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RESEARCH PAPER

Safety Culture in Malaysian and Indonesian Academic Institutions: Identifying Influencing Factors through Systematic Review

Siti Noraishah Ismail[1], Tofan Agung Eka Prasetya[2], Herman Bagus Dwicahyo[3], Cendana Fitrahanjani[4], Azizan Ramli[5,*]

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ABSTRACT
Safety culture is a critical aspect of organizational culture, directly linked to improved safety performance. Although it is widely discussed in sectors like construction, manufacturing, and electronics, its significance in academic institutions is often overlooked. This study presents a systematic literature review (SLR) to explore the factors affecting safety culture in academic institutions across Malaysia and Indonesia from 2017 to 2021. The research includes a diverse range of institutions, including preschools, primary schools, secondary schools, matriculation colleges, vocational colleges, public and private universities, and training centers. Adopting the PRISMA methodology, the study applies thematic analysis to assess the findings, revealing eight key themes and 20 subthemes for Malaysia, compared to just two main themes and four subthemes for Indonesia. The results highlight safety competence, commitment, and attitude as the most influential elements for cultivating a strong safety culture in Malaysia. In terms of dimensions, behavioral factors (85%) were found to have the greatest impact on safety culture, followed by psychological factors (10%) and situational factors (5%). In Indonesia, the primary drivers of safety culture were situational and behavioral factors. Overall, the study underscores the importance of increasing awareness among academic institution leaders, governments, and policymakers to foster a robust safety culture in both countries.

KEYWORDS: *Safety culture; Safety attitude academic institutions; Safety management system.*

1. Introduction

Safety culture seems important nowadays to build a safe working environment for students, academics, and management staff and prevent injuries or accidents. The importance of safety culture in education sectors or academic institutions was reported worldwide, such as in the United States of America [1], China [2], Vietnam [3], Brazil [4]. According to Faller et al. [5], contusions, compressions, and strains constituted more than 50% of all kinds of injuries, while fractures, irritations, burns, or acid burns were reported frequently among university students in Germany. According to Naji et al. [6], the organization that set and has concerns about the importance of safety-related values, beliefs, and attitudes shows a strong safety culture that can aid in reducing risk and preventing injuries. However, organizations with a poor safety culture are more likely to incur injuries and accidents [6]. Moreover, Alkhaledi et al. [7] stated that safety culture is important to public sectors such as academic institutions, which helps to increase safety performance.

Bandura's Social Learning Theory, Schein's Theory, Total Safety Culture' or Geller's Theory [8], Reason Safety Culture Model [9], Guldenmund's Three Layered Organizational Culture [10], Reciprocal Safety Culture Model [11], and Reniers Model/P2T Model are the examples of various established safety culture models introduced by previous scholars. A well-known and mostly used was Reciprocal Safety Culture Model introduced by Cooper [11]. This model focuses on the three main dimensions, namely, psychological (how people feel), situational (what the organization has), and behavioral (what people do) elements as preventative tools to reduce accidents and promote a good safety culture in organizations.

To the best of the authors' knowledge, there need to be more studies that emphasize the influencing factors in building a safety culture at academic

* *Corresponding author: Azizan Ramli*
azizanramli@umpsa.edu.my

1. *Author is with the Faculty of Chemical and Process Engineering Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, Malaysia*
2. *Author is with the Health Department, Faculty of Vocational Studies, Universitas Airlangga, Indonesia*
3. *Author is with the Health Department, Faculty of Vocational Studies, Universitas Airlangga, Indonesia*
4. *Author is with the Faculy of Public Health, Universitas Airlangga, Campus C, Surabaya, East Java, Indonesia*
5. *Author is with the Faculty of Industrial Sciences and Technology, Universiti Malaysia Pahang Al-Sultan Abdullah, Kuantan, Pahang, Malaysia*

institutions. Back to history, the introduction of safety culture research in Malaysia was started in early 2008 in the radiation industry by Malaysian Agency Nuclear [12]. Later on, other industries or sectors conducted research on safety culture including healthcare sector [13-15]), manufacturing industry [16-21], construction industry [22], shipping industry [23, 24], electronic industry [25]. A study on safety culture in education was reported in 2013 [26]. In addition, extensive studies on risk assessment in academic institutions are not exempt from potential hazards that may pose risks to schools, staff, or students [27-30].

