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Knowledge management as an antecedent of performance in construction firms

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ABSTRACT

Purpose of study: In an intensely competitive business environment, the ability to leverage the value of internal and external competencies has become critical to the success of organisations. This fact is especially pertinent in the case of knowledge management (KM), given the increasing mobility of employees. It is in recognition of this situation that this study sought to explore the role of KM as an antecedent of organisational performance in construction companies.

Design/Methodology/Approach: This empirical study utilised a quantitative research approach and examined a cohort of construction companies listed on the Johannesburg Stock Exchange (JSE) in South Africa. Though the JSE-listed companies were the study's units of analysis, employees were the units of observation. Consequently, self-administered questionnaires were used to collect data from 191 employees (across different managerial levels) that were selected using a purposive sampling method, and the collected data was quantitatively analysed.

Results/Findings: The study's findings revealed the inability of respondents to clearly distinguish between existing constructs such as knowledge dissemination, knowledge acquisition and responsiveness to knowledge, as demarcated in prior research. This fact highlighted the importance of context to the relevance of studies and exposed the effect of geographical and demographic idiosyncrasies to knowledge management research. The three constructs were consolidated, thereafter, into a unitary knowledge management construct which demonstrated a strong correlation with organisational performance.

Managerial implications: From a practical perspective, organisations stand to benefit by investing in knowledge management given the empirical evidence that it lends itself to organisational performance.

Keywords
Construction; Knowledge acquisition; Knowledge dissemination; Knowledge management; Performance; Responsiveness to knowledge.

JEL classification: M19

1. INTRODUCTION

The ability to integrate, build, and re-configure internal and external competencies as part of the response to rapidly changing business environments is an integral part of firm behaviour that, inevitably, has catalysed knowledge-based competition (Faccin *et al.,* 2019). Consequently, harnessing these competencies in organisations as part of the overall KM effort has been acknowledged in different spheres that are not limited to innovation (Lichtenthaler & Lichtenthaler, 2009) strategic management (Bolisani & Bratianu, 2017), inter-organisational relationships (Zheng *et al.,* 2011) and international business (Vahlne & Jonsson, 2017). This situation is the background against which investments in effective KM could possibly herald an organisation's ability to remain consistently competitive. Indeed, Eresia-Eke and Makore (2017) argue that it is imperative for organisations to invest in knowledge assets for the purpose of achieving a sustainable competitive advantage.

This contention is particularly instructive given that Massingham (2018) observes that organisations are currently grappling with the challenge of an increasingly mobile workforce. The consequence of this employee mobility could be an erosion of institutional knowledge in the workplace which, in turn, might encumber organisational performance. Levallet and Chan, (2019) observe that, unfortunately, expert employees, who are deeply knowledgeable about organisational strategies and goals, have a high propensity to leave their work units or firms in search of 'greener pastures'. Alarmingly, the situation of mobility of employees is briskly increasing and shows no signs of abating, especially because of the presence of lower average employee tenures in many organisations (Massingham, 2018). Commenting on the consequence of this situation, Stevens (2010) argues that a broad spectrum of organisations have been adversely affected by employee mobility as evidenced by the difficulty in finding replacements with comparable levels of organisational knowledge.

In cognisance of this reality, it would seem appealing for organisations to intensify efforts in the KM domain. This practice may indeed be extremely pertinent for construction companies in South Africa in which, according to Kruger and Johnson (2013), most employees work on a non-permanent employment contract basis. Despite this peculiar situation within South African construction companies, there is scarcely any empirical evidence related to the

nature of the relationship, if any, that may exist between KM and a firm's performance in this specific context.

This paucity in extant literature possibly exists because KM research in South Africa tends to pivot around measuring and valuing KM practices (Kruger & Snyman, 2005; Tobin & Volavsek, 2006; Bouncken & Kraus, 2013); the role and influence of corporate culture on KM (Davel & Snyman, 2005); KM in SA law firms (Du Plessis & Du Toit, 2005); organisational maturity in KM (Tobin & Snyman, 2004; Kruger & Snyman, 2005); strategic perspectives of KM (Snyman & Kruger, 2004); as well as KM and organisational structure (Tobin & Franze, 2005). The current study, therefore, seeks to contribute to the body of literature related to KM by exploring the association between KM and organisational performance. Notably, the fact that the construction sector contributes immensely to the South African economy (Creamer Media Engineering News and Mining Weekly, 2015) and employs workers with diverse knowledge and skills (Stats SA, 2014) for executing time-phased projects, makes the sector particularly suited for this study.

