

# ANALYSIS OF BUILDING DEFECTS AT RESIDENTIAL COLLEGES: A CASE STUDY AT HIGHER EDUCATION FACILITIES

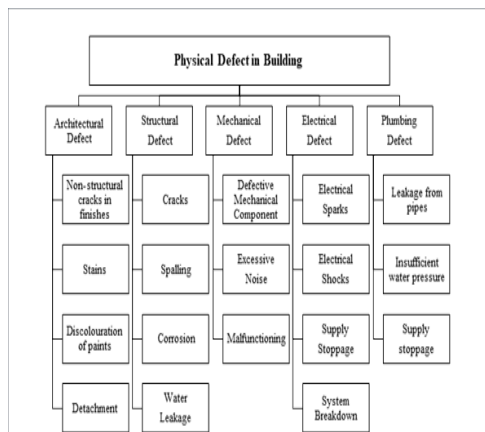
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## Graphical abstract



## Abstract

Residential colleges are where students spend a significant amount of time at university. The university’s maintenance team must keep the building facilities in good condition to ensure the safety and comfort of the students and staff as well as to protect the university’s reputation. However, with today’s economic challenges, management frequently encounters difficulties in maintaining the buildings, resulting in the high number of complaints from building users. As a result, early detection of complaint trends is critical in reducing issues. Based on user complaints and the ‘learning from failure’ philosophy, the main aim of this study is to identify the most common complaint of building defects in residential colleges. The scope of the study is limited to 9 residential colleges from one (1) Malaysian public university. Complaints from 2012 to 2017 due to defects were categorized into 3 main areas of civil, electrical and mechanical. From here, the most frequent complaints from these categories were then identified. From the findings of this study, defects under civil received the highest number of complaints (62%), followed by defects under electrical (35%) and mechanical (3%). Under the category of civil, most defects were reported due to damage component, leaking and clogging. The solutions emphasize the importance of quality control, on improving workmanship, increasing building occupants’ awareness level, and improving complaints management. Overall, this study is significant when constructing new buildings because it provides information to the operation team as early as the design stage to consider the possibility of future maintenance activities, and planning improvement.

*Keywords:* Complaints, Defects, Maintenance, Residential College

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## 1.0 INTRODUCTION

All high school students aspire to attend university to further their education. They will consider not only the university’s ranking but also the university’s amenities in comparison to those of other universities to select the best of the best. Students have high expectations of university facilities due to the increasing media influence. Most of the building’s facilities, however, are already under service by almost half of their lifespan. Building deterioration occurs as a result of internal factors such as maintenance and external factors such as weather [1]. Pheng and Wee [2] suggest that defects are caused by both nature and human error. According to Douglas [3], factors such as wear and

tear and vandalism also contribute to the deterioration process. Meanwhile, Seeley [4] found that 58% of defects were caused by faulty design, 35% by operation and maintenance, 12% by poor materials and systems, and 11% by unexpected user requirements. Chew [5], on the other hand, found the occurrence of defects in wet areas was due to deficient construction (43%), material (37%), design (11%) and maintenance practices (9%). Hence, regular maintenance is important to ensure the continuous operation of the building. Nonetheless, maintaining an old building (for instance more than 10 years old) is more challenging than maintaining a new one. Not only does a university has many buildings to conduct lectures and classes, but it also has other facilities such as gymnasium, stadium, and laboratories that must be maintained regularly. The larger the

compound of the campus, the more resources they will need to maintain the facilities. The constraint in maintaining a large campus is to meet the users' satisfaction. Many complaints will normally be lodged when the facility's performance failed to satisfy the needs of the users.

To keep the reputation of the university, management must meet users' expectations. Hence, this study focused on the complaints lodged by the students on their residential college facilities. The complaint is collected and analyzed from the complaint database. Schmitt and Linder [3] stated that customer complaints may help to improve the quality of life. In this case, universities can evaluate the problem mostly faced by the students based on the complaint data and prepare the appropriate maintenance measures to address the problem. This action is taken to avoid the recurrence of the same issues in the future. When the concerns are resolved, the number of complaints will decrease, and the university's image will improve. Previous study found that students frequently complained on the condition of the building provided by the university [4]. Therefore, based on the 'learning from failure' philosophy, the purpose of this article is to identify the most common complaints on building defects at residential colleges in Malaysian public university and recommended prevention methods. This study involved nine (9) residential colleges with a total of 179 buildings, with complaints data from 2012 to 2017. This case study, however, is limited to only one (1) university. As a result, the findings may not reflect the defects of other universities or higher education facilities.

