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POST OCCUPANCY EVALUATION (POE) IN GOVERNMENT OFFICE BUILDINGS: A LITERATURE REVIEW

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ABSTRACT

The construction industry is a vital sector in the global economy, with governments acting as one of its primary clients. Despite this significance, many public office buildings have recurring issues in operation and environment, which affect satisfaction, comfort, and productivity for users. Therefore, research aims to develop a framework for the adoption of post occupancy evaluation (POE) in government office buildings. A comprehensive literature review was conducted to recognize pertinent issues with government buildings and their effect on occupants. The research evaluates POE as a tool capable of addressing such issues by providing a systematic assessment of building performance from the user's perspective. A framework is built to explain the linkages between the identified issues, impact on the user, and the intervention function of the POE. Further, the framework presents how POEs act as an intervention device that leads to many advantages, such as improving building operation, evidence-based decision-making, and additional occupant satisfaction; however, the use of a POE in the public sector is hampered by many obstacles, such as institutional inertia, lack of awareness, and resource constraints. The framework also offered strategies to clear these barriers and enhance the use of POE as a building management staple where continuous improvement is prioritized for government office environments.

Keywords: *Office Buildings; Post Occupancy Evaluation; User Satisfaction.*

1. INTRODUCTION

Construction, as a key branch of the economy, remains a significant contributor to the overall Gross Domestic Product, with rates varying from 5% to 10% for several countries (United Nations, 2024, as cited in Lopes & Banaitienė, 2024). Accordingly, Cooray et al. (2018) emphasized that the government is one of the primary clients for construction projects, particularly in areas such as infrastructure development, public facilities, and housing. Despite the construction industry being a major driver for economic development, frequent construction project failures are a potent issue noted in the global context (El-sokhn & Othman, 2014). Construction project failures extend beyond building collapse, further including the failure to achieve intended quality requirements (Shahhossein et al., 2017). Particularly, the government buildings are confronted with

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several failures relating to inadequate interior design, suboptimal facility management, and deficient maintenance (Awasho & Alemu, 2023; Dissanayake et al., 2020). These issues are worsened by the lack of standardization, weak management support, and the absence of quality management systems (Ali et al., 2016; Rahaman et al., 2025). This has led to Sick Building Syndrome (SBS) which has been identified as a common concern in office buildings (Wijerathne et al., 2012).

According to Akinshipe et al. (2022), building defects possess a direct impact on the psychological attitudes of the occupants within an establishment. Workplace productivity is directly proportional to the well-being of employees, and where the psychological well-being has improved by a significant amount, business productivity has been seen to improve by about 10% on average (Krekel et al., 2019). Thus, the investments in improving the building quality requirement will, in return enhance the workplace productivity (van der Voordt & Jensen, 2021). Thus, when a structure does not fulfil specific criteria of user satisfaction, it is classified as unsatisfactory and requires some form of intervention, whether it be maintenance or an upgrade, to restore comfort and convenience to the users (Mughairi et al., 2023).

User satisfaction in buildings is the degree to which a space meets the physical and psychological requirements of users, enabling comfort, functionality and safety in daily operations (Aksoy & Uzunoglu, 2020). Assessment of user satisfaction plays an important role in monitoring building performance as well. The feedback provided by the end users of a building is a crucial source of information on occupant satisfaction, which enables the technical and structural functions to be tailored to the well-being of end users (Croome, 2013 as cited in Lolli et al., 2022). The construction industry benefits from multiple feedback mechanisms such as construction company feedback forms, CRM software, BIM software and inspection and reporting software (Cusumano et al., 2024; Ford & Gosling, 2024; Lin et al., 2016; Venturini & Benito, 2015). Among these mechanisms, post occupancy evaluation (POE) stands out to be a prominent feedback technique with the ability to gather effective and comprehensive feedback from end users (Hadjri & Crozier, 2009).