Despite various safety culture models or theories mentioning the importance of building a healthy safety culture in the organization, there is a need for a more systematic literature review (SLR) conducted to investigate the influencing factors of safety culture in academic institutions in Malaysia and Indonesia. The main research question guiding this systematic review is what are the influencing factors associated with the safety culture in the Malaysian academic Institution? Therefore, the study aims to investigate the influencing factors of safety culture in Malaysian and Indonesian academic institutions from 2017 to 2021.

2. Methodology

The goal of a systematic literature review (SLR) is to find, search, and synthesize literature that is systematically related to prior studies or research in a well-organized and transparent process with repeatable methods at each step. Systematic reviews are sometimes known as meta-narrative reviews or mixed studies reviews [31]. These reviews can include studies with various designs and concepts. It is also pertinent to the researchers' assertions and helps to increase research rigour, as well as the discovery of gaps, trends, and essential directions for future investigations. The importance of conducting systematic literature reviews with predefined and transparent methodological stages. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) was chosen to establish a systematic literature review (SLR) on safety culture. PRISMA is a very well-known approach to conduct SLR in various fields of study such as safety research [32], medical and healthcare [33, 34], business and management [35], social sciences [36], and many more. Four main steps for PRISMA include identification, screening, eligibility and data abstraction and analysis [37]. The first step in the systematic review process is identification, which is the identification process was performed in February 2022. In this stage, research question and research objective were clearly identified. Two leading indexed databases were used for this review; ScienceDirect and Scopus. These indexed databases were chosen because of their established indexing systems for citations and to ensure the quality of the articles reviewed in this paper. The research published in peer-reviewed journals also has a good reputation and representation of the scholarly research in particular field of study. Moreover, to support the findings, the additional database which is Google Scholar was used in SLR study. The methodology is presented in two sections to provide clear information on how review is done for each study area.

2.1. Review process for Malaysia context

The systematic literature review was conducted in the Malaysian context resulting in the following keyword combinations of; ("Safety culture" AND "Malaysia" AND "school") OR ("Safety culture" AND "Malaysia" AND "college") OR ("safety culture" AND "Malaysia" AND "education") OR ("Safety culture" AND "higher institution" AND "Malaysia") OR ("Safety culture" AND "Malaysia" AND "vocational")

This process yielded a result of 341 articles from Science Direct, 9 articles from Scopus databases and 5282 articles from Google Scholars databases were retrieved. Scopus and Science Direct databases are well known for their established peer-reviewed journal articles. Furthermore, Google Scholar is generally recognized as a valid source for systematic reviews. To address this concern and maintain the credibility of the selected sources, the authors implemented stringent inclusion and exclusion criteria during the selection phase, as detailed in Tables 1 and 2. Additionally, the author's cross-verified results from Google Scholar with the Science Direct and Scopus databases to confirm the quality of publications and their citation impact when necessary. This meticulous vetting process ensured that utilizing Google Scholar contributed to the thoroughness of the search while upholding academic rigor.

The various search strings were used to get a broad coverage of safety culture in the Malaysian education sector. However, the number of articles

was reduced once the screening process was executed due to inclusion or exclusion criteria set up by the authors. In the screening process, eligibility, inclusion, and exclusion criteria were determined to find suitable articles to be included in the systematic review process as shown in Table 1. After the identification process, out of 5632 articles to be screened. The results obtained 44 articles after the screening stage. The research articles published from 2017 until 2021 and focused on safety culture in academic institutions in Malaysia only were selected at this stage. The journals including systematic reviews or review papers, proceedings, book chapters, book series, and books were excluded. The purpose is to focus on the real research on safety culture in academic institutions in Malaysia only.

The next step was the eligibility process where the articles were included or excluded based on authors 'specific criteria. 9 similar articles were excluded in both databases for the next phase, which left 35 documents for the eligibility process and screened manually for literature focusing on Malaysian education and criteria from the earlier screening processes (inclusion and exclusion criteria). Authors focuses only the English language for broad understanding in the screening process. Other languages are not included as shown in Table 1 and Table 2. The review managed to obtain 26 selected articles related to research on safety culture in academic institutions in Malaysia only. The final step is data abstraction and analysis. The remaining articles were evaluated, reviewed, and analyzed and 26 selected articles (studies) were discussed in detail in this paper as tabulated in Table 3. The reviews were based on specific studies that matched the research question and objective of the study. The studies were then extracted to identify relevant themes and sub-themes for the current research by reading the title, the abstracts, and the full text of the articles. The summary of the SLR process is shown in Fig. 1.

