*Proceedings of the 8th International Conference on Civil Structural and Transportation Engineering (ICCSTE'23)*
*Ottawa, Canada – June 04-06, 2023*
*Paper No. 217*
*DOI: 10.11159/iccste23.217*

# Examining the Assessment of Facility Management (FM) In Educational Buildings

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***Abstract*** **-** The building construction sector has recognized the importance of facility management (FM) as a critical phase. However, there is a need for a new approach to evaluating FM performance. This study aims to explore the various FM approaches in building construction and their impact on the life cycle cost (LCC) of existing buildings. The paper focuses on analyzing the conflict between building activities and LCC during different construction phases. Specifically, the objectives are to 1) Identify current FM methodologies; 2) Investigate different FM approaches and technologies; and 3) Establish an LCC analysis framework. To achieve these objectives, a case study of King Saud University faculties will be conducted to identify appropriate FM solutions. The study findings will help architects and engineers to develop a database of Building Information Modeling (BIM) software systems.

***Keywords*****:** Facility Management (FM), LCC, Construction Management, Buildings, KSA

## 1. Introduction

Every project, regardless of its size and type, has limitations in capabilities. The significance of this deficiency is determined by how closely it relates to the main functions of the project. A multitude of internal and external factors, which vary with the size and nature of the project, can significantly impact it (Simpeh et al. 2022; Alfalah 2020; Qahtani and Alshamrani 2022). Decision-makers usually prioritize the construction phase by providing the necessary resources and capabilities, however, their interest decreases gradually after the project's completion and the start of its use. Operational works and requirements are viewed as secondary and are often postponed or reduced, especially preventive maintenance programs, development requirements, and gradual replacement (Lai et al. 2022; Simpeh et al. 2022; Alarjani 2002). This view has become a common phenomenon among most government sectors, starting from financing agencies that control the level of spending to the beneficiaries who are responsible for directing capabilities and setting priorities (Alfalah and Zayed 2020; Alsayyari, 2019). The financing agencies demand constant reduction in spending on operation and maintenance projects without considering the requirements of each project, while beneficiaries tend to allocate funds to visible and immediate activities, neglecting the invisible works, especially maintenance works of all kinds, without realizing the impact on the operational performance and future costs (Alfalah, 2021).

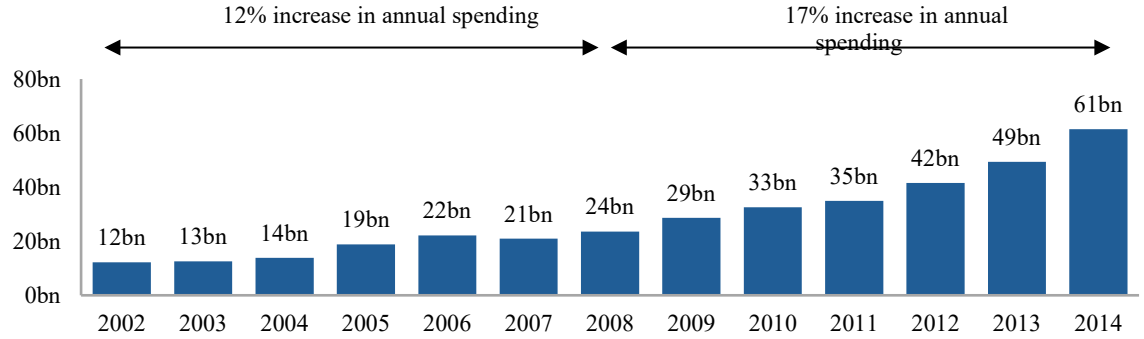


Fig. 1: Comparison spending between 2008 to 2014 period (Alfalah, 2021).

As stated by Jahid (2010), the facilities management industry in the Kingdom of Saudi Arabia, like in many other countries, is viewed as a promising industry due to the growth of the infrastructure sector and government spending The facilities management industry in the Kingdom of Saudi Arabia is experiencing significant growth, thanks to the expansion of the infrastructure sector and government support for this sector, as seen in other countries. A study by the National Committee for Standardizing Operation and Maintenance Works in the Kingdom of Saudi Arabia has identified three distinct periods of government spending on operation and maintenance. The first period was from 2002 to 2008, during which government spending increased by 12%, from 12 billion riyals to 24 billion riyals. The second period, from 2008 to 2014, saw a 17% increase in spending compared to the first period, starting at 24 billion riyals and ending at 61 billion riyals in 2014, as illustrated in Figure 1 (Alfalah, 2021).

