



# The Implementation of Knowledge Management in Conservation Construction Firms: An Empirical Study on Organisational Readiness

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**Abstract:** The difficulty and complexity of implementing conservation projects on Malaysian heritage buildings have led to construction firms to be more innovative in integrating the implementation process with other concepts from various different disciplines and fields. In this study, the need to implement knowledge management among the conservation construction firms is seen to be a significant aspect, particularly to enable these firms to optimize the available knowledge among the workers in order to remain competitive. However, studies related to the level of exposure as well as discussions of knowledge management implementation in conservation construction firms in Malaysia are extremely limited. The purpose of this study is to determine the level of readiness among conservation construction firms towards the implementation of knowledge management in their organisations as well as to evaluate the relationship between organisational readiness with the readiness components. The data needed for this study was collected through a survey, where a specific questionnaire was designed and distributed to selected employees working in conservation construction firms. The main finding of this study shows that the level of readiness among most of these conservation construction firms is relatively good where it has been proven that these firms are capable of realizing the implementation of knowledge management in their respective organizations. The study findings also reveal that there is a strong relationship between organisational readiness with all readiness components that had been tested within this study.

**Keywords:** Knowledge management, organisational readiness, conservation projects, conservation contractor

## 1. Introduction

The need to implement or apply knowledge management within construction projects in general as well as within construction companies has been significantly increasing over the years. "Within the construction industry, where competition triggers relatively small profit margins and projects are becoming increasingly complex, exploiting the most valuable asset of the firm; the knowledge of its employees, poses a desirable gain in performance" (Ericsson and Reiser, 2011). This statement directly explains that the knowledge available among the employees in the construction firms

should be managed and utilized as much as possible in order to assist the firm in generating better performance despite various uncertainties and risks. Besides, lessons learned from the construction industry have proven that reusing and sharing knowledge can enhance construction projects by decreasing cost and time of completion, as well as improving the competitiveness of the entire organisation (Ahmad, 2010). Furthermore, in the undertaking of conservation projects on heritage buildings, the importance of applying knowledge management is also evident, as the related construction firms are constantly faced with various difficulties and complexities in ensuring the project is successfully completed within the given timeframe. There have been many studies conducted across the world that show how the concept of knowledge management could be applied by construction firms especially when these firms are handling conservation projects on heritage buildings. For instance, a study by (Taghizadeha et al., 2014) established knowledge management implementation model aimed for organizations implementing conservation projects for historic buildings in Iran. Another study by (Simeone et al., 2014) investigated the potential impact of introducing Building Information Modelling within the heritage field in order to enhance knowledge management. More recently, a study by (Gulotta & Toniolo, 2019) described the experiences garnered from the context of a Renaissance façade preservation project in showcasing an example of sustainable approaches to conservation practices in heritage-based construction.

In Malaysia, the implementation of conservation projects on heritage buildings has been undertaken in a similar manner as other developing countries where the main aim is to ensure heritage buildings are able to be physically preserved as well as maintaining their historical and aesthetic values. This is seen as a key factor in generating the interest and attraction of tourists towards building a successful heritage-based tourism sector. The implementation of conservation works on heritage buildings in Malaysia are governed and regulated by rules and procedures established by the government as a means to avoid works being conducted in an arbitrary manner. According to (Harun, 2011), the establishment of the National Heritage Department of Malaysia in 2006 is testament to the government's efforts in appreciating the continued existence of heritage buildings in Malaysia. The main responsibility of this department is to ensure that every requirement as prescribed in the National Heritage Act 2005 is adhered to by all respective parties including conservation construction firms. A review of previous studies related to the implementation of knowledge management in conservation projects of heritage buildings in Malaysia has demonstrated that the number and scope of relevant discourse on this subject matter to be rather limited. As a means to address this issue, this study was conducted with the aim to determine the level of readiness among the conservation construction firms in Malaysia that apply knowledge management in their respective organisations and to evaluate each readiness components against organisational readiness. This main objective is based on the notion that a knowledge management readiness assessment is essential before implementing a knowledge management initiative within an organisation (Nenungwi, 2018). Knowledge management readiness assessment is also able to indicate the current status of knowledge management within organisations as well as to allow for the necessary changes in improving organisational capabilities (Dastranj et al., 2011). In addition to these reasons, a detailed study on the level of readiness in an organisation will also allow related parties to identify the required foundation necessary towards establishing critical success factors for knowledge management. These factors can then be subsequently utilized in devising knowledge management frameworks and maturity models within the respective organisations.