However, these findings can be utilized as a guide for those working in the construction industry. According to Chong and Low [5], architects rarely refer to standards and codes, resulting in frequent building defects. The contractor, on the other hand, had poor supervision during the construction stage, which resulted in numerous defects. Creating a knowledge database based on complaints data will enable more understanding to both architects and contractors. Architects will be able to design buildings with fewer defects, while contractors will be able to more closely monitor their workers, particularly in areas where defects are prevalent. Finally, it is hoped that this research would help people minimize the amount of defects to a bare minimum.

This article is divided into six sections, which are as follows. Section 2 discusses the most common building defects. The methods and data analysis used in this study are presented in Section 3. Section 4 then presents the findings and discussions, and Section 5 offers prevention and recommendations for improving quality performance. Finally, the final section summarizes and concludes the study's findings.

## 2.0 LITERATURE REVIEW

### Defects in the Building

Defects are defined as failures or shortcomings in a building's function, performance, statutory or user requirements, which can occur to its structure, fabric, services or other facilities [2, 6]. According to Pheng and Wee [2], defects are caused by both nature and human error. All buildings will have defects from the moment they are built. The only difference is the severity of the defects. Defects occur not only in the building structure but also in the building components. Defects in the components, if not

addressed promptly will spread to other components, potentially leading to more serious failures in the physical condition of the entire building [7]. Defects will make the occupants feel uncomfortable and may even jeopardize their lives if no appropriate action is taken. Therefore, it is important to understand the common defects and factors that cause them.

Faqih, et al. [7] exhibited 5 categories of factors that affect the physical condition of the building, namely mechanical, electro-magnetic, thermal, chemical, and biological factors. Meanwhile, Seeley [8] found that 58% of defects were caused by faulty design, 35% from operation and maintenance, 12% from poor materials and systems and 11% from unexpected user's requirements. Douglas [9], on the other hand, stated wear and tear as well as vandalism as the contributing factors to the deterioration process. Chew [10] carried out research on wet areas found that the occurrence of defects were from deficient construction (43%), material (37%), design (11%) and maintenance practices (9%). Chong and Low [5] categorized roots of defects into 4, namely design, workmanship, material and maintenance.

Wear and tear factors impacted both building structure and building components. According to a case study by Chew [10], building age was ranked 6<sup>th</sup> with a mean of 3.56 for the factor that generates defects in wet areas. Not only that, maintenance operations for old buildings are more complex than those for new buildings. According to Yacob, et al. [11], building defects, on the other hand, occurred in diverse forms and to varying degrees, regardless of the age of the building. Building age, of course, influenced the number of defects, but it is also affected by various factors, such as material quality, stress applied to the building structure and weather. In one case study of building maintenance practices at a Malaysian university by Lateef Olanrewaju, et al. [12], it was revealed that a university received a large number of monthly complaints regarding the poor condition of the building and its component, even though the buildings were in service between 15 and 20 years old. The performance of a building is heavily reliant on maintenance activities. Regular maintenance of the building's facilities will keep the building operational but will not stop the deterioration process. Without appropriate maintenance practice, the deterioration process will accelerate. Dzulkifli, et al. [13], however, stressed the challenges in managing maintenance tasks in Malaysia. The challenges were divided into 3 categories, namely 'planning and management, 'people and competency' and 'technology and technical issues. Planning is essential for performing maintenance practices effectively, especially when dealing with a variety of building types and numbers. Not to mention that resources such as budget, manpower and materials all play a significant influence in the sustainability of maintenance operations. Furthermore, technology will be an excellent instrument for improving the efficiency of maintenance practices. Since buildings degrade with time, the use of technology such as Artificial Intelligent (AI), Artificial neural Network (ANN), Internet of Things (IoT), and others will be able to predict the remaining life of the building and its components, allowing maintenance to be performed on time. This is known as proactive maintenance, and the most cost-effective method.

Faqih, et al. [7] divided the categories of the physical defect into 5, namely architectural, structural, mechanical, electrical, and plumbing defects. Figure 1 presents the categories of physical defects in the building. There were many studies reported on the occurrence of the common defect in various types of buildings.