Figure 2 depicts the third and most recent period, spanning from 2014 to 2018, which saw a growth rate of 18%, bolstered by a high number of ongoing projects falling under the ninth and tenth plans. In 2018, the facility management market size in Saudi Arabia was estimated to be around $30 million riyals, with projections of exceeding $80 million riyals by 2030, resulting in a compound annual growth rate exceeding 15% (Alfalah, 2021). This remarkable growth in the facilities management market in Saudi Arabia is attributed to the increased utilization of facilities management applications in various sectors, including commercial, residential, infrastructure, and industrial facilities. Moreover, the projected population increase to around 40 million people by 2030 (Ministry of Municipal and Rural Affairs, 2018) is anticipated to further drive demand in this sector.

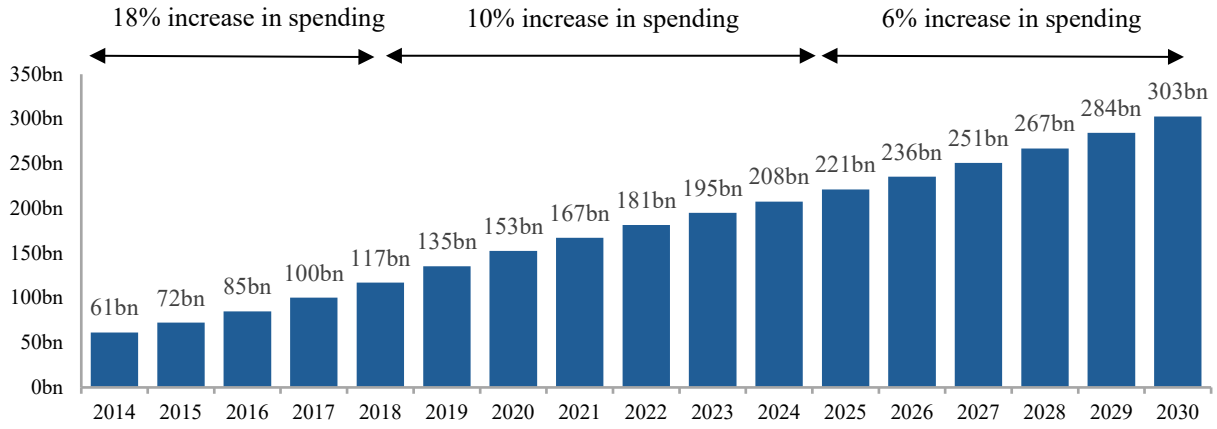


Fig. 2: Spanning from 2014 to 2018 (Alfalah, 2021).

Despite significant government spending on maintenance projects in the Kingdom of Saudi Arabia and the resulting comprehensive urban growth, efficiency in maintenance projects remains weak (Assaf et al. 2011), as shown by a study conducted by the National Committee for Standardization and Standardization of Operation and Maintenance Works in the Kingdom of Saudi Arabia in 2018 (Ministry of Finance, 2020). The study found that the cost of operation and maintenance work in the Kingdom exceeded international standards by twenty percent, and the level of quality was lower by approximately sixty percent. The study also showed that soft maintenance represented 46% and hard maintenance represented 54% of the total government expenditures on various facilities management works. However, if the operation and maintenance works were carried out in accordance with international standards of best practices, the accumulated costs due in current value would be less than five hundred billion riyals for the next fifteen years according to the Alfalah (2021). The study indicated that soft maintenance represented 46% and hard maintenance represented 54% of the total government expenditures on various facilities management works according to Table 1 (Alfalah, 2021). Nevertheless, the same study showed that if the operation and maintenance works were carried out in accordance with

international standards of best practices, the accumulated costs due in current value would be less than five hundred billion riyals for the next fifteen years (Alfalah, 2021).