## **2. Heritage Building Conservation Projects and Knowledge Management**

The implementation of a conservation project generally refers to the execution of complex tasks with multiple dimensions of expertise and complex problems that often require a mutual collaboration across the stakeholders. The term 'conservation' can be defined from various context, perspectives, dimensions as well as requirements. Leader- (Williams et al., 2011) define conservation as 'actions that directly enhance the chances of habitats and species persisting in the wild'. This definition emphasizes the need to maintain and preserve natural habitats and species in balancing the ecosystem. Within the tourism sector, especially when dealing with heritage sites, conservation has been defined as a set of actions that has been taken to protect the related tourism destination from mass tourism activities. In supporting conservation, new concepts of tourism have been introduced, for example, ecotourism is a form of tourism which supports biodiversity conservation, socio-cultural development and economic enhancement of a country (Anup, 2018). Furthermore, in the heritage building construction field, conservation projects have been referred as the approach to protect built heritage in retaining its physical authenticity that represents a society's history and roots (Mohd-Isa et al., 2011) and according to (Feilden & Jokilhetto, 1993), built heritage is universally recognised with a wealth of aesthetical, archaeological, architectural, cultural, historic, social, political and even spiritual or symbolic values. (Harun, 2011) succinctly describes conservation as a technical activity involving historical buildings and requires physical action to preserve the fabric and material of heritage buildings. Although there may seem to be a variety of explanations regarding the term 'conservation', all of these different definitions are always sensitive and particular about addressing the need to maintain the sustainability of each element involved in conservation projects, whether it involves flora, artifacts, tourism sites or historic buildings.

Although Malaysia has lots of heritage buildings all over the country, the understanding on conservation practices is vague or unclear (Harun, 2011). This statement is supported by (Mohd Isa et al., 2011) who insist that heritage building conservation in Malaysia is fairly new. Various efforts have been made by the government at the federal, state and local

levels to ensure that the implementation of conservation project takes place in accordance with established procedures in the hopes of achieving the intended results. The enactment of the National Heritage Act in 2005 was a key turning point in the Malaysian government's commitment to safeguard and preserve national heritage assets including historic buildings. Subsequently in July 2012, the government through the National Heritage Department released a guideline aimed at directing and controlling the implementation of conservation projects. This Heritage Building Conservation guideline specifically provided a standard guide for the implementation of conservation work in Malaysian heritage buildings. The guideline was established in accordance with the National Heritage Act 2005 (Act 645) and the international conservation guidelines of the United Nations Education, Scientific and Cultural Organization (UNESCO) as well as the charters under the International Council on Monuments and Sites (ICOMOS) such as the Charter of Burra, Australia 1999 (Charter for the Conservation of Places of Cultural Significance) and other related charters (Department of National Heritage, 2012).

The implementation of conservation projects needs to be undertaken in a systematic, structured and proven manner to ensure heritage buildings can be inherited from one generation to the next. In any country, the ownership of historic buildings is considered critical since the buildings have heritage value. These instances of built heritage offer a different perspective from other non-physical historical elements, as these buildings can be seen and touched by the senses, making their presence to be appreciated in a more meaningful way. Several scholars believe that heritage buildings can serve as evidence of a significant era or historical event, for instance, during colonization by the Portuguese, Dutch and British, many buildings and monuments were constructed around major cities in Malaysia. These buildings were erected to fulfil various development purposes such as residential, administration, defence, logistics and commercial uses. The implementation of conservation projects on heritage buildings is also seen as being important in preserving the identity, uniqueness and characteristics of architecture. Heritage buildings that were built during the Malay Sultanate era and the colonial periods display their own architectural uniqueness. The differences in styles and architecture basically delineate the growth, progression and creativity of the nation over time. These heritage buildings have a variety of architectural influences and styles that dominated the era and subsequently influenced the development of civilization and technology. From an economic point of view, the implementation of conservation projects on heritage buildings is seen to be able to physically preserve the buildings to continue to serve as tourist attractions. Physical historical heritage such as heritage buildings and monuments is one of the most popular tourism products in any country. Conservation projects on heritage buildings are also seen as crucial in the agenda of educating the nation's younger generations towards appreciating the country's heritage and treasures. The new generation will be more appreciative and aware about the nation's history as they themselves can witness the historical elements portrayed by these heritage buildings.

