industry, which is predominantly project-based (Robinson et al., 2005), possessing high rates of employee mobility, whose knowledge (e.g. skills and expertise) usually leaves organizations as they go (Acharya and Mishra, 2017). The typical construction organization hardly encourages a culture of knowledge sharing (Carrillo et al., 2000). To consistently and intentionally foster knowledge, appropriate organizational mechanisms are a necessity if firms are to improve their ability to manage knowledge (Lee and Choi, 2003).

To date, limited scholarly work has attempted to examine the KM intentions of workers from the organizational infrastructure (managerial, technological and social aspects) perspective, as very few lessons has been learnt into how construction companies, especially those in emerging economies can enhance organizational effectiveness based on their knowledge assets. From the above, it is clear that the distinct organizational infrastructure dimensions do exert influence on organizational effectiveness. In light of this, this study, for construction firms, sought to identify the influence of organizational infrastructure on organizational effectiveness.

2.0 Theoretical Background

2.1 KM

Drucker (1968) introduced and popularized the term "knowledge economy" and noted that companies will have to convert themselves into organizations of knowledge specialists to remain competitive and, perhaps, even to survive. Knowledge Management emerged in the mid-1990s as a solution to the challenge of managing intellectual assets in the post-industrial era widely known as the knowledge economy. Collectively, (Gold et al., 2001; Davenport and Prusak, 2000; Baker et al., 1997) described Knowledge Management as the tools, techniques and methodologies needed to collect, disseminate and integrate knowledge within an organization. The motive behind the usage of Knowledge Management is to recognize and make use of the combined knowledge contained within an organization by virtue of its competencies and experience, via the formation, gathering, storing, disseminating and applying this knowledge (Bollinger and Smith 2001). Based on recent literature, this study adopted the KM definition of Girard and Girard (2015) who described knowledge management as the efficient coordination of an organization's people, technology, processes, and organizational structure to add value through reuse and innovation.

2.2 Organizational Infrastructure and Km

Research has demonstrated that an organization that offers learning among its administration and staff becomes more grounded and turns out to be more competitive. This is the core of knowledge management – the sharing of knowledge (Uriarte, 2008). Several scholarly works have paid attention to the implementation and perception of KM in the construction industry as a result of KM practices improving innovation (Inkinen, 2016), organizational performance and problem-solving activities (Giampaoli et al., 2017). A study conducted by Carrillo and Chinowsky (2006) on the implementation of KM initiatives within engineering design and construction firms revealed a clear distinction between the KM activities of engineering design firms and construction firms. Similarly, Fong and Kwok (2009) found that a prerequisite for successful KM implementation was cultivation of the right organizational culture. Additionally, a study of KM perceptions in Spanish construction and design firms revealed that the industry was very aware of KMs benefits but lacked systematic KM implementation (Forcada et al., 2013).

As posited by O'Reilly and Tushman (2004), organizational arrangements which are aligned to the structure of that organization, assist in housing the essential resource, the organization's knowledge, and thereby benefitting the firm.

3.0 Research Model

Earl (2001) in his theory of KM proposed that behavioural, technocratic and economic dimensions of KM form the foundation of KM. The former relates to the encouragement and promotion of organizational knowledge as a resource that could be developed further through creating, sharing and re-utilization, all with the behavioural aspects of the employees in mind. Supplementing this theory, Gold et al. (2001) were of the view that firms must leverage the existing knowledge via retrieval and sharing while creating new knowledge to achieve intended benefits and organizational goals. They were also of the view that this be done through knowledge-driven capabilities, referring to the available technology and the culture within the organization.

Earlier, organizations were imagined as stand-alone, independent, self-sufficient and self-supported units with a working internal hierarchy. Bunderson and Boumgarden (2010) added that these organizations have evolved into modular forms with improved flexibility, adapting rapidly to changing environment. As a result, the definition of organizational structure is built around the following three interrelated aspects:

1. the mechanisms coordinating the integrating units' resources and activities, resulting in 5 basic structural typologies;
2. the reporting relationships between entities in the organization; and
3. the design of departments, units, teams, divisions, and networks that group individuals (Huber 1991; Moorman et al., 1993).