2. LITERATURE REVIEW

2.1 Knowledge Management

This study is underpinned by the resource-based view (RBV) which Faccin *et al.* (2019) recognise as one of the most influential theories employed in the management sciences. The position of the RBV is that the competitive advantage enjoyed by a firm is largely dependent on the set of resources that it employs (Bamel *et al.,* 2020). These resources that may be of a tangible or intangible nature, however, have to be valuable, rare, inimitable and non-substitutable to enhance enterprise competitiveness (Lin & Wu, 2014). As a corollary of the RBV, the knowledge-based view suggests that effective utilisation of knowledge resources would foster organisational success (Rehman & Iqbal, 2020). The reliance on the knowledge resource to boost competitiveness is appealing because, according to Demir *et al.,* (2021) being an intangible resource, competitors would find it difficult to emulate. This aspect is arguably the premise upon which Ting *et al.* (2021) declare that knowledge resources are critical factors of competitiveness within most service organisations.

The significance of knowledge as a major source of competitive advantage is well established in management studies (Faccin *et al.,* 2019). In practice, Heisig *et al.* (2016) posit that KM should play a vital role in business strategy, but according to Dayan *et al.* (2017), many organisations struggle to implement KM effectively. New knowledge, when

coupled to existing knowledge, can lead to organisational synergies and new competencies (Burmeister & Deller, 2016). At a conceptual level, Ing-Long Wu and Ya-Ping Hu (2018) characterise KM as a knowledge exploitation process (internal KM) and a knowledge exploration process (external KM). This fact notwithstanding, Darroch and McNaughton (2003) contends that KM primarily comprises the elements of knowledge acquisition, knowledge dissemination and responsiveness to knowledge.

2.1.1 Knowledge acquisition

Knowledge acquisition processes are focused on obtaining new knowledge. This practice is important because new knowledge is critical to firms (Bolisani & Bratianu, 2017), especially because organisations stand to benefit by integrating new knowledge with existing firm knowledge (Bloodgood, 2019). In KM discourse, various terms are used to describe the knowledge acquisition process, namely knowledge creation, generation, collaboration and seeking (Kruger & Johnson, 2013). While these terms may differ, the underlying meaning present in all of them is linked to the accumulation of knowledge. Darroch and McNaughton (2003) argues that knowledge acquisition simply relates to the location, creation and discovery of knowledge.

On this score, it may be useful to note that work related knowledge could be acquired from employees or from external relationships with customers, suppliers and other organisations. In agreement with this position, Bolisani and Bratianu (2017) contend that knowledge acquisition is not only an internal process within the firm but also emanates from formalised mechanisms for collaboration with partners outside the firm. Perhaps to entrench KM in organisational schemes, Bloodgood (2019) asserts that in many contemporary firms, research and development units have become important strategic allies of KM units.

Notably, the importance of knowledge acquisition to organisations cannot be discounted because the study of Lyles and Salk (2007), conducted in the specific context of international joint ventures in Hungary, provided empirical evidence of an existing relationship between the knowledge acquisition component of KM and organisational performance. However, Al-Dmour *et al.* (2020) argue that the extent to which knowledge acquisition capabilities affect organisational performance, remains unclear. This observation would appear to also pertain to the exact nature of the relationship between the holistic construct of KM and OP among JSE-listed construction companies in South Africa, thus, making the current study necessary.

2.1.2 Knowledge dissemination

Knowledge dissemination is the distribution of embodied knowledge throughout a firm or a value chain (Mitchell *et al.,* 2009). It is the transfer of knowledge within and across settings, with the expectation that the knowledge will be used conceptually (as learning, enlightenment or acquisition of new perspectives or attitudes) or instrumentally, in the form of modified or new practices (Ortiz *et al.* 2018). Knowledge sharing channels are structured by private, group and public knowledge exchanges among participants (Sedighi *et al.,* 2018). This practice implies that knowledge sharing channels enable participants to select knowledge recipients with whom they wish to communicate in terms of the level of knowledge contribution visibility on the network.

