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Review Article

A mapping review of challenges in existing technology-based occupational safety training in the tourism and hospitality industry: Research potential in commercial kitchens

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ABSTRACT

Introduction: An effective response to a safe and healthy work environment relies on advanced preparedness such as occupational safety training. The main objectives of this study are to describe and classify the most critical challenges and identify knowledge gaps in the literature that could inform future research.

Methods: For methods, a mapping review gathers information from six search engines; Francis and Taylor, Scopus, Science Direct, Emerald Insight, and SpringerLink, which yielded journal publications between 1948 and 2022. The data were analyzed using meta-analysis from 135,310 article search results, whereby 20 articles met the inclusion criteria. The studies varied in terms of aim, study design, and reporting detail.

Results: The results showed that Canada and the United States are countries that study safety training in the tourism or hospitality industry, mainly in food management and food safety. The results also show that studies on occupational safety training in commercial kitchens are not common in the existing literature. The findings revealed that the highest number of articles involving safety training focused on food safety and food management in the tourism industry but less on kitchen workers' safety.

Conclusion: In conclusion, this mapping review demonstrates hospitality workers' struggles, especially commercial kitchen workers. This review presents the types of technologies used for occupational safety training and provides an overview of different strategies that address the challenges. Among the most significant obstacles in occupational safety and health training is a lack of knowledge, the high financial costs for implementation, and outdated policies from authorities.

Keywords: Hospitality, Kitchen, Occupational Safety Training, Technology

Introduction

It is possible to create effective occupational training programs using technology, in which learners can through the content via online training programs, interactive webinars, and other digital formats.[1] These methods can provide learners with more engaging and interactive learning experiences. Furthermore, technology helps track training progress and compliance in various ways. For example, many companies use automated systems to track employees' learning and development activities. Digital tools can create, schedule, and track assessments to measure learners' comprehension and progress. Technology also creates simulations and scenarios

to help learners develop practical skills.

Organizations have been utilizing technology for employee training and development, requiring a technological change in a high-tech industry since the early 2000s.[2] Companies have been replacing conventional training with more efficient training using technology which saves them more training days and can increase training needs for specific training jobs only. Generally, technology so far has proven to enable learning as an effective tool for instructional design principles.

Embracing technology will reduce costs, increase levels of health and safety, and benefit inefficiencies.[3] This claim was later acknowledged by those who observed that technology, in particular the development of digital models, would offer a better method for evaluating potential issues like dangers in the activities taking place on the premises.[4] In 2008, it was proven that engaging new technology creates a significant relationship between productivity improvements and becomes more prevalent in the delivery of training and learning. Still, for trainers to store and communicate knowledge, they must have a solid understanding of technology.[5]

Many countries began developing online learning as part of the next evolution of education.[6] Especially during the recent pandemic, online and remote methods were used widely as training methods. Through online training, the participants or employees are not restricted to a specific location or time to attend the training.[7] They can complete their training materials anywhere and anytime as long as they are connected to the internet. Many technology-based training methods or platforms can be used to deliver training successfully, for example, learning via mobile technology, web-based training, and simulation training.[8]

The online learning initiative is expected to allow both corporations and governments to provide state-of-the-art training to company employees, students, academicians, and researchers and provide the kind of training necessary for the next millennium's computer workforce working from home.[9] As a result, organizations have realized that learning with technology is a highly innovative method. Information technology has influenced training in human resources management, which results in flexible training time management, actively involved participants, creation of quality content, and interactive elements, among others.[10]

Occupational safety training is to provide safety, increase knowledge and physically implement best practices for protecting employees and avoiding hazards and injuries. Technology continuously improves how education works.[11] By enhancing familiarity with technology, technology-based training can provide information beforehand that increases user understanding of safety procedures and testing knowledge proficiency.[12] Hence, the objectives of this study are twofold: (1) to study the types of technology used in the existing occupational safety training delivery, and (2) to provide a comprehensive overview of relevant studies regarding the challenges in technology-based occupational safety training in commercial kitchens in the tourism or hospitality industry. This study mainly describes and classifies the most critical challenges, identifying knowledge gaps in the literature that could inform future research.