W. Preiser (2001) defined post-occupancy evaluation (POE) as “the process of evaluating buildings in a systematic and rigorous manner after they have been built and occupied for some time.” The importance of conducting a complete post occupancy evaluation has emerged out of necessity due to the increasing efforts put in the construction industry towards establishing efficient and sustainable building practices (Nugradi, 2022). In the global context, POE has gained significant awareness as an assessment tool for building performance, thus, the recent research were focused on different aspects of POE, including its application in several areas (Ukpong & Ackley, 2019). With regard to the several building types, frameworks have been developed through the application of POE in housing and apartment building projects (Ozoh et al., 2022; Tannor et al., 2023), in high-rise hotel building projects (Anunobi & Zubairu, 2015) and in office building projects (Choi et al., 2012; Hamid & Othman, 2014; Hamida & Hassanain, 2020; Kim et al., 2022) including green building projects (Kim & Kim, 2020) to enhance the building performance.

However, existing literature reveals a noticeable gap in research concerning government office buildings. A study examining POE research from 2010 to 2017 found that residential buildings were the most frequently studied, followed by office buildings,

educational institutions, and university buildings (Li et al., 2018). Hence, pertaining to government office buildings, an evident lack of research can be observed in the global Context. Therefore, a proper analysis of the current condition of the government office buildings has not yet been carried out in terms of post occupancy evaluation to identify the potential issues that are faced by the occupants and the users of the building. The lack of a proper analysis has resulted in the continuity of these mistakes and issues in future government office buildings.

To address this gap, the present research aims to develop a comprehensive framework that promotes the adoption of POE in government office buildings. Four key objectives are developed to achieve the aim: identifying the unique benefits of post occupancy evaluation to government office buildings, identifying the barriers to post occupancy implementation, identifying suitable strategies to adopt POE, and developing a framework for adoption of post occupancy evaluation in government office buildings in government office buildings. Hereinafter, the paper comprises a methodology, findings, conclusions and recommendations.

2. RESEARCH METHODOLOGY

Research methodology is referred to as the scientific technique employed in the pursuit of conducting research (Croom, 2010; Patel & Patel, 2019). In this research, the methodology is formulated by first establishing a solid foundation through a comprehensive background study. Afterwards, a rigorous literature review is conducted, and the collected literature is analysed to address the identified literature gap. A literature review has several purposes, one of which is to show the researcher's understanding of the discipline, including its concepts, vocabulary, theories, critical variables and phenomena, methods of study, and its history (Qutoshi, 2013). The process involves more than summarizing existing literature, as it necessitates a comprehensive understanding of the topic and its importance (Sajeevanie, 2021). Hence, the research methodology adopted in this research is illustrated in Figure 1.

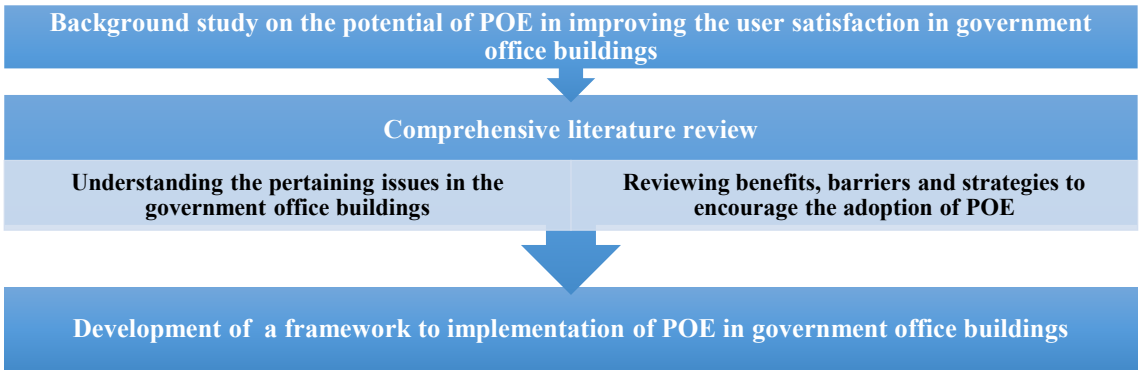

Figure 1: Research methodology

As depicted in Figure 1, an extensive background study was conducted to assess the potential of POE in improving the user satisfaction in government office buildings. The background study revealed the important role POE plays in the construction industry in improving user satisfaction despite its minimal use. A comprehensive literature review was then followed, examining several sources, such as books, reports, theses, journals, magazines, and conference proceedings. The goal was to identify the problems