The importance of implementing conservation projects is therefore significant and should not be disputed by any party. A more relevant question that needs to be further explored however, is in understanding the relationship between conservation projects and knowledge management and how this relationship necessitates the need for knowledge management to be integrated within conservation construction firms. Before attempting to understand this relationship, the purpose of knowledge management must be first clarified. The notion and concept of knowledge management has been propagated for a considerable time now. According to (Ul-Akram, 2019), managing knowledge has become a critical aspect of the contemporary business landscape and as business no longer see profit as the sole purpose of their existence, there has been growing impetus for socially and environmentally conscious business actions. A review of recent literature has shown that knowledge management plays a key role in the global economy and is crucial for improving the competitiveness of large-scale companies, as well as small and medium-sized enterprises (Tsekhovoy et al. 2019). The term 'knowledge management' is usually used to explain the process of acquiring, organizing, managing, sharing, and utilizing knowledge or information towards the achievement of organisational objectives. Knowledge management also refers to the practice of selectively applying knowledge from past decision-making experiences to current and future decision-making activities (Jennex & Olfman, 2006). Therefore, via the application of knowledge management in a project, the respective workers within the organisation will learn how collected information is converted into knowledge and how it will then benefit the organisation in the future. Knowledge management processes will always allow people to access and apply the appropriate knowledge when it is needed to solve any arising problem. The application of knowledge management will also support a continuous learning process in an organisation. It also assists the organisation to make the best use of knowledge and information in ensuring the organisation operates more effectively and efficiently, as well as strengthening decision making, and enhancing the organisation's competitive advantage.

The implementation of knowledge management in the construction sector has been previously discussed in several studies where the main focus was on dimensions such as the development of an application model, the examination of conceptual frameworks, organisational capabilities, implementation issues, technology enhancement, productivity or performance achievement, among others. Since the construction industry is one of the more significant and larger industries in the world, it employs different applications and practices within a very diverse range of projects (Korkmaz & Bahidrah, 2018). The differences in applications and practices have directly stimulated the need for having a comprehensive and systematic knowledge management concept which will enable all information to be collected, coordinated, controlled and properly stored. This will facilitate the related information to be easily accessed when needed by the organisation towards the achievement of targeted goals. The execution of knowledge management in the context of the Malaysian construction sector is relatively new (Nizam et al., 2019). Knowledge management is seen as being

significant to be practiced by construction firms involved in built heritage conservation projects as the execution of these projects requires adapting knowledge for better performance and competitiveness. It is also significant due to the need to adapt to the ever-changing construction sector, where industry players need to continuously be sensitive to market trends, policy revisions, environmental needs, customer behaviour and sufficient information. Therefore, construction firms need knowledge management to allow them to use knowledge and information in an optimal, wise and practical manner. The implementation of conservation projects of heritage buildings involves a complex process, dealing with an extremely heterogeneous range of elements and different components with a large variety of conservation conditions as well requirements. These projects therefore require a thorough knowledge of the specific characteristics of the site, a reliable evaluation of the chosen conservation treatment's efficacy and durability, and efficient control of procedures and timing related to the site during conservation activities (Gulotta and Toniolo, 2019).

According to (Simone et al., 2014), implementing a conservation process on a historic or heritage building is a system of multidisciplinary activities where each professional will need and produce large quantities of information and data. Accuracy of information is required to enable each professional to perform his or her role in line with the requirements of carrying out the key tasks involved in the conservation project. The accuracy and adequacy of information will create new knowledge for professionals in making the best decisions while minimizing the risks. Lack of knowledge or inconsistent information can lead to errors and even irreparable damages. In conservation projects, management of information is crucial to support collaboration and knowledge sharing at all the different levels of the conservation process (Simone et al., 2014). (Taghizadeha et al., 2014) pointed out that the implementation of a conservation project should be emphasized by different models of implementation because each heritage building has different characteristics, different problems, limited resources, different locations and requires different methods or technologies. In conservation projects, it is critical to transfer data and information from projects completed in the past although there is still seemingly a lack of systematic approaches in place to enable organizational learning from previous projects. Therefore, adapting a systematic approach to knowledge management will enable the conservation professionals to have improved chances in arriving at decisions based on time, cost and quality related to a particular project. This improved decision-making process will also be dependent on evaluating and optimizing related knowledge from past projects. This goes to show that due to the existence of unique and novel differences within conservation projects, construction firms have relied on the application of knowledge management in their organisations as one of the more significant approaches to successfully undertake and complete these projects.