Isa, et al. [14] conducted a study in a university and found that many defects came under the architectural work discipline with 63%. Under this discipline, that the most frequent type of defects includes non-functional windows, water seepage, damaged door, damaged window and untidy wall painting. Similarly, a study by Bortolini and Forcada [15] on building campus found that the most common defects in façade were water problem (64.2%) such as leaking, moisture and entrapped water, cracking (54.7%), and detachment/broken (41.5%). Furthermore, building service installation often develops defects during its operational use. Unwanted breakdown of building services may cause discomfort or even devastating consequences. Examples of common defects in building service includes stoppage in water and electricity supplies, unclean water, insufficient water pressure, improper closing of lift door and false alarm in fire services [7].

Many studies had shown frequent problems such as water leakage, non-functional building elements, cracks, and other issues that impact the physical state of the structure and building components. To assist the maintenance team in minimizing all these defects, it is critical to understand the typical types and causes of these faults, thus the maintenance team has a guide to

effectively carry out the maintenance duties to prevent them from reoccurring.

#### Analysis of Common Defects from Previous Literature

Table 1 summarizes defects found in previous studies conducted in a variety of countries. The majority of the literature cited was focused on new construction (1-6 years). Cracks, water seepage, leakages, damaged components (door and window), and M&E defects such as air conditioning, lighting, plumbing, and so on were mostly reported [5, 10, 14, 16, 17]. Plebankiewicz and Malara [17] stated that reports on problems associated with defect were minimal in the first half of the year after the building was commissioned, but steadily rose on the following year. Meanwhile, problems in building services such as electrical supply were high in the early building commissioned, but decreased over time. All defects were caused by poor workmanship during installation, using low quality material, lack of consideration in maintenance issues during the design stage, poor maintenance planning and vandalism.

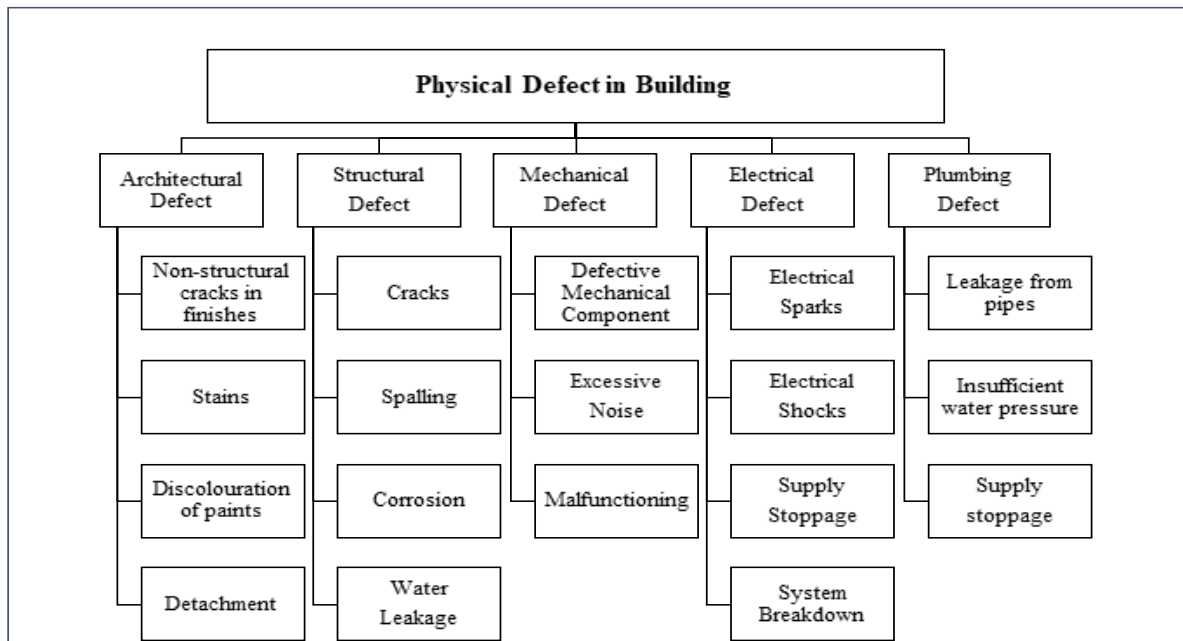


Figure 1 Categories of physical defects in a building [7]

