Research Article

Leveraging Technology for the Survival of the Restaurant Business: A Systematic Literature Review

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Abstract

The convergence of technology and the restaurant industry has become increasingly critical, especially in the context of the unprecedented challenges presented by the COVID-19 pandemic. Embracing technology has played a pivotal role in enabling restaurants not only to endure but also thrive in these turbulent times. This conceptual paper examines how technology has played a vital role in the survival and adaptation of restaurants during the COVID-19 pandemic. It highlights the importance of swift technology integration for restaurants to remain competitive and navigate the disruptions caused by the pandemic. The study emphasizes the significance of technology in ensuring the restaurant industry's continuity and proposes ongoing investments in technology for post-pandemic competitiveness. This research also explores the positive impact of technology on convenience, efficiency, and customer satisfaction in the foodservice sector, offering valuable insights for restaurant owners, policymakers, and technology developers. While acknowledging its limitations, this study underscores the need for further exploration of technology's role in the survival and success of small and medium-sized restaurants, especially in developing countries, as they strategize for sustainability amid the ongoing global health crisis.

Keywords:

Business Survival, Covid-19, Restaurant, Systematic Literature Review, Technology

1 Introduction

The year 2020 will be recorded in the annals of history as the year in which the Coronavirus Disease 2019 (COVID-19) achieved global prevalence. It marked the first instance in which nearly all nations around the world found it necessary to temporarily enforce restrictions on public movement, shutter businesses, and steer human behaviour towards reducing physical interactions. This worldwide and abrupt occurrence of the COVID-19 pandemic emerged as a significant transformative catalyst for both societal and economic structures. This transformation, often referred to as the "new normal," is characterized by shifts in the labour force, alterations in demand, disruptions in supply chains, and subsequent modifications in business models. COVID-19 is an infectious ailment caused by the severe acute respiratory syndrome coronavirus. The disease was initially detected in December 2019 in Wuhan, the capital of China's Hubei province, and subsequently spread globally, resulting in the ongoing pandemic of 2019–2020. The earliest confirmed case can be traced back to November 2019 in Hubei province. Common symptoms encompass fever, cough, and respiratory distress. Additional manifestations may encompass fatigue, muscular discomfort, diarrhoea, pharyngitis, loss of the sense of smell, and abdominal pain.

The impact of the COVID-19 pandemic on the operational activities of Small and Medium-sized Enterprises (SMEs) worldwide is profound. While stringent government regulations and responses are imperative for disease control, most businesses have experienced adverse effects in the short or long term. Predominant challenges include cash flow disruptions, temporary closures, workforce layoffs, preservation of operations, and diminished capacity for future growth (Wahyudi, 2014; Craven et al., 2020; Smith-Bingham & Hariharan, 2020). These circumstances necessitate significant adjustments in business strategies, operations, and conduct, as well as the exploration

of new opportunities for redevelopment, all of which are recognized as critical survival challenges for most SMEs (Cassia & Minola, 2012; Svatošová, 2017; Syed, 2019). It should be noted that the impacts may vary depending on the type of business activity, size, and available resources (Cassia & Minola, 2012). Consequently, there is a pressing need to examine the consequences of such phenomena, with limited existing references accessible to practitioners, policymakers, and the academic community.

During times of crisis, such as the COVID-19 lockdowns, the utilization of innovation emerges as the optimal approach to ensure the sustainability of businesses (Fletcher & Griffiths, 2020). The COVID-19 lockdowns have proven to be an opportune moment for enterprises to enhance their adaptability and agility within markedly diverse circumstances. This situation has compelled them to formulate novel strategies for delivering products and services aligned with their unique business requirements (Chetty et al., 2020). The COVID-19 lockdowns should allow companies to augment their sales, as they can leverage innovative technologies to promote their offerings through digital online channels. Technology assumes a pivotal role that demands the attention of every business. In the contemporary landscape, the digitalization of operations should be a primary focus, particularly in light of the prevailing imperative of social distancing (Chetty et al., 2020).

Technology is rapidly advancing its capacity to support businesses in achieving enhanced efficiency and delivering superior outcomes. The integration of Artificial Intelligence (AI), Big Data, and the Internet of Things (IoT) collaboratively facilitates the development of software applications that enable businesses to reduce the time required from conceptualizing product ideas to manufacturing and ultimately delivering products to customers. As articulated by Manyika et al. (2013), "Advancements in artificial intelligence, machine learning, and user interfaces (such as voice recognition) are now enabling the automation of tasks traditionally considered infeasible or impractical for machines to perform."