Combining the knowledge of individuals from different areas who have diverse skills and experiences that have been shaped by different organisational cultures and structures can be a very intricate and difficult process (Ortiz *et al.* 2018). Overcoming the challenge that this coalescing embodies, may require organisations to create an enabling environment that encourages knowledge sharing. In the main, the ultimate aim of acquiring and sharing knowledge is to transform individual's 'know-how' and experiences into organisational competencies (Mwila, 2013) so that the organisation, consequently, can exploit the acquired knowledge for desired benefits, as and when it deems fit. Nascimento *et al.* (2021) assert that the dissemination of knowledge increases employees' access to useful information and this would invariably catalyse performance. This assertion signals that knowledge dissemination would engender better performance within the organisation and so provides impetus for this study to explore the possible role of the consolidated KM construct on the performance of JSE-listed firms in South Africa's construction industry.

2.1.3 Responsiveness to knowledge

Responsiveness to knowledge is a critical component of KM that organisations find challenging (Levallet & Chan, 2019). Employee departures, outsourcing, resistance to learning, information technology (IT) breakdowns and unexpected events, all lend themselves to knowledge loss (Daghfous *et al.,* 2013) and construction firms in South Africa are not immune from these occurrences. The actions taken in response to the knowledge gathered and filtered, characterises knowledge responsiveness (Alavi & Leidner, 2001). Roth (2003) posits that the main activity of the field of KM is the integration and development of an organisation's knowledge resources in order to meet the organisational goals.

The frequently named mechanisms for facilitating knowledge integration are routines, sequencing, rules and directives, group problem-solving and decision making (Apolloni *et al.*, 2014). An organisational routine can be regarded as an executable capability for repeated performance with a particular context that has been learned by an organisation in response to selective pressure (Bloodgood, 2019). Organisational routines involve human actors and artefacts that are part of stored organisational knowledge (Hodgson, 2008) that can enable or constrain organisational actions (Burns & Scapens, 2008). Routines can be designed and operated deliberately or emergently (Cohendet & Llerena, 2000; Miner *et al*., 2008), and they habitually develop when they are frequently exercised by the organisation as part of the firm's behavioural practices that are perceived to be important (Burmeister & Deller, 2016).

These behaviours are subsequently repeated and, if frequently engaged, become routine and automatic over time (Nigam *et al.* 2016). The repetition of behavioural practices within an organisation arguably stems from positive reinforcement that is driven by a conviction that such behaviours bode well for the organisation. Since these actions are essentially expressions of responsiveness to knowledge, it may imply that this component of KM engenders improved organisational performance. Corroborating this premise, Nascimento *et al.* (2021) argue that good practices in responsiveness to knowledge domain engender positive performance and a sustainable competitive advantage. This fact, notwithstanding, the idiosyncrasies of different research contexts, make it necessary to empirically investigate the exact state of the possible association of the holistic KM construct and organisational performance in JSE-listed South African construction companies, in a bid to expand and enrich KM literature.

2.2 Organisational performance in the construction sector in South Africa

The knowledge-based theory (KBT) suggests that the ability to deploy resources successfully depends on the knowledge residing in the human capital of a firm and the development of interrelated knowledge across organisational structures, with organisational routines and processes as instruments of knowledge integration (Theriou *et al.*, 2011). Proponents of the KBT (Alavi & Leidner, 2001; Kok, 2007) argue that because knowledge-based competencies and capabilities are usually socially complex and, thus, difficult to imitate, they are among the major determinants of sustainable competitive advantage and superior organisational performance.

In a review of the construction industry in South Africa, Creamer Media Engineering News and Mining Weekly (2015) observed that it is widely perceived to be an industry with low

productivity and poor performance, despite its importance in the national economy. It seems rational to contend that since construction businesses tend to be 'project-driven', KM processes need to be institutionalised to collect, disseminate and use project-generated knowledge, for the benefit of the entire organisation (Tobin & Magenuka, 2007), instead of allowing such knowledge only to reside with certain expert employees. The need for this integrative practice is amplified by the observation of the Construction Industry Development Board (CIDB) (2004) that most South African construction projects are not well-organised and are mired in excess details which make it difficult to compile and disseminate useful knowledge to other projects.

