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The Impact of the COVID-19 Outbreaks Towards Malaysian Contractors: An Analysis of Contractors' Strategies

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ABSTRACT

The Coronavirus Disease 2019 (COVID-19) pandemic has affected over 4.3 million individuals and caused the death of more than 290,000 people. Moreover, it has aroused apprehension among citizens regarding a global economic problem and the potential for a recession. The aim of this study is to determine the influence of the COVID-19 epidemic on workers in Malaysia and identify the resulting difficulties they have faced. This study investigates the repercussions of COVID-19 infections on the building sector in Malaysia, with a specific emphasis on the influence it has had on Malaysian contractors and their subsequent reactions. This study employs a quantitative approach and leverages an online poll developed through Google Forms. Total numbers of 175 questionnaires were distributed to contractors categorised as G1–G7 based on the Construction Industry Development Board (CIDB) Website in 2023. The response rate was 56%, with 98 questionnaires received for processing. The analysis revealed that Malaysian building contractors ranging from G1 to G7 possess a comprehensive understanding of COVID-19 outbreaks. These contractors acknowledge the significance of contractor tactics in the Malaysian construction industry. The respondents concur that the COVID-19 pandemic plans implemented by contractors are beneficial for the construction industry. The validation of the identified methods by the respondents confirms their effectiveness in addressing immediate challenges and promoting sustainability and resilience in the building industry during times of global pandemic concerns.

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INTRODUCTION

The construction sector plays a pivotal role in stimulating development in Malaysia. The construction sector in Malaysia significantly contributes to the nation's economic expansion and employment generation. The construction industry has experienced recent setbacks that have been ascribed to escalating costs, which have adversely affected the capacity of contractors to carry out their obligations without accruing significant losses. Despite widespread expectations that the COVID-19 Pandemic would dissipate rapidly, its enduring effects continue to be observed over a span of over two (2) years. It utterly disrupted the global order. The permissibility of contractors to assert supplementary fees, such as the actual expenses incurred to adhere to novel standards or the disruption costs linked to compliance, lacked explicit guidance. Consequently, contractors were predominantly obligated to bear the financial burden of these limitations.

Presently, as the global community readjusts to the pandemic, Malaysian contractors are confronted with an expected sharp rise in material costs and a severe labour shortage. Most contractors will not have accounted for this when submitting their estimates. As a result of these unforeseen supplementary expenses, contractors are presently confronted with significant challenges in accomplishing their tasks. Furthermore, this circumstance has nearly become unthinkable. At the present juncture, averting the initiation of the bankruptcy procedure is frequently more important than generating a viable profit. Contractors persistently encountered obstacles throughout the Conditional Movement Control Order (CMCO), which occurred in May and June 2020. One such challenge was the strict enforcement of standard operating procedures (SOPs) pertaining to health and safety precautions on construction sites. Due to this obstacle, contractors have encountered significant challenges in progressing with their projects as usual, and the COVID-19 pandemic has further compounded the complexities of the situation. An initial framework for contractors to assess each task in projects can be established through an investigation into the ramifications of the COVID-19 pandemic on Malaysian contractors and an examination of the strategies employed by contractors in response to the crisis. It possesses the capacity to provide contractors with a method by which they can achieve a harmonious equilibrium between material cost concerns and the execution of construction projects.

LITERATURE REVIEW

The Impacts of COVID-19 Towards Malaysia Construction Industry

The construction industry in Malaysia has been greatly affected by the COVID-19 outbreak, resulting in delays in projects and disruptions in the supply chain. The government enforced a Movement Control Order (MCO) to restrict the spread of the virus, leading to a 40% decline in construction operations during the months of March and April 2020. As a result, construction businesses have experienced substantial project delays and cost escalations. The epidemic has also caused disruptions in supply chains, impacting the accessibility of vital components such as steel, cement, and tiles. The construction industry plays a crucial role in Malaysia's economic growth and advancement, and any delays in construction projects could have a substantial effect on the economy. The pandemic has also raised inquiries on the efficacy of global supply chains in the context of pandemics. Globalisation has facilitated the creation of manufacturing facilities and storage spaces in distant areas. However, the closing of borders and the physical distance between suppliers and consumers may hinder access to crucial goods. Certain nations have investigated sustainable alternatives, such as employing disinfection, sterilisation, or reprocessing methods to enable the reuse of personal protective equipment (PPE).