Kitchen Training Method

The food industry in Malaysia is predicted to earn US$62.27bn in 2024.[13] Between 2024 and 2028, the market is expected to grow by 6.85% yearly.[13] As a result, universities have created gastronomy and culinary arts departments within tourist faculties to meet this market demand. Gastronomy studies the relationship between food and culture, the art of preparing and serving rich or delicate and appetizing food, the cooking styles of particular regions, and the science of good eating.[14] As a result, the gastronomy teaching system focuses on practical rather than theoretical classes. However, we are currently living in the age of the fourth industrial revolution - technology. As it transforms key businesses, life has grown more interconnected, blurring the borders between the personal and professional, with an increasing number of sectors and enterprises becoming operationally mobile. The education business has also slowly but steadily worked to meet these shifting demand trends, bringing a distinct set of difficulties, especially after the Coronavirus Disease 2019 (COVID-19) pandemic.[15] Therefore, researchers are attempting to use virtual studies in gastronomy to educate kitchen training and safety in the world and Malaysia.[16]

Practical classes are part of a complex learning environment. Through experimentation, observation, and interpretation, students learn and practice psychomotor skills and gain an understanding of their subject.[17] Most gastronomy classes (authentic cuisine, Italian cuisine, and gluten-free cuisine) require students to participate in practical classes in the kitchen or cooking lab. The benefit of practical classes is that students get

to experience a natural kitchen environment. The benefit will assist students in learning or practicing how to use the equipment (industrial-type stove, oven, and fryer) and cooking methods (poaching, boiling, roasting). Furthermore, practical classes can help students learn how to work well with their partners in the kitchen and improve their communication skills. Finally, since practical classes simulate the real-world workplace, this can teach students how to solve problems in the kitchen. However, reported that the rise in the number of workers in gastronomy tourism has coincided with an increase in workplace accidents.[18] Therefore, since the kitchen contains sharp objects, hot oil, and boiling water, the disadvantage of practical classes is that students unfamiliar with the industrial kitchen environment may sustain injuries (lacerations, skin burns).

Conversely, a virtual classroom is a video conferencing tool where instructors and participants engage with each other and with the learning material.[19] Beginning with the COVID-19 pandemic, virtual classrooms have become a new norm in universities worldwide, including in Malaysia. Virtual classrooms primarily teach theoretical subjects.[20] Virtual education can help gastronomy students learn kitchen subjects regardless of time and location, which are common challenges in traditional classrooms.

With the removal of these constraints, students can study and complete their coursework whenever and wherever they want, resulting in lower costs and more free time. There is research on VR teaching in the kitchen done by, which attempts to teach students how to identify hazards using VR glasses.[18] The quality of equipment can affect the VR teaching method, and not everyone can afford high-quality VR glasses. On the other hand, argued that virtually-learned information can be challenging to apply in the real world and may not assist students in using their knowledge in the workplace.[21] Finally, based on the literature, there are several advantages and disadvantages of practical and virtual teaching techniques in the training method. Although practical classes still look like the best option to prepare students for real-world working areas, technology can also be an alternative to practical courses for kitchen trainers. Hence, for a comprehensive understanding of occupational safety training as a subject area of tourism research,

Methods

A mapping is a secondary study that describes and classifies the most critical challenges, identifying knowledge gaps in the literature that could inform future research. Mapping and literature review are the methodologies of secondary sources, which the main difference between this methodology and literature reviews is that mapping aims to respond to general questions by providing a descriptive and classifying the literature studies.[22] In contrast, literature reviews carry an in-depth analysis of the research questions of specific literature investigations.

Sources of information

The strings chosen in this study used main search engines that were subscribed by the International Islamic University Malaysia (IIUM) databases. The databases consist of six search engines: Francis & Taylor, Emerald Insight, Scopus, Springer Link, and ScienceDirect without a time limit using English as the primary language. The researchers did not limit their search by publication year since this study wished to determine the number of significant issues studied worldwide. The keywords used for searching the studies were: "occupational safety training," "tourism or hospitality," "technology," and "kitchen." This research reviewed all journal articles in full-text and abstract. However, this study excluded books, reports, websites, documents, and newspapers from the review. Peer-reviewed journal articles were one of the best sources of information for this study, as they provide the most current, stable, and reliable academic sources of information. Furthermore, these journal articles are a cost-effective means of information collection and give a method that remains unaffected and unaltered by the research process or the researcher's presence.

Design of the Study

The study's design consists of research papers after being filtered by relevant keywords. Letters and abstracts of papers presented at conferences, books, and seminars were also excluded. During the screening process, duplicate studies, articles that could not be accessed, and articles on unrelated topics were eliminated. Following this, the selected titles were reviewed, and articles that did not align with the study's objectives were excluded. The last stage analyses the abstract and full text according to subject and inclusion criteria before being recorded in a table.