As posited by Chetty et al. (2020), the current scenario presents a glimpse into a long-term landscape where digital technology will occupy a central role in all forms of interaction and communication. Crises often serve as catalysts for novel technological advancements and innovations. Digital technology emerges as a pivotal tool for mitigating the impact of the COVID-19 pandemic. Organizations shifting from on-premises systems are urged to transition towards hybrid cloud services. Enhancing customer experiences necessitates the utilization of technology, while financial and operational processes should undergo digital enhancements, fostering a more adaptable and dynamic work environment (Chetty et al., 2020). The integration of artificial intelligence is recommended as a strategic response to mitigate the repercussions of this crisis. This advanced technology adoption strategy encompasses the transformation of offline business establishments into online platforms, prioritizing customer safety and convenience. During the COVID-19 pandemic, companies can advance their marketing and distribution efforts through online applications (Chetty et al., 2020). Given that both large and small enterprises constitute integral components of the economic system, the adoption of digital technologies is imperative for ensuring

business sustainability in both the present and the future (Ameen et al., 2021; Dwivedi et al., 2020).

Drawing from prior literature reviews, it is evident that there needs to be more scholarly articles or journals pertaining to business survival within the context of technology adoption. The prevailing research predominantly centres on business survival with an emphasis on financial aspects and related considerations. Throughout the COVID-19 crisis, a considerable proportion of Small and Medium-sized Enterprises (SMEs) have prudently managed their debt exposure by employing capital rationing strategies in the acquisition of assets and the management of working capital. This prudent approach can be attributed to their pre-existing business policies and prior experiences, particularly in response to governmental changes subsequent to the general election, as elucidated by Omar et al. (2020). An analysis of the political landscape proves instrumental in elucidating the policy decisions and measures undertaken by both central and state governments. Such insights enable businesses to capitalize on governmental provisions aimed at alleviating the operational challenges experienced during this turbulent period, as suggested by Rakshit and Paul (2020). A subset of enterprises, particularly smaller ones, may lack the requisite digital competencies for transitioning their operations online. Consequently, this circumstance necessitates an accelerated learning curve for them to familiarize themselves with and employ online business tools.

In light of the prevailing emphasis on financial strategies for business survival in existing research, there exists a notable gap with regard to investigations into the role of technology in business survival. Consequently, this study is driven by the primary objective of examining the business survival strategies of small-scale restaurateurs through the lens of technology adoption. Furthermore, this study contributes to the extant body of knowledge regarding the impact of innovation on businesses, thereby providing a foundation for prospective research in this domain. In an academic context, this study presents an invaluable opportunity for scholars from diverse backgrounds to delve into this research area, expanding insights into the significance of technology adoption for small business proprietors. The subsequent sections of this paper are structured as follows: a comprehensive review of the business situation during the COVID-19 pandemic in Malaysia, an exploration of the challenges and issues faced by businesses, a detailed analysis of the adoption of technology by restaurateurs during this crisis, and survival strategies during the pandemic. Subsequently, the implications of the findings for both theory and practical application are discussed, acknowledging the study's limitations and delineating potential avenues for future research.

2 Literature Review

2.1 Business situation in Malaysia during COVID-19

In accordance with Pinzaru et al. (2020), the COVID-19 pandemic has exerted a significant influence on the business landscape in Malaysia, leading to both adverse and

favourable outcomes for enterprises. These effects range from the closure of businesses struggling to compete and endure in this challenging environment to the substantial growth of certain enterprises achieved through the adept utilization of technology to ensure business continuity in the present era. As highlighted by Rashid et al. (2019), the restaurant industry occupies a prominent position in Malaysia's economic development, contributing significantly to its growth. Previous studies have revealed that only 36% of Malaysians opt for home dining, while 64% of the population dine out at least once daily, with 12.5% having made purchases of meals outside their homes. It is noteworthy that the trend of dining out among Malaysians has nearly doubled in the past three decades, underscoring the necessity to comprehend the distinct attributes of the restaurant industry, particularly within the full-service category.

A full-service restaurant, as delineated, pertains to an establishment offering a comprehensive dining experience, complete with table service. Furthermore, it is characterized as a food service venue providing table service and catering to customers for dining, offering a diverse range of food and beverage options. Finally, full-service restaurants are venues where patrons receive food services while seated and settle their payments prior to departure. In some instances, these establishments may also provide bar services, alcoholic beverages, and entertainment as supplementary features to enhance the overall dining experience.

Notably, the COVID-19 pandemic inflicted substantial economic losses on Malaysia, with a daily economic shortfall of RM2.4 billion during the Movement Control Order (MCO) period and a cumulative loss of RM63 billion by the end of April 2022. On May 4, Malaysia initiated a relaxation of the MCO measures. It commenced the reopening of its economic sector as a measure to alleviate the economic burdens incurred, facilitated by achieving herd immunity to COVID-19 through comprehensive vaccination efforts. Malaysia's COVID-19 case fatality rate stands lower than the global average, a result of effective early preparedness and planning, a robust public health and hospital system, extensive contact tracing, active case detection, and the strict enforcement of the Enhanced Movement Control Order (EMCO).