encountered in the government office buildings, define POE, identify benefits and barriers in implementation of POE and identify strategies to encourage the adoption of POE. To enable a cohesive analysis, search terms such as 'Post Occupancy Evaluation', 'Government Office Buildings' and 'User Satisfaction' were filtered using the search engines 'Google Scholar', 'Science Direct' and 'Emerald Insight'. Then the collected data was analysed using content analysis as it allows the researchers to examine large volumes of data organize them into structured formats to draw conclusions (Zavyalova, 2010). Subsequently, a framework was developed incorporating the findings from the literature review, since it serves as a foundation for advancing knowledge and guiding the research process (Guntur, 2019).

3. RESULTS AND FINDINGS

3.1 PROBLEMS IN GOVERNMENT OFFICE BUILDINGS

Public buildings are vital to a healthy and vibrant society, contributing to the economic and social wellbeing of communities, with a renewed emphasis on their importance recognized by government policies and actions (Ziegelbauer et al., 2005). However, these buildings encounter a multitude of challenges, with maintenance and management issues being a key challenge (Leaman & Bordass, 1999). According to Ali et al. (2016), these maintenance issues include unclear plans, unsystematic approaches, and concerns with human resources and technical aspects, which affect service performance and user productivity. Moreover, as reported by Kim (2022), there are security concerns involved with the government office buildings ranging from inadequate crime prevention designs to need for improved sound insulation to mitigate noise impacts.

Apart from these issues, the SBS has emerged to become a more potent challenge in the government buildings (Adiningsih & Hairuddin, 2021; Thirumalaikolundusubramanian et al., 1991; Wijerathne et al., 2012). In the view of Rostron (2008), the SBS is becoming more prevalent in public buildings, presenting a significant obstacle to the overall efficiency and health of employees. The profound damages experienced in government buildings are often attributed to lack of proper maintenance, as these buildings serve as the focal point of administrative and bureaucratic activities (Wijaya et al., 2020).

3.2 IMPACT OF OFFICE BUILDING ISSUES ON USER SATISFACTION

These building issues within the office buildings significantly affect the user satisfaction of the occupants by diminishing the occupant comfort and minimizing the workplace productivity (Altomonte et al., 2020). User satisfaction with government office buildings stems from environmental, personal, and design elements. Frontczak and Wargocki (2011) emphasize that satisfaction and overall building performance is shaped by the building's thermal comfort, visual and acoustic comfort, indoor air quality, user factor, architecture, and externally, weather conditions. Moreover, accessibility is crucial, especially in public office contexts (Norazman et al., 2023). Out of these factors, thermal comfort is of great importance in offices and significantly influences satisfaction (Park et al., 2018). Other contributory factors are air temperature, size of thermal zone, windows, temperature regulation, radiant temperature asymmetry, cleanliness, and heating, which shape user perceptions of comfort and performance (Artan et al., 2022; Bengi & Topraklı, 2020; Pestana et al., 2021). Also, spatial comfort, privacy, ergonomics, office lighting, and building aesthetics are essential design and functionalities that influence user

experience, as highlighted by W. Preiser (2002). These parameters ensure the comfort, performance and health of the occupants are not compromised (Haroon et al., 2024).

