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Empirical Scrutiny of the Human Resource Management Features for Effective Maintenance Management of Educational Buildings

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ABSTRACT

This paper presents the findings of an empirical assessment of human resources management features required to effectively maintain higher education institution (HEI) buildings in South Africa. This was done to improve the maintenance management of HEI buildings in the country for better performance of buildings. The study adopted a post-positivism philosophical perspective using a quantitative research approach with questionnaire as the instrument for data collection. The questionnaire survey was distributed to the users of academic buildings and heads of maintenance departments in six HEIs in Gauteng, South Africa. Data collected were analysed using mean item score, Kruskal-Wallis H-test, and confirmatory factor analysis. The study found that the availability of skilled and experienced personnel, adequate staffing of the maintenance department, effective occupational health and safety practices of maintenance staff, and top management support for training are key to the effective maintenance of HEIs buildings. This study offers a theoretical contribution to the existing discourse on the maintenance of educational buildings by exploring the human resources management dimension. This aspect has gained little attention in recent times.

Keywords: HEIs, Maintenance management, Educational buildings, Human resources management

INTRODUCTION

Higher Education Institutions (HEIs) are often faced with the competing challenge of balancing increasing student enrolment with providing adequate facilities to cater to the new enrolment numbers. Mowoyo (2014) reported that the increase in student enrolment had created infrastructure constraints and inappropriate teaching spaces in some universities in South Africa. While the increase in student enrolment makes education accessible to more citizens, it can impact the quality of education (Mukhanji, Ndiku, and Obaki,

2016). To improve this quality of education, the provision of adequate building infrastructure and the maintenance of these buildings is crucial. (Studies have shown that HEI buildings are diverse in nature and critical in supporting the core function of higher education: teaching, learning, and research (Simpeh, 2018; Abisuga, Wang, and Sunindijo, 2020). The optimal functioning of the various spaces used by HEIs also affects staff and students' productivity, health, and performance (Leung and Fung, 2005; Abisuga, Famakin, and Oshodi, 2016). According to Akinlolu, Ndihokubwayo, and Simpeh (2017), well-maintained university buildings enhance learning. Lateef (2010) suggested that buildings are the second most important university assets after staff and students. Therefore, these buildings must be well maintained to provide a conducive teaching and learning environment. However, despite the importance of building maintenance, more attention has always been placed on new construction projects instead of maintaining existing ones (Tan et al., 2014).

Academic buildings serve the needs of internal stakeholders, such as students and staff members, and external stakeholders, including government, alumni, accreditation bodies, and advisory committees (Shams and Belyaeva, 2017; Marshall, 2018). These stakeholders have a vested interest in the performance of HEIs as they can influence strategic objectives and the quality of teaching (Kettunen, 2015). The majority of university programs are subjected to external quality audits. For most programs, the condition of these buildings becomes critical as they contribute to the success of these audits. Odeyemi et al. (2019) submitted that accreditation bodies expect academic buildings to maintain a certain standard that supports conducive learning. Barrett, Davies, Zhang, and Barrett (2015) reported that students who study in a conducive learning environment perform better than their counterparts. Dilapidated buildings can lead to low morale for both students and staff, thereby negatively affecting the performance of students (Tschannen-Moran and Uline, 2007). Therefore, regular building maintenance becomes essential in HEIs (Olanrewaju et al., 2010; Olanrewaju, Idrus, and Khamidi, 2011).

Existing models and frameworks on maintenance management have highlighted the importance of human resources management features in achieving successful maintenance management (Waeyenbergh and Pintelon, 2002; Fernández and Márquez, 2012; Macchi and Fumagalli, 2013; Idrus, Khamidi, and Abdul Lateef, 2014). Studies on maintenance management also mentioned the important role that human resources play in achieving effective maintenance. In order to support the maintenance department, management should provide training for new employees where technical competency is required (Zawawi, Kamaruzzaman, Ali, and Sulaiman, 2010). This will, in turn, improve the rate of responsiveness to queries from the maintenance department (Oluwatobi, Alli-Johnson, Ayedun, and Akinjare, 2019).

These human resources management features identified in this study have not been extensively considered in the maintenance management of HEI buildings in South Africa. This is demonstrated by the scarcity of models and frameworks for maintenance management appropriate for HEI buildings. Therefore, this study assessed the critical human resource management features required in South African HEIs to effectively manage their buildings. The next sections of this paper present a review of studies on human resource

management, the methodology used, and the research findings. Conclusions and recommendations drawn from these findings are also presented.

