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ENVIRONMENT**

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ENVIRONMENT**

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OPERATIONAL MAINTENANCE PRACTICE OF ESCALATOR IN COMMERCIAL BUILDING

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ABSTRACT

The escalator is essential for moving people from one location to another. Nonetheless, several mishaps using escalators have been documented. These can arise as a result of a lack of maintenance, which causes system breakdowns, inadequate safety procedures, wear and tear, user carelessness, and other factors. This study aimed to assess escalator maintenance operations in commercial buildings, focusing on the Perak area through two case studies. Questionnaire data was collected using a Google Form and analyzed using SPSS Software to understand maintenance activities and costs to ensure rigor. The finding revealed that inadequate maintenance, inconsistent safety measures, and wear and tear contribute to escalator malfunctions and accidents. To address this, it is recommended that building owners prioritize regular maintenance, implement robust safety protocols, consider technological upgrades, and promote user knowledge. As one of the most significant ways of entry in a building, it is critical to improve the efficiency of escalators, particularly in commercial buildings. Hence, such measures can enhance escalator efficiency, reduce accidents, and contribute to safer commercial building environments.

Keywords: *escalator, lack of maintenance, safety procedures, commercial building, maintenance activities.*

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INTRODUCTION

The escalator has had the greatest impact on commerce of any invention. As a convenient way to link different levels throughout the past century, the escalator has created a whole new universe that we now pass through on a daily basis. Even though it is the installation that is least appreciated by its consumers, the escalator was the most revolutionary aspect of this architectural modification process. It is still the most well-liked installation in our retail environment. Moving walkways and escalators are still essential for moving huge crowds of people. Escalators and moving paths must be properly planned in shopping malls, convention centers, businesses, theatres, and public transit facilities in order for people to move freely and successfully do business. This pamphlet serves as an all-inclusive manual for the entire goal process, from project conception to commission.

Commercial industry in commercial buildings, escalators and moving walkways are utilized to improve consumer density and hence aid to raise sales. The following real-world instances from everyday practice show exactly how and why: For instance: A department store Three elevator units were housed in a six-story department store in the heart of a European metropolis, and they were all controlled by the same control system. The goal was to increase client flow in order to increase sales on the top levels by 20%. The owner decided to build escalators on the planners' advice. Customer flow significantly improved as a consequence, and sales grew by more than 30%. Example 2: A food retailer supplied access to his store's upper floor through two welcoming and tastefully constructed glass elevators. For concerns of space, moving walkways had not been erected. Due to insufficient client traffic, the planned sales statistics on the higher floor were not met even after the elevators had been in use for a while. Sales increased once moving walkways were added. (Richard Harrison, 2009)

The buildings are designed to give people a place to live and a private area in which to conduct their everyday activities. The primary requirements of a decent shelter are being able to work efficiently and having enough space to offer comforts. For instance, particular utilities like plumbing, air conditioning, ventilation, elevators, and escalators must be offered for commercial buildings. Hamiazwa Azmi (2017) says moving stairs and escalators are two types of vertical transit that are frequently used in both business and residential structures to move people from one location to another. It is essential for getting people to and from above and below floor levels in retail centers. To minimize issues, the system must be able to operate efficiently, especially during busy times.

Major factors like design and location need to be considered when installing something in a structure. This is important to ensuring that the system is safe, comfortable for users, and that issues like sick building syndrome may be avoided.

As a result, regular and careful maintenance is required to ensure that the escalator can function properly and is appropriate for its intended use. Another essential area that the building owner must take care of is maintenance management. He or she has to consider how incorrect maintenance procedures and their associated expenditures might be avoided. When maintenance management is done correctly, an escalator system's lifespan may frequently be maintained without the need for major repairs or the installation of new machinery. (Battal Murat, March, 2023). Precursor requirements must also be fulfilled in accordance with the standards outlined in the SOP.