Tab.1. The criteria for inclusion and exclusion for Malaysia

Criteria	Inclusion	Exclusion
Publication timeline	Year 2017-2021	Year 2016 and before
Document type	Journal (research articles) and conference proceeding	Journals (systematic review), review paper, chapters in book, book series, books
Type of sector	Safety culture in Malaysian education	Exclude safety culture other than Malaysian education sector
Language	English and Malay language	Non-English and Malay

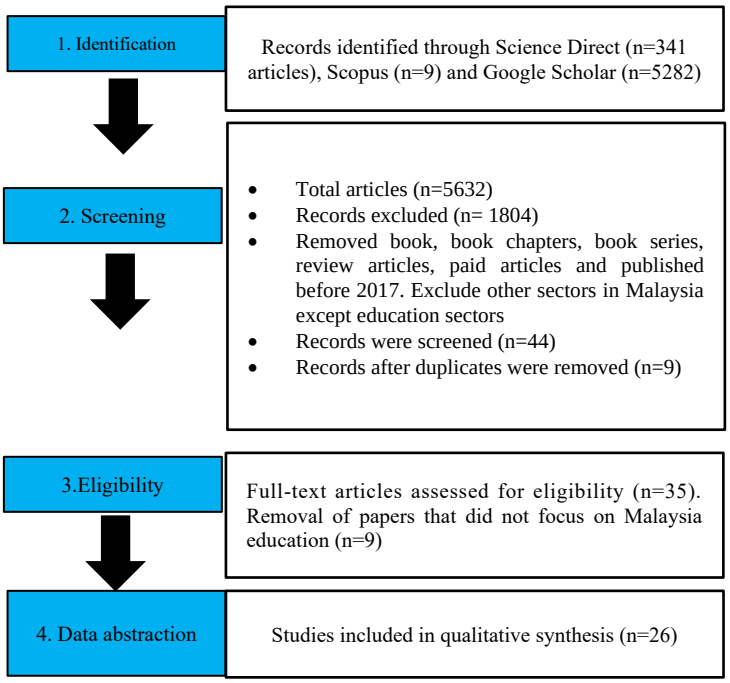

Fig.1. The flowchart of the PRISMA approach used in the SLR study for Malaysia. (Adapted method from [37])

Tab.2. The criteria for inclusion and exclusion for Indonesia

Criteria	Inclusion	Exclusion
Publication Timeline	Year 2017-2021	Year 2016 and before
Document Type	Journal (research articles) and conference proceeding	Journals (systematic review), review paper, chapters in book, book series, books
Type of sector	Safety culture in Indonesian education	Exclude safety culture other than Indonesian education sector
Language	English and Indonesian	Non-English and Indonesian

2.2. Review process for Indonesia context

The systematic literature review conducted in the Indonesian context used a similar combination of keywords as the review in the Malaysian context. However, the keyword for the region was adjusted, resulting in the following keyword combinations of; ("Safety culture" AND "Indonesia" AND "school") OR ("Safety culture" AND "Indonesia" AND "college") OR ("safety culture" AND "Indonesia" AND "education") OR ("Safety culture" AND "higher institution" AND "Indonesia") OR ("Safety culture" AND "Indonesia" AND "vocational").

Using these keyword combinations, a total of 22 articles were found in the ScienceDirect database, 3 articles from Scopus, and 306 articles from Google Scholar, resulting in 343 articles to be screened. Filters were applied during the database search to retrieve full-text or open-access articles, a feature available only in ScienceDirect and Scopus. In contrast, the full-text availability of the 306 articles from Google Scholar was further assessed during the screening process.