The turbulent nature of the business environment, market dynamics and trends towards specialised and customer-oriented services in the construction industry demands the application of knowledge especially within project-focused organisations (Tobin & Magenuka, 2007; Dabić *et al.* 2021). Duly cognizant of this situation, there is no gainsaying that KM is becoming an essential function for organisations keen on manoeuvring the business landscape with intelligence and creativity (Metaxiotis *et al.,* 2005) in order to advance their performance. Curiously, the extent to which such abilities could be beneficial in the specific case of the construction industry in a developing economy such as South Africa remains indeterminate.

Nevertheless, Kruger (2009) states that generally, organisations that can manage their knowledge are capable of co-ordinating and combining their resources and capabilities in innovative and distinctive ways so as to provide more value for their customers. Furthermore, Ashok *et al.* (2021) tacitly declare that the implementation of KM practices enhances service delivery in the public sector. On a similar note, Bamel *et al.* (2020), studies have demonstrated the importance of firm-specific knowledge for the realisation of an organisation's strategy. Contributing to this discourse, Demir *et al.* (2021) contend that good KM practices can specifically increase market share. Against the background of these observations, this study anticipates that JSE-listed construction companies in South Africa that are adept in KM may experience improved organisational performance and so it is hypothesised that:

> *There is a relationship between KM and organisational performance in JSE-listed construction firms in South Africa.*

3. METHODOLOGY

The overall aim of the study was to investigate the possible existence of a relationship between KM and organisational performance. The positivist assumptions that reality is external, positive, simple and produces measurable properties that are independent of the observer (Ponterotto, 2005) were embraced in this study. The survey strategy is usually related to a deductive approach and is used mostly to answer such questions as 'who', 'what', 'where', 'when', 'how many' and 'how much' (Saunders *et al.*, 2012) and that is why this method was the preferred strategy for this study.

The study population comprised construction companies that were listed on the JSE. Since there were ten companies listed, it was decided that all the companies should be included in the study. The human resource departments in the various companies were contacted and they all agreed to participate in the study. It is important to note that while the units of analysis were the surveyed organisations, the units of observation were the employees in these organisations.

A purposive sampling method was utilised to identify and select knowledge workers such as civil, mechanical and electrical engineers, architects, surveyors, designers, project managers and technicians employed by the participating companies. This selection was achieved with the assistance of the researchers' contacts at management levels in the various companies who helped to identify potential study respondents. Additionally, snowball sampling was used because there were cases in which a respondent identified other potential employees who would be suitable study participants. Regardless of the method used to identify respondents, the major consideration was that selected respondents had to be sufficiently well-versed with KM issues. This fact indicates that, in effect, the key-informant technique was also utilised in the study.

In keeping with standard ethical requirements, respondents were not coerced or incentivised to participate in the study. All respondents were assured of their anonymity and informed that they were at liberty to withdraw from participating in the study whenever they wished to do so. The questionnaire for data collection included the KM measurement scale credited to Darroch (2005) that had been previously used and validated in earlier KM studies. The scale for the measurement of the independent variable of KM contained 14, 15 and 13 items for the KM components of knowledge acquisition, knowledge dissemination and responsiveness to knowledge, respectively. Each scale item comprised a statement and a 5-point Likert

scale answer option in the 'strongly agree' to 'strongly disagree' range. The questionnaire also included seven items that were utilised for measuring the dependent variable of organisational performance.

A total of 500 questionnaires were distributed across the ten participating construction companies and 191 valid responses were received which amounts to an effective response rate of 38 percent. Subsequently, the data extracted from the questionnaires was coded in preparation for statistical analysis. To examine the data, factor analysis, t-tests and ANOVA were utilised.

4. PRESENTATION OF FINDINGS

Factor analysis was used to investigate inter-correlations between KM measured with its components and organisational performance. The principal component analysis method was employed to determine the number of factors that explain the correlations among the variables. The scales for the measurement of KM were tested for reliability and validity and the results are presented in Table 1.

Table 1: Results of reliability analysis

	No. of items	Raw alpha value	Item deleted	Standardised alpha value
Knowledge acquisition	14	0.907822	V25	0.898226
Knowledge dissemination	15	0.925810	V37	0.917680
Responsiveness to knowledge	13	0.915519	V54	0.905934
Organisational performance	7	0.950784	-	0.951231

Source: Authors' own compilation (2021)

Generally, Cronbach's alpha coefficients greater than 0.7 are regarded as indicating internal consistency of the items in the scale (Wong & Aspinwall, 2005; Saunders *et al.*, 2012). The Cronbach alpha values obtained for the four scales in the instrument exceeded the standard 0.7 threshold. The resultant range of standardised alpha values provides evidence that all the scale items have a high internal consistency and, therefore, are, reliable.