### 3. Readiness for Implementing Knowledge Management

The limited number of empirical-based works on organisational readiness for knowledge management clearly exhibits a deficit of related literature in the area of knowledge management (Mohamed Razi & Abdul Karim, 2010). This is even more evident within the context of the construction industry or the implementation of conservation projects in particular. However, recent research developments in knowledge management have produced various studies and discussions related to organizational readiness in implementing knowledge management from a host of different sectors and organisational typologies. An example of this would be a study by (Jandaghi et al., 2014) aimed at identifying the level of readiness for implementing knowledge management in management schools in Qom Province of Iran. This study divided the assessment of readiness levels into 5 distinct themes, namely organisational culture, organisational structure, information technology infrastructure, management initiatives, and human resource. The themes were defined by referring to the existence of key components that can provide strong support towards the implementation of knowledge management in an organisation. Using the initiative to implement knowledge management in government agencies as the underlying context, (Nenungwi, 2018) evaluated the level of readiness of knowledge management implementation through several enablers compiled from literature. The enablers comprise of leadership which relates to vision, mission and values regarding knowledge management; processes which relates to capturing knowledge; explicit knowledge which relates to storing of knowledge; tacit knowledge which relates to codification of tacit knowledge; culture or structure which relates to encouragement towards knowledge management; knowledge centres which relate to facilitations for knowledge management; infrastructure related to technical support for knowledge management; organisational strategy which relates to approaches or efforts by the organisation in supporting knowledge management; and finally, human resources which relate to staff capability.

A study by (Hendarman & Anindita, 2018) on a game developer organization, assessed knowledge management readiness based on the Asian Productivity Organization Framework (APO) which relates to knowledge management leadership, process, people, technology, knowledge process, learning and innovation, and knowledge management outcomes. The results of this study show that the level of readiness in the application of knowledge management in the leadership aspect is very high but the level of readiness that is closely related to the knowledge aspect of the process is very low. The required data was collected through interviews and distribution of questionnaires. In this study, the level of readiness for implementing knowledge management was divided into 5 categories, namely reaction (not aware of what knowledge management is or of its importance), initiation (beginning to recognize the need for knowledge management), expansion (knowledge management practice in some areas), refinement (continually evaluating knowledge management), and the last level is maturity (knowledge management is fully mainstreamed within the organization). An

earlier similar study using APO to determine level of readiness was conducted by Behruz & Shima (2016) where their results found that knowledge management readiness level is at the lowest, demonstrating that the companies involved in their study were not aware of what knowledge management is, and neither do they realize the importance of knowledge management in improving productivity and competitiveness.

In the higher education field, (Kumaravel & Vikkraman, 2018) analysed knowledge management readiness in higher educational institutions in India. In order to achieve their research objective, a study instrument to assess knowledge management readiness was developed based on literature and used to collect data from selected higher educational institutions. The structural equation modelling was then subsequently used to analyse the data. The attributes of the Knowledge Management Assessment instrument were categorised under the six factors of creating knowledge, capturing knowledge, organising knowledge, storing knowledge, disseminating knowledge, and applying knowledge. Another study on the level of readiness, concentrating more on specific components with a focused research direction was conducted by (Putri & Susanti, 2018). This study analysed the degree of readiness by referring to knowledge management infrastructure (comprised of organisational culture, structure, information technology infrastructure, common knowledge, and physical environment) which was then linked to the profile of employees in an organisation.

These previous studies clearly demonstrate that the scope of research regarding the level of readiness to be relatively wide and open. These previous researches, although seemingly different in terms of their study focus, have an underlying common research component, which is to explore and investigate the preparation of an organisation in implementing knowledge management within their organisational structure. Using the findings gleaned from previous research, this study set out to examine organizational readiness based on 7 aspects or statements of readiness as follows:

- Organisational Foundation - refers to the fundamental issues of organisational development that encompass organisational policy, vision, mission, objectives and future direction;
- Leadership -refers to the top management's strategies, initiatives and commitments to implement knowledge management;
- Organisational Structure-refers to the establishment of an administration and management framework within an organisation that is capable of stimulating knowledge management in a structured and organized way;
- Organisational Culture - refers to programs or actions that have been taken to ensure knowledge management practices are accepted and executed by employees continuously and voluntarily within the organisation;
- Support System and Facilities -refers to the availability of support in various forms such as consulting and advisory services, infrastructure (including information technology), technology, and physical assets that facilitate the implementation of knowledge management;
- Resource Allocation - refers to the availability and adequacy of needed resources for implementing knowledge management in an organisation including human resources, financial and equipment; and
- Expertise Development - refers to the exposure, training and guidance that have been properly given to the employees in the efforts to equip a better understanding and awareness for knowledge management implementation.