During the screening process, eligibility criteria, as well as inclusion and exclusion criteria, were applied to identify relevant articles for inclusion in the systematic review. The inclusion and exclusion criteria were determined by the author, as shown in Table 2. As a result of the screening, 339 articles were excluded based on the predefined criteria, leaving only 4 articles to be included in the final systematic review. The use of these keyword combinations did not eliminate the retrieval of irrelevant studies. A total of 122 articles were excluded for covering irrelevant topics, such as studies on patient safety, food safety, educational strategies, disaster management, and other unrelated subjects. Additionally, 42 articles were excluded as they focused on non-academic settings, such as construction and mining industries. The final step is data abstraction and analysis. The remaining articles were evaluated, reviewed, and analyzed and 4 selected articles (studies) were discussed in detail in this paper. The reviews were based on specific studies that matched the research question and objective of study. The studies were then extracted to identify relevant themes and sub-themes for the current study by reading the title, then the abstracts, and then throughout the full text of articles.

The authors used the same research string for PRISMA method for Indonesia academic institution (identification screening, eligibility and data abstraction and finally obtained four articles that suits the requirements. This is same method used for Malaysia context. The summary of SLR process for Indonesia area is shown in Fig. 2.

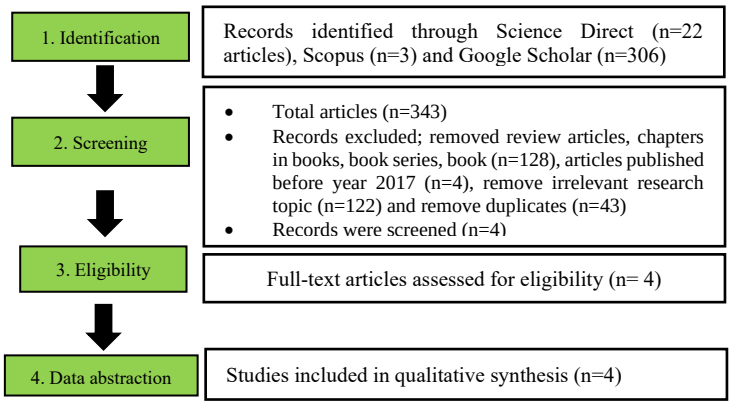

Fig.2. The flowchart of the PRISMA approach used in the SLR study for Indonesia. (Adapted method from [37])

All articles obtained from Fig. 1 and Fig. 2 was analyzed using thematic analysis [38]. The thematic analysis was conducted to construct the coding or themes and subthemes for both Malaysian and Indonesian academic institutions. The process of thematic analysis was illustrated in Fig. 3.

3. Result and Discussion

3.1. Systematic literature review on safety culture in academic institutions in Malaysia

The review managed to obtain 26 selected articles based on the PRISMA approach. The number of publications from 2017 to 2021 is illustrated in Fig. 4. By applying a thematic analysis [38], eight themes were created for academic institutions consisting of Preschool & Kindergartens, Primary school, Secondary school, Matriculation College, Vocational College, Public University, Private University, and Training Institution for Malaysia institutions. The number of publications for each academic institution is shown in Tab. 3. The SLR results for research trends in safety culture studies in Malaysian academic institutions are shown in Tab. 4. The influencing factors of safety culture studied based on 26 articles are shown in Tab. 5 and Tab. 6.

The SLR successfully generated eight academic institutions in Malaysia as main themes from 26 articles that had discussed safety culture in the past five years. Most research on safety culture came from public universities, private universities, primary schools and vocational colleges, as shown in Table 2. For further analysis, the thematic analysis [38] was used to identify the influencing factors of safety culture, which had been discussed in each Malaysian academic Institution and were mapped as shown in Table 4. Three sub-themes and their respecting influencing factors were generated for each academic Institution for psychological (two factors), situational (one factor), and behaviour dimensions (seventeen factors) of safety culture, as shown in Table 4.

Tab.3. SLR results on the number of papers of Malaysia academic institutions for each academic institution

Types of Academic Institutions (Theme 1 to 8)	No. of papers
Preschool & Kindergartens	1
Primary school	4
Secondary school	3
Matriculation college	1
Vocational college	4
Public University	12
Private University	5
Training Institution	3
Total	33

Note: The total number of articles in SLR was 26. However, these articles may combine and discuss more than one academic institution, so the total in the Table was more than 26.

The mapping analysis of the influencing factors of safety culture studies for each Malaysian academic Institution and respective subthemes is shown in Table 5. The percentage for each factor is; the behavior dimension with 17 subthemes was the most highlighted (85%), followed by psychology (10%) and situational (5%).