Data analysis

As shown in Figure 1, the flow chart of data analysis demonstrates the stages used in the refining data process.

The data analysis process involved four (4) stages

of data refining which are identification, screening, eligibility and inclusion. The first stages (3) demonstrate the different refining processes that lead to the concluded results in phase four (4).

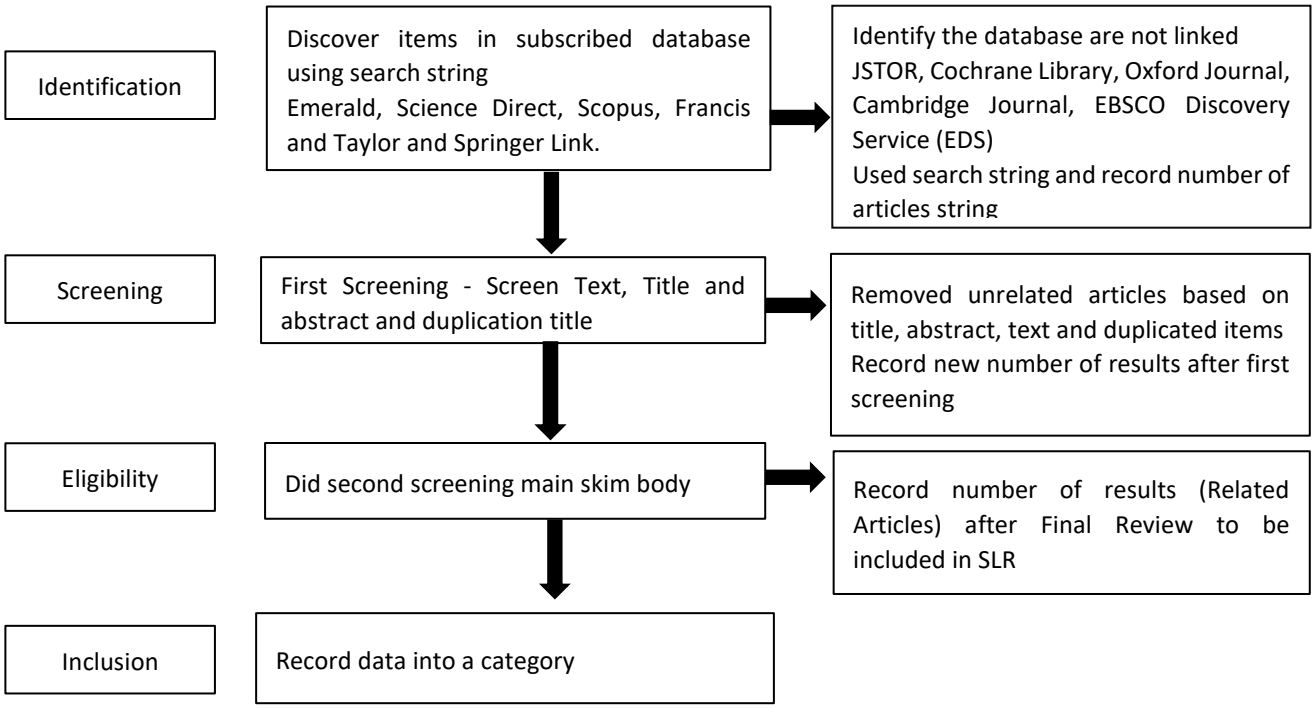

Figure 1: Flow chart of the data analysis process (own work, 2023)

Results

This study employed five steps to achieve a single aim using the exact keywords or filter. Of five search engines, Scopus, followed by SpringerLink and Science Direct, yields the best results when the end keywords of "occupational safety training + technology + tourism or hospitality + challenges or obstacle or barrier + kitchen" were used as the filter. The filtering tool from five databases limited the subjects and reduced the number of results, and it extracted 135,310 articles using the terms safety training (refer to Table 1). In the final review, the full-text articles were excluded if they did not meet the study's objectives, or could not be assessed.

