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Determinant of Escalating Construction Material Costs in the Post-Pandemic Period: Contractor's Perspective

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ABSTRACT

The COVID-19 pandemic emerged as the most talked-about topic of the year, damaging the economy, and upsetting the lives of many people and businesses across industries. Its effect, which varies by industry, was enormous in the construction industry, causing Malaysian construction projects to suffer the consequences of escalating material costs during the pandemic and post-pandemic period. This study aims to improve the effects of the escalating construction material costs by identifying the factors influencing the escalating construction material costs in construction projects from the contractor's perspective. This research was conducted using questionnaire surveys and distributed to Selangor Contractors Grade G6 and G7 registered with the Construction Industry Development Board (CIDB). Descriptive statistics and ranking analysis were used in data analysis. The finding showed nine (9) factors influencing the escalating construction material costs, transportation costs & fuel price increases, supply chain disruptions & material shortages, labour shortages, higher labour costs, demand increases, economic factors, tariff increases & trade policy changes, health & safety costs increase and Government policies & regulations. Thus, this study must be put into consideration, as it ultimately helps to enhance the construction industry's performance. Finally, construction professionals, industry, and the government will benefit.

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INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by a coronavirus produced by the SARS-CoV-2 virus, which spreads when an infected individual comes into close contact with a susceptible person. COVID-19 caused significant issues for public health (Olanrewaju et al., 2021). The pandemic killed about 2,727,837 people and affected 123,902,242 with reported cases. On April 4, 2020, World Health Organization (WHO) announced that over one million cases of the virus had been detected. Malaysia ranked 82nd, with 74,295 recorded cases and 384 deaths. In response to the surge in cases in March 2020, the Malaysian government imposed a national lockdown referred to as the Movement Control Order (MCO).

The COVID-19 pandemic emerged as the most talked-about topic of the year, devastating damage to the economy and upsetting the lives of many people as well as businesses across a wide range of industries. The construction industry also was one of the industries severely affected by COVID-19. The COVID-19 pandemic had a significant effect on construction projects in Malaysia. Project delays, supply chain disruptions and workforce constraints were some of the effects that contributed. These effects resulted in escalating material costs on construction projects, not only during the pandemic, but also following the outbreak. According to the Real Estate and Housing Developers' Association (REHDA), the average price of sand and concrete increased by 10% per year as of December 31, 2023, and construction costs are expected to rise by 15% in the first half of 2024, resulting in higher costs, particularly for property (Zainul, 2024).

After the COVID-19 pandemic, Malaysian construction projects have suffered the consequences of escalating material costs on construction projects and Selangor is one of the states affected. According to the Department of Statistics Malaysia (2024), Selangor contributed the most to construction growth, accounting for 10.2%. Hence, understanding the determinants of escalating construction material costs, particularly in the post-pandemic period constitutes an essential for enhancing the overall performance of the construction industry. Thus, the objective of this research is to identify the factors influencing the escalating construction material costs in construction projects.

FACTORS INFLUENCING THE ESCALATING CONSTRUCTION MATERIAL COSTS IN CONSTRUCTION PROJECTS

The post-pandemic era has brought about significant challenges in the construction industry, notably the escalating costs of construction materials. Factors such as disrupted supply chains, labour shortages, increased demand for raw materials, and inflation have converged to drive prices upward. The pandemic-induced global lockdowns and restrictions have led to a scarcity of essential materials, while the economic recovery efforts have spiked demand, creating a perfect storm of cost pressures. Additionally, the surge in transportation and logistics expenses has further exacerbated the situation, compelling construction projects to grapple with unprecedented budgetary constraints and delays.

Transportation Costs and Fuel Price Increases

Transportation costs associated with obtaining materials can substantially impact the overall cost of construction projects. These costs fluctuate based on several factors, including the distance materials must travel, the mode of transportation used such as trucks, ships, or trains, and the current price of fuel. According to Datuk Azman Yusoff, President of the Bumiputera Contractors Association of Malaysia, the price of goods in the construction sector has surged by nearly 30% following the recent increase in diesel prices (Bunyan, 2024). Heavy machinery, excavators, backhoes, pavers, and trucks all run on diesel.