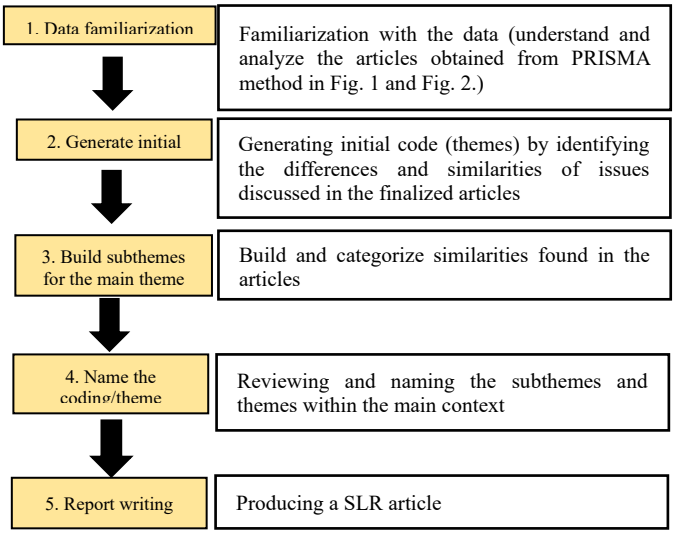

Fig.3. The flowchart of thematic analysis [38]

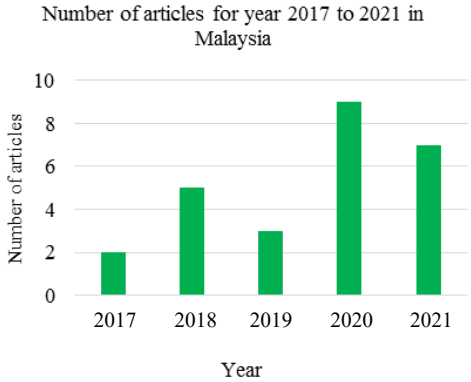

Fig.4. SLR results on the number of publications of Malaysia academic institutions in the year 2017-2021

For behaviour safety culture, the influencing factors highlighted were management commitment, safety awareness, safety practice, safety rewards, safety commitment, safety communication, safety training and many more, as shown in Table 5. For example, safety commitment was the most factor highlighted in six academic institutions [39-42], as shown in Table 6. The safety commitment refers to the commitments of students, top management and administration staff to ensure safety is their main priority and create a conducive environment for learning support; therefore, a positive safety culture can be built. Safety knowledge was the most significant predictor of safety culture, followed by safety regulations, safety training and safety communication, according to Makhtar et al. [43] based on his research conducted in Vocational Colleges (VC) all over Malaysia as one technical and vocational Institution in Malaysian Education sector which involve 380 instructors teaching in engineering technology courses at VC. Furthermore, safety training was required to train and educate the students in Secondary schools [43], Vocational colleges [44, 45], Public universities [40, 46-48].

Tab.4. SLR results on Safety Culture Study in Academic Institutions in Malaysia in the year 2017-2021

No.	Year	References	Main Theme: Academic Institutions in Malaysia							
			Theme 1: Preschool & Kindergartens	Theme 2: Primary school	Theme 3: Secondary school	Theme 4: Matriculation College	Theme 5: Vocational college	Theme 6: Public University	Theme 7: Private university	Theme 8: Training Institution
1	2017	[49]						/		
2	2017	[55]			/					
3	2018	[45]					/			
4	2018	[50]						/		
5	2018	[26]						/		
6	2018	[44]					/			
7	2018	[43]		/						
8	2019	[66]	/							
9	2019	[47]						/		
10	2019	[51]					/			/
11	2020	[48]						/		
12	2020	[67]						/		
13	2020	[56]						/	/	
14	2020	[52]		/						
15	2020	[46]						/		
16	2020	[68]							/	
17	2020	[41]						/		
18	2020	[39]		/	/	/	/	/	/	
19	2020	[40]						/		
20	2021	[69]		/						
21	2021	[70]							/	
22	2021	[71]								/
23	2021	[54]						/		
24	2021	[72]							/	
25	2021	[42]								/
26	2021	[53]			/					