LITERATURE REVIEW

Humans need shelter to carry out their daily activities, as well as a private space for solitude, which is why buildings are constructed. One of a good shelter's key qualities is that it must provide enough comforts in addition to functional other capabilities. For example, commercial buildings need to have specialized services like plumbing, air conditioning, ventilation, lifts, and escalators. Escalators are a kind of vertical transportation that are frequently used to move people from one place to another, not just in commercial buildings but also in residential ones. They are also sometimes referred to as moving stairs. It is necessary for moving customers between upper and lower floor levels in shopping malls.

However, in order to prevent problems, especially during peak hours, the system must be able to operate properly. Before putting in a structure, certain important factors including design and placement must be taken into account. This is required to ensure that the system is secure, safe, and that issues like sick building syndrome may be avoided. As a result, regular, thorough maintenance is required to guarantee that the escalator is in good working order and suitable for its intended use.

The building owner also has to take care of maintenance management. He or she has to think about ways to reduce unnecessary maintenance costs and poor maintenance practices. If maintenance management is done correctly, an escalator system's lifespan may often be increased without requiring intensive maintenance or the purchase of brand-new equipment. In accordance with the standard operating procedure, prerequisite conditions must also be fulfilled. Both maintenance and safety measures are essential elements that should not be disregarded by all parties involved in light of the numerous escalator mishaps.

Maintenance of Escalator

A definition of escalator is a moving staircase that transports people between the levels of a building is called an escalator. It is frequently constructed in locations where lifts would be impractical. These consist of shopping centers, transit hubs, trade centers, hotels, and public buildings.

Estimates state that there are at least 33,000 escalators in the United States. Escalators are used by over 90 billion people annually. Escalators and moving walkways travel at a speed of 0.3 to 0.6 meters per second (1 to 2 feet). The steepest slope is 30 degrees, while the average increase is around 60 feet (18 meters).

Definition for maintenance is escalators are a fantastic invention. Steps and escalators can be built in the same physical space, but escalators can carry more passengers. Unless it's rush hour, there's typically no queue to get on an escalator. They can be used to point tourists towards important exits or specific exhibits. Escalators may also be constructed outside Both scheduled and unscheduled issues are resolved as soon as they occur. The preventative maintenance that the manufacturer advises doing on installed building equipment (IBE) and buildings is covered by this. It also includes engineering and/or contracted Architectural and Engineering (A&E) services that aid in the planning, creation, and execution of maintenance.

Definition of maintenance escalator are a maintenance duties include fixing or maintaining structural elements on a regular schedule. To ensure that the equipment may reach its maximum functional state, maintenance is frequently carried out on a regular basis. The act of keeping the system in top condition of operation is sometimes referred to as maintenance. Improved integrity, safety, energy efficiency, cost optimization, and an environment that is more favorable are a few advantages of effective maintenance management.

Escalator maintenance is necessary to keep it in safe operating condition. An escalator's lifespan can be increased with routine maintenance. In order to satisfy an organization's physical, financial, and social needs in all areas, maintenance is now essential. Run to Failure Maintenance, Preventive Maintenance, Corrective Maintenance, Improvement Maintenance, and Predictive Maintenance are all examples of maintenance chores. Repair or replacement tasks that are necessary for the system to function at its best are considered maintenance operations. For the action to be accomplished for the least amount of money feasible, it should be fair. The following elements of escalator upkeep include, but are not limited to: all safety sign ages and escalator directions are clearly displayed; the edges of each step must be marked with yellow lines; safety devices are equipped to prevent passengers' feet from getting caught on or at the sides of step; switch for emergency breaks is well functioning and can stop when pressed; and others.

Maintenance Activities of Escalator

Maintenance operations differ according to corporate policies. According to the information gathered from the interviews, all escalators require daily and weekly maintenance. Certain types of escalators require frequent maintenance on a daily or weekly basis. However, this is subject to the policies and regulations set out by the system's supplier. In general, the literature study recognizes daily and monthly maintenance as preventive and improving maintenance, respectively.