Table 1 Summary of Defects from Previous Study

Authors	Chong and Low [5]	Isa, et al. [14]	Carretero-Ayuso, et al. [16]	Plebankiewicz and Malara [17]	Chew [10]
Type of building	Institutional building, hospital, residential, commercial	University building	Residential building	Residential building	Non-residential high-rise building
State of building/Age of building	2-6 years	New building	-	1-2 years	1-30 years
Survey duration	-	Defect Liability Period	2011-2013 (Judicial complaints)	2018-2020 (Acceptance stage)	-
Country	Singapore	Malaysia	Spain	Poland	Singapore
Defects	Crack, water seepage,	Non-functional	Leakages and humidity,	Window and door	Water leakages,

	damaged or spoilt ironmongery for door and window, leakages, missing item, M&E defect (A/C, light fitting, urinal sensor and heating element)	windows, water seepage, door damaged, window damaged and untidy wall painting	anomalies and mismatch, obstruction and clogging, deficient ventilation and foul odors, and deficiently placed elements	joinery, electrical installation, defect in terrace and balconies area, scratches, dampness, plumbing installation, central heating installation	corrosion pipes and spalling of concrete
Failure Causes	Moisture from wet area, impacts from occupants, deteriorates faster than expected and weather	Work not accordance to specification, poor workmanship, lack of protection, vandalism and water seepage	Damaged in the installation, various, and inadequate tail-end	-	Deficient construction, material, design and maintenance practices
Prevention Method	Appropriate materials, protection against occupants and loads, prevent water leakages	-	Early detection and diagnosis of faults	-	-

### 3.0 METHODOLOGY

A case study was conducted at 9 residential colleges in 1 Malaysian public university. This study used content analysis to analyze complaint data (secondary sources) in the residential colleges. The information was extracted from the available database system from 2012 to 2017. In this study, the residential colleges are identified as K1 to K9, with a total of 179 buildings. Two (2) buildings with 1 floor level; 68 buildings with 2 floor level; 68 buildings with 3 floor level; 13 buildings with 5 floor level; 6 buildings with 7 floor level; and finally, 22 buildings with 8 floor level. This university was chosen as a case study because it has a large number of buildings and some of the buildings have reached certain ages and are prone to many defects if not properly maintained. Table 2 summarized the building details of the case study.

All complaints were analyzed, resulting in 55439 complaints. Using Frequency Analysis, the complaints were then classified by year, college and category. Due to the large volume of data, only categories with the highest number of complaints were subjected to a more thorough analysis. In addition, since a single complaint can contain multiple issues, the total number of issues surpassed the total number of complaints. Finally, all the results were tabulated with appropriate relationships for better comprehension.

Table 2 Details of Residential Colleges

College	Age of Building	No. of Storey		No. of Units
		Storey	Nos	
K1	15	3	2	1,180
		8	4	
K2	16	3	2	1,100
		7	6	
K3	16	3	1	715
		5	2	
K4	16	3	1	715
		5	2	
K5	16	8	18	503
K6	23	2	23	840

		3	16	
		5	6	
K7	34	1	1	977
		2	11	
		3	17	
		5	1	
K8	31	1	1	1,032
		2	15	
		3	16	
		5	1	
K9	30	2	19	1,032
		3	13	
		5	1	

The data obtained in this study was divided under 3 main categories, namely civil, mechanical and electrical. It should also be noted that architecture and plumbing were included under the category of civil. All categories were sorted by their identification (id), date requested, date completed, problem section (name of the category), details of the complaint, location and status. Table 3 shows the examples of defects under the 3 categories:

Table 3 Example of Defects by Category

Category	Description
Civil	<ul style="list-style-type: none"> <li>• Defects in ironmongery element                             <ul style="list-style-type: none"> <li>○ Non-functional window handle</li> <li>○ Non-functional doorknob</li> </ul> </li> <li>• Plumbing system issue                             <ul style="list-style-type: none"> <li>○ Leaking</li> <li>○ Clogging</li> <li>○ Low water pressure</li> </ul> </li> <li>• Flooring issue                             <ul style="list-style-type: none"> <li>○ Tiles crack</li> <li>○ Cement crack</li> </ul> </li> <li>• Ceiling issues                             <ul style="list-style-type: none"> <li>○ Roof leak</li> </ul> </li> <li>• Animal attack on building component</li> </ul>