According to Pemberton, Stonehouse and Yarrow (2001), an organizational infrastructure consists of the systems and technologies that underpin the organization's learning culture, its activities and its structure. Hence, in this study, organizational infrastructure is broken down into the three component aspects of management, technology and societal.

4.0 Research Methodology

In order to augment generalization of the study results, the survey methodology (quantitative strategy) was employed whereby questionnaires were distributed to targeted respondents (Dooley, 2001) for subsequent analysis.

4.1 Measures

Most of the variables taken into account in the study derived from previous scholarly work. A few further, were put forward by the authors as applicable to the Ghanaian Building Construction context. These variables were then separated into the two types of (a) organizational infrastructure variables of managerial, technological and social constructs and (b) the resulting organizational performance variables. To validate the measures, development of the questionnaire involved the two phases:

Phase 1: The questionnaire developed, included two sections, (a) demographic data about the study respondents and (b) fourteen (14) variables relating to organizational infrastructure (8-managerial, 2-technological and 4-social) adapted from Downes and Marchant (2016).

Phase 2: Eighty-two (82) construction professionals (Project managers, Knowledge management specialists, Quantity surveyors, Architects, and Site Engineers) of D1K1 and D2K2 (financial classification) construction firms were selected to provide the research data.

The Likert scale employed for this study ranged from 1-Not often to 5-Very often to ascertain the views of the respondents.

4.2 Sampling

The study population included Project managers, Knowledge management specialists, Quantity surveyors, Architects, and Site Engineers from both DIKI and D2K2 construction firms. However, due to the lack of an updated list of contractors at the Ministry of Works and Housing in Ghana at the time of the survey, the researchers had to rely on the registered membership and paid-up lists held by the Association of Building and Civil Engineering Contractors of Ghana (ABCECG). The ABCECG is the umbrella organization for both building and road construction firms in Ghana and is responsible for the day-to-day monitoring of the operations of its members. The list consisted of 68 registered and operational D1K1 and D2K2 building construction firms in Kumasi-Ghana at the time of the study.

The size of the sample used was forty-one (41) registered and operational D1K1 and D2K2 building construction firms in Kumasi-Ghana at a confidence level of 95%. Two (2) respondents were chosen from each firm resulting in the distribution of eighty-two (82) questionnaires. Seventy-two (72) questionnaires were retrieved, a high response rate of 87.8%, mainly as a result of personal distribution and persistent follow-ups.

Kothari (2004) posited that, the basis for employing a purposive sampling technique depends on the condition that those selected represent the whole population considered in the study. For this study, the sample of construction professionals chosen, was based on this strategy bearing in mind the registration classification (D1K1/D2K2) of the company they worked for. These classifications were chosen because most such firms have technical expertise in the KM field and use modern methods of project delivery.

5.0 Data Analysis and Results

In this section, analysis is reported of the answers to questions seeking basic information and some other, so as check respondents' understanding of the study and to provide comprehensive respondent characteristics. This section is of key relevance in that it established trustworthiness and therefore confidence in the data collected.

Table 5.1: Demographic Data of Respondents

Demography	Inputs	Frequency	Percent (%)
Gender	Male	61	84.72
	Female	11	15.28
Level of Education	HND/Diploma	9	12.5
	Bachelor's Degree	26	36.11
	Master's Degree	29	40.28
	MPhil/Doctorate Degree	8	11.11
Current Position in Organization	Project manager	28	38.89
	Knowledge management specialist	4	5.55
	Quantity surveyor	18	25
	Architect	12	16.67
	Site Engineer	10	13.89
Working Experience in Current firm	<5	5	6.94
	5-10	38	52.78
	11-20	25	34.72
	Above 20	4	5.56
Category of Contracting Firm	D1K1	44	61
	D2K2	28	39
Awareness Variable			
Do people at all levels in your organization recognize knowledge as a key resource?	Yes	58	80.56
	No	4	5.56
	Somehow	10	13.88
Do you perceive knowledge hoarding as a weakness and knowledge sharing seen as strength?	Yes	64	88.89
	No	0	-
	Somehow	8	11.11
Is there a board level representation for KM in your organization?	No	42	58.33
	Yes	4	5.56
	Do not know	26	36.11
Are employee's co-operative and helpful when asked to share information or ideas?	Yes	48	66.67
	No	2	2.78
	Somehow	22	30.55