To prevent the deterioration of infrastructure and facilities that serve and contribute to advancing development, it is is crucial to adopt new approaches to facility management in building construction. This includes improving the performance performance of the life cycle cost of existing buildings, efficiently and effectively preserving assets and facilities, and standardizing facilities management tasks and functions. Such measures are urgently required on the economic and developmental levels to avoid material losses due to maintenance, repair, rehabilitation, and restoration.

## 2. Methodology

Maintenance is often viewed from a narrow perspective by most organizations, failing to recognize its crucial role in ensuring the continuous and efficient performance of facilities (Alfalah 2020; Simpeh et al. 2022). Current maintenance management practices in many departments rely on addressing problems as they arise, which is not compatible with modern management principles and may prove expensive and hazardous, especially when related to the safety of workers and facility users. Consequently, maintenance departments encounter various challenges (Alfalah and Zayed 2020).

In addition, the following points have been identified as areas of concern regarding maintenance management (Al-Arjani 2002; Alassafi et al. 2022; Qahtani and Alshamrani 2022): firstly, it is not receiving sufficient attention; secondly, senior management views it as a cost center rather than a production activity; thirdly, the objectives and tasks of the maintenance department are unclear. Furthermore, poor coordination between the maintenance department and other facility departments negatively affects maintenance performance, and there is no determination of the importance and sensitivity levels of units and equipment (Hassanain 2018; Simpeh et al. 2022). Additionally, a lack of available information on maintenance work and equipment conditions makes it difficult to predict current and future maintenance burdens, leading to challenges in planning and estimating necessary resources (Al-Arjani 2002; Alshamrani et al. 2022). This lack of information also leads to the inaccurate design of maintenance personnel's functional structure and a lack of flexibility in utilizing labour specializations, work site distribution, and shift coordination.

It is imperative to develop a comprehensive plan that involves both initial and long-term planning under effective regulations and legislation to enable and harmonize facilities management projects, enhance the efficiency of facilities management contractors, and improve the productivity of its employees (Alfalah, 2020; Alassafi et al. 2022; Alshamrani et al. 2022). In doing so, the maintenance management approach must shift towards facilities management . This requires facilities departments to construct a project portfolio that considers all projects holistically and their interdependence, based on criteria aligned with the organization's objectives and goals (Alsayyari 2019; Qahtani and Alshamrani 2022; Simpeh et al. 2022). The implementation of these projects must utilize a unified mechanism that standardizes procedures, specifications, and leverages technology to enhance efficiency and effectiveness. The allocation of the five-year operational portfolio is delineated in Table 1.

Table 1: Different five-year operational portfolio and strategies.

| The department concerned with strategy and planning | The department concerned with the implementation of operational projects in the entity | The department concerned with preparing technical studies in the entity |
|---|---|---|
| a. Inventory of all operational projects required during the third and fourth quarters of each year<br>b. Alignment of requests for new operational projects with the general strategies of the state and those specific to the region<br>c. Aligning new operational projects with existing assets and good project targets<br>d. Feasibility study and analysis of options and risks associated with them<br>e. Implementation plans for operational projects and the expected schedule for carrying out various | a. Managing the five-year portfolio and updating it annually<br>b. Ensure the effectiveness of the five-year portfolio<br>c. Ensure alignment of new operational project requests with strategies<br>d. Ensure the preparation of the preliminary study of the projects<br>e. Evaluating and balancing all operational projects after adding | a. Preparing the state and detailed study for the projects<br>b. Reviewing the outputs of the detailed studies of the projects with the joint work teams for approval<br>c. Calculation of operational costs<br>d. Preparing value engineering for operational projects<br>e. The impact of the project on local content |

| | | |
|---|---|---|
| maintenance plans with other operational projects and the risks associated with them<br>f. Study estimated costs<br>g. Studying private sector participation, alternative financing methods and associated risks<br>h. Studying the requirements of third parties and their compatibility with the operational plans<br>i. Establish measurement indicators linked to operational projects and existing assets with the strategies of the target sector | new projects approved by the strategic management and approved evaluation criteria<br>f. Approving the list of operational projects from stakeholders<br>g. Sending the list of operational projects in the five-year portfolio to the Finance and Budget Department | f. The impact of operational projects on job creation<br>g. Preparing RFP |

The main objective of this paper is to analyze the conflict between building activities and Life Cycle Cost (LCC) at different stages of construction. To achieve this goal, the paper aims to 1) identify the existing Facilities Management (FM) methodologies; 2) explore various FM approaches and technologies; and 3) establish a framework for analyzing LCC.