The maintenance procedures were chosen in accordance with the escalator maintenance philosophy after the evaluation. There were contradictions between the case study and the theory that were found. A specified set of rules that the building operator must abide by will establish the realistic procedures for escalator repair operations. As a result, the maintenance procedures carried out may have an impact on the escalator's performance. Escalator upkeep will keep the system operating efficiently. The longevity of the escalator system may also be increased. Based on a research done on escalator repair activities at shopping malls, the first goal, which was to determine the maintenance activities of the escalator in a commercial structure, was accomplished.

Basically, it is necessary to enable consumer movement inside the building in order to achieve ideal client density. On business properties and on office buildings, distances more than 50 meters should be avoided. The fundamental escalator layouts are shown in the charts below. The flow of customers through a store is influenced by a variety of factors, including the organization of the merchandise. Fast-moving commodities are typically offered at locations farthest from escalators. Working closely with expert shop planners or fitters is something we advise.

Research Focus

The core objective of this study is to establish a foundational framework for the effective maintenance of escalators within commercial buildings situated in the Perak region. Specifically, this research will focus on two prominent commercial establishments: Billion Shopping Mall Centre in Seri Iskandar, Perak, and AEON Mall Seri Manjung, Perak. The study aims to address important aspects of escalator maintenance, assess the current operational and maintenance practices in these business facilities, identify potential shortcomings in the existing escalator maintenance management systems, and ultimately provide well-informed recommendations for the development of a robust and tailored escalator maintenance plan.

Assessment of Current Operations: The study will involve a comprehensive assessment of the current operational and maintenance practices related to escalators within Billion Shopping Mall Centre and AEON Mall Seri Manjung. This assessment will encompass factors such as maintenance schedules, inspection routines, servicing protocols, and adherence to safety standards. Through meticulous data collection and analysis, the research will provide insights into the strengths and weaknesses of the current practices.

Identification of Maintenance System Issues: By closely examining the escalator maintenance management systems employed in these commercial facilities, the study aims to pinpoint any potential issues, gaps, or challenges. These may include inadequate scheduling, inconsistent servicing, lack of technical expertise, or deficiencies in safety protocols. The identification of such issues will serve as an important step in formulating effective solutions.

Informed Recommendations: Building upon the gathered data and insights, the research will develop well-reasoned and practical recommendations for an enhanced escalator maintenance plan tailored to the specific needs of Billion Shopping Mall Centre and AEON Mall Seri Manjung. These recommendations will encompass various aspects, including maintenance frequency, routine inspections, technician training, safety measures, and emergency response procedures. In order to achieve these research objectives, the study will likely involve a multifaceted approach:

Site Visits and Data Collection:

The research will involve on-site visits to the two commercial establishments to observe escalator operations, gather maintenance records, and engage with maintenance personnel. This direct engagement will provide firsthand insights into the current state of escalator maintenance.

Interviews and Surveys:

Interviews with maintenance staff, facility managers, and relevant stakeholders will be conducted to gain a deeper understanding of the operational challenges and perceptions of the current maintenance practices. However, there is a lot of limitation to interview the staff because of certain reasons. Surveys might also be employed to collect quantitative data on maintenance schedules, procedures, and concerns.

Benchmarking and Best Practices:

The study will likely involve a comparative analysis of industry best practices and benchmarks in escalator maintenance. This will enable the identification of global standards and innovative approaches that can be adapted to the Perak context.

Risk Assessment:

A thorough assessment of potential risks associated with escalator malfunctions and suboptimal maintenance will be conducted. This risk assessment will provide a basis for developing targeted and proactive maintenance strategies.

Ultimately, the study's findings and recommendations will contribute to elevating the quality of escalator maintenance practices within Billion Shopping Mall Centre and AEON Mall Seri Manjung, and by extension, set a precedent for enhancing escalator maintenance standards across the Perak region's commercial buildings. This research endeavor holds the potential to foster safer, more efficient, and more reliable vertical transportation systems, positively impacting both visitors' experiences and the overall operational efficiency of these commercial establishments.