3.3 POST-OCCUPANCY EVALUATION: CONCEPT

The negative impacts experienced by building users underscore the need to address these identified issues, ensuring maximum user satisfaction and workplace productivity for employees. Traditionally, responding to these issues has been conducted in a reactive way, which only repairs when problems arise, thereby increasing costs and causing operational disruptions (Breesam & Jawad, 2021). In fact, it could bring about escalated expenditure in cases where minor issues have been allowed to grow into major problems (Suffian, 2013). According to Breesam and Jawad (2021) proactive maintenance strategies which focus on preventing building issues before they occur serve as a solution for the underlying issues as it involves periodic inspections, predictive analytics, and programmed system replacements. These strategies will prolong the lifespan of building components and enable the uninterrupted availability of the necessary services (Horner et al., 1997). It allows building managers to not only prioritize repairs but also address concerns through active feedback from the end-user, thereby maintaining the building in conformity with the occupants' needs (Breesam & Jawad, 2021). In the opinion of Aliyu et al. (2016), a proper facility assessment should involve all types of occupants irrespective of their knowledge, role in the building, and mother tongue. Typically, assessment systems are primarily used in the design phase, while there is a requirement for certification in the operation phase (Li et al., 2018). Further, Li et al. (2018) reported that only a few ratings systems address the aspects of measurement of actual performance.

POE can be suggested as an appropriate technique since it is an examination of the degree to which occupied design environments meet client satisfaction and functional needs, with criteria on which testing of occupancy performance is usually based on the fulfilment of the functional programme of occupants' requirements (Zimmerman & Martin, 2001). Post occupancy evaluation originated from the UK where the British Ministry of Education in conjunction with local governments first undertook evaluations of buildings in the post-World War II period (Preiser et al., 1988 as cited in Aliyu et al., 2016). Ukpong and Ackley (2019) described indicative POEs as the short assessments that include walkthroughs, document reviews and interviews to explore key strengths and weaknesses while investigative POEs perform more comprehensive interviews and often surveys buildings which are the same to discover deeper understandings. Further, the researchers stated that diagnostic POE is the most in-depth and includes research which may be months or even years long, including technical factors and human behaviour, on a systemic level.

Several governments across the globe have adopted POE as a tool for evaluating the performance of public buildings (Albuainain et al., 2021; Daish et al., 1983; Khalil & Nawawi, 2008; Olagunju et al., 2013). A study in Malaysia has also pinpointed the significance of POE in the sustainability of government buildings in terms of functionality, pointing to evaluation after occupancy as a way of catering for continually recurring maintenance and performance concerns (Nawawi & Khalil, 2008). Similarly, in Nigeria, the POE has also helped in the identification of major maintenance problems, including plumbing failures and roof leakage which has been compounded by inadequate funding (Olagunju et al., 2013) whereas in New Zealand, the government has adopted a formal POE program to evaluate the efficiency of government buildings as well as the

procedure followed in the management process (Daish et al., 1983). Moreover, the new studies in Bahrain are concerned with the evaluation of occupant satisfaction with IEQ in government buildings, exploring the possible relationship between occupants' demographic characteristics, building characteristics and occupant satisfaction levels (Albuainain et al., 2021). Likewise, the United Kingdom and Brazil have put into practice the POE in relation to public buildings to improve the performance of the construction industry, mainly with regards to maintenance and efficiency (Woon et al., 2015). Altogether, these examples show that the use of POE as a planning tool is typical for the modern world and helps governments to achieve the goal of providing the population with comfortable working conditions and, at the same time, maintaining the quality of public services provided in buildings.

Nevertheless, below study depicted in Figure 2, conducted by Li et al. (2018) revealed that among the examined building types with regards to POE from 2010 to 2017, the government buildings are the lowest examined type compared to other building types. Expanding on these results, a detailed review of papers from 2006 to 2022 also provides evidence that the most discussed types of buildings were office, commercial, and public buildings, with a combined percentage of 31% (Lolli et al., 2022), which depicts a slight improvement towards studies of POE in government buildings, yet still inadequate.

