

Space Utilisation Rate of Public Higher Education Classrooms in Klang Valley

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ARTICLE INFO

Article history:

Received 12 March 2024

Revised 15 April 2025

Accepted 08 June 2025

Online first

Published 01 January 2026

Keywords:

space utilisation

high education

classrooms

utilisation rate

frequency

occupancy

DOI:

10.24191/bej.v23i1.1106

ABSTRACT

A study on the space utilisation rate of public higher education classrooms to accommodate the increasing demand for educational spaces by focusing on their classrooms. Identifies several factors contributing to space inefficiencies, including low utilisation rates, a mismatch between space design and usage, and lack of organisation within classrooms. The study focuses on current practices on space management mixed method been applied towards three (3) public higher institutions are selected within the Klang Valley area. The study is specifically covered in the College of Built Environment classes at each university by interviewed two (2) representative expertise in build environment and engineering field, timetable coordinators. The utilisation of the classrooms was determined by using utilisation rate (by referring and observed the timetable), Frequency rate (how frequent the space being used), and Occupancy rate (nos of capacity or users) – “UFO” formulation. The findings from the research indicate that this study will be finished on the rate of space utilisation in public higher education classes to focus their classrooms and satisfy the rising demand for academic spaces. In addition to overcoming a limitation of understanding and abilities, particularly within the management team, this paper may assist in overcoming that issue by signifying improvements. This study's findings will include on-field current practices and their utilisation rate, providing a better understanding. From the results shown, most of the classrooms are optimally utilised, and no classroom is congested. To conclude the utilisation rate, this model can be utilised globally in implementing the space utilisation higher education institutions.

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<https://doi.org/10.24191/bej.v23i1.1106>

INTRODUCTION

Space has various purposes in the community and can play a definite role in supporting the comfort of the living and learning spaces and other functions. The classroom is the most important asset to the higher education institution for learning spaces (Saa'id et al., 2018). Therefore, it is important to ensure the classroom is in good condition and fully utilised for educational activities. However, it has been reported that higher educational institutions have a problem with the low utilisation rate of the classroom (Abdullah et al., 2012a). The management of classroom spaces to ensure full utilisation is an area of study on the impact of public higher education classroom space utilisation rates. Consequently, this leads to the utilisation rate efficiency and success of most academic spaces (Ibrahim et al., 2012). According to Abdullah et al. (2013), there is a connection between space and classroom management, users, and occupants. This fact has been integrated into norms and is one of the main factors that might affect the rate at which classroom space is utilised. To maximise classroom utilisation, the management, users, and space occupants must all be satisfied (for this study, our focus is on their management team). Without performing a research study, satisfaction cannot be determined, and it also depends on the spaces in which the management team has been in charge.

One way to analyse space performance is to use the performance rate, one of several techniques and methodologies. A specific formula for analysing space utilisation can be used to determine the performance rate. According to Li et al. (2017), the performance rate can potentially affect the use of space and address current issues by focusing on faculty classrooms, which may have the greatest impact on public higher education. As a result, the goal of this study is to classify the indications provided for the management level specifically, not only practicable in Malaysia yet shall be as a reference globally for space utilisation within the classrooms to avoid conflict on the waste of spaces in institutional (Lavy et al., 2020). The bright side is beneficial for their institutions to keep track of all the spaces to be functional and fully utilised also applicable during semester week and semester break (Che Rusuli et al., 2015).

Background of classroom space utilisation in public Higher Education Institution (HEI) in Malaysia

According to Kasim et al. (2012), the performance rate study in Malaysia is still very low compared to other countries like the UK and the United States of America (USA). However, understanding of this rate of space usage was first researched in 1998 by an association of scientists openly in teaching and learning classrooms at public higher education utilising theoretical updates for space use (Kasim et al., 2012). The frequency rate (F%) of space usage to determine the level of a room utilised for public higher education classrooms was the focus of a study on utilisation rate that was conducted after seven (7) years. One of the parameters for gauging space is relevant to the capacity of the student either in a grouping or individual spaces during the interim and is helpful for financial benefit for the faculty or the college as it meets the ideal utilisation rate (Valks et al., 2021). Between the space and student information ought to be utilised to analyse the space utilisation rate of various divisions, resources, or research gathering to their performance and one another, in this analysis may include among higher education institution in a faculty specifically in Malaysia (Abdullah et al., 2012a).