RESEARCH METHODOLOGY

The study's methodology will be covered in this chapter. Every component of doing this study will be covered in this chapter, including the population, population frame, and survey sample procedures. Finally, this chapter provides a thorough explanation of the method of analysis and data collection that was selected.

This chapter provides a description of the research technique. It explains the methodology used to carry out this investigation as well as the justifications for doing so. This chapter also discusses several levels of research, such as data collecting and analysis techniques. This chapter also includes commercial building escalator maintenance training. This Chapter finishes with a review of reliability and validity in quantitative research, as well as how these requirements are satisfied in the current study in the basic method.

Quantitative Data Collection Method

In general, the term "research design" refers to a framework for planning and carrying out a specific research project. The research design is the most important aspect of the study since it takes into consideration all four main factors: the strategy, the conceptual framework, who and what to examine, and the instruments and methods to be utilized for data collecting and analysis. There are many different types of research designs, including qualitative and quantitative research. The two types of questionnaires that may be used in research are open-ended questions and close-ended questions. Open-ended questions allow respondents to respond based on their knowledge, whereas closed-ended questions may force respondents to choose from a list of multiple-choice answers. Both methods were used in the questionnaire to gauge the respondent's understanding of the subject. The survey is made available

to the general public in Seri Iskandar and Seri Manjung, Perak, using social media channels like WhatsApp.

RESULT AND FINDING

Objective 1 : To Identify The Current Operational Of Maintenance Activities For The Escalator In A Commercial Building.

According to questionnaire that distributed to the respondents, awareness of escalator maintenance is very important to occupant of the building. Most of the respondent agree that awareness of escalator maintenance is important for sustain functionality, safety and hazard.

The first objective of the research is to identify the current operational maintenance activities for escalators in a commercial building. This objective was achieved through a set of questions in section C of the online questionnaire.

1. Questionnaire Design and Data Collection:

The online questionnaire was designed to gather insights into the awareness and knowledge of escalator maintenance among the local community. The questionnaire likely consisted of multiple questions related to this topic. In the first question, respondents were asked if they were aware of escalator maintenance. Subsequent questions may have delved into the specifics of their understanding and familiarity with escalator maintenance activities.

2. Awareness and Knowledge Levels.

The data collected from the questionnaire revealed that the local community generally possesses a reasonable level of awareness regarding escalator maintenance in commercial buildings. The research findings indicated that only a small portion, specifically 15% of respondents, were unaware of the concept of escalator maintenance. This suggests that the majority, a significant 85% of the community, is indeed familiar with the concept of maintaining escalators.

3. Relationship between Awareness and Expertise:

Furthermore, the research examined the relationship between awareness and detailed knowledge of escalator maintenance characteristics. It's important to note that while a substantial percentage (85%) of the community was aware of escalator maintenance, the study revealed that a smaller proportion provided detailed answers regarding the intricacies of this maintenance practice.

4. Interpreting the Findings:

The research findings highlight that, overall, the local community possesses a moderate level of familiarity with escalator maintenance. The higher percentage of awareness suggests that the concept of escalator maintenance is generally understood. However, the relatively lower percentage of detailed knowledge indicates that while people are aware of the practice, they might not be well-versed in the specific activities involved.

5. Implications and Significance:

These findings have implications for both the community and those responsible for escalator maintenance. For the local community, the results suggest an opportunity for increased education and awareness about the specific maintenance activities associated with escalators. For maintenance personnel and building managers, this information could guide efforts to improve communication and awareness initiatives, ensuring that the community is well-informed about the importance of escalator upkeep and safety.

6. Future Considerations:

Future research or initiatives could focus on bridging the gap between awareness and detailed knowledge. This might involve targeted awareness campaigns, educational materials, or community engagement efforts to enhance the community's understanding of escalator maintenance practices and their significance.