## 3. Data Collection

The data collection section is categorized into three primary components as outlined below:

### 3.1. Contract

In the realm of operation and maintenance, there are two fundamental types of contracts: completion contracts and contracts for the supply of labour. The former requires a minimum level of employment and measures performance based on actual completion, while the latter necessitates a minimum number of workers and gauges performance primarily on worker presence. Both contract types possess their respective advantages and disadvantages (Al-Hammad 1995; Al-Hazmi 1995). Completion contracts offer greater flexibility in utilizing available resources, which can lead to cost reduction, particularly with regard to labour wages. However, such contracts may suffer from imbalanced estimates of necessary capabilities and competencies. On the other hand, labour supply contracts are preferred by many government agencies because they allow for more accurate estimates of capabilities and thus lead to higher performance levels (Alarjani, 2002; Al-Hazmi, 1995).

Labour supply contracts typically comprise three main provisions (Al-Arjani 1995; Alshamrani et al. 2022): the employment clause, which requires a minimum level of employment; the materials and spare parts clause, which specifies a predetermined value of the total contract value to be allocated to these items and which are provided by the contractor according to project needs; and the complementary works clause, which contains a range of priced works that are paid to the contractor based on the quantity executed (Alshamrani et al. 2022; Al-Sultan, 1996; Al-Hammad 1995). These provisions are managed by government regulations, which can only be bypassed with permission from authorized personnel. Penalties for contract breaches or delays also require regular procedures and coordination with other administrative departments, posing challenges for the supervisory body, particularly in emergencies or when specific timelines and seasons are involved (Alfalah, 2021; Al-Hazmi, 1995; Rehman and Ishak 2022).

### 3.2. Labour

Each of the three primary constituents of a contract possesses its own distinct attributes and requirements (Al-Hammad and Assaf 1996). The labour component comprises a substantial proportion of the contract's value, sometimes accounting for as much as 60-70% of it (Alshamrani et al. 2022). The remainder is largely allocated to materials, spare parts, and ancillary work, with rates ranging from 18-25% for materials and parts and from 10% for complementary work. The disbursement of labour compensation is based on the contractor's monthly payroll and remains largely consistent over the contract duration, especially following project labour completion (Al-Arjani, 1995). The challenge in the financial management of human resources arises not from their compensation but from their recruitment and verification of eligibility for assigned tasks (Al-Hammad and Assaf 1996). This, in turn, requires the presence of the

labour force and their productivity, as well as their suitability for technical work according to the relevant principles. Insufficient qualification of workers leads to non-technical work execution, which is one of the negative consequences of a of a lack of minimum wage regulation (Al-Sultan, 1996). Another important consideration is minimizing the detrimental effects of low morale caused by delay compensation, which undermines performance and potentially generates resentment resentment among workers, leading to inferior work output (Alarjani, 2002).

Oddly enough, an increase in the proportion of labour compensation in contracts does not necessarily correspond with improved performance or the maintenance of systems and services (Al-Hammad and Assaf 1996; Alshamrani et al. 2022). This is primarily due to the overall low value of contracts, which induces contractors to reduce labour wages as a way to control the project's financial offer during the competition (Algumzi 2022; Rehman and Ishak 2022). The hiring of unskilled workers is a common consequence of this, prompting the stipulation of worker transfers from one contract to another to preserve cumulative knowledge and experience of the project's nature and components. However, this approach does not solve the issue of endemic expertise, which is lost when trained workers leave (Alfalah 2021; Algumzi 2022).