For purposes of anonymity the ten companies that participated were assigned nominal labels of A to J. Table 2 presents the aggregate scores of each of the companies with

respect to the three components of KM and the dependent variable of organisational performance.

Table 2: Aggregate mean-scores of companies for study variables

Company	Knowledge Acquisition	Knowledge Dissemination	Responsiveness to Knowledge	Organisational Performance
A	36.0	34.0	31.2	16.6
B	33.6	33.3	29.5	11.1
C	34.2	32.1	25.6	13.5
D	41.5	39.7	35.7	23.1
E	43.7	41.3	34.7	19.7
F	54.6	49.1	43.8	27.6
G	52.1	50.9	45.2	29.9
H	54.5	54.6	49.3	29.7
I	56.6	55.8	51.7	30.5
J	58.6	61.6	55.5	31.4

Source: Authors' own compilation (2021)

Likert-type options with ratings of 1 to 5 were used for the variables of knowledge acquisition, knowledge dissemination and responsiveness to knowledge scales. Respectively, the ratings of 1 to 5 represented the options 'strongly agree', 'agree', 'neutral', 'disagree' and 'strongly disagree'.

Given that the knowledge acquisition scale contained 14 items, the score range lies between 14 and 70. If this range is divided into three equal parts for purposes of categorisation, scores in the ranges of 14-32, 33-51 and 52-70 would equate respectively to 'low', 'medium' and 'high' accomplishments in terms of knowledge acquisition by the surveyed companies. As shown in Table 2 a while the companies J (58.6), I (56.6), F (54.6), H (54.5) and G (52.1) are in the 'high accomplishments' category, E (43.7) and D (41.5) are in the 'medium accomplishments' category while the other companies (A, B and C) are in the 'low accomplishments' category. The knowledge dissemination scale had 15 items and so the score range is 15 to 75. Associated accomplishment categorisations would mean that the

score ranges of 15-35, 36-55 and 56-70 represent respectively 'low', 'medium' and 'high' knowledge dissemination accomplishments. Against this background, the results delineated in Table 2 make it evident that companies I and J are in the high knowledge dissemination accomplishment category while companies A, B and C are considered to be in the low accomplishment category.

The responsiveness to knowledge scale had 13 items. This figure means that the possible score range is from 13 to 65. Scores of 13-30, 31-48 and 49-65 would imply low, medium and high accomplishments respectively in terms of responsiveness to knowledge by the surveyed companies. In this regard, companies H, I and J fall within the high accomplishments category while B and C are in the low accomplishments category. The organisational performance scale had seven items and so possible aggregate mean-scores obtained by companies would be in the 7-35 range with scores of 7-16, 17-25 and 25-35 representing low, medium and high organisational performance respectively.

The collected data was amenable to parametric analyses such as t-tests. Parametric statistical methods are considered powerful with higher level numerical data (Saunders *et al.*, 2012). The t-test was administered to determine the likelihood of a pattern, such as the differences between the variables occurring by chance alone. The t-Tests (Least Significance Difference-LDS) for organisational performance (OP) produced 1.98027 as the critical value for the t-statistic tested at the 0.05 percent level of significance. This result means that any t-statistic greater than 1.98027 indicates that the organisational performance (OP) scores for that set of companies are significantly different. In essence, there is little probability of the differences between each of the groupings in the model occurring by chance.

Table 3 shows the t–grouping of the ten construction companies that were surveyed. The summary of the company "mean statistic" indicates which pairs are significantly different and which are not. The mean statistic for each company is given and mean values with the same letter are not significantly different. Therefore, companies with the same label (G1, G2, G3, G4, G5) belong to the same group in terms of their organisational performance. Table 3, therefore, shows that companies J, H, G and I are not significantly different from one another since they all belong to group G1. However, companies J, H and G (in group G1) are significantly different from Company F (in group G2). It is of interest to note, however, that according to the results of the statistical analysis, Company I (in group G1) is not significantly different from Company F (in group G2).