Table 1: Search strings and total articles

Database	Search string 1* and total articles	Search string 2** and total articles	Search string 3*** and total articles	Search string 4**** and total articles	Search string 5 ***** and total articles	Final Review
SpringerLink	21,899	1,161	750	659	74	4
Francis and Taylor	29,755	16,738	308	7	0	7
Scopus	47,214	3,436	1,517	942	26	2
Science Direct	27,705	13,216	149	14	6	3
Emerald Insight	8,737	5,685	625	48	4	4
Total	135,310	40,236	3,349	1,670	110	20

Note: * Search string 1 = "occupational safety training,"
** Search string 2 = "occupational safety training" + "tourism or hospitality,"
*** Search string 3= "occupational safety training" + "tourism or hospitality" + technology,"

**** Search string 4 = "occupational safety training" + "tourism or hospitality" + "technology" + "challenges or obstacle or barrier,"

****** Search string 5 = "occupational safety training" + "tourism or hospitality" + "technology" + "challenges or obstacle or barrier" + "kitchen"

Twenty (20) studies were located in eight different nations (USA, Canada, Ireland, Scotland, China, Switzerland, Turkey, and Ghana). The United States has the most studies (25%), with five (5) studies, followed by Canada with three (3) (15%) and Ireland with two (2) (10%) studies. Others include Switzerland, China, Turkey, Scotland, and Ghana, each with one study (5%) respectively.

Figure 2 depicts the locations of the included investigations. The majority of the countries that paid the greatest attention to this issue, and the research that was conducted in those countries (the United States, Canada, and Ireland), are developed countries with the largest manufacturing industries in the food and beverage business worldwide.[23]

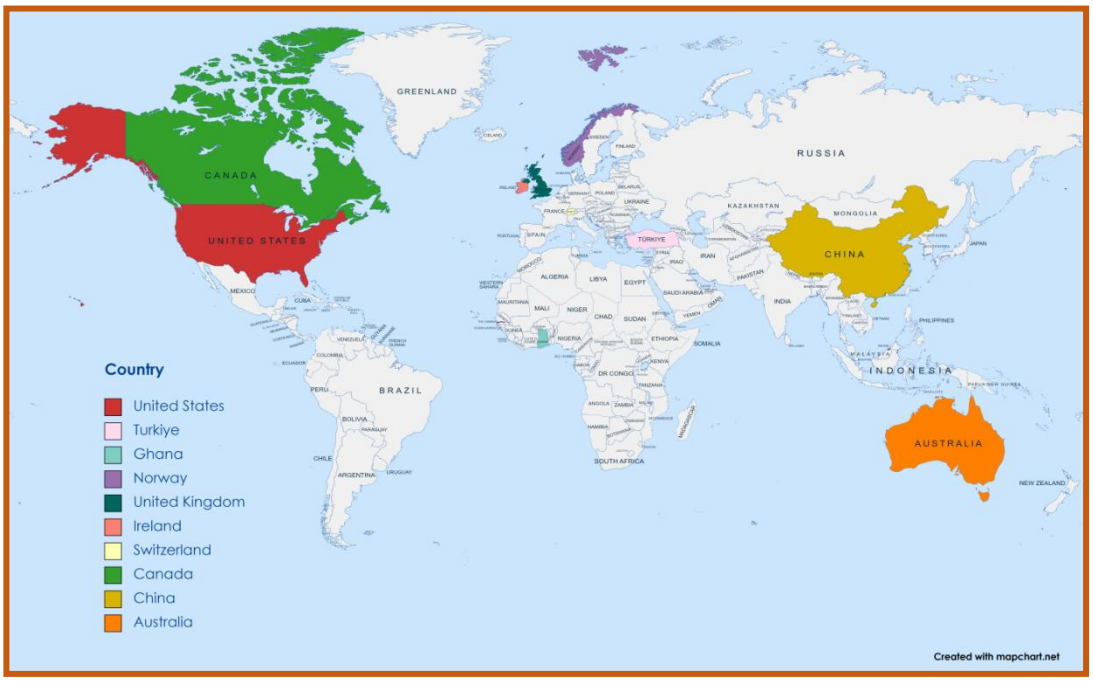

Figure 2: Origin countries of publications on safety training in the commercial kitchen (own work, 2023)

Discussion

In searching for types of technology used in the existing occupational safety training delivery in the kitchen, a few strategies have been used to improve safety by integrating innovation with technology, programs, and system improvement. Some countries use Wearable Technology to reduce injuries and hazards and improve workplace health.[24] Wearable Technology is an electronic device worn on the user's body. These devices can come in many forms, like jewelry, accessories, medical devices, and clothing or parts of clothing, like VR headsets.[25] The findings also revealed that the impact of digital safety training can influence the rate of injury factor with video comparison training with traditional paper.