2.2 Issues and challenges on restaurants during the pandemic

Amid the COVID-19 crisis, the majority of businesses encountered substantial strains within their supply chains, a situation marked by multifaceted challenges spanning from procuring goods and raw materials to transportation, production, and final delivery while simultaneously addressing the human element. The daily management of these intricate and unpredictable issues could have helped the formulation of coherent short-term planning strategies. However, enterprises remained compelled to oversee the lifeblood of any business, which included navigating constraints related to cash flow, the timely retrieval of outstanding debts, payments to suppliers and employees, and servicing the financial obligations to banks. Many businesses would have faced bankruptcy at an accelerated pace were it not for the financial aid extended by several, though not all, countries' governments, and the levels of assistance significantly varied

across different nations. During the literature review, various studies examining the impact of COVID-19 lockdowns on businesses were identified.

Governments have been diligently striving to assist businesses in navigating the economic disruptions instigated by COVID-19, fostering their resilience and post-pandemic prosperity. Simultaneously, organizations and industry leaders have proposed innovative approaches to help businesses in the management and optimization of essential resources (Budhwar & Cumming, 2020; Verbeke, 2020). Diverse industries have adopted novel strategies, such as the implementation of virtual property viewing in the real estate sector to ensure safe service provision and the redesigning of business strategies, exemplified by menu modifications within the hospitality industry, aimed at stabilizing business operations and instilling consumer trust and confidence, as detailed by Rivera (2020). Shankar (2020) emphasizes that this juncture presents a critical moment for management to scrutinize short to medium-term business challenges and opportunities, underscored by the need for developing new business strategies rooted in a comprehensive understanding of industry dynamics influenced by COVID-19 (Budhwar & Cumming, 2020; Fong et al., 2020). Researchers have honed and advanced numerous methods for probing the crisis's impact and industry-specific challenges, with case studies, interviews, and surveys emerging as the most commonly employed techniques (Timoshenko & Hauser, 2019).

Furthermore, restaurateurs have embarked on a quest to enhance their capacity to navigate through challenging circumstances (Badinelli et al., 2012; Barile et al., 2014) and exhibit resilience in the face of complexity (Derbyshire & Wright, 2014) and crisis response (Badinelli et al., 2012; Barile et al., 2014). The concept of resilience, as delineated by Camarinha-Matos (2014), has been pivotal in guiding restaurateurs toward reimagining their business models. They have come to recognize the profound impact of exogenous factors on entrepreneurial endeavours (Gaies et al., 2022) and have shown a commitment to digitization as a foundational element in shaping the future of the restaurant industry. In particular, the utilization of Information and Communication Technology (ICT) platforms for online reservation management has facilitated crowd management, enhanced communication between restaurants and customers, and enabled restaurateurs to accumulate substantial data pertaining to consumer preferences.

In addition, by December 1, 2020, the COVID-19 pandemic had led to the temporary or permanent closure of over 110,000 foodservice establishments in the United States, representing approximately 10% of the total foodservice operations (Sink, 2021). Despite some restaurants managing to continue their operations with government assistance, their future remains to be determined, and necessitating research efforts to identify the required adaptations for the restaurant industry's recovery from this profound crisis. Despite the industry's considerable efforts to create a comfortable dining experience and reassure customers, concerns persist regarding dining out, even at restaurants offering outdoor dining options, owing to perceived COVID-19 infection risks and other uncertainties within restaurant environments (Yang et al., 2020). Perceived risk denotes the subjective assessment of uncertainties within the consumer

decision-making process, encompassing potential financial, physical, psychological, or social consequences (Liebermann & Stashevsky, 2002). Due to the high risk of infection to individuals, various regions and countries have mandated the suspension of social and economic activities. The restaurant industry, characterized by its highly social and interactive nature, has been among the sectors most severely affected financially and economically during this pandemic (Kim et al., 2021).