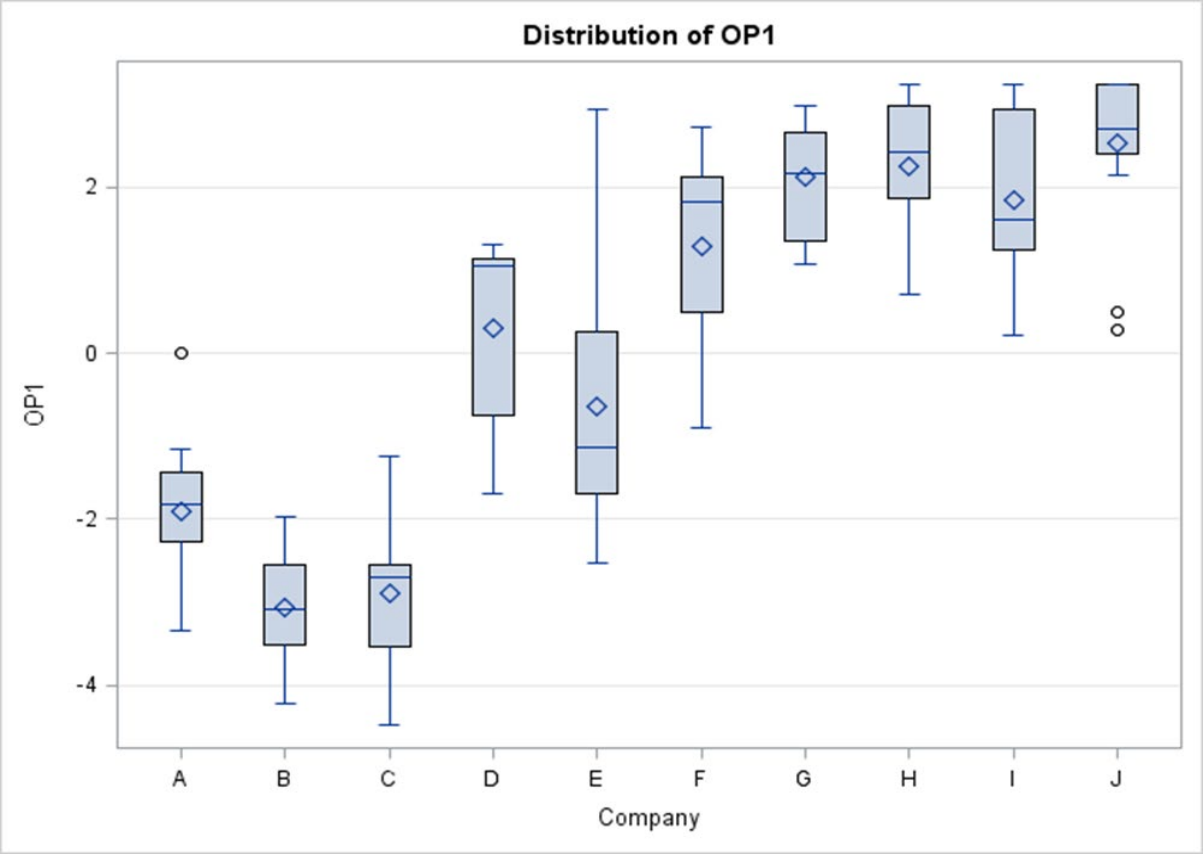
Table 3: t-groupings of companies

Groups	Mean	N	Company
G1	2.5202	16	J
G1	2.2395	9	H
G1	2.1121	13	G
G1 / G2	1.8438	14	I
G2	1.2783	13	F
G3	0.3106	8	D
G4	-0.6515	11	E
G5	-1.8948	14	A
G6	-2.888	12	C
G6	-3.0539	20	B

Source: Authors' own compilation (2021)

The above groupings can also be observed from Figure 1: Box and Whisker plot, delineated below. The same groupings in the Box and Whisker plot tend to replicate themselves in the statistical t–grouping, confirming that the KM performance groups that correlate to organisational performance are statistically correct.

Figure 1: Box and Whisker plot



Source: Authors' own compilation (2021)

An ANOVA identifies and explains two types of variances: *systematic* (variance in data which is attributable to a known factor that increases/decreases all scores that it influences) and *error* (variance in data attributable to an unknown factor that has not been examined/controlled in the study. Table 4 presents the results of the analysis of variance.