The impact of performance rate is one of the most significant factors impacting the transformation of the public higher education system that needs to take place, and for Malaysia, it is moving in the direction of becoming a significant educational hub whose scope and teaching midpoint represent Southeast Asia. To be attentive, the current practices for performance rate must be held by someone who is certified in space management to achieve the greatest impact when applying to the department in faculty (Grapagasem et al., 2014). Low utilisation rates occur in learning space because, during the time of the timetable structuring process, a single classroom is being allocated to more than one (1) program at the same time; a bigger class size is allocated to a small capacity room while classrooms with bigger capacities are left unused, and most of the users do not use classrooms the way they have been allocated on the master

timetable, rather whenever they are found unoccupied and containing a capacity able to carry that particular class size (Abdelhalim & Khayat, 2016; Daudi & Lucian, 2018). Some lecturers utilise classrooms near their offices more frequently by prioritising them over those classes that have been designated for their usage, which are far. There might be certain cases where the lecturers mistake the designated classroom with another, and it turns out the designated classroom for them was found unused, and no activity is conducted in that space (Ibrahim et al., 2011). They also re-schedule the timetable due to an emergency that takes place later after the final master timetable has been released (Abdullah et al., 2012b). It becomes necessary for a class to look for an additional room to compact the entire student from those courses to ease the flow of the day (Ibrahim et al., 2012).

Factors that Affecting Classroom Space Utilisation

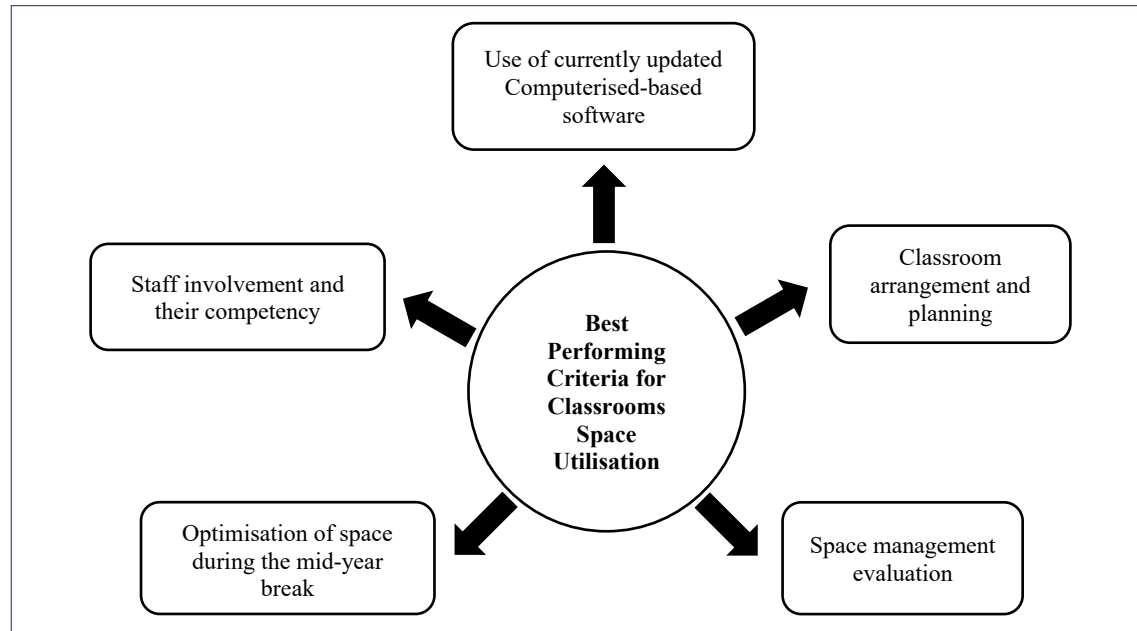


Fig. 1. Criteria for Effective Space Management in Higher Learning Institutions in Malaysia

Source: Abdullah (2012a)