### 3.3. Materials and Spare Parts

The provision of materials and spare parts plays a crucial role in the successful execution of operational processes, particularly those related to the operation and maintenance of electromechanical systems (Rehman and Ishak 2022). Procuring these items can be a challenging task, especially when they are not readily available in local markets, as it requires significant effort and financial investment for research and supply from overseas (Al-Arjani 1995; Alshamrani et al. 2022). Additionally, the importation of such items from a third-party vendor can lead to complications in terms of obtaining equivalent quotations, ensuring fairness in pricing, and complying with legal procedures. The government procurement system mandates the need to obtain at least three bids, from which the lowest-priced bid meeting the technical specifications should be selected. The lengthy and complicated documentation procedures often delay the timely arrival of materials and spare parts, which further delays the implementation of maintenance programs according to the planned schedule (Alarjani 2002; Algumzi 2022).

To overcome these challenges, it is important to maintain adequate stock levels of materials and necessary spare parts. However, the scarcity of financial allocations for this item presents a real challenge for most bodies overseeing operations and maintenance (Al-Sultan, 1996; Alshamrani et al. 2022). Failure to provide the necessary stock of materials and spare parts could hinder proper planning and programming of required works, ultimately leading to a decline in the continuity of operating systems at the required level (Al-Arjani ,1995). This scenario can be avoided through prudent spending on materials and spare parts, as economizing in this area could ultimately shorten the life of systems and services and lead to their eventual failure. In particular, this situation arises when the project has been operational for several years and previous unqualified contractors have been penalized (Alfalah, 2021; Algumzi, 2022).

## 4. Case Study

The study project is comprised of two main areas: the academic area and the service area. The academic area consists of several independent buildings including medical colleges, the university hospital, scientific and theoretical colleges, an administration building, supporting deanships, the central library, a mosque, and other supporting services. It spans a total area of two million square meters. It serves an estimated 46,000 students, 12,000 faculty members and employees, as well as many visitors and beneficiaries of health and cultural services. The buildings house numerous devices, mechanical and electrical equipment, extensions, and networks used to transfer various services such as air handling units, fire alarm systems, elevators, and electrical panels, among others. Additionally, the academic area is equipped with a system of services, including six chillers, six boilers, six cooling towers, and four gas turbines with a total capacity of 60 megawatts. To manage these biosystems, King Saud University has invested 841.5 million Saudi riyals in 14 contracts for operation and maintenance services across its 2,062 buildings, which occupy a built-up area of 3.04 million square meters. Most maintenance services are hard services (mechanical, electrical, civil), accounting for 66% of the portfolio, while soft services (cleaning, irrigation, pest control) account for 34%. Details are provided in Table 2.

Table 2: Total Operating Costs.

| Costs | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Operation and maintenance costs | 186 | 186 | 187 | 187 | 167 |
| Security and safety costs | 29 | 29 | 20 | 20 | 15 |
| Cleaning and control contracts | 32 | 32 | 32 | 32 | 28 |
| Planting and irrigation costs | 7 | 8 | 8 | 13 | 13 |
| diesel contract costs | 5 | 5 | 5 | 5 | 5 |
| Gas contract costs | 736 | 736 | 736 | 736 | 736 |
| Electricity consumption costs | 299 | 297 | 312 | 329 | 298 |
| **Total Operating Costs** | **1,294** | **1,293** | **1,300** | **1,322** | **1,262** |

Table 1 illustrates a notable fluctuation in contract values, with a recent decrease in financial appropriations. This can be attributed to the lack of a clear methodology for conducting financial returns, which relies on the financing agencies' vision rather than the state of the assets in each institution. To address this issue, financial credits for each party should be based on the institution's asset registry and periodic evaluation of the assets' condition, including documentation of critical assets. Failure to meet these requirements could result in several consequences, such as the absence of an Asset Management Strategy and lack of crucial information like drawings, assets volume, and condition. Without an Asset Register, it becomes challenging to determine the number and condition of portfolio assets accurately. The absence of a Facilities Management system could accelerate the technical depreciation of facilities and cause missed opportunities to consolidate and maximize asset management. Moreover, the unavailability of a critical assets register could make it difficult to determine the consequences of failure, which can negatively impact decision-making. Lastly, a variation in supervision procedures weakens the operation and maintenance implementations.