#### 4. Research Methodology

A descriptive research design was utilized to carry out the objectives of this research where a questionnaire form had been developed to collect the related quantitative data. The data was acquired based on the answers from the study respondents on knowledge management readiness described via the given readiness statements in the questionnaire. The study respondents involved were employees positioned at middle and top management levels from conservation construction firms. Conservation construction firms approached in this study comprised of qualified contractors registered with the Construction Industry Development Board (CIDB) and authorized to perform specific works under the B03 category. This study involved only qualified contractors from Melaka and Pulau Pinang (the only 2 states in Malaysia that have a recognized heritage status). According to CIDB in 2018, there were 147 qualified contractors in the state of Melaka and 56 qualified contractors in Pulau Pinang, making the total population involved in this study amounting to 203 contractors. With the total population of around 200, a reasonable sample size for this study is 132 contractors. This sample size was determined by considering the sampling tables employed by (Krejcie & Morgan, 1970) and Cohen (1988). The sample selection was conducted using a simple random sampling technique where the population of conservation construction firms located at Melaka and Pulau Pinang had an equal and fair opportunity to be selected as a sample or respondent for this study. Financial and time constraints of this study required the data collection period to be completed within 2 months. Distribution of questionnaire forms was done in two ways, direct visits (involving 25 respondents) and through postal service where a total of 107 questionnaires were mailed and distributed.

The questionnaire form was divided into two sections. The first section related to questions regarding respondent demographics, while the second section contained statements based on literature that seek to determine the level of readiness towards knowledge management implementation in an organisation. Each statement was provided with the choice of a 5-range answer scale as follows; 1 = Highly Not Ready, 2 = Not Ready, 3 = Less Ready, 4 = Ready and 5 = Highly Ready. This answer choice provided the respondents the opportunity to express their views more objectively. The data obtained was then analysed for reliability using Cronbach's Alpha Coefficient test. Descriptive statistical analysis

techniques such as mean, mode and median were used for further analysis to achieve the objective of the study. The statements of readiness were then analysed using frequency analysis in order to show the number of occurrences of each response chosen by the respondents based on the given statement. Finally, the level of readiness for the implementation of knowledge management in conservation construction firms was determined using the Percentage of Readiness Level (PRL) which was calculated based on the following formula:

$$PRL = \left( \frac{\sum n4 + \sum n5}{N} \right) \times 100 \quad (1)$$

Where;

- $\sum n4$  = Total Response for Prepared Scale
- $\sum n5$  = Total Response for Very Prepared Scale
- N = Total Response from all scale

This study also utilised Spearman’s correlation as part of a further analysis to investigate the degree of association between study variables, involving both independent and dependent variables. Subsequently, this study expanded the results of this correlation analysis to further establish inferential statistical findings as a means to expound and substantiate the results of the descriptive analysis employed within the study. Acknowledging that correlation analysis can be either in the form of linear or non-linear relationships, this paper opts to focus solely on linear correlation analysis as this is the most preferred and utilized method in social science studies as professed by (Senthilnathan, 2019).

## 5. Result and Discussion

### 5.1 Demographic Findings

From the 132 questionnaire forms that had been distributed, only 68 questionnaire forms were returned by the respondents, representing a 51.5% response rate. More than half of the respondents (62%) were found to have had more than 15 years of experience working in the construction industry. In terms of work experience in implementing built heritage conservation projects, the number of projects reported by the respondents are as follows (in descending order based on the percentage of respondents): 1-3 projects (42%), 4-6 projects (39%), 7-10 projects (13%), and more than 10 projects (6%). It was also discovered that 90% of the respondents have a bachelor’s degree in terms of educational qualification. Approximately half (49%) of the respondents for this study work at the middle management level compared to 41% who are in the top management level.

### 5.2 Result of Reliability Test

In this study, the instrument of data collection, i.e., the questionnaire was analysed and tested for its internal consistency. This was conducted using Cronbach’s Alpha reliability coefficient test. Cronbach’s Alpha was calculated cumulatively for each readiness statement in the questionnaire. The final value of Cronbach’s Alpha for the 14 statements of readiness in the questionnaire was recorded at 0.970. The value for each statement is shown in the following Table 1. The recorded value is highly acceptable as it demonstrated the existence of strong and reliable internal consistency towards the data collection instrument. Generally, alpha values greater than 0.7 are regarded as sufficient (Nunnally, 1994), and a cut-off value of 0.6 had been utilized by researchers such as Black & Porter (1996).

**Table 1 - The reliability output for readiness statement.**

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Organisational Foundation	22.47	38.462	.951	.961
Leadership	22.53	38.939	.948	.961
Organisational Structure	22.35	41.784	.821	.970
Organisational Culture	22.88	40.941	.762	.975
Support System and Facilities	22.59	39.768	.920	.963
Resource Allocation	22.53	37.865	.937	.962
Expertise Development	22.41	38.574	.910	.964

### 5.3 Results of Descriptive, Frequency and Correlation Analysis

**Table 2 - Descriptive outputs for readiness statements.**

No.	Readiness Statements	Descriptive Outputs			
		Mean	Median	Mode	Standard Deviation
1.	Organisational Foundation	3.82	4.00	4.00	1.158
2.	Leadership	3.76	4.00	4.00	1.121
3.	Organisational Structure	3.94	4.00	4.00	1.006
4.	Organisational Culture	3.41	4.00	4.00	1.149
5.	Support System and Facilities	3.71	4.00	4.00	1.080
6.	Resource Allocation	3.76	4.00	4.00	1.223
7.	Expertise Development	3.88	4.00	4.00	1.191