It can be deduced from Table 5.1 that the majority of respondents were male thus throwing more emphasis on the male dominance of the typical construction setting. Respondents were asked whether workers at all levels in their organization recognize knowledge as a key resource? 80.56% responded "Yes", with 5.56% responding "No" and 13.88%, "Somehow". This signifies that KM systems have been properly established.

88.89% responded 'Yes' as to whether they perceive knowledge sharing as a strength and knowledge hoarding as a weakness. Only 11.11% responded 'somehow' indicating that they were not so sure of the truthfulness of that statement. No respondent disagreed with the statement.

Respondents were also asked whether a broad level of direct action in support of KM existed in their organization. 58.33% replied 'No', there was not much attention given to KM since it was not deemed integral within their firm. 36.11% responded 'Do not know'. 5.56%, however, responded 'Yes'.

5.1 PRE-TEST

Prior to detailed examination of the data retrieved, a data reliability pre-test was performed. Reliability can be defined as the probability of success. Reliability is therefore measured in the range of 0 to 1 with 0 representing no reliability (probability of failure is 1) and 1 representing high reliability (probability of failure is 0). Cronbach's alpha coefficient (α) was used (Santos 1999). The calculated α value was 0.845, indicating that the 14 variables are internally consistent and highly reliable.

Kendall's coefficient of concordance (Kendall's *W*) is a coefficient index for ascertaining the overall agreement amongst sets of rankings (Chan *et al.*, 2009). This analysis was performed to check whether the construction professionals were consistent or not in their assessment of the extent to which organisational infrastructure influenced organizational effectiveness in the Ghanaian Construction industry. The value of Kendall's *W* ranges from 0 to +1. This indicates "no agreement" to "complete agreement" respectively, within the group on the ranking of a particular set of factors. In this study, the value of Kendall's *W* for Organizational Infrastructure was 0.578 (see Table 5.3**).** Siegel and Castellan (1988) recommended that, since the number of factors ranked was more than 7 ($N > 7$) and the sample size was > 20, the significance of an observed *W* should be determined by reference to the approximate distribution of Chi-Square (X^2) with *N*-1 degrees of freedom (df). X^2 *for the Organizational Infrastructure factors*= 68.156 and df = 14, giving a probability of occurrence, *p, of less than* 0.001, indicating good agreement among the respondents on the extent to which organisational infrastructure influenced organizational effectiveness in the Ghanaian Construction industry.

Table 5.2: Impact of Organizational Infrastructure on Organization Effectiveness in Construction firms

ORGANIZATIONAL INFRASTRUCTURE		**Mean**	**RII**	**Rank**
No.	**MANAGERIAL**	3.9947		1st
1	Constraint of resources dedicated to sharing and learning	4.3333	0.8666	2nd
2	Lack of intrinsic or extrinsic rewards as motivation in the recognition of employees' efforts of transferring knowledge	4.3888	0.8777	1st
3	Non-availability of standardized processes that characterize every KM activity	4.2222	0.8444	3rd
4	Insufficiency of organizational resources to deliver suitable Knowledge sharing opportunities	3.5277	0.7055	8th
5	Lack of top management support and ongoing commitment for knowledge transfer	3.8194	0.7638	5th
6	Non-integration of sharing initiatives and KM strategies into the organization's overall strategy and goals	4.2222	0.8444	3rd
7	Lack of managerial direction and leadership in conveying the essence of KM	3.6944	0.7388	7th
8	Suppression and distortion of information as a result of organizational politics, in order to gain authority and control	3.75	0.75	6th
	TECHNOLOGICAL	3.9652		2nd
9	Deficiency of integrated IT systems, restricting workers in effective sharing	3.9027	0.7805	2nd
10	Usage of Technology as a substitute for human interaction	4.0277	0.8055	1st
	SOCIAL	3.7604		3rd
11	Pressures from competition decrease opportunities and time for exchange of information thus communication	4.1527	0.8305	2nd
12	Ineffective process of retaining knowledge leading to knowledge loss and loss of experience of valued and skilled employees	4.2777	0.8555	1st
13	Lack of opportunities for social networking	3.4305	0.6861	3rd
14	Ineffective sharing of knowledge as a result of layout of work areas and physical work environment	3.1805	0.6361	4th