Other than that, safety training also focuses on the young or old workforce and expects better leader direction and a diversified training system to improve safety training.[26] Some organizations, such as the aviation sector, use training programs as safety training tools by promoting a safety training culture on mental healthiness and stress management. Although some countries have previously implemented safety training incorporating technology, it has not yet been done with a kitchen-specific focus. The literature, however, mentions the techniques for improving safety training tools, particularly in the kitchen sector, which should be taken more seriously in the future. [27]

In yielding the results for the second objective, a comprehensive overview of relevant studies regarding the challenges in technology-based occupational safety training in commercial kitchens was generated. According to the findings, existing safety training that has already been implemented in the hospitality sector is concerned with food management and food safety.[28] Unlike occupational safety, food safety refers to using

various tools and techniques to ensure that all types of food are safely kept, prepared, and preserved.[29] Safety training in food management is to manage chemicals that come into touch with food to reduce hazards and handling procedures like store operations.

The challenges of occupational safety training were not comprehensively discussed by scholars in searched publications.[30] As shown in Figure 3, training related to tourism or hospitality is likely in hotel management, food management, and kitchen in the aviation sector.[31] Furthermore, the findings on occupational safety training concerned with housekeeper safety and how a lack of proper cleaning equipment harms the food and the workers' safety.[32] This study, however, argues that kitchen workers' safety is vital since this sector is the busiest in the tourism industry.

Figure 3: Existing safety training related to technology in the tourism industry (own work, 2023)

Regardless of the outcomes, a lack of expertise is one of the most difficult challenges in implementing occupational safety and health training. Collins dictionary defines expertise as a particular skill or knowledge acquired by training, study, or practice.[33] In the field of information technology, it is critical to acquire and develop core technical skills to become sought-after professionals who can make significant contributions to future workplaces and the economy as a whole.[34] The technology is not user-friendly and requires expertise in maintenance since the employee does not have the skills about the system and data.[35] That is why most tourism organizations have a low level of ICT adoption in their IT infrastructure.[36] Aside from that, it is the management's responsibility to provide sufficient resources, such as qualified personnel, time, money, information, safety work methods, facilities, tools, and machinery, to implement a safety program, which is also a challenge[37] also revealed six significant dimensions underlying the barriers: a lack of Occupational Safety and Health (OSH) regulations and legislation, technological constraints, a lack of genuine organizational commitment, prohibitive costs, a poor safety culture, and privacy and data security concerns when it comes to technology implementation. Policy issues were also identified. Safety management practices are the policies, strategies, procedures, and other measures implemented or followed by an organization's management with an eye for employee safety.[38] Governments must improve their education and training policies as soon as possible to help more people reap the benefits of digital transformation and reduce the risk of automation widening inequalities and driving unemployment.[39] Over time, health and safety procedures have become common sense in various businesses.[40] Improving its safety performance can increase an organization's resilience or robustness and reduce the likelihood of accidents. Table 2 tracks the data by categorizing it into a title, technology type, country, industry, and the number of outcomes. The table is a comprehensive list of articles that enables the researcher to form conclusions and assign meaning based on the patterns of emerging concepts from the literature study.

Table 2: Final Review based on Title, Types of Technology and Countries

Search engines	Authors (year)	Title	Type of technology	Country
Emerald	Mejia et al. (2021)	A Wearable Technology Solution and Research Agenda for Housekeeper Safety and Health	Wearable Tech.	Florida, USA
	Bui & Filimou (2021)	A Recipe for Sustainable Development: Assessing Transition of Commercial Food Services Towards the Goal of The Triple Bottom Line Sustainability	NIL	UK
	P. Rayn (1992)	European Industrial Training	NIL	Britain
	Raymond (2015)	Implementation of Sustainable Development Practices in The Hospitality Industry: A Case Study of Five Canadian Hotels	NIL	Canada
Science Direct	Robinson & Barron (2007)	Developing A Framework for Understanding the Impact of Deskilling and Standardisation on The Turnover and Attrition of Chefs	NIL	Australia
	Wu et al. (2021)	Managing Internal Service Quality in Hotels: Determinants and Implications	NIL	China
	Torres & Jang (2021)	The Impact of Wearable Devices on Employee Wellness Programs: A Study of Hotel Industry Workers	Wearable technology (Ex: Fitbit)	USA
Scopus	Nelson & Nesmith (2014)	The Impact of Safety Training on Work-Related Injuries at Eating and Drinking Places	Digital training	Ohio and Indiana
	Young et al. (2018)	Explaining the Food Safety Behaviours of Food handlers Using Theories of Behaviour Change: A Review	NIL	Canada
Springer Link	Gardner & Hill (1999)	Technology Education in Ontario: Evolution, Achievements, Critiques and Challenges Part 2: Implementation and Evaluation	Loud-Based Learning Software, Apps, Blogs or Discussion Boards, Digital Whiteboards, and other Interactive Online Tools	Canada
	Muncke et al. (2020)	Impacts of Food Contact Chemicals on Human Health: A Consensus Statement	NIL	Switzerland