Based on the results of the analysis as shown in the preceding Table 2, it is found that the mean score for all statements of readiness exceed 3.5 except for the readiness statement regarding to organisational culture which returned a mean score of 3.41. The mean score of more than 3.5 indicates that the level of readiness among the respondents is approaching the “ready” level. While the results of the median and mode analysis recorded the same score for each statement, the consistent score of 4 demonstrates that the level of readiness to implement knowledge management in the organisation of the conservation construction firms to be considered as good since the score of 4 is defined under the degree of “ready”. Furthermore, Table 2 also shows that the standard deviation for all readiness statements exceed or are greater than 1.0. This result exhibits that the scores obtained through this study are relatively high in variance, where distributions with a coefficient of variation (CV) higher than 1 are considered to be high variance whereas those with a CV lower than 1 are considered to be low variance (Kaufmann, 2014).

**Table 3 - Frequency and RII outputs for readiness statements.**

No.	Readiness Statements	Frequency					Percentage of Readiness Level (PRL)
		Highly Not Ready (1)	Not Ready (2)	Less Ready (3)	Ready (4)	Highly Ready (5)	
1.	Organisational Foundation	4	8	4	32	20	76%
2.	Leadership	0	8	4	44	12	82%
3.	Organisational Structure	0	4	12	32	20	76%
4.	Organisational Culture	8	4	16	32	8	59%
5.	Support system and Facilities	4	8	4	40	12	76%
6.	Resource Allocation	0	8	4	40	16	82%
7.	Expertise Development	4	8	4	28	24	76%

Based on the output of analysis as shown in Table 3, it is found that the percentages of readiness level for the seven listed statements to be greater than 50%. The highest percentage of 82% was recorded in two readiness statements which are related to leadership and resource allocation. Four statements of readiness, namely, organisational foundation, organisational structure, support system and facilities, and expertise development accounted for the second highest percentage of readiness levels with a score of 76%. The readiness statement regarding organisational culture returned the lowest level of readiness since its PRL result is at 59%. Correlation analysis was then conducted to evaluate the strength of relationship between the variables involved in this study. In the context of this study, organisational readiness is deemed to be the dependent variable whereas the variables pertaining to organisational foundation, leadership, organisational structure, organisational culture, support system and facilities, resource allocation and expertise development are classified as the independent variables. As study data was collected through an ordinal scale via the questionnaire, Spearman’s correlation analysis was then employed as it is suitable and apt for the study data set. This is in line with (Daniulaityte, 2017) who states that in order to use Spearman’s correlation, the scale of measurement for collected data had to be ordinal. The findings of the analysis are as demonstrated in the following Table 4.

**Table 4 - Output of Spearman's rho correlation analysis.**

Variables	Spearman's rho Organisational Readiness		
	Correlation Coefficient	Sig. (2-tailed)	N
Organisational Foundation	0.895**	.000	68
Leadership	0.894**	.000	68
Organisational Structure	0.781**	.000	68
Organisational Culture	0.643**	.000	68
Support System and Facilities	0.808**	.000	68
Resources Allocation	0.827**	.000	68
Expertise Development	0.820**	.000	68

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

As with other analysis methods, the strength of the relationship would be found to be at the values of +1 or -1 (the + and – prefixes denote the direction of the relationship) while a value of 0 will establish that there is no correlation evident between the study variables. Previous studies, however, have stated that further interpretation of variable relationship strength derived from correlation analysis can be explained as follows:

**Table 5 - Interpretation towards correlation coefficient.**

Correlation coefficient	Interpretation
- 0.19	Very Weak
0.20 - 0.39	Weak
0.40 - 0.59	Moderate
0.60 - 0.79	Strong
0.80 - 1.00	Very Strong

(Adapted from Beaumont (2012) and Hauke & Kossowski (2011) as cited in Galadanci & Mukhtar (2017)).