Besides, the ongoing global COVID-19 pandemic has adversely impacted numerous firms, particularly the construction sector. The construction industry has been compelled to temporarily suspend activities due to its classification as a high-risk sector for the transmission of the COVID-19 virus. The acquisition of

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permits from multiple government entities is progressing at a glacial pace. The primary source of these delays is the transition of government institutions to remote work from home, which is further compounded by challenges in accessing crucial information and documents (Alsharef et al., 2021). Due to the government's consecutive implementation of movement control orders, a significant number of construction projects experienced delays. The construction industry plays a vital role in Malaysia's economic growth and advancement.

SMEs in the construction sector were especially vulnerable to the financial challenges caused by the COVID-19 epidemic. A significant number of small and medium-sized enterprises (SMEs) experienced insolvency as a result of their restricted or non-existent incoming revenue, which was caused by the postponement of projects and delays in receiving payments. Small businesses sometimes lack the financial resources of larger organisations, which makes them less able to withstand long-term financial challenges. Noor Azmi Mat Said, the CEO of SME Corporation Malaysia (SME Corp Malaysia), has expressed that the worst-case scenario is plausible due to the limited financial resources available to most small and medium firms (SMEs), especially microenterprises (Zainuddin, 2021). Microenterprises distinguish themselves from larger SMEs by exclusively relying on internal financing mechanisms, while also seeking short-term bank lending options such as credit card overdrafts, credit lines, and bank overdrafts (Masiak et al., 2019). The financial constraints, coupled with the microenterprises' limited expertise and managerial skills, will ultimately compel them to prioritise short-term goals. Instead of focusing on long-term objectives, this approach hinders the potential for future growth and the exploration of new possibilities

As a result of the lockdown, a significant number of international construction workers have repatriated to their home countries and are currently unable to re-enter Malaysia due to various travel restrictions and visa obligations (Wahab, 2020). The building Industry Development Board (CIDB) released its inaugural set of guidelines on April 27, 2020, outlining the standards for carrying out building projects during the lockdown period. The Standard Operating Procedure (SOP) outlines measures recommended by the Construction Industry Development Board (CIDB) to minimise the effects of the MCO and the COVID-19 pandemic on the construction sector.

The COVID-19 pandemic expedited a significant shift towards the implementation of digitalisation and the usage of technology among contractors. In order to minimise delays and ensure the smooth operation of the company, they implemented construction management software, conducted virtual meetings, carried out digital inspections, and utilised virtual reality for project planning. Moreover, the pandemic underscored the importance of constructing structures with sustainable and resilient designs, equipping the industry to handle potential future pandemics or similar global catastrophes. During a pandemic, individuals are required to adhere to stay-at-home orders or restrict their mobility in order to prevent the transmission of a potentially fatal virus (Kevin K, 2023). These difficulties can be effectively addressed by the utilisation of Digital Twin technology. For instance, the drone can be utilised to observe the current state and advancement of the construction on-site in real time. The manager has the capability to conduct remote monitoring or inspection. If an unforeseen circumstance arises, a digital twin has the capability to track or replicate the analysis of the construction process in real-time. This helps to minimise disagreements in construction engineering and reduces the occurrence of safety accidents in engineering (Chen et al., 2023).

The COVID-19 epidemic has underscored the necessity of a robust healthcare system. Governments and private organisations worldwide are financing the construction of healthcare facilities, such as hospitals, clinics, and research institutions. Construction companies should capitalise on these opportunities by redirecting their focus towards healthcare initiatives. The government enacted social exclusion measures (Ashraf, B. N. (2021) and MCO (Shah et al. 2020) with the aim of curbing

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the transmission of COVID-19. However, these policies often result in adverse consequences for stock market returns, primarily due to their detrimental impact on economic activity (Ashraf, B. N. (2020a).

Thus, the COVID-19 pandemic has significantly disrupted the Malaysian construction industry, highlighting critical vulnerabilities in project management, supply chains, and financial stability, particularly among SMEs. The enforced MCO resulted in substantial operational declines, project delays, and increased costs. Despite these challenges, the pandemic has driven the industry towards rapid digitalisation, with greater adoption of construction management software, virtual tools, and sustainable practices. Additionally, the crisis has underscored the importance of resilient supply chains and robust healthcare infrastructure, presenting new opportunities for the construction sector. To navigate these disruptions and ensure long-term growth, the industry must leverage technological advancements, enhance workforce capabilities, and foster strong government support, thereby reinforcing its role in Malaysia's economic development.