Online food purchasing has emerged as a nationwide trend, with e-commerce platforms assuming the role of the new "food source" for consumers. Recent research indicates that an increase in confirmed COVID-19 cases heightens the likelihood of consumers turning to online food purchases (Gao et al., 2020). Moreover, shifting consumer behaviours, driven by the necessity of social distancing, have given rise to widespread e-commerce use and less frequent in-person shopping, with takeout and home delivery becoming alternatives to dine-in experiences at closed restaurants (Bakalis et al., 2020; Wang et al., 2020). Previous investigations into drone delivery services have predominantly centred on their capacity to reduce environmental impacts within industries (Park et al., 2018), exploration of consumer innovativeness (Hwang et al., 2019), and assessments of consumer acceptance of such services (Khan et al., 2019). Notably, Hwang and Choe (2019) conducted a study that delved into the perceived risks associated with drone food delivery services (DFDS) before the COVID-19 outbreak. In the long term, it is of paramount importance for researchers to provide fresh insights and implications for the hospitality and tourism industries, addressing not only crisis management during the COVID-19 pandemic but also strategies for the post-pandemic era in light of the evolving preferences and demands of newly emerging consumers (Gursoy & Chi, 2020).

Alterations in consumer behaviour pertaining to home-cooked meals have manifested as a consequence of restaurant closures and social isolation, with the proliferation of takeout and home delivery services supplanting defunct dining establishments (Li et al., 2020). Consequently, online food delivery services have surged in popularity and continue to do so during the COVID-19 outbreak. To minimize the risk of COVID-19 transmission, the National Restaurant Association suggests that the safest options are limited to drive-through, delivery, takeout, and curb-side pick-up services. In contrast, the highest risk arises from on-site indoor dining without adherence to the mandated 2-meter distancing requirement (National Center for Immunization and Respiratory Diseases (U.S.). Division of Viral Diseases, 2020). Despite these activities being perceived as less risky, delivery personnel face an elevated risk of COVID-19 transmission, potentially becoming vectors for the virus. Consequently, mitigating measures, such as contactless delivery, strict adherence to personal protective equipment, contactless payment methods, prompt disposal of packaging materials, and immediate hand hygiene, should be practised to minimize this risk (Nguyen & Vu, 2020).

Furthermore, digital trends have gained prominence within the food service industry, encompassing online ordering systems and delivery applications, contactless payment methods, online table reservation systems, digital menu boards for kitchen staff, automated inventory management software for tracking food and beverage

stocks, online menu access via QR codes, and air purification technology for ensuring clean indoor air quality (EHL, 2021). Consumer behaviour has adjusted to the routine of ordering takeout meals, prompting businesses to adapt their models and innovate in enhancing the sensory aspects of online meal orders (Gavilan et al., 2021).

2.3 The technology adoption by restauranteurs during the pandemic

Morosan (2011) delves into the investigation of consumer receptivity toward biometric payment systems deployed within restaurant settings. This study, in particular, extends the conventional technology acceptance model by incorporating elements such as the perceived security and innovativeness associated with biometric systems in the realm of information technology. The research findings identify utilitarian value, convenience, privacy concerns, and compatibility as the most influential determinants of mobile payment technology acceptance. This conclusion stems from an online survey distributed to a sample of individuals within a large university situated in the south-eastern region of the United States. Furthermore, Kapoor and Vij (2018) scrutinize the impact of mobile application attributes offered by online food aggregators (OFA) on the purchase decisions of diners, specifically examining how these attributes contribute to effective purchase conversion. In addition, Beldona et al. (2014) engage in an assessment of customer perceptions to evaluate the relative effectiveness of an e-tablet menu when compared to a traditional paper-based menu. The study findings underscore the significant enhancement in the service experience facilitated by the integration of technology, particularly in the context of the ordering process.

In recent years, the technology sector has introduced innovative systems tailored to the restaurant industry. Historically, the restaurant industry operated without the assistance of technology, relying on manual processes such as cash registers to collect receipts for financial transactions. Elements like point of sale (POS) systems, reservation management, and online ordering systems were non-existent (Doran, 2010). Success in the restaurant business was contingent upon the skill and acumen of operators, whether they managed a small, unpretentious diner or a full-service dining establishment. Despite the “old-fashioned” techniques employed, there were still numerous thriving restaurants. The nascent field of business computing offered insight into how to optimize restaurant operations, providing support in various tasks such as accounting, accounts payable, and guest order processing. Notably, Red Lobster was a pioneer in the adoption of restaurant technology, introducing the first-ever POS system in 1976, effectively revolutionizing the casual dining industry. It is worth noting that this innovative system was developed by American Machine and Foundry, a bowling pin company, which had grown dissatisfied with the technological stagnation within its primary industry (Doran, 2010).