Using Table 5.0 as the basis for interpretation, in the context of this study, all seven tested independent variables registered a relatively strong relationship with the dependent study variable. This is due to the fact that five out of the seven independent variables returned a correlation coefficient value of higher than 0.8 which corresponds to a “very strong” classification. The remaining two independent variables of organisational structure and organisational culture scored a correlation coefficient value of less than 0.8 but higher than 0.59. This interprets to both these variables as having a relationship within the “strong” classification. Based on the results as presented and described above, the main finding of this study is that the level of readiness among the majority of conservation construction firms in Melaka and Pulau Pinang are discovered to be at a good level. This is because the PRL score for all 7 readiness statements tested in this study garnered a percentage that is greater than 50%. The PRL result is further supported by a central tendency test consisting of mean, median and mode values. The median and mode score for all readiness statements tested were 4 (denoting ‘ready’) while the mean score of 6 statements were above 3.5. Only 1 statement recorded a mean score below than 3.5. Coupled with the results of the correlation analysis, it is evidently clear that all independent variables have exhibited a relatively strong relationship with the dependent variable as all correlation coefficient values exceeded 0.6. This directly implies that all seven independent variables are inherently capable of highly influencing the level of readiness in these companies in gearing to implement knowledge management within their respective organisations.

A note of importance in particular is that based on the readiness statements that were tested, the leadership statement was seen as having the highest level of readiness. The statement on leadership is related to specific fundamental elements that have been established by the founders and/or top management of an organisation in implementing knowledge management within their firms. The need for leadership in ensuring successful knowledge management application within an organisation has been widely discussed by previous researchers, both from the academia and industry. If knowledge management is not instilled or integrated in all levels of the organisation, especially at the top, it is unlikely that knowledge management programs will ever catch on or be effective (DeTienne et al., 2004). Goleman et al. (2002) also note that visionary leadership has a strong positive effect on organisational climates, and is particularly important whenever a clear direction is needed and this would also ring true for the adoption of knowledge management within organisations.

In addition, high degree of readiness in aspects pertaining to leadership is required because the leader can become a good example to other workers when he or she is seen to be able to handle the implementation of knowledge management processes in a smooth manner. This is as stated by (Singh, 2006) who argues that in every organisation, leaders set the examples for others, therefore it can be safely assumed that leaders have a direct impact on how companies should approach and deal with knowledge management processes as well as practices. With a wide range of responsibilities, leadership readiness can be a key driver of knowledge management implementation in an organisation. According to



(Debowski, 2006), a leader has the full responsibility to provide strategic visions, motivate others, effectively communicate, act as an agent of change, coach others, model good practices, and carry out the knowledge agenda. The second statement which shows a high degree of readiness is the statement related to resource allocation. The implementation of a conservation project in Malaysia is subjected to the compliance towards regulatory requirements as decreed by the relevant government agencies. In order to ensure compliance, most of the conservation construction firms have complemented their organisation with sufficient allocation of resources including human, material and financial resources. The need for contractors or conservation consultants to have sufficient resources have been clearly described in most conservation planning or implementation manuals, for instance as mentioned in the Conservation Project Manual published by the BP Conservation Programme, United Kingdom as quoted by (Bibby and Alder, 2003). In the context of this study, most of the respondents felt that they had sufficient resources, not only limited to carry out the conservation projects but also to implement knowledge management as well. In fact, a review of related literature has shown that the implementation of knowledge management does actually not require a significantly large allocation of resources. However, previous studies do explain the specific need for integrating the management of certain resources in the application of knowledge management within an organisation. A study by (Figurska, 2009) highlighted the importance of human resources and its management towards implementing knowledge management. The study also underlined the necessity to understand that human resources have a limited ability to perform tasks including the implementation of knowledge management. Financial resources are also needed in implementing knowledge management as stated by Kisielnicki & Sobolewska, 2019). They demonstrated that sufficient financial resource is needed in order to provide the related support infrastructure such as computers and networks.

The readiness statement related to organisational structure is further listed as having a good level of readiness. This finding shows that most of the conservation construction firms involved in this study have a good management and governance framework. Organisational structure is the shape or design of the organization and determines the internal structure of the relationships prevailing within the organisation. It also illustrates the divisions or sections of the main and branch entities as well as the various actions and activities required to achieve organizational objectives (Hammoud, 2002). According to (Lichtarski, 2009), the efficiency of the knowledge management process is determined by a number of factors, where some of them are directly related to organisational structure. Another study by (Alawamleh and Kloud, 2013) advocates the design of appropriate organisational structures, in the efforts to push for more production as well as the application of knowledge as a prerequisite for organizational survival and success. This recommendation demonstrates that the need to formulate and shape a suitable as well as strong organizational structure will enable an organisation to achieve the objectives of implementing knowledge management more easily and effectively.