In conclusion, the research successfully achieved its first objective by identifying the current level of awareness and knowledge of escalator maintenance activities within the local community. The findings provide valuable insights into the community's familiarity with this aspect of commercial building operations and pave the way for potential improvements in communication and education regarding escalator maintenance.

Objective 2 : To Determine Problem In The Implementation Of The Maintenance Management For The Escalator In A Commercial Building.

According to the study, the locals are aware of the risks associated with escalator maintenance failure, but most of them indicate that they are unsure of how to administer maintenance. Many members of the community agreed that even without effective awareness-raising, an escalator without maintenance can harm the original building and be dangerous to live in. They are shockingly knowledgeable on the scope and impact of this offense's demolition. This demonstrates that they are only vaguely aware of building-related local government guidelines and procedures.

The second objective of the research is to determine problems in the implementation of maintenance management for escalators in a commercial building. This objective was pursued through an online survey involving the local community.

1. Survey Design and Data Collection:

The online survey was designed to assess the local community's awareness and understanding of escalator maintenance, particularly focusing on potential issues in the implementation of maintenance management. The survey likely included a set of questions aimed at gauging respondents' knowledge of maintenance risks, procedures, and related guidelines.

2. Awareness of Maintenance Risks:

The research findings indicate that the local community is generally aware of the risks associated with escalator maintenance failure. Respondents recognize that neglecting maintenance can have adverse consequences for the original building and pose safety risks. This awareness highlights the importance of effective maintenance practices in ensuring both the structural integrity of the building and the safety of its occupants.

3. Uncertainty in Administering Maintenance:

A notable observation is that while respondents are aware of the risks, they express uncertainty about how to effectively administer escalator maintenance. This suggests that there might be a lack of knowledge or clear guidance on the practical aspects of maintenance management. This gap in understanding could potentially lead to suboptimal maintenance practices or decision-making.

4. Awareness vs. Implementation:

The findings suggest that although the community acknowledges the importance of maintenance, there seems to be a disconnected between awareness and actual implementation. While they recognize the risks, they may not possess the necessary information or tools to effectively carry out maintenance activities or make informed decisions regarding maintenance management.

5. Building-Related Guidelines and Procedures:

Another insight from the study is that community members appear to have limited familiarity with local government guidelines and procedures related to building maintenance. This lack of knowledge might contribute to the uncertainty mentioned earlier, as well as hinder the community's ability to ensure proper maintenance practices are followed.

6. Implications and Recommendations:

The research findings underscore the need for improved education and awareness efforts focused on bridging the gap between recognizing maintenance risks and effectively implementing maintenance management. Community members should be empowered with knowledge about not only the potential consequences of maintenance failure but also the practical steps and resources available to ensure proper upkeep.

7. Community Engagement and Education:

Addressing the identified problems could involve initiatives such as community workshops, information campaigns, or resources that provide clear guidance on maintenance procedures, local regulations, and best practices. By enhancing the community's understanding and confidence in maintenance management, the building's safety and longevity can be better assured.

8. Collaboration with Authorities and Experts:

To better align community practices with local government guidelines, collaborations between local authorities, building management, and maintenance experts might be valuable. This could involve disseminating information, conducting training sessions, and fostering a culture of proactive maintenance within the community.

In conclusion, the research successfully addresses its second objective by identifying problems in the implementation of maintenance management for escalators in a commercial building. The findings emphasize the need for targeted educational efforts and improved communication to empower the community with the knowledge and tools to effectively manage escalator maintenance and mitigate associated risks.

Objective 3 : To Recommend A Suitable Strategy In Maintenance For The Escalator In A Commercial Building.

The local community's opinion on the present process and their preferred proposal to raise awareness about the maintenance of escalators in business buildings are two items in the questionnaire that are linked to this purpose. It may be said that the majority of the local population prefers radio as an effective medium for raising awareness. Other suggestions include utilizing social media platforms like Facebook and WhatsApp, which is excellent given that the majority of the local population spends their free time looking via social media. Most of them expressed satisfaction with the escalator's performance while commenting on the procedure. However, a specific statement indicates that they want improvement and are not familiar with the process.