In reality, less than half of IT managers within the restaurant industry are exclusively responsible for managing accounting and restaurant operations, concurrently bearing the additional responsibilities associated with in-house IT operations (Cobanoglu, 2007). Restaurant technology can be categorized into Front House (FOH) and Back House (BOH) technologies, which respectively support the operational facets of FOH and BOH. The

pivotal technological system employed across these restaurant operations is the point-of-sale system (POS), which encompasses a network of cashiers and server stations responsible for order processing, transmission of orders to the kitchen and bar, guest-check reconciliation, timekeeping, and the systematic posting of charges to guest accounts (Collins & Cobanoglu, 2008). One might anticipate a significant integration of IT-oriented practices within the production and delivery of goods in the restaurant industry, considering the broader trend of innovation across various sectors (Collins et al., 2017). Therefore, the primary objective of this study is to scrutinize the deployment of FOH and BOH technology applications across various types of restaurants in the United States, alongside an evaluation of the level of IT management. Additionally, the research seeks to assess the significance of these technology applications in enhancing restaurant operations.

2.4 Survival strategies during the pandemic

Small enterprises must devise alternative strategies to effectively address their challenges as they operate under highly adverse conditions (Kottika et al., 2020). The rapid advancement of technology presents an opportunity for the restaurant industry to function during the ongoing pandemic with minimal physical contact. Consequently, restaurant businesses are compelled to integrate a range of technologies into their daily operations. Digital menus have become a necessity, allowing patrons to scan a QR code to access the menu of their choice, thereby reducing the significant risk of direct contact with physical menu books. Cashless payments have become the prevalent method, minimising contact with Electronic Data Capture (EDC) machines. Restaurants that have transitioned to Point of Sale (POS) software find it immensely valuable in determining customer preferences for food and beverages, thus aiding in the development of effective sales strategies (Utama et al., 2020). Additionally, the use of POS software enables a comprehensive understanding of daily and weekly revenue generation, which can be analysed as part of the previously discussed cost-reduction endeavours. The high demand for order-through services, coupled with user-friendly access via digital platforms, is expected to witness substantial growth over the year, as it permits customers to enjoy their preferred meals without the need for direct interactions with numerous individuals within the restaurant setting.

Additional issues that restaurants encounter include disruptions in supply chains, rising operational costs, financial constraints, employee absenteeism, and other related challenges (Sunthornpan & Hirata, 2021). In Pakistan, restaurants are grappling with diminished sales, extensive workforce layoffs, reduced economic activity, and limited government relief. To counteract the impact, many restaurant businesses have turned to alternative off-premise models, such as drive-thru services and food delivery. However, these models prove more advantageous for fast-food establishments already equipped with digital infrastructure and drive-thru facilities. At the same time, full-service restaurants need help adapting swiftly, thereby experiencing more substantial financial consequences (Yang et al., 2020).

Conversely, in Malaysia, a multitude of street vendors and micro-food sellers offer items such as fried food, hamburgers, nasi lemak, satay, beverages, and more from food trucks and kiosks. These businesses traditionally rely on daily offline customer transactions. The "Stay at Home" policy implemented during the COVID-19 pandemic restricted patrons from frequenting these family-run food stalls. Some had to cease operations, while others exhibited resilience by embracing innovative approaches (Azman & Majid, 2023).

Table 1: Summary of articles included in the review

Year	Location	Author	Finding	Variable
2021	International Journal of Contemporary Hospitality Management	Choe, J. Y. J., Kim, J. J., & Hwang, J.	The impact of using drone food delivery service.	The risk of technology
2021	International Journal of Entrepreneurial Behavior & Research	Crick, J. M., Crick, D. and Chaudhry, S.	Survival strategy within the business models of ethnic minority-owned urban restaurants affected by COVID-19	Survival strategy amid COVID-19
2010	Worldwide Hospitality and Tourism Themes	Doran, D	Restaurants and technology in past, present and future	Restaurant technology present and past
2020	China Agricultural Economic Review	Guo, H., Liu, Y., Shi, X., & Chen, K. Z.	The role of e-commerce in the urban food system	The role of e-commerce
2022	British Food Journal	Hamid, S., & Azhar, M.	Behavioral intention to order food and beverage items using ecommerce during COVID-19	Customer behavioral order food and beverage using e-commerce
2021	International Journal of Contemporary Hospitality Management	Jeong, M., Kim, K., Ma, F., & DiPietro, R.	Factors driving customers' restaurant dining behavior during the COVID-19	Factors driving customers' restaurant dining behavior
2022	Journal of Hospitality and Tourism Insights	Kahveci, E.	Business strategies for small-and medium-sized tourism enterprises during COVID-19	Business strategies for small-and medium-sized tourism enterprises
2019	Journal of Hospitality and Tourism Technology	Moreno, P., & Tejada, P.	The using of information and communication	The using of information and communication technology