Mechanical	<ul style="list-style-type: none"> <li>• Defects in Air-Conditioning                             <ul style="list-style-type: none"> <li>○ Leaking</li> <li>○ Air-cond not functioning</li> </ul> </li> <li>• Lift issue                             <ul style="list-style-type: none"> <li>○ Lift non-functioning</li> <li>○ Lamp non-functioning</li> </ul> </li> <li>• Fire system                             <ul style="list-style-type: none"> <li>○ 'EXIT' signage not operate</li> <li>○ Emergency bell keeps ringing</li> </ul> </li> </ul>
Electrical	<ul style="list-style-type: none"> <li>• Defects found to fan, lamp, plug – malfunction or low performance</li> </ul>

### 3.0 RESULTS

#### Total Number Of Complaints

From 2012 to 2017, a total of 55,439 complaints were received from all residential colleges of the 179 buildings. Figure 2 depicts the year-to-year percentage trend in the number of complaints. The percentage was calculated based on the cumulative of the complaints lodged in the 6 years duration. It was discovered that the pattern of complaints slightly increasing. From 2012 to 2017, the highest number of complaints received was in 2016 with 11,124 (20%).

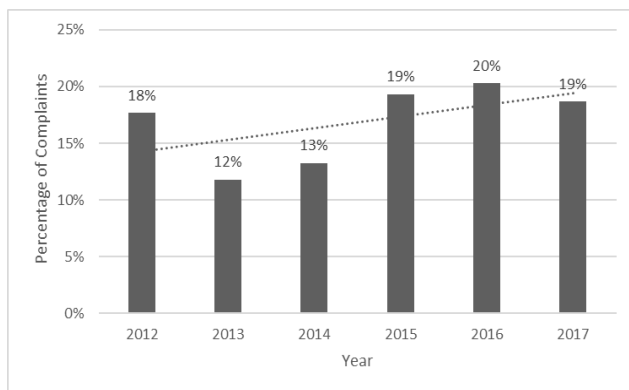


Figure 2 Percentage of complaints from 2012 to 2017

#### Number of Complaints by College and Category

The data were then analyzed to determine the differences of complaints between the colleges. From the analysis, K5 college has the highest number of complaints among the other colleges, with a total of 18.3%. K7 college received the second-highest number of complaints with 14.3% complaints, followed by K6 with 13.4% complaints. The number of complaints received from K9, K8 and K1 colleges were 12.6%, 12.0% and 10.5%, respectively. Finally, K2 and K4 colleges received the lowest number of complaints, with 7.1% and 7.0%, respectively. It is important to note that the majority of these complaints come from students who reside at colleges. K5 had the highest number of complaints, possibly because the students are more concerned about their well-being and low quality (design, workmanship, material) during construction. Findings from Chew [10] proved that construction quality plays an important role in most defect analysis. Details about the complaints will

be discussed in the section below. Figure 3 illustrates the percentage of complaints according to each college and their main categories.

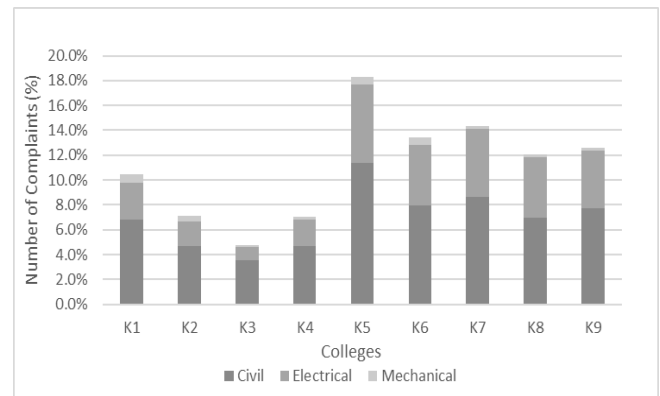


Figure 3 Percentage number of complaints according to each college and main category

#### No. of Complaints by Age of Buildings

By the rule of thumb, as a building ages, the materials inside it age as well, resulting in more damaged material and thus increase in the number of complaints. However, this study reveals a surprising result which is building age does not influence the number of complaints. Figures 4 depict the link between the percentage of complaints by college and the age of the building. As shown in Figure 4, K5 having the largest amount of complaints, despite the fact that the building is just 16 years old. In contrast, K7, the oldest building at 34 years old, had less complaints than K5. A likely reason for this outcome is the influence of other factors such as poor maintenance activities, deficient construction materials and internal factors such as vandalism.