Cronbach's Alpha (α) = 0.845

Table 5.3: Test of concordance of Organizational Infrastructure variables

No	72
Kendall's W	0.578
Chi-Square	68.156
Df	14
Asymp. Sig.	0.000

a. Kendall's Coefficient of Concordance

Source: Field Survey, 2018

6.0 Discussion

To better appreciate the influence of organizational infrastructure variables on organizational effectiveness, mean score ranking and Relative Importance Index were calculated as these measures are widely adopted in many scientific studies (Ho et al., 2014). Respondents were asked to rate the variables under each construct (8-managerial, 2-technological and 4-social) according to how often the variable had an influence on their organization's effectiveness. Table 5.2 gives the ranking of the 14 variables. The results reveal that the managerial construct factor has the highest influence on organizational effectiveness with a mean value of 3.9947 followed by technological and social constructs with mean values of 3.9652 and 3.7604 respectively.

Under the managerial construct factor, respondents ranked highest, the lack of intrinsic or extrinsic rewards in recognition of employee efforts in transferring knowledge as a de-motivating factor with a mean value of 4.3888. This finding comes as no surprise as several researchers have posited that organizational knowledge sharing increases proportionally with appropriate incentives (Gammelgaard, 2007; Wolfe and loraas, 2008). Although other studies refute the fact that monetary incentives should not be used to promote knowledge sharing because of corruption effects (Osterloh and Frey, 2000), standardized incentives in appreciation of employee sharing of valuable knowledge goes a long way to improving the effectiveness of an organization. Constraint on resources dedicated to learning and sharing, with a mean value of 4.3333 was ranked 2nd in influencing organizational performance. Most construction firms were lacking such resources as Comments Boxes, PC's and telephone lines for easy communication and, hence hindering their effectiveness.

Usage of Technology as a substitute for human interaction and Deficiency of integrated IT systems, restricting workers in effective knowledge sharing were the variables under the technological construct and ranked with mean values of 3.9027 and 4.0277 respectively. Respondents believed that as the world is geared towards an era of globalization, technology presents the main front through which organizations can retain knowledge, as experienced workers after retirement or on termination of contract leave the organization, taking their knowledge with them. Therefore, the technological aspect of any organization was deemed important in influencing the effectiveness of that firm. This is somewhat consistent with the findings of Vitari et al. (2007) and Pandey and Dutta (2013) who revealed that without the support of IT systems, knowledge-oriented capabilities in the form of networked computers, emails, software through which documents can be easily exchanged, faster decision making and the securing of jobs would suffer and organizations would remain stuck in their current state, witnessing no tangible improvement.

The social construct revealed that (a) ineffective processes for retaining knowledge, leading to knowledge losses including the loss of the knowledge held by experienced skilled employees (b) pressures from competitors would decrease opportunities and the time available for information exchange (c) lack of opportunities for social networking (d) ineffective sharing of knowledge as a result of the layout of work areas and the physical work environment, obtained mean values of 4.2777, 4.1527, 3.4305 and 3.1805 respectively as having an influence on organizational effectiveness. This agrees with the findings of Chong et al. (2000) that cultural factors such as mission statement, corporate vision, information services knowledge retention schemes and proper communication must be aligned effectively for a proper knowledge sharing culture to be facilitated. The respondents were of the view that if the knowledge held by experienced skilled employees leaves the organization, then this is not good practice and leads to organizational non-effectiveness. The Layout of work areas and the flow of physical work processes were also believed to influence organizational effectiveness in that it obstructed the free flow of information leading to common mistakes on construction sites. With this being said, managing the social aspect of any organization with regards to knowledge transfer or sharing will promote the effectiveness of that organization.