			technology in the restaurant industry.	
2022	Transforming Government: People, Process and Policy	Polese, F., Botti, A., & Monda, A.	Reflections on restaurant management practices during COVID-19 in Italy.	The adaption of owners and managers restaurant amid of COVID- 19
2022	Journal of Hospitality and Tourism Insights	Shukla, B., Sufi, T., Joshi, M., & Sujatha, R.	Leadership challenges for Indian hospitality industry during COVID-19 pandemic.	Challenges in hospitality industry during COVID- 19
2022	2021 IEEE Region 10 Symposium (TENSYMP)	Sunthornpan, S., & Hirata, S.	The situation and the survival of MSMEs restaurant under COVID-19 pandemic in Thailand.	The survival of MSMEs restaurant
2021	I Gusti Nyoman Wiantara Ida Ayu Putu Sulastri I Gusti Bagus Rai Utama, 07-12.	Wiantara, I. G. N., Sulastri, I. A. P., & Utama, I. G. B. R.	Survival Strategy Restaurant Business during the COVID-19 Pandemic	The ways of restaurants survival strategy.
2021	International Journal of Contemporary Hospitality Management.	Yang, M., & Han, C.	Industry challenge and business response to COVID-19	Challenges in industry and business during COVID- 19

3 Methodology

This study aims to comprehensively review literature on restaurant management during the COVID-19 crisis. This research adopts a systematic literature review, examining conceptual perspectives from various authors (Mas et al., 2019). This method is well-suited for the investigation into post-COVID-19 restaurant industry literature, facilitating the systematic identification and evaluation of relevant articles. Initiated during the 2020 COVID-19 lockdowns, this study utilized major research databases, including Emerald Insight, ScienceDirect, Web of Science, and Scopus, to compile pertinent articles. This meticulous process aimed to pinpoint literature specifically focused on post-COVID-19 restaurant contexts, with a particular emphasis on the role of technology in ensuring survival during the crisis.