The Impacts of COVID-19 Outbreaks towards Malaysian Contractors

The COVID-19 pandemic has profoundly affected Malaysian contractors, bringing about a multitude of challenges that have significantly impacted the construction industry. One of the most immediate effects was the enforcement of the MCO by the Malaysian government to curb the virus's spread. This restriction led to a drastic decline in construction operations during March and April 2020, causing substantial project delays and escalating costs. The disruption of global and local supply chains further exacerbated these delays, particularly affecting the availability of critical construction materials such as steel, cement, and tiles.

Besides, the COVID-19 epidemic has had a substantial impact on it, as it has on numerous other sectors. One of the most significant challenges that Malaysian contractors and the construction sector have encountered is the disruption of work schedules and project delays. According to Jallow et al. (2021), the closure complicates project monitoring since numerous employees work from home. Nevertheless, most construction tasks necessitate manual labour, rendering it impossible to complete them from home or online (Gamil & Alhagar, 2020). The construction industry's operations are unquestionably not the same as they were previously, despite the government's approval to resume operations under stringent SOP. During the pandemic, the government mandates that most construction sites suspend operations. As a result, most programmes experienced completion delays (Esa et al., 2020). The project's completion was expedited during the COVID-19 pandemic because of the increased project costs, the extension of the delivery time, and the limitation of resources. Furthermore, the construction industry experienced an 11.8% workforce reduction because of the epidemic, which was the most significant among all economic sectors in Malaysia. This is also supported by the research conducted by Wahab (2020), which demonstrates that the construction industry has been adversely affected by the implementation of the MCO and the proliferation of COVID-19. The unemployment rate increased by 0.2% from 3.3% in Q1 2019 to 3.5% in Q1 2020.

The same study also discusses how the increased need for COVID-19 safety compliance on construction sites raised operational costs. Contractors had to invest in safety measures, including PPE and enhanced site safety protocols, which were necessary to comply with health regulations but also added to the financial burden (Norhaidin & Keng, 2023). Research from a study conducted on the construction projects in Sarawak, Malaysia found that the COVID-19 pandemic caused significant disruptions in the supply chains. The implementation of supplementary health and safety protocols, including PPE regular sanitisation, and social distancing, resulted in an increase in operational expenses. Although these measures were necessary for safety, they necessitated investments in both resources and training, which had a direct impact on the financial status of construction projects (Gara et. al., 2022).

Another important area that was significantly impacted by the epidemic was the requirement for better communication techniques. With physical barriers in place, Malaysia's construction industry needed to improve project communication management techniques. When face-to-face interactions were constrained,

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the use of digital communication technologies became crucial to preserving project continuity and guaranteeing alignment among all stakeholders (Subramaniam C. et. al., 2022).

According to Li, Z. et. al, (2022), the usage of digital tools in construction project management has increased as a result of the epidemic. According to a study, 11 construction activities were impacted by COVID-19 at different stages of the project life cycle. This underscores the necessity for project stakeholders to adjust and leverage technology in order to efficiently manage projects. Building information modelling (BIM) and other digital technologies are being used as part of this adaptation to improve construction project management both during and after the pandemic.

Businesses in Malaysia had to adjust their strategy to ride out the stormy times during the COVID-19 epidemic due to considerable market concerns. Evaluating and regularly modifying corporate strategies to conform to changing client demands, and market conditions was a crucial tactic. Companies discovered new markets, moved their operations to online platforms, or changed the products they offered to satisfy the shifting consumer needs. This tactical adaptability was essential to the company's survival and ongoing relevance in the marketplace (Chapman & Karau, 2023).

The COVID-19 pandemic had a substantial impact on contractors in Malaysia, exposing both weaknesses and potential advantages within the construction sector. The implementation of the MCO resulted in a significant decrease in construction activity, causing notable delays in projects and financial difficulties due to suspended operations and higher expenses related to the implementation of essential safety measures such as PPE and upgraded site protocols. Moreover, the disturbance of supply chains exacerbated these difficulties, impacting the accessibility of vital resources and increasing expenses. Nevertheless, the epidemic expedited the integration of digital technologies and enhanced communication protocols throughout the sector. Contractors were obligated to embrace innovation and incorporate new tools like BIM and other digital platforms in order to effectively manage projects and involve stakeholders from a distance. This transition not only resolved immediate operating difficulties but also laid the foundation for enduring enhancements in efficiency and resilience. The pandemic highlighted the importance of being flexible and quickly adapting to changing situations, characteristics that will determine the future competitiveness of the building industry in Malaysia.