HUMAN RESOURCE MANAGEMENT IN THE MAINTENANCE OF BUILDINGS IN HIGHER EDUCATIONAL INSTITUTIONS

Building maintenance is undertaken to retain the performance of buildings to the required standard, thus prolonging the life span of buildings (Akasah, Abdul, and Zuraidi, 2011; Besiktepe, Ozbek, and Atadero, 2020). According to Hauashdh, Jailani, Abdul Rahman, and AL-fadhali (2020), investment in building maintenance accounts for nearly half of the total turnover of construction worldwide. In the same vein, Tan, Shen, Langston, Lu, and Yam (2014) reported that although the maintenance of buildings continues to grow, very little attention is given to maintenance as the focus is placed on the construction of new and large sophisticated projects. This often leaves some buildings vulnerable. Effective maintenance management of buildings used by HEIs is critical as it provides value to the staff, students, and other stakeholders (Olanrewaju, Khamidi, and Idrus., 2010; Olanrewaju and Abdul-Aziz, 2014). A conducive learning environment benefits students academically, creates a positive work environment for staff members, and is required for programme accreditation by various audit bodies. According to Tschannen-Moran and Uline (2007), dilapidated educational buildings can lead to low morale for both students and staff, thereby negatively affecting the performance of students.

To ensure effective management of maintenance of these HEI buildings, careful consideration must be given to the management of human resources, among other factors. This study sees human resources management features as those features related to supporting the maintenance department by providing necessary resources to assist them in effectively discharging their duties. These include ensuring the maintenance department has the relevant skills to undertake maintenance activities. Building maintenance is a resource-driven activity requiring a combination of technical and managerial capabilities (Cholasuke et al., 2004; Ali, Kamaruzzaman, Sulaiman, and Cheong Peng, 2010). Adamu and Shakantu (2016) identified technical skills as those related to the ability to assess building workmanship and the quality of materials and spare parts used. At the same time, managerial capabilities relate to the skills required to effectively manage projects and associated resources to ensure the smooth delivery of the maintenance function (Saghatforoush et al., 2011). In addition, maintenance managers must be able to balance the economic, environmental, and social considerations in building management by linking the strategic level with the operational level (Au-Yong, Ali, and Ahmad, 2017). The maintenance needs of academic buildings differ due to the diverse nature of program offerings and building usage. Maintenance departments within HEIs should be resourced with technical staff with the necessary competencies to develop the maintenance plans and life-cycle costs for these diverse buildings (Sherwin, 2000).

The importance of human resources management features in supporting building maintenance in HEIs becomes critical in ensuring that the objectives

of HEIs are realized. Additionally, building users prefer to be attended to by experienced staff who can provide the service they require (Abdul Lateef and Abdul-Aziz, 2015). Therefore, maintenance staff's technical, operational, and managerial capabilities should be strengthened to effectively and efficiently deliver on maintenance needs (Sherwin, 2000). Where skills gaps exist, HEIs should equally invest in training maintenance staff as they do with academic staff (Olanrewaju and Abdul-Aziz, 2014). This investment in human resources could improve personnel mindset and the maintenance culture, thereby contributing to better care and prolonged life of buildings (Pintelon and Gelders, 1992). Providing training for the maintenance department can result in cost savings, improved employee morale, and increased productivity as less supervision is required (Olanrewaju and Abdul-Aziz, 2014).

METHODOLOGY

To establish the important human resource management features in the effective maintenance management of HEI buildings, this study employed a post-positivism research approach through a quantitative research design, which informed the use of a questionnaire survey. The questionnaire was developed from an extensive review of existing literature on maintenance management. The questionnaire comprised two sections. The first section was designed to collect respondents' background information. Information obtained from this section sought to understand the respondent's suitability to answer the questions in the second section. The second section assessed the significance of 13 identified human resources management features. A five-point Likert scale, with one being 'not important' and five being 'very important,' was used to assess this section.

The questionnaire was distributed to users of academic buildings, library and study spaces, hot desk spaces, boardrooms, allocated office space, and research laboratories. These spaces were identified as critical spaces that support teaching and learning. The respondents were drawn from the 19691 academic and non-academic staff members from various faculties across six HEIs in Gauteng Province in South Africa, as indicated by the Department of higher education and training (DHET) (DHET, 2021). Furthermore, the head of maintenance units in the six identified HEIs in Gauteng formed part of the target population. Cochran's sample size calculation formula, with a confidence level of 90% and a margin of error of $\pm 7\%$, was used to arrive at a sample size of 783. From a sample population of 19691, a sample size of 783 was derived. Data collection for this study adopted a combination of purposive and snowball sampling approaches. Purposive sampling was used to identify the initial set of study respondents as it allows for direct generalization of the study population and allows the researcher to select the population elements based on his or her own judgment (Deshpande and Girme, 2019). From the identified responses, snowball sampling was used to distribute the questionnaire to their networks, creating a chain of referrals.