To improve utilisation rates, the evaluation of space management needs to be adequately addressed. These elements were equivalent to the best-performing criteria shown in Figure 1 for regulating the use of classroom space in public institutions of higher education specifically in Malaysia (Abdullah, 2012a). As for the method for effective space management practices, the involvement depends on the size of the faculty, which staff or officers shall be competent in space management and should have relevant knowledge of space management (Shahril et al., 2015). Additionally, in the classroom arrangement, we need to consider the ratio between a classroom capacity and the number of students, and the traveling time between two (2) rooms should be minimised. Timetabling systems will lead to the software being frequently used; it is necessary to have at least a staff that can master the use of the software to make sure the system can always function. Rent out the space to increase room frequency and generate income from spaces. Cooperate with other organisations that need a venue for organising events. The current space management system must be reviewed and evaluated regularly, as the frequency of review should be based on the ability of the university (Logendra, 2015).

Common Challenges of Management Teams to Manage Classrooms in Faculty

Common challenges of the management team to manage classrooms in faculty to seek after the persuasive space utilisation rate, for example, the lack of data on the expected and an assessment through observation is not being recognised at the beginning stage during key arranging concerning types of spaces and hours of activity going to be conducted (Wan Hamdan et al., 2016). Ibrahim et al. (2014) said that, on the off chance that the utilisation rate isn't improving, it is conceivable to turn out with great effect by methods for overhaul spaces; rooms estimate, however, confined by cost. The space utilisation rate can be estimated on frequency and occupancy rates, yet the frequency rate is simpler to deliver contrasted with the occupancy rate (Aziz et al., 2015).

Frequency essentially can be estimated on how frequently a space or room is being used, yet occupancy is more to the quantities of tenants versus the limit of the space itself. The subsequent challenge, as said by Saaïd et al. (2018), is insufficient data on the spaces going to be utilised for how long and the size of the gathering. The individual in control of the timetabling does not have full data on the space usage limits, careful number of occupants (size of gathering), kinds of classrooms, available equipment or assets, hours of spaces going to be utilised, and others. The third problem is that changed interests and goals for the foundation, academic staff, administration, and students will get one of the constraints, said Arokiasamy (2011). Typically, the top administration is interested more in budgetary well-being for its foundation as space can create pay for college. Although space is considered a resource that can create salary, the enthusiasm for the academic staff and students may be changed. For instance, academic staff elevates adaptable courses to pull in enrolment of students yet have cared less about the use of the space itself (Thian, 2014).

The next obstacles are related to the absence of research on space the board. Past studies found that examining in space the board zone was very challenging. Lack of research on performance rate or space utilisation becomes one of the constraints in which the data collected can be used as a reference. This statement is supported, although lacking in terms of research, it is balanced by numerous technical reports throughout the world. The other challenges are the person in charge is not an expert in space management, and optimisation of space was restricted due to too many parties involved, but there is no center specialising in managing space (Saidin et al., 2018). The next challenge is limited space, whereas the limitation of space restricts the performance rate system from being implemented efficiently as the space itself is not well equipped for the teaching and learning requirements. HEIs face common space management problems such as low-performance rates for teaching space and usage of space mismatch with its design.

The limited space mentioned by the previous researcher is not mainly on the limitation on the space, but it includes restriction of spaces to be used by occupants. Besides, more challenges are coming from the top management support. According to Saaïd et al. (2018), top management support has a significant impact on the effectiveness of space management implementation. As a result, lack of top management support contributes toward low utilisation of space even though the best plans and techniques have been applied to manage space. Top management may establish a space management committee. The challenges are data from the survey that has been collected does not apply to the space management policy (Harpreet, 2019). This scenario happened due to the difficulties in interviewing and analysing data to apply it to information management systems. Furthermore, it has proven to be costly and time-consuming.

METHODOLOGY AND DATA COLLECTION

The following methodologies that have been used in this mixed-method study, which combines qualitative and quantitative techniques: Observation assessments are an essential part of space management; they must be conducted in classrooms using a checklist to make sure all the data is handled appropriately (Elkatawneh,

2018). According to Mehrad & Tahriri (2019), this includes carrying out interviews by gather more information about how the space is being utilised and verifying its capacity, frequency, and condition to validate the overall number of students occupying it. An interview has been conducted with the management team (which directly involved in production of the timetable especially for this study) from the selected faculty in public higher education classrooms. The data collected was analysed using the data sampling (UFO) technique comprised of utilisation rate, frequencies, and occupancy rate, as well as tabling methods. Three (3) public higher institutions located in Klang Valley were involved for this study and three (3) classrooms in the built environment faculty at each institution were selected (Table 1).