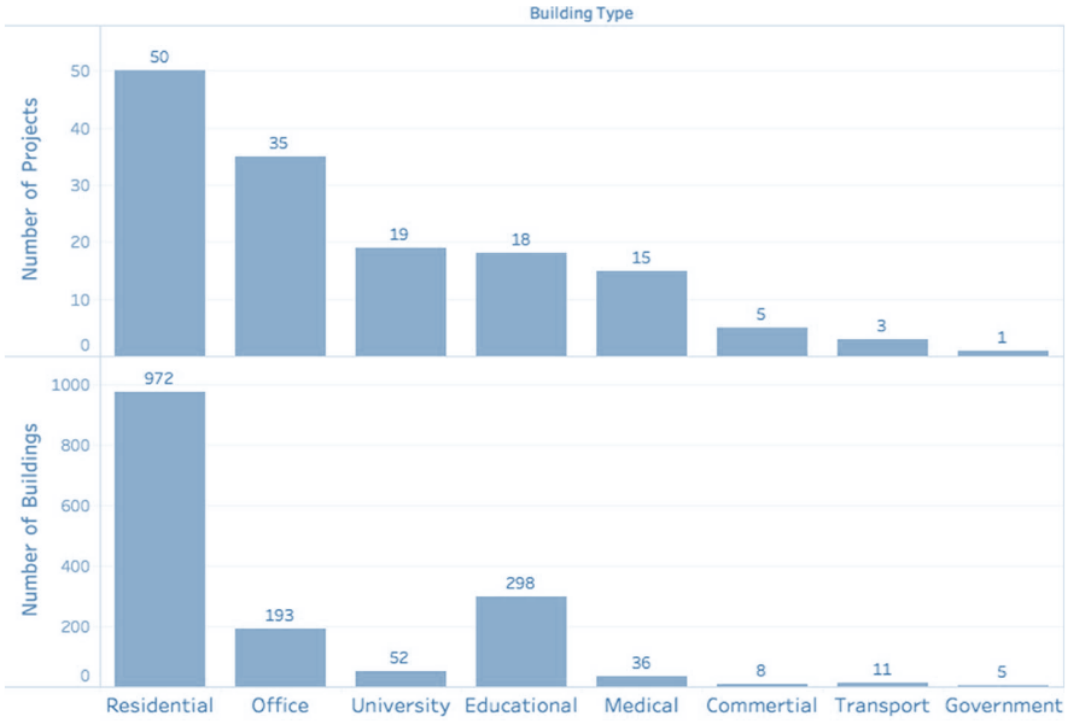

Figure 2: Number of projects and number of buildings per type of building from 2010 to 2017

3.4 BENEFITS OF POE

Post occupancy evaluation is a multifaceted tool that can significantly improve building performance and provide valuable insights for future design (W. F. E. Preiser, 1995). Table 1 discusses the different types of benefits served by POE.

Table 1: Benefits of POE

Item No.	Benefit	Source
1	Provides valuable data to support ongoing improvement and behavioural adjustments in building performance.	[1], [2], [3], [4], [6], [7], [8]
2	Identifies emerging needs or functions to enhance future project design.	[1], [3], [6]
3	Assists in making informed pre-design decisions for new projects, minimizing repeated design errors.	[1], [3], [6], [10]
4	Helps in identifying specific owner/developer requirements, aiding effective space utilization and performance measurement.	[1], [3], [8]
5	Assists developing performance measures for built space	[2], [3], [4], [5], [6]
6	Improves the fit and building performance throughout the life cycle	[1], [3], [4], [5], [6], [7]
7	Acts as a feedback mechanism to design	[1], [3], [4], [5], [6], [8], [10]
8	Reduces long-term owning and operating costs	[1], [4], [6], [7], [8], [10]
9	Uses comparisons with best practices to improve competitive edge, especially in commercial property	[1], [7]
10	Facilitates the replacement or redesign of dysfunctional or rarely used building features, encouraging innovation.	[1], [3], [4], [6], [7], [8], [9], [10]

[1] (Zimmerman & Martin, 2001), [2] (Hadjri & Crozier, 2009), [3] (W. Preiser, 2002), [4] (Bengi & Topraklı, 2020), [5] (Li et al., 2018), [6] (Aliyu et al., 2016), [7] (Eke et al., 2013), [8] (Darkwa et al., 2006), [9] (Forbes, 2002), [10] (Roberts & Edwards, 2022)

As per Table 1, POE provides a variety of benefits, and it can be observed that design improvements are the most potent advantage. Apart from those, POE acts as a learning tool and a source of information on building performance, which in turn benefits the stakeholders involved in the process and the organisations.