The third objective of the research is to recommend a suitable strategy for maintenance of escalators in a commercial building. This objective is informed by the local community's opinions and preferences on awareness-raising methods for escalator maintenance.

1. Community Feedback and Awareness-Raising:

The research gathered valuable insights from the local community about their opinions on the current maintenance process for escalators and their preferred approaches to raising awareness about escalator maintenance in commercial buildings.

2. Preferred Awareness Medium:

An interesting finding is that the majority of the local population prefers radio as an effective medium for raising awareness about escalator maintenance. This indicates that radio broadcasts could be a highly impactful method for reaching a wide audience and conveying information about maintenance practices. Radio has the advantage of being accessible to a large portion of the population, and it can be particularly effective in areas where television commercials might be less feasible or engaging.

3. Utilizing Social Media:

Another recommendation that emerged from the community's feedback is the use of social media platforms like Facebook and WhatsApp. Given that a significant portion of the local population spends their leisure time on social media, leveraging these platforms for awareness campaigns could be highly effective. This approach capitalizes on the popularity of social media among the community and provides a means to reach a tech-savvy audience.

4. Satisfaction with Escalator Performance and Desire for Improvement:

The research findings indicate that most respondents are generally satisfied with the performance of the escalators. However, there is a specific mention that improvement is desired and that the process of maintenance is not well understood. This highlights the importance of clear communication and education regarding maintenance procedures to address this gap in knowledge and understanding.

5. Local Authority Involvement and Communication:

A valuable suggestion from a respondent is that local authorities should provide a comprehensive explanation of the nature and process of enforcement related to escalator maintenance. This aligns with the need for transparent communication and education to ensure that community members are wellinformed about the importance of maintenance and the steps involved.

6. Consideration of Smartphone Use:

Given the widespread ownership of smartphones among the population, the use of social media for awareness campaigns is particularly promising. This approach acknowledges the prevalent use of smartphones and positions social media as a convenient and accessible platform to disseminate information.

7. Balancing Engagement Methods:

While radio and social media are recommended as effective mediums, it's important to strike a balance between different methods of engagement. The research suggests that television commercials may capture attention effectively, and combining various approaches such as radio, social media, and targeted events could lead to a comprehensive awareness-raising strategy.

In conclusion, based on the community's feedback and preferences, a suitable strategy for escalator maintenance awareness could involve a combination of radio broadcasts and social media campaigns. Transparent communication from local authorities, along with educational initiatives on the nature and process of enforcement, would further enhance community understanding. The goal is to create a multifaceted approach that leverages both traditional and digital mediums to effectively convey the importance of escalator maintenance and encourage active participation in ensuring the safety and longevity of escalator systems in commercial buildings.

RECOMENDATION FOR FUTURE RESEARCH

The local authority and public point of view should be consulted in order to gain a highly in-depth investigation and identify the variables influencing the degree of local awareness. This will assist in raising the general issue of the community's awareness. Face-to-face interviews are required in addition to the online questionnaire approach in order to fully understand the scenario the local community is facing in relation to the research. Due to the mobility restriction order, this research is deficient in a number of data points, but it is still able to accomplish its goal and get a better understanding of how the local population feels about the unlawful building development taking place nearby. Future studies might benefit from being able to collect information about the local authority's approach to raising awareness directly from them.

CONCLUSION

The conclusion covered the findings and suggestions made by the research. Whether the goal was achieved was determined by the research's data. All three goals have been achieved, and it is clearly clear that people are aware of the need to maintain escalators in business buildings. They obviously understand maintenance escalators, but the technical and legal details are not given. Without this study, the researcher would not know how well-informed the local population is about escalator maintenance. The local community's opinion may be utilized to get comments and recommendations that can assist advise the best approach to take and the subjects that should be discussed local.

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Tarikh : 20 Januari 2023

Prof. Madya Dr. Nur Hisham Ibrahim
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