## 5. Conclusion

The primary aim of examining the issues within the project study was to shed light on the financial and administrative obstacles that currently challenge the management of operation and maintenance contracts. The intention was to provide practical lessons and recommendations that can help create a comprehensive approach to tackle these challenges. Understanding the root cause of shortcomings in estimating capabilities can help address or at least mitigate the issue (Assaf et al. 2011; Lai et al. 2022). Typically, a lack of capability in any project is often due to several factors, such as a failure to identify needs and requirements, unpredictability in estimating necessary funding, and not considering cost change factors like component obsolescence, material price change, or an increase in the serviced area or number of users. Additionally, a lack of efficient management and resource direction is another common issue that both the financing and supervising authorities face. It is assumed that the financing entity is aware of the project's components that it finances and estimates material and human resource requirements based on fixed criteria while considering each project's general and specific needs. This can be achieved by developing a project database that includes fundamental data such as the project component's size and specifications, service areas, project age, number of users, and other necessary information that can be relied upon to estimate costs. In the Kingdom, most operation and maintenance projects share similar training and service quality requirements, making it essential to consider common factors in operational needs. These factors include the similarity in size and type of systems and services used such as heating and cooling, which results from comparable weather and temperatures during the year, the need to treat sewage water for cooling and irrigation purposes, and total reliance on automatic heating and cooling, emphasizing the

importance of maintaining these systems and services. The mechanical, electrical, and civil works that make up these systems, their sizes, types, and operation nature reflect the workforce, materials, and spare parts required. Therefore, it is is necessary for the financing entity to estimate project costs, especially operation and maintenance projects, based on the the capabilities' size and specifications available in each project.

## References


[1] Alfalah, G., Al-Sakkaf, A., Mohammed Abdelkader, E., & Zayed, T. (2022). An Integrated Fuzzy-Based Sustainability Framework for Post-Secondary Educational Buildings: A User-Perspective Approach. Sustainability, 14(16), 9955.

[2] Al-Sakkaf, A., El-Zahab, S., Abdelkader, E. M., &Alfalah, G. (2021). A Holistic and Systematic Assessment of Maintenance Approaches in Heritage Sites. WSEAS Transactions on Systems and Control, 16, 335-350. (PDF) A Holistic Sustainable Maintenance and Operation Approach for Architectural Heritage Facilities. Available from: https://www.researchgate.net/publication/359816238_A_Holistic_Sustainable_Maintenance_and_Operation_Approach_for_Architectural_Heritage_Facilities [accessed Mar 19 2023].

[3] Eweda, A., Al-Sakkaf, A., Zayed, T. and Alkass, S. (2021), "Condition assessment model of building indoor environment: a case study on educational buildings", International Journal of Building Pathology and Adaptation, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/IJBPA-03-2021-0036

[4] Oladokun, S. O., & Ajayi, C. A. (2018). Assessing users' perception of Facilities Management services in a Public University: A case study approach. Journal of Facility Management Education and Research, 2(2), 62-73.

[5] Amaratunga, D., & Baldry, D. (2001). Case study methodology as a means of theory building: performance measurement in facilities management organisations. Work study, 50(3), 95-105.

[6] Pishdad-Bozorgi, P., Gao, X., Eastman, C., & Self, A. P. (2018). Planning and developing facility management-enabled building information model (FM-enabled BIM). Automation in Construction, 87, 22-38.

[7] Lindkvist, C., Temeljotov Salaj, A., Collins, D., Bjørberg, S., & Haugen, T. B. (2021). Exploring urban facilities management approaches to increase connectivity in smart cities. Facilities, 39(1/2), 96-112.

[8] Pinti, L., Codinhoto, R., & Bonelli, S. (2022). A review of Building Information Modelling (BIM) for Facility Management (FM): implementation in public Organisations. Applied Sciences, 12(3), 1540

[9] Alarjani, A. (2002) "Management of operation and maintenance contracts - requirements and challenges: a case study" Sixth Saudi Engineering Conference. 1 (17), 17-32

[10] Alsayyari, A., Alblawi, A., Nawab, M., & Alosaimi, A. (2019). A conceptual framework for facility management in Higher education institutions in Saudi Arabia. TEM journal, 8(1), 157.