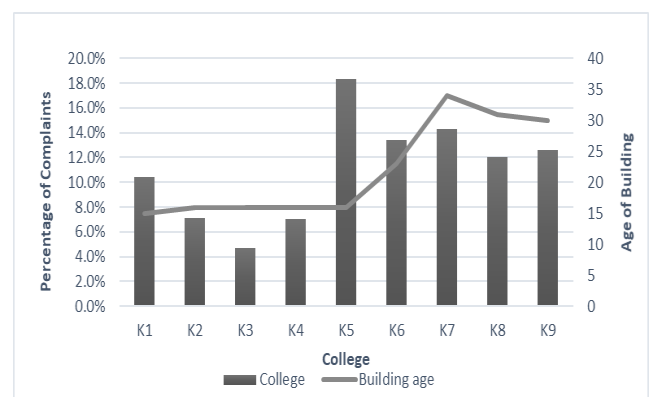


Figure 4 Percentage of complaints by college based on building age

#### Details of Complaints by Category

From the data analysis, the main category under civil received the most complaints (62%), followed by electrical (35%) and mechanical (3%). Table 4 summarize the number of complaints by each category. The category under mechanical received the least complaints as compared with the other categories. The reasons may be because 1) there was no complaints, 2) data cannot be captured due to several reasons or 3) data were

missing. Furthermore, the involvement of architectural and plumbing under the civil category was the reason why it was the highest. A previous study by Isa, et al. [14] on another case study, found that architecture defects had the highest number of complaints as compared with the other categories under mechanical, electrical and civil.

**Table 4** Details of Complaints by the Main Category

Rank	Category	Number of Complaint	Percentage (%)
1	Civil	34,630	62
2	Electrical	19,015	35
3	Mechanical	1,794	3

### Classification of Defects under Civil

A total of 35,080 issues of defects categorized under civil were received from 2012 to 2017. The defects were further analyzed by grouping them into several classifications. Table 5 presents the classification of defect, most common types of defect occurrence and the percentage of defects. The majority of defects occurrence were from damage component, accounting for 59.8%. This was followed by leaking at 14.1%, clogged at 12.6%, technical issues at 10%, and missing component at 3.5%. It should also be noted that the age of the total 179 buildings ranged from 15 years to 34 years. Therefore, all the buildings are considered old and had received several maintenance procedures. However, the frequency of maintenance procedures was not included in the data analysis.

**Table 5** Classification and Type of Defects

Classification of Defect	Type of Defect	Percentage (%)	Rank
Damaged Component (D1)	1. Door damaged	59.8% (20,970)	1
	2. Non-functional sliding door		
	3. Door ironmongery damaged		
	4. Doorknob not provided		
	5. Window handles damaged		
	6. Flush not working		
	7. Shower head not working		
	8. Cistern not working		
	9. Ceiling damaged		
	10. Floor tile crack		
Leaking and Water Seepage (D2)	1. Sink leak	14.1% (4,952)	2
	2. Sewerage pipe leak		
	3. Cistern leak		
	4. Bottle trap leak		
	5. Water Seepage from external wall/ slab		
Clogging (D3)	1. Shower room filled with water	12.6% (4,426)	3

		2. Pantry blockage	
Technical Issues (D4)	1. No water	10%	4
	2. Low water pressure	(3,515)	
	3. Animal/ insect attack		
Missing Component (D5)	1. Shower head missing	3.5% (1,217)	5
	2. Toilet door does not have lock		
	3. Ceiling missing		
	4. Window handle		
	5. Key missing		

The category under civil recorded the highest number of complaints, with 62%. However, no complaint was received on issues regarding the structural element. This is because the users lodging the complaints are students who may have little knowledge regarding the defects in the structural element. Therefore, they will not report the defect unless it causes discomfort and may threaten their safety. That is why the maintenance team should not only focus on solving complaint issues but also to have regular maintenance schedule to check on the structural element. This will reduce the effect of unwanted or sudden failures that will cause more damage in the future.