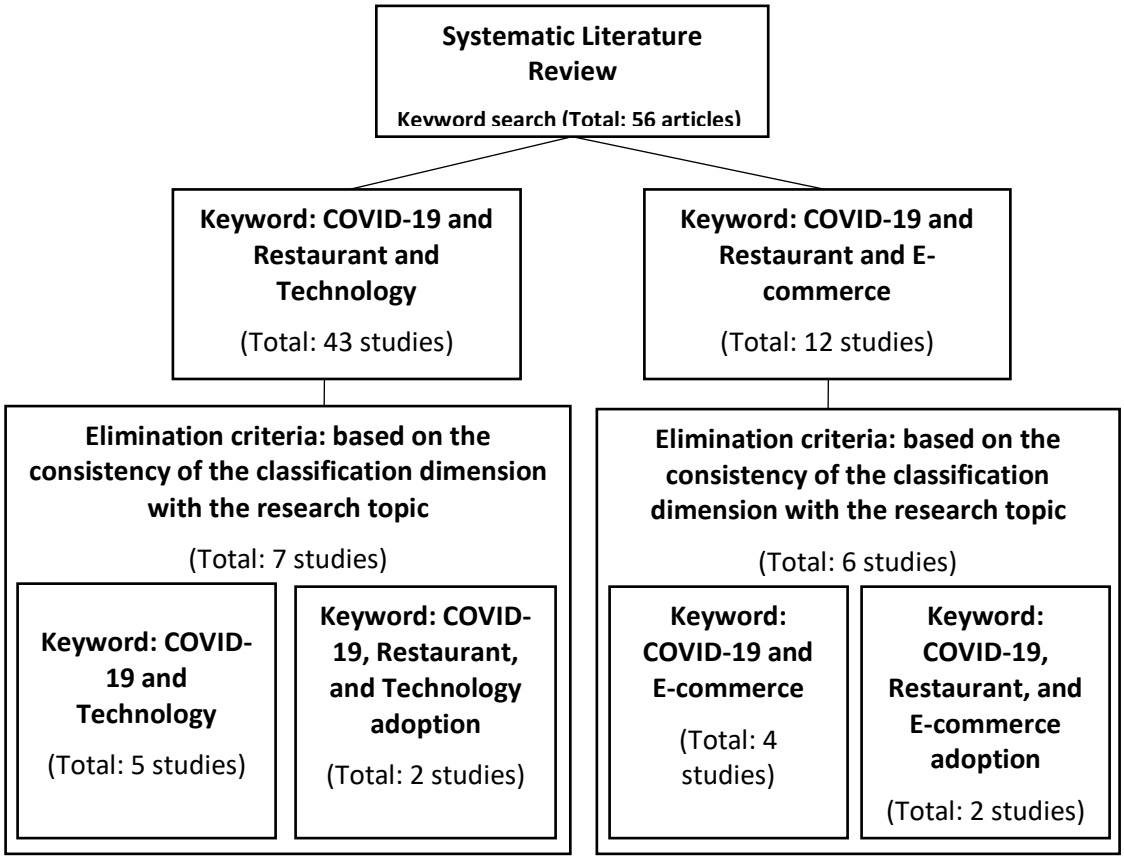

Figure 1: Systematic Literature Review

In pursuit of the research objective, it was deemed suitable to employ a keyword search strategy. The study utilized the subsequent keywords for the systematic exploration of pertinent research outcomes: ("COVID-19" OR "lockdowns" OR "Crises" OR "Pandemic") AND ("Restaurant" OR "Eating Place" OR "Eatery" OR "Eating House" OR "Diner") AND ("technology" OR "e- commerce") AND ("Acceptance" OR "Adoption" OR "Diffusion" OR "Intention" OR "Usage" OR "Satisfaction" OR "Use Behaviour"). The keyword search produced 56 articles, of which only 13 were relevant to the study's focus. The other 44 articles covered various fields, including medicine, health, science, education, government and citizens' responses, economy, and politics. While some studies acknowledged the COVID-19 pandemic, they did not conduct a thorough investigation. Figure 1 depicts the research design for the systematic literature review in this study. The 56 identified studies were classified into two main dimensions:

(1) Fist dimension: (COVID-19, Technology) and (COVID-19, Restaurant, Technology).

(2) Second dimension: (COVID-19, E- commerce) and (COVID-19, Restaurant, E-commerce).

The 56 studies were divided into two dimensions, with 43 in the first and 12 in the second, based on an assessment of abstracts, introductions, and conclusions. After excluding articles not aligning with either dimension, 13 studies were retained for a detailed literature review (see Table 1), comprising 7 in the first dimension and 6 in the second. The systematic literature review generated 13 articles, all tied to the search criteria in selected databases. Due to their diverse nature, these articles were categorised into two main subgroups. The first subgroup focused on the impacts of COVID-19 on the tourism and hospitality sector, emphasizing businesses and the role of technology in survival. The second subgroup explored the effects of COVID-19 on the restaurant business and the role of technology in its survival.

4 Discussions

This conceptual paper seeks to delineate and comprehend the role of technology adoption among restaurateurs in the context of the COVID-19 pandemic. It accomplishes this objective by conducting a thorough examination of existing literature pertaining to technology implementation and its impact on business resilience. Additionally, the study explores the various issues and challenges encountered by restaurateurs during the pandemic. Previous research suggests that the prospects for survival and continued operation within the food industry during the pandemic and beyond are somewhat constrained. The intertwining of technological innovation and economic development has exerted a positive influence across numerous domains. Within the restaurant sector, online food delivery has gained significant prominence. This contemporary service underscores the importance of convenience, offering individuals the ability to access meals from the comfort of their homes. While COVID-19 has wrought negative consequences in many aspects of life, it has, paradoxically, presented opportunities for the delivery industry (Hoang & Suleri, 2021). As outlined by Pinzaru et al. (2020), the continuum of business operation spans from the potential closure of establishments due to the inability to compete and persevere to the remarkable growth achieved by those leveraging technology to ensure business continuity. Consequently, this study offers a comprehensive exploration of the impact of technology adoption in sustaining business operations amidst the COVID-19 crisis.

In a post-COVID-19 landscape, there is an escalating emphasis on contactless services, with technology-driven solutions garnering significant attention within the hospitality sector (Jiang & Wen, 2020; Lin et al., 2020). Among these innovations is the emergence of drone food delivery services (DFDS), defined as "services employing drones for the delivery of food to consumers" (Hwang et al., 2019). Over the past few years, the use of drones as delivery vehicles has transitioned from theoretical conjecture to practical application, accompanied by heightened expectations and optimistic prognostications regarding the potential of DFDS. Most significantly, from an epidemiological standpoint, DFDS assumes a crucial role in offering contactless food service, thereby mitigating the potential transmission of COVID-19. The use of DFDS eliminates direct face-to-face interactions between service providers and consumers, substantially reducing the risk of virus transmission. Despite the myriad advantages

associated with DFDS, it is important to note that in many countries, the full commercialisation of drone delivery services remains unrealised, primarily due to consumer apprehensions related to privacy and security concerns surrounding the use of commercial drones (Khan et al., 2019).

Furthermore, the Point of Sale (POS) system represents a pivotal facet of restaurant technology. Remarkably, in the year 1976, Red Lobster etched its name in history as the first company to introduce the restaurant POS system within the industry, subsequently triggering a revolutionary transformation in the landscape of casual restaurant dining. The advent of the early POS system ushered in a multitude of benefits, such as the electronic input of guest orders by service team members and the streamlining of the guest check process, alongside the invaluable function of inventory usage tracking. This cutting-edge system engendered a reduction in table turn-time and a substantial mitigation of errors related to server additions on guest checks. The significant financial impact derived from the elimination of errors in the calculation of guest checks swiftly captured the attention of the industry, catalysing the establishment and proliferation of technology systems designed specifically for restaurant operations.