[11] Alassafi, H., Al-Gahtani, K., Almohsen, A., & Alfalah, G. (2022). The Causal Factors of Elevator Maintenance: A Perspective from Saudi Arabia Healthcare Facility Management. Buildings, 12(5), 532.

[12] Hassanain, M. A., Alnuaimi, A. K., & Sanni-Anibire, M. O. (2018). Post occupancy evaluation of a flexible workplace facility in Saudi Arabia. Journal of Facilities Management.

[13] Al-Sultan, K. S. (1996). Maintenance in Saudi Arabia: needs and recommendations for improvement. Journal of Quality in Maintenance Engineering, 2(4), 5-16.

[14] Assaf, S., Hassanain, M. A., Al-Hammad, A. M., & Al-Nehmi, A. (2011). Factors affecting outsourcing decisions of maintenance services in Saudi Arabian universities. Property management, 29(2), 195-212.

[15] Al-Arjani, A. H. (2002). Type and size of project influences on number of bidders for maintenance and operation projects in Saudi Arabia. International Journal of Project Management, 20(4), 279-287.

[16] Alfalah, G., & Zayed, T. (2020). A review of sustainable facility management research. Sustainable Cities and Society, 55, 102073.

[17] Alfalah, G. (2020) " Maintenance of Saudi heritage buildings: facility management perspectives" Symposium on Future of Urban Development in Al-Jouf Province: Opportunities and Challenges, 87-103

[18] Alfalah, G. (2021) " A Methodology for Achieving Integration Between Architectural Design, Maintenance and Operation in Public Facilities" Journal of Architecture and Planning, 33 (3), 227-266.

[19] Qahtani, M. A., & Alshamrani, O. (2022). A Comparison between Conventional and Advanced Maintenance for Office Buildings in Saudi Arabia. *Journal of The Institution of Engineers (India): Series A*, *103*(1), 47-56.
[20] Al-Hammad, A. M. (1995). Interface problems between owners and maintenance contractors in Saudi Arabia. *Journal of performance of constructed facilities*, *9*(3), 194-205.
[21] Al-Arjani, A. H. (1995). Impact of cultural issues on the scheduling of housing maintenance in a Saudi Arabian urban project. *International Journal of Project Management*, *13*(6), 373-382.
[22] Al-Hammad, A. M., & Assaf, S. (1996). Assessment of work performance of maintenance contractors in Saudi Arabia. *Journal of management in engineering*, *12*(2), 44-49.
[23] Al-Hazmi, T. A. A. (1995). *Toward standardization of public building maintenance contracts in Saudi Arabia* (Doctoral dissertation, King Fahd University of Petroleum and Minerals (Saudi Arabia)).
[24] Alshamrani, O. S. D., Saleem, M., AlYousif, I. K., & Alluqmani, A. (2022). Development of a pre-qualification and selection framework for construction projects' contractors in Saudi Arabia. *Journal of Asian Architecture and Building Engineering*, 1-19.
[25] Simpeh, F., Mavangwa, G. M., & Wentzel, L. (2022). Strategies to overcome barriers to public facilities management. *Property Management*, (ahead-of-print).
[26] Lai, J. H., Hou, H. C., Chiu, B. W., Edwards, D., Yuen, P. L., Sing, M., & Wong, P. (2022). Importance of hospital facilities management performance indicators: Building practitioners' perspectives. *Journal of Building Engineering*, *45*, 103428.
[27] Rehman, M. A., & Ishak, M. S. B. (2022). Moderation role of government policies, laws and Acts between cultural factors and risk management among Saudi Arabian contractors. *FWU Journal of Social Sciences*, *16*(1).
[28] Algumzi, A. (2022). Risks and Challenges Associated with NEOM Project in Saudi Arabia: A Marketing Perspective. *Journal of Risk and Financial Management*, *15*(9), 381.
[29] Jahid, T. (2010) "Facilities and Facilities Management Engineering between Perspective and Application in Government Departments in the Kingdom of Saudi Arabia and Arabia" Research Center College of Architecture and Planning at King Saud University 1-34
[30] Ministry of Finanace (2020) "Efficient spending and empowering the private sector", Ministry of Finanace, > https://www.mof.gov.sa/< (September 2022)