The Contractors' Strategies Towards of COVID-19 Outbreaks

Malaysian contractors have devised and executed various techniques to efficiently overcome the obstacles presented by the COVID-19 outbreaks. These strategies essentially aim to ensure the uninterrupted operation of the firm, protect the well-being of employees, and adjust to the evolving economic environment.

Contractors augmented their expenditure in health and safety standards in order to adhere to government laws and guarantee the well-being of workers. This encompassed the utilisation of PPE frequent sanitisation, and adherence to social distancing protocols (Norhaidin & Keng, 2023; Esa et al., 2020).

The epidemic expedited the implementation of digital tools and technologies in construction project management. BIM and remote project management software have become indispensable tools for sustaining operations and enabling remote work (Li et al., 2022; Subramaniam et al., 2022). Besides, contractors implemented flexible work arrangements, such as remote work for administrative positions, in order to decrease the number of workers present at the physical workplace and comply with movement limits (Gamil & Alhagar, 2020).

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Effective stakeholder communication involved the consistent and open exchange of information between clients, suppliers, and staff. Contractors were provided with frequent information regarding modifications in project timeframes, safety protocols, and business activities and training and development are essential investments to provide personnel with the necessary abilities to adapt to new technology and work processes (Subramaniam et al., 2022).

In term of supply chain management, the contractors implemented strategies to enhance supplier diversification and bolster inventory levels of essential goods in order to minimise the potential for delays caused by disruptions in the supply chain (Cherian & Arun, 2023). Thus, improving financial robustness was essential. Contractors are prioritising cost reduction strategies, renegotiating contracts, and exploring government relief programmes to properly manage their cash flows.

Therefore, Malaysian contractors have strategically navigated the challenges posed by the COVID-19 pandemic by adopting comprehensive health and safety measures, enhancing digital transformation, and maintaining robust stakeholder communication. These efforts included significant investments in PPE, regular site sanitisation, and adherence to social distancing protocols to protect employees' health and comply with government regulations. The accelerated use of digital tools such as BIM and remote project management software enabled continuous operation and facilitated remote working arrangements. Additionally, contractors adopted flexible work policies and improved supply chain management by diversifying suppliers and increasing critical material inventories to mitigate potential delays. Effective communication with stakeholders and ongoing employee training ensured that all parties were informed and equipped to adapt to new technologies and processes, further reinforcing operational resilience. These combined strategies have strengthened financial robustness and allowed contractors to navigate the pandemic's economic impacts successfully, positioning them for future.

METHODOLOGY

The aim of this study is to examine the influence of the COVID-19 pandemic on contractors in Malaysia. The study centres around a group of 175 contractors ranging from grades G1 to G7 in Shah Alam, Selangor, Malaysia. These contractors were selected from the CIDB website. A significant sample size was attained with a response rate of 56%, resulting in a thorough comprehension of the challenges encountered by these contractors. The study utilises a questionnaire survey to gather quantitative data, which is then analysed using a 5-point Likert scale to assess the degree of agreement with different claims addressing the effects of COVID-19 outbreaks on Malaysian contractors. The results are effectively illustrated through the use of charts and tables.

ANALYSIS AND FINDINGS

Table 1. The Impact of COVID-19 towards Malaysian Contractors

The Impact of COVID-19 towards Malaysian Contractors	Ranking	Mean	Standard Deviation (SD)
Workforce challenges impact the morale and productivity of construction workers	1	4.85	5.17
The disruptions in the supply chain influence the cost of construction materials and equipment.	2	4.47	0.81
Construction workers have educated on the significance of health and safety protocols, fostering a safety culture within the construction industry.	3	4.38	0.57
Government policies affect contractors' planning and bidding strategies for future projects	4	4.36	0.58
Economic uncertainty during pandemic affects the market's willingness to invest in new construction projects	5	4.33	0.69
The lockdown's work schedule delays impact on Malaysia's	6	4.26	0.52

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upcoming building project planning.			
Contractors provide leadership training to effectively manage stress and maintain a positive work culture	7	4.17	0.66
The construction of SMEs firm is affected by the financial hardship.	8	4.08	0.60
Social distancing requirements affect the effective workforce on construction sites.	9	3.93	0.68
Contractors address the need for training programs to ensure the workforce could effectively use newly adopted digital tools	10	3.79	0.65