### Causes of the Defect

From the analysis, damaged component was the most reported complaints by the users, of which in this case were students. Component damage occurred due to 3 factors, namely 1) low material quality, 2) lack of routine maintenance and 3) vandalism [18, 19]. Low quality of the material is frequently used to cut costs, whereas lack of routine maintenance affected much to the older material and facility of which preferred corrective action should be taken when they are used until it is damaged or unusable (due to tight budget). Both arguments have financial component consequences at their core. Lastly, vandalism occurred due to the lack of self-belonging awareness on asset preservation whereby the students did not value them.

Leakage was the second most common defect, accounting for 14.1% complaints by the students. Reported leakage usually came from the sink and shower as well as from the slab or floor components, resulting in discomfort to the students. At the same time, the management of the building had to bear high water bill. Slab leakages occurred when the waterproofing used on the structure reached its service life or poor quality of waterproofing material and workmanship during the installation [5, 10, 14]. Meanwhile, leaking from the sink or shower may be due to the malfunction of the material to perform its purposes or poor workmanship during installation [10]. Clogging usually occurred when the cleaning activities was not following the maintenance schedule, resulting the wastes to be trapped inside the floor trap. Therefore, cleaning activities should be conducted daily to avoid these problems.

In the technical issues classification, many complaints came from the 'no water' issues, low water pressure and animal or insect attacks. Also, depending on the location of the building (for example, near the forest), animal attacks were often

complaint by the students. This is something that can be classified as unplanned maintenance in which they will take action when there is a complaint. Lastly, missing component was the least number of complaints at 3.4%. This type of complaint was mostly came from misplaced room key, missing window handle, and others. This is not considered as a critical issue because if the material is available, the maintenance team will handle this type of complaint immediately. However, if the component is not available, then it may take longer time, especially when there is a need to replace them with the same specification. Therefore, providing spare parts is important in a maintenance management system. Table 6 summarizes the most common defects under the category of civil and its failure causes.

Finally, the authors discovered similarities of common defects between this study and previous literatures (refer to table 1). The majority of previous literature's defects have issues on damaged component, particularly in the door and window area. This item, no matter how old it is, is prone to defect. Meanwhile, leaks and water seepage are prevalent at toilets, pipe joints, and concrete slab. Clogging, on the other hand, is ranked third in this study, but there is less literature on this issue. Extracted literatures are mainly from new building, hence it can be said that clogging is not critical in early building commissioned, but it can get worsen over time. Furthermore, this study found less complaints about technical issues, which is consistent with past research. Finally, both in this study and in the literatures, the missing component is the least mentioned. As a result of this research, it is feasible to conclude that, regardless of which countries or types of buildings are studied, they all exhibit similar defects throughout time.

**Table 6** Summary of Common Defects under the Category of Civil with its Causes

Civil Defect Category	Failure Causes
Damaged Component	Poor material quality Lack of routine maintenance Vandalism
Leaking	Waterproofing reached its service life Poor material quality Vandalism
Clogging	Poor maintenance activities Vandalism
Technical Issues	System breakdown Animal attacks
Missing Component	Vandalism

## 4.0 PREVENTION METHOD AND RECOMMENDATION FOR PERFORMANCE IMPROVEMENT

### Quality Control

A quality check is essential due to high percentage of damaged component in this study. The PDCA (Plan-Do-Check-Act) cycle is a method used for quality improvement that had shown to be able to improve the service quality [20]. This strategy is utilized in numerous ISO management standards [21, 22], including ISO 41001: 2018 – Facility Management [23]. According to this

standard and its method, providing the resources must start at the planning stage. For instance, Clause 7.1 mentioned that “the organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the facility management (FM) system” [23]. Therefore, the operation and maintenance (O&M) team must participate in the selection of the material during the design stage. Based on their O&M experience and budget provided, this team will pick appropriate material that are durable and suited for the population, as well as its availability and easy to maintain. Not only that, the quality of the material must assess together with its improvement. PDCA cycle is capable of providing diagnosis on process evaluation, allowing organizations to make a further decision [24]. Therefore, quality control is very significant for organizations improvement.