	Sorensen et al. (2021)	The Future of Research on Work, Safety, Health and Wellbeing: A Guiding Conceptual Framework	NIL	Boston, USA
	Cahill et al. (2022)	The Case for Change: Aviation Worker Wellbeing During the COVID-19 Pandemic, and the Need for an Integrated Health and Safety Culture	Using emails, website/ telephone	Dublin Ireland
Francis and Taylor	Mensah & Boakye (2021)	Conceptualizing Post-Covid 19 Tourism Recovery: A Three-Step Framework	NIL	Ghana
	Linda & Lie (2014)	Merging Occupational Health and Safety Management with Food Control: A Healthy Recipe for The Hospitality Industry	NIL	Norway
	Palasis et al. (2016)	Enhancing Occupational Safety and Health Through Use of The National Skill Standards	NIL	Scotia
	Kilichan et al. (2020)	Food Safety Attitudes and Practices of Chefs in Cappadocia Region, Turkey	NIL	Turkey
	Rosemberg et al. (2021)	COVID-19 and Mental Health of Food Retail, Food Service, and Hospitality Workers	NIL	USA
	Lomaire et al. (2020)	Chefs' Perspectives of Failures in Food Service Kitchens, Part 1: A Phenomenological Exploration of The Concepts, Types, And Causes of Food Production Failure	NIL	Ireland
	Haris et al. (2020)	The Impact of Social Norms and Risk Assessment on Diners' Reaction to Food Safety Concerns In Restaurants	NIL	Florida

Limitations of the study

This study considered all the articles that featured the types of technology used in the existing occupational safety training's delivery and the challenges in technology-based occupational safety training in commercial kitchens. While the participants referred to English journal articles chosen for inclusion in the study, the focus was on the implementation issues, impediments, and obstacles to existing safety training. This study therefore does not examine the relationship between VR technology and occupational safety training.

During the screening phase, this study encountered a restriction. The majority of the articles were only available for a price. Using the set strings, the accessible publications for review were unrelated to the core aims. Other journals, such as JSTOR, Cochrane Library, Cambridge Journal, Ebsco Discovery Service (EDS), and Oxford Journals, were not appropriate for use because they focus on different sectors with study areas such as Engineering, Law, Economics, Human Science, Law, Medical, Science, Education, Architecture & Environmental Design, Nursing, and Language. Thus, the mapping review in this study employed only five databases from the IIUM database: Francis and Taylor, Scopus, Springer Link, and Emerald Insight.

Table 3 explains the the inclusion and exclusion criteria that set the boundaries for the systematic review conducted in this study.

Table 3: Inclusion and exclusion criteria for the systematic review

No.	Exlusion Criteria	Explaination
1.	Searching keywords.	This study considered all the articles that featured the types of technology used in the existing occupational safety training's delivery and the challenges in technology-based occupational safety training in commercial kitchens.
2.	Language.	This astudy referred to English journal articles only.
3.	Niche area.	The focus was on the implementation issues, impediments, and obstacles to existing safety training. This study therefore does not examine the relationship between VR technology and occupational safety training.
4.	Database restriction.	The majority of the articles were only available for a price. the mapping review in this study employed only five databases from the IIUM database: Francis and Taylor, Scopus, Springer Link, and Emerald Insight.

Conclusions

The research paper on occupational safety training related to technology for the commercial kitchen sector is a very new subject in research, indicating enormous research potential. The findings suggest that most published articles on safety training only concentrate on food safety and management. In contrast, it has been demonstrated by the five most popular search engines that training on the safety of commercial kitchen workers concerning technological advancements is not yet widespread. This lack of training presents a gap and an opportunity for researchers to investigate new areas currently available to contribute to the body of knowledge in this field of study. This study has vital perspectives on improving learning delivery, particularly in occupational safety training in modern-based training compared to traditional paper-based training. It is aligned with the objectives of Industry Revolution 4.0, which aim to revolutionize the manufacturing industry. In keeping with the concepts of prevention, future research could investigate the use of VR for workplace safety training in the kitchen.

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