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For construction companies sourcing materials from international suppliers, transportation costs can be even higher due to the extended distances involved and additional import charges. During the COVID-19 pandemic, transportation costs for shipping materials escalated dramatically due to a combination of increased demand and limited supply. The global disruption caused by the pandemic led to bottlenecks in supply chains, with a significant effect on the availability and cost of transportation services (Fernanda & Ellitan, 2023).

Supply Chain Disruptions and Material Shortages

During the COVID-19 outbreak, many construction material supply chains ceased manufacturing and delivering. Builders encountered delays and escalating costs for imported raw materials such as steel, tiles, and off-site construction materials such as cabinetry and interior fittings, as many production factories were shut down for long periods. For instance, in the construction of infrastructure projects, Mass Rapid Transit (MRT), Light Rail Transit 3 (LRT3), and East Coast Rail Link (ECRL), the supply chain of steel and cement materials was affected by one-month production pause due to the outbreak. Steel and cement factories played a significant role in the supply chain of critical infrastructure projects like the MRT, LRT3, and ECRL, as they supply steel and cement materials (Zaidon, 2021). And, limited transportation and travel restrictions disrupted project delivery, and materials suppliers and rental companies suffered with materials left on inoperable sites (Atif, 2021; Khanal et al., 2020).

Since the pandemic disrupted global supply chains, raising costs and limiting the availability of materials and goods, the costs for construction companies remain high due to ongoing material shortages, high transportation and workforce costs, and foreign conflicts, which add to volatility and risk. According to the analysis of the Associated Builders and Contractors in Bureau of Labour Statistics, construction input costs have risen by 38.7% since February 2020. The cost of raw materials, natural gas, and iron and steel has risen by more than 50%. In January 2024, construction input costs increased by 1%, the first overall price increase in three months (Kapadia, 2024).

Labour Shortages

Labour shortages have significantly limited the production capacity of materials, increasing the issues posed by escalating costs in the construction industry. During the COVID-19 epidemic, many construction-material companies stopped producing and delivering materials. Builders faced higher costs and delays for imported raw materials because many production factories were closed for a prolonged time, and numerous labourers demanded to return home in response to the pandemic (Atif, 2021; Khanal et al., 2020).

Contractors limit their ability to maintain or expand their workforce as material costs escalate. This was highlighted in the National Subcontractor Market Report 2023, which revealed a substantial 26% increase in material costs in 2022. This surge in material costs imposed additional financial burdens on Subcontractors, exacerbating workforce constraints. The report further noted that these escalating costs contributed to an approximate 15% increase in worker-related expenses, as Subcontractors struggled to manage the dual challenges of higher material prices and the need to adequately compensate their workforce (Billd, 2023).

Higher Labour Costs

Costs rise as a result of a lack of labourers, which might drive up material costs. Higher labour costs lead to higher production costs, which are passed on to users or purchasers. Skilled labour shortages in construction can also lead to higher wages, boosting project costs. The chairman of the REHDA Institute

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reported that during the COVID-19 outbreak, construction materials and labour costs impacted project cashflow projections and delayed project scheduling. The price of mild steel climbed by 41%, while sand increased by up to 20%. All of these factors collectively affected the costs of construction (Moh, 2022). Following that, REHDA Malaysia also claimed that new home pricing would be affected by the escalating prices of land, construction materials, and labour costs (Sharen, 2023). This would affect the purchasers as well.

Demand Increases

The post-pandemic recovery shows a significant surge in construction activities as economies worldwide rebound and infrastructure projects resume at a rapid pace. This resurgence is fuelled by both public and private sector investments aimed at revitalizing economies and addressing the backlog of delayed projects. The increased demand for construction materials exceeds the available supply, creating a supply-demand imbalance that drives up costs. The global construction materials market was valued at USD 1.28 trillion in 2022 and is projected to increase from USD 1.33 trillion in 2023 to USD 1.81 trillion by 2031, at a Compound Annual Growth Rate (CAGR) of 3.9% over the forecast period (2024-2031). The goal of the construction materials market is to meet the increasing demand for construction activities particularly the post-pandemic recovery (SkyQuest Technology, 2024).