### Periodical Maintenance Management

From to the findings of this study, poor maintenance is often the cause of the many defects issue. Therefore, maintenance management should not only focus on complaints but also conduct frequent inspections of the overall building performance. Chanter and Swallow [25] described the types of maintenance strategies, which are preventive maintenance and corrective maintenance. Preventive maintenance is the process through which maintenance staff check a facility, identify problems and fix them before they become worse. Meanwhile, completing repair work after a construction part fails is referred to as corrective maintenance. As such, preventive maintenance is a regular maintenance, while corrective maintenance involved resolving complaints. According to Chanter and Swallow [25], it is costly to implement corrective maintenance. According to Qu-Yong et. al., complaints, on the other hand, are unavoidable, however, by continuously performing maintenance, the number of complaints can be reduced [26].

### Improvement toward People Competency

Competency defined by ISO [23] as the ability to apply knowledge and skills to achieve the desired result. Competencies refer to persons who do labor activities and those who supervise in the context of a building operation. Both personnel must be knowledgeable in their respective fields to assure the quality of building performance. Previous research [26-28] showed that improving staff competencies will increase staff aptitude for divergent thinking and productivity. Competency may be acquired by attending seminars and training programs. Consequently, it is the obligation of the management team to ensure that all employees are competent in their scope of work. As stated in ISO 4001: Clause 7.2 [23], people performing labor work, on the other hand, must have a professional qualification and be skilled enough for the job.

### Awareness and Imposing Penalties

One of the most prevalent sources of problems is vandalism. This problem existed worldwide, regardless of the country. As a response, Chong and Low [5] suggested that high quality material to be used and as well as strict rules to prevent this from happening. Also, building owners can prevent vandalism by raising knowledge about the value of the assets and

imposing penalties on individuals who do harm on the property.

### Effective Complaints Management

Communication and satisfaction are the criteria in the project success factors [29]. Complaint acts as a channel between building occupants and management, and as such, it must deliver on its claims. Sufficient information on the complaint's reports will help the maintenance personnel to carry out the work easier. Therefore, by following guidelines from the Government of Western Australia [30], an effective complaint report should include:

- a) Details on the defects with appropriate picture as an evident
- b) Maintenance personnel should state the cause of the defect
- c) Provide details as to what code, standard, permit, specifications, manufacturer's recommendation or equipment the defect is non-compliance with.
- d) Provide recommendations to remedy the defect.

Providing pictures will assist maintenance personnel in identifying the problem and obtaining available supplies and manpower for the job. It is or course not all situations can be solved by simply looking at a picture, but it does assist to reduce the amount of time to manage the situation.

Enough information allows the maintenance personnel to learn and improve their knowledge and skills. Continuous improvement, as mentioned in ISO 41001, will increase service quality performance. To do this, maintenance employees need to add few extra details to the current complaints report, as described above. If the data is saturated, the Engineer may finally create a handbook to help with the maintenance work. Overall, a comprehensive database system will facilitate the auditing process.

## 5.0 CONCLUSION

Buildings are constructed from many complex and complicated components and systems, making it difficult to access the condition. Universities on the other hand, with various types of buildings and infrastructure, if fail to operate will have a negative impact on their image. To provide an appropriate diagnosis during an inspection, it is critical to understand the elements that give a significant reputation to the building condition. Structural defects will degrade the state of the building and risk the safety of the occupants if the source of the problem are not identified. Meanwhile, other defects will cause discomfort to the occupants, and if not managed properly will also harm the occupants. Therefore, both types of defects are very important to be identified and managed properly. In this study, complaint on defects under the category of civil were the highest (62%), followed by electrical (35%). The lowest complaint came from the category under mechanical (3%). Under the category of civil (which is the focus of this study), most complaints came from damage component, leakage, clogging, technical difficulties and component missing.

The outcomes of this study will assist university management in identifying the types of problems that typically arise during

the service life of a building. Knowing the most prevalent defects allows management to plan suitable strategies to prevent or minimize the occurrence of those issues. Taking suitable actions, such as preventive maintenance, could reduce the cost and time required for large repairs caused by minor defects propagating into major defects. By identifying all of the problems and their causes, recommendations are proposed to ensure that the building can be effectively maintained to improve its service life. Finally, the primary goal of providing acceptable facility service to occupants or users can be met. This paper is focusing on complaints of record based on user satisfaction with their lodging building. This research can be expanded more in terms of defects' severity and their consequences for the building's functioning. Besides, any discoverable defects that are neglected without any rectification could deteriorate the building's function. Therefore, such effects should be investigated to assist the efficiency of building operations and maintenance.

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