3.5 BARRIERS FOR THE IMPLEMENTATION OF POE

Even though POE provides invaluable insights into the building performance, there are several challenges in implementing POE in buildings, and Table 2 presents these challenges according to the conducted studies.

Table 2: Barriers of POE

Item No	Barrier	Source
1	Lack of standard practice as the facility delivery process does not recognize the concept of continual improvement.	[1], [3], [4], [5]
2	Designers are seldom compensated for reviewing the outcomes of their design, discouraging POE involvement.	[1], [3], [4]
3	Lack of investment in Research and Development	[1], [5]
4	Lack of awareness and training is not taught as a part of traditional design education.	[1], [2], [4], [6]
5	Sheer number of stakeholders involved with a conflict of interest.	[1], [2]
6	Lack of funding	[1], [2], [3], [4], [5], [6]
7	Lack of timing	[1], [2], [3], [4], [5], [6]
8	Lack of indicators and accompanying benchmarks	[1], [3]
9	Institutionalized pressure in the industry to continue with standard practice and not to innovate	[1], [6]
10	Owners, especially those with fully leased buildings, may hesitate to initiate POEs that might reveal performance issues.	[1], [3], [4]

[1] (Zimmerman & Martin, 2001), [2] (Hadjri & Crozier, 2009), [3] (Li et al., 2018), [4] (Aliyu et al., 2016), [5] (Darkwa et al., 2006), [6] (Roberts & Edwards, 2022)

As identified by Table 2, lack of funding and lack of timing accounted for limited implementation POE. In addition, false conceptions and lack of awareness within the stakeholders of the industry are another major factor which limits the adoption of POE buildings.

3.6 STRATEGIES TO ENCOURAGE THE ADOPTION OF POE

To promote the wider acceptance of POE and overcome the barriers of implementation, several strategies can be utilised, ranging from focusing on communicating its benefits, streamlining the process, and integrating it into standard practice (Zimmerman & Martin, 2001). Zhao et al. (2024) emphasized that the key strategy for encouraging the adoption of POE is demonstrating its tangible benefits, which include showcasing empirical evidence and case studies that clearly communicate successful outcomes. They further elaborated this stating that presenting specific metrics data rather than vague claims could motivate the stakeholders to adopt it practically. As identified by Ahmed et al. (2021), stimulating POE adoption through policies and regulation implementation is another strategy. In addition, Bughio et al. (2020) reinforced this opinion, stating that governments are able to promote the adoption of POE by mandating its implementation in public buildings and providing financial incentives to the private sector initiatives. Moreover, developing comprehensive and standardized POE toolkits or frameworks to evaluate the current condition of the buildings is another strategy that will improve POE adoption and also facilitate knowledge dissemination between the stakeholders while addressing the knowledge and awareness gap on POE (Joseph et al., 2014).

3.7 FRAMEWORK

Government office buildings require a specialized framework to cater for the adoption of POE owing to their peculiar challenges of insufficient funds and very limited awareness, while the existing frameworks display their own pitfalls including uncertainty of performance assessment and implementing assessment findings (Dam-Krogh et al., 2024; Jayoda et al., 2024). Figure 3 demonstrates the framework developed using the findings of the study to encourage the adoption of POE in government office buildings.