The readiness statement pertaining to expertise development also recorded a good level of readiness in implementing knowledge management. This finding indicates that most of the respondents in this study acknowledged that their organisations have provided them with a series of good exposure and training as preparation for implementing knowledge management in their respective organizations. The relevant guidance, exposure as well as training should be adequately and effectively provided to the related employees in order to ensure they are capable enough to perform their responsibilities or tasks appropriately. Ignorance will cause many disruptions and will delay the progress of implementing knowledge management in conservation construction firms. According to (Lichtarski, 2009), training is defined as a necessary fundamental implement for gathering information and improving an individual's knowledge, especially for organisations that are intent on managing personalized knowledge. Companies which take care of the career development of their staff often treat training as an investment in human resources rather than a cost element. These companies have large budgets for a wide range of training courses and organize them more frequently. Frequent training courses are required mostly for organisations that operate in an environment with rapid technological development, unstable external regulations, and globalized markets (Lichtarski, 2009). The statement of readiness concerning organisational foundation is also seen to indicate a good level of readiness. In general, the term organisational foundation describes the existence of any fundamental component that is needed to establish and operate any organisation which includes the types of organisations that are the focus of this study. These components are, but not limited to, the vision, mission, objectives and policies of the organisation. The dedication and seriousness of implementing knowledge management in an organisation should begin at the very foundation of the organisation. A clear set foundation will support the implementation of knowledge management, where it can serve and act as a catalyst for progressive and structured implementation programs. The good level of readiness for organisational foundation as demonstrated in this study is believed to have been strongly influenced by and tied to the leadership statement, which recorded the highest PRL. This is in line with the views expressed by (Anwar and Hasnu, 2011) who explain that leadership is one of the factors that will undoubtedly influence the vision of an organisation as well as being the most influential factor which transcends and transforms the vision.

The readiness statement which recorded the next highest percentage in descending order is related to support system and facilities. This result is largely due to the fact that most of the respondents involved in this study are working with conservation construction firms that have been established for a long time. The existence of support system and facilities, such as specific support teams, computer systems, computer hardware and software, database and other similar elements are able to facilitate the implementation of knowledge management more easily. The availability of state-of-the-art support systems and facilities not only assists the implementation process but also helps an organisation to evaluate the

impact or achievement of knowledge management implementation on the overall performance of the organisation. The importance of establishing a support system (including technology) to assist in the implementation of knowledge management has been stated and discussed in various academic literature, spanning from books to journal articles and conference papers. (Hajric, 2018), for instance, described support system and facilities as a dimension that needs to be refined and properly formulated for the purpose of implementing knowledge management in an organisation. Other discussions revolved around the existence of support systems and facilities that will enable an organisation to develop an effective, realistic and useful knowledge management system in enhancing and improving the organisation's decision-making process.

This study also found that the level of readiness related to organisational culture to be at a relatively lower level than the other statements. This finding is not entirely surprising as the development of organisational culture is not an easy or overnight task. It needs to involve all parties as well as their willingness to create, establish and maintain a certain organisational culture. An effective knowledge management program depends on organisational willingness and ability to participate in knowledge creation, knowledge sharing, knowledge acquisition and knowledge codification activities (Shahzad et al., 2013). According to (Ahmady et al., 2016), the presence of a suitable culture in an organisation is vital for the success of knowledge management practices. The development of a culture within an organisation can only work well if all employees (regardless of their respective grades or levels of hierarchy) are able to openly accept certain practices or activities and subsequently make these new practices as a regular routine within their work environment. However, in reality, with different educational status, experience, workload and other aspects, employees of different grades and ranks will have significant differences in accepting a practice, including practices that need to be emphasized in the implementation of knowledge management. If this practice is forced, it is very likely that the quality of implementation would be low and will only be sustained for a certain period of time, contrary to the notion that the development of a cultural process requires continuous prolonged action.

## 6. Conclusion

This study has descriptively and inferentially determined the level of readiness in implementing knowledge management among construction firms involved in built heritage conservation projects. Through this study, it was found that the overall achievement of readiness is at a good level. This finding demonstrates that most of these type of construction firms in Malaysia generally, or in Melaka and Pulau Pinang specifically, are ready to implement knowledge management within their respective organisations. The implementation of knowledge management is seen as being able to enhance the governance and performance of construction firms. Pertinent information generated during the undertaking of a conservation project on heritage buildings would be able to be collected, stored, shared and accessed as and when needed. This environment and practice will ensure that these construction firms are ready to engage in and handle more challenging conservation projects in the future by minimizing related risks through informed decision making by way of knowledge management. In addition, information can be leveraged by these firms to make them more competitive and able to explore new business opportunities within the built environment field. However, the current level of readiness should not be taken for granted or left unutilised. Using this current good level of readiness as a stepping stone, focused and directed efforts are now necessary to ensure the implementation of knowledge management is not a mere pipe dream but rather an achievable and attainable outcome that will only benefit both the construction firms as well as the industry as a whole.

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