Tab.5. Influencing Factors for each Safety Culture Dimension

Safety Culture Dimension	Influencing Factors of Safety Culture (subthemes)	No of institutions discussed on each factor
Psychological	Safety attitude	6
	Peer influence	1
Situational	Safety management system	3
Behaviour	Management commitment	3
	Safety knowledge	5
	Safety compliance	4
	Safety practice	5
	Safety communication	3
	Safety training	3
	Safety competency	6
	Safety commitment	6
	Safety awareness and motivation	5
	Safety leadership	4
	Safety behaviour	3
	Safety rules & regulations	3
	Safety reporting	2
	Safety reward	2
	Safety budget	2
	Safety program	2
	Risk perception	1

Moreover, the safety knowledge on the importance of safety culture among students and staff is also important, as highlighted by [49, 50, 26, 47, 39, 41]). The dissemination of information on safety culture is also significant for the behaviour dimension because it ensures all levels of students and staff at academic institutions have the same understanding of safety culture, as highlighted by [44, 43, 51-53]) in Vocational college and Public university [46]. This finding was supported by previous research, whereas the most significant dimension to inculcate the safety culture in the education sector came from the behaviour dimension [54]; For example, the management commitment was highlighted by Abdullah et al. [41] and Hussain et al. [46] to ensure a safe learning environment can be established and this also supported by safety awareness, safety practice and safety budget [52, 48].

Most academic institutions such as secondary schools, matriculation colleges, and private and public universities discussed the safety attitude factors for the psychological dimension. For example, Hassan et al. [55] focused on laboratory staff's safety and health practices knowledge. He found a good attitude for creating safety environment in the laboratory by establishing a positive work culture. In addition, Ahmad Razali et al. [39] conducted a study on developing the safety and health culture of construction projects through academic institutions and industry linkages through the Technical and Vocational Education and Training (TVET) platform. He found that a safety attitude was significant in safety culture and the development of safety commitment, knowledge, skills, and motivation.

The safety management system subtheme was highlighted for the situational dimension of safety culture, as shown in Table 6. Previous researchers mentioned the necessity of having good safety implementation and safety monitoring to ensure all the safety activities can be centralized and monitored properly in primary schools [52], vocational colleges [51], private universities [56] and training institutions [51, 42]. The organization must have a good safety management system to ensure that the implementation and practices of safety culture are run smoothly.

3.2. Systematic literature review on safety culture in academic institutions in Indonesia

The review successfully identified four selected articles based on the PRISMA approach. Thematic analysis resulted in the creation of eight themes for academic institutions, categorized as follows: Preschool & Kindergartens, Primary School, Secondary School, Matriculation College, Vocational College, Public University, Private

University, and Training Institution, following the thematic analysis framework proposed by Nowell et al. [38].

Among the four articles included in the systematic review, all studies were focused on a single region in Indonesia, specifically the Special Region of Yogyakarta. These consisted of one study conducted in a public university and three studies conducted in vocational high schools, as shown in Table 6. Three sub-themes and their respecting influencing factors were generated for each academic Institution shown in Table 7.

In contrast to the articles reviewed in the Malaysian context, the SLR for Indonesia did not comprehensively represent all eight academic institution themes. The majority of the reviewed articles focused on safety culture in vocational high schools, where various workshop and laboratory activities take place [57-59]. In comparison, only one article conducted at a public university analyzed safety culture across all university activity areas, covering potential hazards throughout the campus environment [60]. The SLR in the Indonesian context highlighted a stronger focus on situational factors in academic settings, followed by behavioral and psychological dimensions. According to Cooper [61], safety management system is a core component of safety culture, representing any formalized strategic system designed to manage health, safety, and environmental (HSE) aspects through clear policies and procedures.

The reviewed articles assessed various occupational safety and health (OSH) criteria, including: (a) two-way safety communications processes; (b) incident and analyses and lessons learned processes; (c) the design of plant, equipment, and processes; and (d) asset integrity to ensure material conditions meet the expected standards [60, 57, 59]. The same author in his article [61] suggests the importance of improving situational dimensions to prevent process safety disasters. This is also supported by Bautista-Bernal et al. [62], who demonstrated that companies with policies aimed at improving employee health and safety, employee training, or implementing safety management systems positively impact safety performance.