Table 1 shows the analysis of the impact of COVID-19 outbreaks on Malaysian contractors. The highest value of the mean is 4.85 (SD:5.17) for workforce challenges that impact the morale and productivity of construction workers. It is supported by reduced shifts, paid or unpaid temporary leave, staff who were quarantined or self-isolated, and other variables that contributed to a slowdown in production volumes that was unprecedented on a global scale. This slowdown had a negative impact on the economy. The disruptions in the supply chain influence the cost of construction materials and equipment, with the second highest mean value of 4.47 (SD: 0.81). With the goal of effectively coping with the unpredictability of the post-pandemic construction scene, contractors have been forced to innovate, adapt, and investigate alternative supply chain approaches. This is a direct response to the disruptions that have occurred. According to Bou et al. (2021), the supply chain is defined as "the actions and processes of an organisation that are related to the transfer of cash, information, products, and services from the manufacturing centre to the final consumer." Construction workers have been educated on the significance of health and safety protocols; fostering a safety culture within the construction industry remains the third highest mean value of 4.38 (SD:0.57). Safety comes next, which includes inadequate safety procedures, a lack of rule execution, a lack of funding, skilled officials, and a lack of knowledge. All these factors contribute to a total lack of safety. Recent studies have shown that COVID-19 has significant repercussions for the loss of jobs in the future, in addition to having an impact on the emotional and physical health of workers and employees (Hashim, 2021).

With a mean score of 3.79 (SD: 0.65), the impact with the lowest ranking suggests a substantial requirement for training programmes to guarantee that the workforce can use newly adopted digital tools successfully. This shows that even if the workforce is becoming more digitally literate, there is still a deficit in that regard. With a mean value of 3.93 (SD: 0.68), the effect of social distancing requirements on the productive workforce on construction sites came in second lowest, highlighting the difficulties that physical distancing measures have for productivity and site operations. Maintaining a balance between job efficiency and health precautions is still a major challenge. Remarkably, with a mean score of 4.08 (SD: 0.60), the construction of SMEs firm is affected by the financial hardship. was ranked eighth, demonstrating the more general economic difficulties the industry encountered during the pandemic. These results highlight the complex issues and the need for all-encompassing approaches to improve training, oversee health procedures, and maintain industry financial stability.

These findings highlight the complex issues faced by Malaysian contractors, emphasising the need for comprehensive approaches to improve training, oversee health procedures, and maintain financial stability within the industry.

Table 2. The Contractors' s Strategies towards of COVID-19 Outbreaks

The Contractors' s Strategies towards of COVID-19 Outbreaks	Ranking	Mean	Standard Deviation
Construction companies should adhere to government guidelines regarding health and safety during pandemic	1	4.57	0.57
Force majeure clauses in contracts considered and managed in response to the unique challenges posed by the pandemic	2	4.48	0.58

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Contractors seek local material sources to reduce reliance on international supply chains.	3	4.33	0.53
Contractors must ensure adequate PPE to construction workers.	4	4.31	0.58
Contractors are expanding into new markets or industries, such as infrastructure upkeep or restorations, which are less affected by the pandemic.	5	4.29	3.25
Contractors invest in virtual reality (VR) for site inspections significantly improved the efficiency or accuracy of site inspections.	6	4.23	0.67
Contractor's approach reskilling employees to accommodate new technologies.	7	4.15	0.76
Contractors develop preparedness plans for future disruptions,	8	4.13	0.49
Technologies, such as virtual reality and drones, minimise the need for physical presence on construction sites	9	4.10	0.89
Contractors collaborate with industry associations to advocate for policies and support measures	10	3.90	0.83