Table 4: Results of ANOVA – Organisational performance

Source	df	Sum of Squares (SS)	Mean Square	F value	Pr > F
Model *(SS effect)*	11	636.5246783	57.8658798	70.9	< .0001
Error	118	96.3102458	0.8161885		
Corrected Total	129	732.8349240			

Source: Authors' own compilation (2021)

The 'within-group' variability of organisational performance (OP) or e*rror* variance in this instance represents the fact that OP cannot be readily explained or accounted for it in the

current design. However, the SS effect (model) can be explained in that the variability of organisational performance is due to the differences in the 'means between the groups. Expressed differently, group membership explains this variability because it is known to be due to the differences in means.

The results presented in Table 4 show that the findings are statistically significant at the 0.0001 level, so much so that the risk of observing a relationship when there is no relationship in the variables is less than 0.001 out of 100. This fact implies that the results are very unlikely to have occurred by chance. Statistical significance testing in this instance is based on a comparison of the variance due to the between-groups variability (called mean square effect) with the within-group variability (called mean square error), a practice which also explains why many statistical tests are represented by ratios of explained and unexplained variability, as is the case with the ANOVA test.

A comparison of those two estimates of variance can be achieved using the *F*-test (F-value), which interrogates whether the ratio of the two variance estimates is significantly greater than 1. In this instance, the test is highly significant, and it can be concluded that the means for the groups are significantly different from each other. The F-value in Table 4 represents the ratio of variance. An F-statistic of 70.9 represents a low likelihood of any difference between the groups occurring by chance alone, and this fact is statistically significant.

Table 5: Assessing the strength of relationship

R-Square	Coeff Var	Root MSE	OP Mean
0.868579	3431.562	0.903432	0.026327

Source: Authors' own compilation (2021)

The results presented in Table 5 show that there is a strong relationship between KM and organisational performance. As shown in Table 5, the coefficient of multiple determination (R-squared) indicates that 87 percent of the variation in organisational performance is explained by KM. This finding confirms that there is statistical support for the hypothesis that projected that there is a relationship between KM and organisational performance in the JSE-listed construction firms in South Africa. It also resonates with the results presented in both the study by Ashok *et al.* (2021) that examined public sector organisations and the research of Rehman and Iqbal (2020) which was conducted in the context of higher education.

5. CONCLUSION

The results of this study show that KM has a strong and statistically significant relationship with organisational performance. The cross-tabulation of the aggregate scores of each of the construction companies with respect to the three components of KM performance and organisational performance (see Table 2) showed that companies H, I and J that had high scores in KM also had high scores in their organisational performance. The same trend was observed for companies A, B and C that performed poorly on KM and concurrently performed poorly in terms of organisational performance. Credence for the established association between KM and organisational performance in JSE-listed construction companies in South Africa also arises from the returned regression coefficient (R-squared) of 0.87 that indicates that a substantial amount of the variation in the organisational performance amongst the studied organisations is attributable to the effect of KM.

6. MANAGERIAL IMPLICATIONS

The finding of an association between KM and organisational performance provides impetus for increased investment in the improvement of the KM processes of the surveyed organisations. This result also implies that KM is not an incident or a technology system but a long term and continuous initiative that involves classifying and categorising knowledge as a core competency within the organisation.

As a means of ensuring improved performance, it initially may be of benefit for the managers in the JSE listed construction sector companies to select a small number of KM measures and initiatives that are within the reach of the organisation's business processes, cultural readiness and funding constraints.

KM in the construction organisations should not only seek to manage internal efficiencies of the companies but should also extend to managing knowledge about their industry, the skills and expertise of employees and knowledge about their customers and other third parties.

7. LIMITATIONS AND FUTURE RESEARCH

Based upon the findings and analysis acquired through empirical research and presented in this study, it is recommended that future researchers should carry out investigations into the influence of geography, and the peculiarities thereof, that might have an influence on the outcome of the study. It is also recommended that further studies be committed to more in-depth investigations of the KM elements that affect performance.

Other aspects of KM that would require further work are its measurability and the lead times that are required before the effects of the institutionalised KM can be realised.

It would also be quite informative, probably through the conducting of a separate study, if the terms of employee engagement would be explored including the effects of the affirmative action and demographic transformation efforts prevailing in South Africa on the management of knowledge. That particular area of study is outside the scope of this research study, but it is envisaged that, for example, if the employees are engaged on a contract basis based on the availability of projects, this fact could have an adverse effect on the employees' opinions about the organisation and its performance among other things.

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