In the context of this research, diverse technological and managerial approaches have been employed across multiple countries in a concerted effort to resuscitate the economy and reinvigorate food-based businesses. As evidenced in recent studies, the outcomes of these endeavours yield positive implications for Food and Beverages (F&B) entrepreneurs (Toh & Wang, 2020; Chuah et al., 2022; Jeong et al., 2022; Kim & Lee, 2020). Notably, a study focusing on consumer behavioural intentions with regard to the selection of restaurants offering contactless dining services (CDS) and convenience during the epidemic has been conducted within the context of developed environments, including China, Taiwan, and the United States. The findings of this research underscore the growing trend of online food purchases, with e-commerce platforms emerging as the new "food basket" for consumers, thereby reducing the necessity to venture outside and facilitating the deceleration of virus transmission. Intriguingly, the research posits a positive correlation between the proportion of confirmed COVID-19 cases and the likelihood of consumers engaging in online food procurement (Gao et al., 2020).

E-commerce platforms have been identified as instrumental in offering opportunities for entrepreneurs to weather the crisis, as expounded upon by Park et al. (2018). The realm of drone delivery services has primarily been scrutinised in terms of its role in mitigating the environmental footprint of the industry, with a focus on customer service, hospitality, and the integration of technology within the workforce. The outcomes of these investigations underscore the efficacy of multifaceted strategies, encompassing stakeholder engagement, improved communication with employees, the incorporation of employees in making challenging decisions, and the harnessing of technology to surmount challenges. Moreover, the implementation of contactless food delivery services has been deemed to harbour a low risk of infection for food delivery personnel. Thus, in accordance with the findings of Nguyen and Vu (2020), a suite of practices has been delineated to minimise this risk, comprising contactless delivery, the stringent use of face masks and gloves, the utilisation of newly formulated hand

sanitisers, the preference for e-wallet or credit card payment methods, and the prompt disposal of packaging, coupled with immediate handwashing following the receipt of food.

5 Conclusion

This study underscores the profound impact of technology on the resilience of the restaurant industry in the face of the pandemic. It accomplishes this by delving into the intricate interplay between technology and the survival of restaurants amid the COVID-19 crisis. As a result, the study underscores that restaurants that expeditiously embraced technology exhibited a remarkable capacity to acclimate to the evolving business landscape and retain their competitive edge during the pandemic. Significantly, this research illuminates the pivotal role of technology in safeguarding the restaurant industry's viability throughout the pandemic, propounding the imperative for restaurants to perpetuate their investments in technology to ensure their competitiveness in the post-pandemic era. A cascade of studies has also scrutinized the influence of technology on the convenience, expeditiousness, and overall satisfaction of food ordering and delivery.

The significance of this conceptual paper emanates from its capacity to furnish a robust and dependable framework for gauging the role and import of technology in the restaurant industry's endurance amidst the pandemic. The outcomes of this evaluation yield invaluable discernments for proprietors and administrators of dining establishments, policymakers, and technology innovators regarding the instrumental role of technology in perpetuating the restaurant industry's vitality and competitiveness amid and beyond the COVID-19 pandemic.

Notably, akin to any empirical inquiry, this research harbours certain constraints with regard to its exploration of technology's role in sustaining restaurants during the COVID-19 pandemic. It is essential to acknowledge that the study encompasses a relatively modest sample size, potentially deviating from the broader panorama of literature scrutinizing the interplay of technology in upholding the restaurant industry's survival during the pandemic. Nevertheless, despite these limitations, this research confers valuable insights into technology's role in bolstering the restaurant industry's resilience throughout the COVID-19 pandemic. While the reviewed articles predominantly centred on the implementation of technology in the restaurant industry and its ramifications for restaurant operations, they predominantly revolved around developed nations and the pandemic's repercussions on the industry.

Hence, it remains a paramount task to unravel the intricacies of technology utilization and its ramifications on the viability and operations of small and medium-sized eateries in developing countries, where the restaurant industry constitutes a pivotal economic pillar. Furthermore, the need persists for additional research to gauge the effectiveness and sustainability of the survival strategies undertaken by restaurants during the COVID-19 pandemic, both in developed and developing nations. In summation, this study substantiates that technology has played a pivotal role in shoring

up the restaurant industry's survival during the pandemic, with those restaurants that swiftly embraced technology evincing the ability to navigate the evolving business milieu and sustain their competitive position.

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