Table 1. Sampling Input

No	Institution	Population	No. Space (classroom)
1	A	Almost exceed 15,000	3
2	B	1,500	3
3	C	Not accessible	3

Source: Authors (2025)

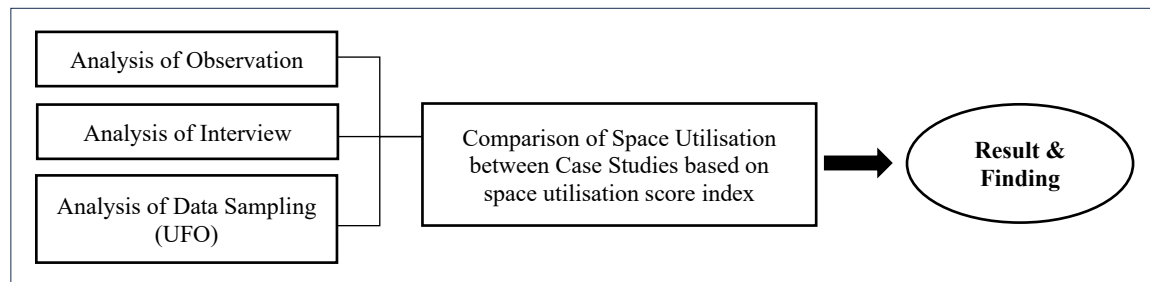


Fig. 2. Methodology for Space Utilisation Rate of Public Higher Education Classrooms in Klang Valley

Source: Authors (2025)

ANALYSIS AND DISCUSSION

The discussion outcome is based on the analysis consisting of:

- (i) Analysis of observation – the observation analysis of case studies is based on three (3) conditions: the total area of the space, the EPU requirement, and comfort for the occupancy. The schedule for seven (7) days which applied for the entire year) on each campus have been clarified and determined by the academic department, the facilities team, and the lecturer's feedback for providing the necessities for a class. This observation section's table, which includes the classroom's overall space, it is also present capacity as recorded by the observation sessions, the compatibility perspective, and the classroom's comfort level for the occupants, is shown in Table 2.
- (ii) Analysis of interview – semi-structured interviews are the form of interview procedure used. The questions have been divided into four (4) separate sections: background information about the respondent, questions about space, challenges, and satisfaction concerning the performance rate of space usage, and improvement about the impact of public higher education classes on performance rates. Based on the interview question, is classified or

divided into five (5) items referring to the criteria for effective space management in higher learning institutions (Abdullah, 2012). the management staff's engagement in matters concerning classroom utilisation, the timetabling software used to book the classrooms, the use of other spaces, and the management team's evaluation which was conducted by occupants to provide input to the management for improvement. The outcome turns out that all criteria are in good current practices and can be improved for three (3) case studies except for the usage, Institution A shall need more work on managing the space usage, especially during the semester break.

- (iii) Analysis of Data Sampling (UFO) – giving the rate of space utilisation in the classroom meets the purpose of determining whether the standards set by the government were meant to be followed in the first place. The Ministry of Education Malaysia's "*Amalan Baik Pengurusan Ruang*" Book provides the framework for the utilisation rate category (refer to Table 3). The process of designing the classroom schedule, developing the as-built floor plan, and creating the space management report involves all relevant parties. This procedure is carried out to accomplish the second goal of the study and to bolster the findings to reach the third goal.