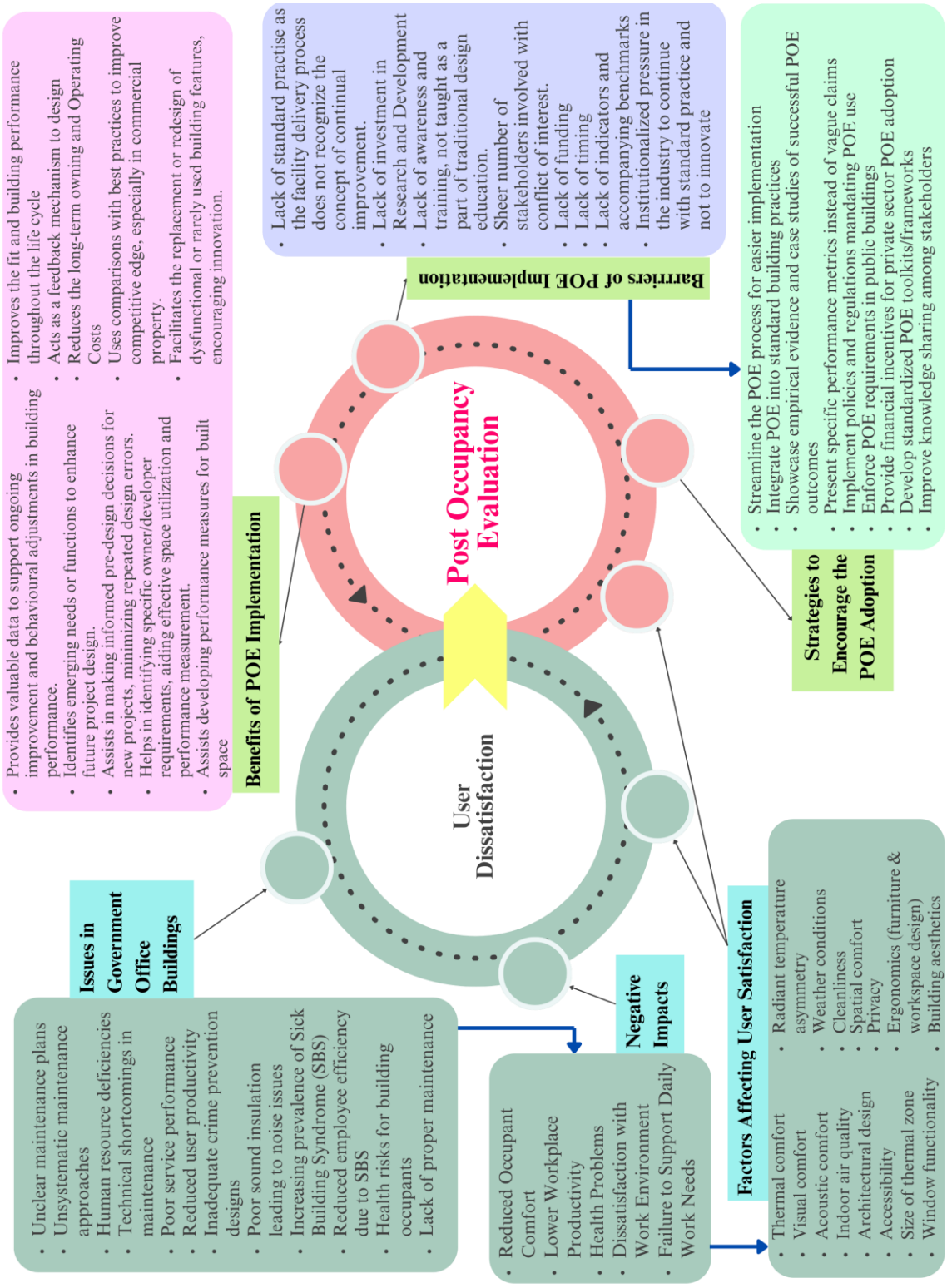

Figure 3: Framework for the adoption of POE in government office buildings

4. CONCLUSIONS AND RECOMMENDATIONS

This study has exposed the inherent problems that have been passed down to government office buildings. These entail issues such as poor maintenance, substandard user comfort, and operational inefficiencies. Mostly, these problems arise due to the absence of systematic feedback mechanisms after a building has been occupied. POE can address these challenges by structuring a building performance assessment from the perspective of its users. Despite POE's merits, including increasing user satisfaction, feeding into the design of future buildings, and enhancing performance over an actual life cycle, the practice is still seldom applied because of building managers being unaware of it, the absence of standard procedures, and scarce resources.

Therefore, the study developed a framework to demonstrate the potential adoption of POE in government office buildings. Important recommendations include integrating POE into policies and procurement standards, setting up standards for the toolkits, providing a budget for POE in the building lifecycle, and enhancing stakeholder awareness of POE through training. By deploying these interventions, public sector agencies can take steps in transforming into a more proactive versus reactive, user-driven, and performance-targeted approach.

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