Table 2 shows the analysis of the contractors' strategies towards COVID-19 outbreaks. The highest value of the mean is 4.57 (SD: 0.57); construction companies should adhere to government guidelines regarding health and safety during the pandemic. It is supported by: According to Veeraraghavan's 2020 research, the outbreak has caused a huge decrease in inventories and impacted supply networks across the world. This will have a significant impact on the expansion of Malaysia's economy (Zaid et al., 2014). Delays in huge development projects will occur. In the first quarter of 2021, the construction industry had a decrease of 10.5%, bringing the total to RM31.4 billion (compared to RM31.7 billion in the fourth quarter of 2020). This represents an improvement from the -14.2% decline that occurred in the fourth quarter of 2020 (Department of Statistics Malaysia, 2021). The value of construction work that has been completed continues to be negative, even though the construction industry had growth in the first quarter of 2021. Force majeure clauses in contracts considered and managed in response to the unique challenges posed by the pandemic have the second highest mean value of 4.48 (SD: 0.58). Force majeure refers to extraordinary events that are beyond the control of the parties involved and cause a delay in the physical or legal execution of building contracts. This contrasts with the challenges; these delays are mostly caused by the transformation of government entities to work remotely from home, as well as the difficulties in getting the essential information and documentation (Alsharef et al., 2021). As a result of the government's succession of movement control orders, numerous construction projects were delayed. Contractors seek local material sources to reduce reliance on international supply chains, with a mean value of 4.33 (SD:0.53). Birkie and Trucco's (2020) research suggests that considering supply chain complexity can aid in mitigating disruptions through resilience. According to Shah (2020), the resilience of SC is contingent upon its capacity to reorganise resources in response to shocks. According to Scholten and Schilder (2015), collaborative activities like information exchange and communication help to promote SC resilience by enhancing visibility, responsiveness, and flexibility.

The lowest-ranking strategies towards of COVID-19 outbreaks among contractor with a mean value of 3.90 (SD: 0.83) among the strategies used by Malaysian contractors during the COVID-19 epidemic, was working with industry associations to promote laws and regulations that would be beneficial. This implies that although contractors understand the value of assistance and advocacy, other techniques may have taken precedence. The use of drones and virtual reality to lessen the need for physical presence on building sites was the second lowest method, with a mean value of 4.10 (SD: 0.89). This suggests some reliance on technology but also highlights potential obstacles to its wider adoption. With a mean score of 4.13 (SD: 0.49), creating plans for future disruption readiness came in somewhat higher, indicating the understanding of the significance of strategic planning for resilience against future crises. These results point out areas where Malaysian contractors believe they can still do better and adapt, especially when it comes to using technology to increase industry collaboration and advocacy activities.

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An analysis of the techniques employed by Malaysian contractors during the COVID-19 outbreaks reveals their emphasis on complying with government health and safety regulations, handling force majeure clauses, and procuring local materials to strengthen the resilience of their supply chains. Nevertheless, there are certain aspects that require enhancement, such as fostering industry collaboration for advocacy and embracing cutting-edge technology like drones and virtual reality to minimise the requirement for actual presence on-site. Creating contingency planning for future shocks also demonstrates a planned approach to creating long-term resilience. These initiatives highlight the contractors' endeavours to adjust to current operating difficulties while simultaneously preparing for long-term sustainability and resilience in the business. The findings underscore the varied approaches used by Malaysian contractors to manage the epidemic, focusing on both urgent operational adaptations and long-term strategic initiatives to improve industry resilience and sustainability.

CONCLUSION

The COVID-19 pandemic has had profound and multifaceted impacts on the Malaysian construction industry, introducing a slew of unprecedented challenges for contractors. This study has meticulously elucidated the extent to which the outbreak has disrupted the sector, highlighting the immediate effects such as workforce morale deterioration, supply chain disruptions, and the substantial impediments these have posed to construction operations and project completions. Malaysian contractors have been compelled to navigate a new reality marked by stringent health and safety requirements, material cost volatility, and the urgent need for strategy recalibration. In response to these challenges, contractors have developed and implemented a series of adaptive strategies. These include stringent adherence to government-imposed health guidelines, localising supply chains, and exploring new market avenues that are less susceptible to pandemic-related disruptions. Furthermore, the incorporation of technology such as virtual reality for site inspections and reskilling of employees has emerged as a pivotal strategy to sustain operations amidst restrictions on physical presence. The strategic pivot towards digital tools underscores the industry’s resilience and the critical role of innovation in crisis management. This study's findings provide a vital repository of knowledge for industry stakeholders, offering strategic insights that could inform policy formulation, academic discourse, and practical applications within the construction industry. The contractors' strategic responses, as outlined in this research, could serve as a blueprint for managing future crises, ensuring sustainability and resilience in the face of global disruptions. Therein lies the potential for these findings to transcend the immediate context of the pandemic, contributing to the long-term fortification of the construction industry against a broad spectrum of potential crises.

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CONFLICT OF INTEREST STATEMENT

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

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AUTHORS' CONTRIBUTIONS

Nur Fatin Firzanah Mohd Naseri carried out the research and wrote the article. Siti Norazniza Ahmad Sekak conceptualised the central research framework and supervised the research progress. Azeanita Suratkon anchored the review, prepared revisions and approved the article submission.

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