7.0 Limitation

This study, despite the fascinating outcomes, possesses a number of limitations. Being survey based, the study was limited in scope to the Ghanaian construction industry practitioners and the findings can be limited in generalization across other countries.

The study would have benefitted from the inclusion of a case study within a specific organization to add weight to the survey results. Correlation analysis between case study and survey results would have more clearly revealed the extent to which the variables concerned influence organizational effectiveness.

8.0 Key Findings and Implications

This empirical study contributes to the literature on organizational knowledge management and organizational performance. A major finding of this study is that organizations can benefit from their internal knowledge by understanding and incorporating managerial goals such as dedicating resources to knowledge sharing, motivating workers via intrinsic and extrinsic rewards, towards greater efforts in transferring knowledge. In addition, the integration of knowledge sharing initiatives with KM strategies, all towards the overall goals of organization performance enhancement should be a conscious endeavour.

From the results of Table 5.2, the study made clear that the managerial aspects of an organization's infrastructure have the highest impact on organizational effectiveness, hence much attention should be paid to these aspects by building construction firms as the benefits are far reaching. An enabling environment that encourages the sharing of knowledge through IT systems should be created in modern organizations to ensure free flow of knowledge and the use of standardized incentives to reward employees who share their knowledge.

Firms in industries such as manufacturing, finance and information technology, may stand to benefit as the findings deriving from this study are not prescriptive in nature.

Lastly, the research serves as a foundational reference point for researchers in conducting similar studies in a bid to identify the extent of the influence of these constructs in different contexts/scopes, helping to create a pool of information of value to both academics and industry alike towards improving organizational performance.

9.0 Conclusions

Organizational infrastructure, specifically the managerial, technological and social aspects of any knowledge-based firm, were found to influence the organizational effectiveness of such firms. A survey questionnaire was employed to empirically collect data from construction professionals in the building construction industry of Kumasi-Ghana. Fourteen (14) variables were derived from the literature as organizational infrastructure factors and their ranked order of importance obtained with the aid of mean score ranking and Relative Importance index data obtained via survey. Respondent levels of agreement and reliability of data were checked with the help of Kendall's W coefficient of concordance and Cronbach's Alpha coefficient respectively. In this study, the value of Kendall's *W* for the Organizational infrastructure was 0.578 while Chi squared, X^2, for the Organizational infrastructure factors was equal to 68.156, df = 14, thus having a probability of occurrence $p < 0.001$, indicating good agreement between respondents on the rankings of how organisational infrastructure influences organizational effectiveness in the Ghanaian Construction industry. Findings revealed that the managerial construct, including but not limited to the following, (a) constraint of resources dedicated to sharing and learning, (b) lack of intrinsic or extrinsic rewards as motivation in the recognition of employee efforts to transfer knowledge, (c) non-availability of standardized processes that characterize every KM activity and (d) non-integration of sharing initiatives and KM strategies into the organization's overall strategy and goals, had the highest influence on the construction organizations effectiveness in Ghana. This revelation thus places more emphasis on effective management as a strategy when firms plan for performance improvement.

In this era of globalization, technology also emerged as a key factor through which organizations can retain and reuse knowledge to their benefit as respondents believed technological variables were second only to the managerial construct. This implies that construction companies should focus on improving the management-oriented approaches towards employees, motivating them with incentives to share knowledge through the availability of IT systems and do better in the retention of corporate knowledge for the effectiveness of the organization to be evident.

Further scholarly work should investigate the relationship between KM processes and organization performance (financial (cost) and time performance) including for other types of firm such as construction consulting firms. The identification of such relationships could be critical to improving organization Knowledge management effectiveness more widely**.** Lastly, to further validate the findings, future studies should incorporate interviews after empirical evidence has been attained.

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