Safety culture itself is a behavioral manifestation related to safety practices [63]. The behavioral dimension assessed in the reviewed articles within the Indonesian context primarily focused on safety climate. Wahrini et al. [58] argued that there is a positive correlation between safety climate and safety culture. Additionally, their study explored the influence of teachers' roles in Vocational High Schools on shaping safety culture. Although safety culture and safety climate are often used interchangeably, they represent distinct concepts. Safety culture is generally seen as a practical framework for improving safety within organizations, while safety climate refers to employees' shared perceptions of safety practices and policies within a specific organization [64].

Despite the limited research on safety culture in academic institutions in Indonesia compared to Malaysia, the Indonesian articles introduced an additional factor—safety climate—which was not analyzed in the Malaysian academic context.

Tab.6. SLR results on Safety Culture Study in Academic Institutions in Indonesia in year 2017-2021

No.	Year	References	Main Theme: Academic Institutions in Indonesia							
			Theme 1: Preschool & Kindergartens	Theme 2: Primary school	Theme 3: Secondary school	Theme 4: Matriculation College	Theme 5: Vocational college	Theme 6: Public University	Theme 7: Private university	Theme 8: Training Institution
1	2018	[60]						/		
2	2019	[57]					/			
3	2019	[58]					/			
4	2019	[59]					/			

Tab.7. Influencing Factors for each Safety Culture Dimension

Safety Culture Dimension	Influencing Factors of Safety Culture (subthemes)	No of institutions discussed on each factor
Psychological	Peer influence	1
Situational	Safety management system	3
Behavior	Safety climate	1

Teo and Feng [65] argued that assessing safety climate could provide a reliable prediction of the overall safety culture within an organization. Moreover, peer influence was identified as a factor analyzed exclusively in vocational colleges both in the Indonesian and Malaysian contexts. According to Cooper's reciprocal model, the psychological dimension is shaped by interactions between individuals. However, many studies suggest that the psychological dimension has minimal influence on safety performance, making it the least significant factor that organizations should focus on. In addition, Cooper [61] argued that organizations should allocate at least 80% of their efforts in cultural change to situational and behavioral factors.

4. Implication of Study and Future Research Direction

This study has a good implication for developing safety culture guidelines, policies or practices in the Malaysian and Indonesian education sector by referring to the influencing factors of safety cultures highlighted in this study. Practically speaking, policymakers or top-level education officers may find this study useful to understand the factors contributing to forming a safety culture in the Malaysian education sector and help them build it guided. The findings from the study are also helpful in identifying the weaknesses that may exist and hinder the formation of a safety culture in academic institutions.

In addition, this study can raise an awareness among ergonomics professional. This study highlights the need for locally adapted ergonomic assessments and interventions that consider cultural, environmental, and occupational factors unique to the region. Professionals are encouraged to contribute to the evidence base through rigorous documentation and evaluation of their practices especially the importance to foster safety culture in academic institutions for Malaysia and Indonesia region. This study also helps to create a safe learning environment and prevent future incidents, near misses or accidents. This review offers several recommendations for future studies. The SLR study has a few limitations: focusing only on two indexed journals and an additional database, Google Scholar. To achieve a depth and broad understanding of the current issues of safety culture study, it can increase the number of indexed journals to be used for future study. Various databases, indexed journals, or search engines can be used to expand the knowledge of existing studies on safety culture in the Malaysian and Indonesian education sectors by adding several databases. It could help researchers to understand more about the influencing factors in constructing a safety culture at academic institutions in both Malaysia and Indonesia.

Moreover, empirical studies such as case study and observational analysis can be conducted in future to validate and support the findings for Indonesia and Malaysia region.

5. Conclusion

The SLR was successfully conducted in this study to investigate the influencing factors of safety culture in Malaysian and Indonesian academic institutions. The review for Malaysian academic institutions identified that the behavioral dimension is the most influential factor in fostering a positive safety culture in academic institutions, contributing 85% to the overall safety culture. This is followed by the psychological dimension at 10% and the situational dimension at 5%.

In the Indonesian context, the review similarly highlighted the importance of situational and behavioral dimensions as key predictor variables for developing a positive safety culture in academic institutions. This systematic review study could encourage policymakers to provide a better understanding and emphasize the issues related to safety culture and the importance of creating a safe learning environment for the students and reducing the number of incidents, near misses or accidents in future.

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