Table 2. Space Utilisation Score Index

No	Category	Capacity (%)	Compliance	Remark
1	Low	0-59	Not comply	Space not optimum and inefficient space usage
2	Medium	60-75	Comply	Partial optimum and efficient space usage
3	High	76-100	Comply	Optimum and efficient space usage
4	Crowded	>100	Not Comply	Crowded space and more than maximum capacity

Source: Hamid et al. (2018)

Table 3. Comparison of Space Utilisation Between Case Studies Based on Space Utilisation Score Index

Institution	Room type	Room no.	Utilisation rate (%)	Category	Remark
A	Classroom	AP-C307/310	59	Low	Institution B shows the most optimal space utilisation with 82% of the space usage which indicates them in optimum rating between case studies. Institution C has the lowest utilisation rate compared to B and A, even there is one of the classrooms achieved the highest rate of high utilised other classes have recorded a rate of 28% which is a very low level of utilisation.
		AP-C315	80	High	
		AP-C321/324	52	Low	
B		BS7	82	High	
		BS8	73	Medium	
		BS9	82	High	
C		BK1	87	High	
		BK2	43	Low	
		BK3	28	Low	

Source: Authors (2025)

Below are the findings that can be depicted from the result analysis based on research objectives. The outcome of the first objective is that a study has discovered on-field current practices, from the observation interview sessions, their rate of utilisation, which can aid in improving knowledge, encouraging the use of space in public higher education classrooms, and increasing exposure to contemporary classroom management tools (Krosnick et al., 2009). Most of the campus is currently practically with the traditional way of controlling space utilisation. This objective has been carried out by using a parameter that uses UFO equations to extract data for space utilisation rate.

Most of the classrooms that were optimally utilised and the other four (4) classrooms are still in the low category. From the analysis, classrooms with low utilisation rates should be the norm to use frequently to get a good performance rate of space usage. Basically, from the data collection, better practices can be achieved for space utilisation by improving the way of communication between management and occupants. The existing classrooms must have flexibility due to the various number of students that will use the classroom per period and better preparation from the arrangement of the timetable phase. These findings from the utilisation of usage determine the proposes needed to evaluate the space utilisation rate of public higher education classrooms in respective to fulfil the users' and the comfortable aspect for the users.

FINDINGS AND CONCLUSION

To conclude, the result of this study stated on-field current practices and their utilisation rate, which can help to address knowledge and skill gaps by giving a better understanding and encouraging space utilisation in public higher education classrooms as well as further research for implementation purposes between space management and utilisation rate. Leads to our main objective, the space inefficiencies can be identified through a proper organised timetable management, and achieved our objective 2, towards full utilisation rates (Wan Hamdan et al., 2016). For objective 3, a mismatch between space design and usage shall be resolved and improvising the organisation within classrooms (refer to objective 4). The findings show most of the classrooms are optimally utilised, and none of it has been congested. The other four (4) classrooms are still in low category. From the findings, classrooms with low utilisation rates should have been in proper planning to use it by frequently to reach a good performance rate of space usage.

As this study aims for the management teams by offering practical recommendations for improvement of the space utilisation rate of public higher education classrooms.

EQUATIONS AND FORMULAS (UFO)

Space Utilisation Rate (U) =	$\frac{\text{Frequency Rate (\%)} \times \text{Occupancy Rate (\%)}}{100}$		(Eq.1)
Frequency Rate (F) =	$\frac{\text{Number of hours used during week}}{\text{Hours allocated during week}}$	X 100	(Eq.2)
Occupancy Rate (O) =	$\frac{\text{Total student numbers during week}}{\text{Room capacity during week}}$	X 100	(Eq.3)

Fig. 3. Equations and Formulas for Space Utilisation, Frequency and Occupancy Rate

Source: Abdullah et al. (2012a)

ACKNOWLEDGEMENTS

I would like to acknowledge the support of Universiti Teknologi Mara (UiTM), Shah Alam, Selangor, Malaysia, Faculty of Built Environment (FBE) for providing the facilities and Built Environment Journal

(BEJ) platform for support on this research. My family members keep on counting on me to finish and publish the paper.

CONFLICT OF INTEREST

I agree that this research was conducted in the absence of any self-benefits, commercial, or financial conflicts and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

Amira Adelina Hasmadi carried out the research and wrote and revised the article. Nadia Kamaruddin conceptualised the central research idea and provided the theoretical framework. Nadia Kamaruddin and Nuzaihan Aras Agus Salim designed the research and supervised the research progress; Nadia Kamaruddin anchored the review, and revisions and approved the article submission.

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