Various statistical analyses were used to analyse the data gathered from the respondents. The background information of study respondents was analysed using percentage (%) and frequency (f), while Cronbach's alpha (α) was used

to measure the questionnaire's internal reliability. Based on previous studies, a cut-off of ≥ 0.7 was set as a threshold (Schumacker and Lomax, 2010), while 0.971 was obtained. Thus, confirming the reliability of the questionnaire. The significance of each variable for the human resources management feature as rated by the respondents was ranked using the mean item score ($\overline{X}$). The respondents for this study were grouped into academics, administrative support, others, heads of maintenance, and management. The significant difference in their rating was assessed using Kruskal-Wallis H-test (K-W).

FINDINGS AND DISCUSSIONS

Background Information of Respondents

The background information of the respondents in Figure 1 revealed that most respondents were academics, administrative support, head of maintenance unit, management, and others such as post-doctoral fellows, laboratory technicians, interns, and librarians. In terms of working experience with the relevant institution, Figure 2 shows that 6.4% have less than one year, 40.9 % have 1–5 years, 25.6% have 6–10 years, 14.5% have 11–15 years, while12.3% have been with the institution for more than 15 years. It can be concluded from this feedback that most respondents are knowledgeable about the various facilities that they frequently use.

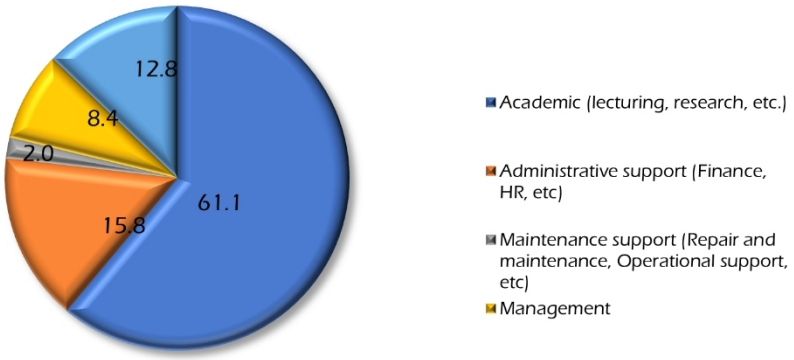

Figure 1: Role of respondents.

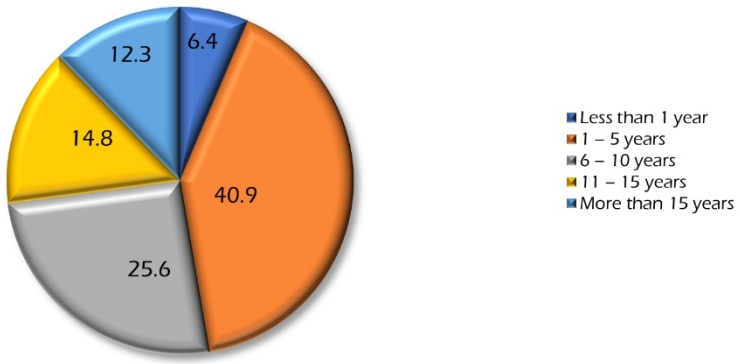

Figure 2: Years of experience.

Human Resource Management Features Influencing Maintenance Management of HEI Buildings in South Africa

Based on the review of extant literature, models, and frameworks, 13 variables were identified to assess the important human resource management features that will influence the maintenance management of HEI buildings in South Africa. Table 1 reveals the overall ranking of these human resource management features by the respondents. Since these respondents have different roles, the *K-W* test was conducted to establish the significant difference in their views. The result in Table 1 shows that all the human resources management features assessed had a mean above the average rating of 3.0, indicating that the respondents view the assessed human resources features as significant in the maintenance management of buildings in HEIs. The availability of skilled and experienced personnel in the maintenance department ($\overline{X} = 4.16$, p-value $= 0.159$) had the highest rating, followed by adequate staffing of the maintenance department ($\overline{X} = 4.11$, p-value $= 0.640$), and the effective occupational health and safety (OHS) practices of maintenance staff ($\overline{X} = 4.08$, p-value $= 0.885$). Although head hunting of staff with relevant maintenance management skills and experience is ranked the least, it is still considered significant as a $\overline{X}$ of 3.61 and a p-value of 0.085was derived. therefore, institutions seeking effective management may want to consider this approach in getting the required skills within their management department. The result of the *K-W* test shown in Table 1 revealed some disparity in the views of the respondents regarding three of the thirteen variables assessed. These variables include top management support for training, budget

Table 1. Ranking of human resources features.

Human Resources Management features	Overall		K-W	
	$\overline{X}$	Rank	χ^2	Sig.
Availability of skilled and experienced personnel in the maintenance department	4.16	1	5.179	0.159
Adequate staffing of the maintenance department	4.11	2	1.687	0.640
Effective occupational health and safety (OHS) practices of maintenance staff	4.08	3	0.648	0.885
Top management support for training	4.01	4	7.872	0.049**
Budget available for training	3.90	5	8.850	0.031**
Maintenance staff desire for training	3.90	5	4.732	0.193
Performance evaluation of maintenance staff	3.90	5	3.018	0.389
Availability of clear technical requirements	3.87	8	4.619	0.202
Employee involvement and empowerment	3.86	9	8.507	0.037**
Frequency of training and development of maintenance staff	3.84	10	6.498	0.090
Skills' gaps analysis	3.75	11	4.178	0.243
Assessment of training outcomes	3.73	12	3.528	0.317
Head hunting of staff with relevant maintenance management skills and experience	3.61	13	6.615	0.085

Note: ** significant at p< 0.05, $\overline{X}$= Mean Score, K-W = Kruskal-Wallis H-test, χ^2= Chi-square

available for training, and employee involvement and empowerment. The three variables have a *p*-value of 0.049, 0.031, and 0.037, respectively.

DISCUSSION

The importance of human resources management features in maintenance management has been highlighted in past studies (Cholasuke et al., 2004; Ali, Kamaruzzaman, Sulaiman, and Cheong Peng, 2010 Sheikhalishahi, Pintelon, and Azadeh, 2016). In HEIs, where the safety and health of the building users is critical, building safety is a highly important issue (Wang, Almassy, Wei, and Shohet, 2022). By prioritizing human resources, health and safety issues can be minimized (Ali et al., 2010).

Sheikhalishahi, Pintelon, and Azadeh (2016) reported that on-the-job training can improve the skill and knowledge of maintenance personnel. However, training alone is not enough if the maintenance department is not adequately resourced with the right skill (Cholasuke et al., 2004). Adequately staffing the maintenance department with the right skill was ranked second overall. This is in line with existing studies (Mohd-Noor et al., 2011; Velmurugan and Dhingra, 2015) that highlighted the need for the maintenance department to be adequately resourced to execute their function effectively. Having enough staff with the right maintenance skills can result in a faster response rate and satisfied building users.

Maintenance is a budget-driven activity driven by top management (Srivastava et al., 2020). Most of the variables highlighted as important can only be achieved if there is financial support from management. Lack of resources to support maintenance management can result in a less effective maintenance department that cannot optimally function, which can eventually lead to the degradation of buildings and negatively impact user satisfaction (Raposo, De Brito, and Fonseca, 2013; Hamid and Alexander, 2016).

CONCLUSION AND RECOMMENDATIONS

A review of existing literature and the survey results revealed that human resources management features are important in the maintenance management of HEIs buildings. To discharge their duties effectively, top management should support the maintenance department by adequately capacitating it with the right skills. Where necessary, HEIs should invest in developing maintenance personnel skills through training. This will, in turn, benefit both the HEIs and the stakeholders.

Past studies reported that the physical state of buildings in HEIs and the effective maintenance of these buildings contribute significantly to the well-being of both staff and students. Therefore, supporting the maintenance department with resources and training and improving the way they conduct business can result in improved outputs from this Department. More than human resources, maintenance management is a budget-driven activity. It is not always easy to allocate enough budget to this function as the scope of work can easily change when maintenance work starts. However, making

the necessary provisions for planned maintenance during the annual budget planning is important.

The results of this study provide useful insight into how HEIs in South Africa might enhance building maintenance to improve building performance. Theoretically, the findings of this study can serve as an excellent platform for future studies seeking to explore maintenance management in the HEI sector in South Africa and other countries where such studies have not been conducted. Because the study was conducted in one province, the results cannot be generalized. Future studies can be undertaken in other provinces that were not part of the study. Future studies can also adopt the use of different research approaches to compare results, as this study used a quantitative research approach only.

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