Economic Factors

Inflation, exchange rates, and interest rates were identified as major economic factors affecting the cost of construction materials (Ogwueleka & Okon, 2023). Currency fluctuations, in particular, play a crucial role in determining material costs. Currency fluctuations relate to changes in the value of a country's currency. Currency exchange rates vary between countries, indicating that it is dynamic and has a great influence over the value of money. A country's currency value is a strong indication that identifies certain strengths and weaknesses in its economic status (Surinder Kaur Babbhra, 2023). Exchange rate volatility can affect the cost of imported materials. A weaker local currency makes imports more expensive, while a stronger currency can reduce costs. Contractors must navigate these fluctuations to manage material costs effectively.

The construction industry has been dealing with fluctuating costs of construction materials since the outbreak of COVID-19 hit, and according to current projections, escalating costs are unlikely to slow down in 2024 where predictions indicate that costs may rise by much to 28% in contrast to before the pandemic (Barbour, 2023). However, according to the Construction Industry Development Board (CIDB) (2024), the Malaysian construction sector still faces challenges due to weakening Ringgit.

Tariff Increases and Trade Policy Changes

A tariff is a tax that increases the price of imported materials, making the materials less appealing and competitive. It is also one of the instruments that Governments employ to collect taxes and protect local products that have similar characteristics to the items. This will become one of the causes of the escalating price of construction materials, as most of the raw materials are imported commodities, such as steel that are imported from Japan, China, South Korea, and Indonesia (Samsir et al., 2023). Changes in tariffs and trade policies can influence material costs. For example, import duties on steel or timber may increase the costs for domestic consumers. Therefore, Contractors must stay informed about the policy changes that could impact material procurement.

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Health and Safety Costs Increase

The post-pandemic landscape has necessitated increased spending on health and safety measures within construction projects. The need for enhanced hygiene protocols, personal protective equipment (PPE), and adherence to social distancing guidelines has led to a rise in operational costs. Ensuring the well-being of workers has become paramount, requiring significant investments in health and safety infrastructure. This increase in health and safety costs further adds to the financial strain on construction projects, making cost management an even more critical task for Industry Stakeholders. Compliance with health and safety recommendations, including additional costs for personal protective equipment (PPE) and other safety measures, increased project costs (Al-Saffar et al., 2023). Unsafe working environments and the need for social distancing measures further contributed to inefficiencies and cost increases (Shaikh et al., 2023).

Government Policies and Regulations

Government policies and regulations also play a significant role in influencing construction material costs. Post-pandemic regulations aimed at ensuring health and safety have increased operational costs for construction companies. Stricter environmental regulations may limit the supply of certain raw materials or increase the costs of compliance. Navigating these regulatory landscapes requires careful planning and adaptation, as changes in government policies can have immediate and profound effects on material costs and overall project budgets. Compliance with new Government regulations and standard operating procedures (SOPs) added to the financial burden on construction projects (Hesna et al., 2021; Nur Ariyanto & Amin, 2023; Zanuar & Nasir, n.d.).

METHODOLOGY

For this research, a quantitative method was used. The quantitative method systematically enabled the measurement of variables, resulting in objective data being analysed statistically. This method was appropriate for collecting large amounts of data to identify patterns and make generalisations about the population. Both primary and secondary data were employed, where the primary data was obtained through questionnaires distributed to target respondents and the secondary data was used in the process of gathering information for the literature review. The questionnaires were distributed to the Contractors Grade G6 and G7 registered with the Construction Industry Development Board (CIDB) in Selangor. The Contractors are higher-tier Contractors with the ability to undertake larger, more complex projects. Contractors are more likely to have substantial experience in construction projects and, therefore, can provide valuable insights into industry practices and trends. By focusing on Selangor, which is one of Malaysia's most developed states, this research captured data from Contractors engaged in a significant volume of projects, thus contributing to robust results. The sampling technique for this research was probability sampling, specifically, simple random sampling, a sampling technique that assured each Contractor in the population had an equal chance of being included in the sample. The population size for the Contractors Grade G6 and G7 in Selangor, which was 4121 respondents, was used to compute the sample size for this research. The sample size was calculated by using Raosoft, considering a 5% margin of error, 90% confidence level and 50% of response rate. The sample size was 254.

RESULTS AND DISCUSSION

The questionnaire was distributed online to Contractors G6 and G7 in Selangor. The obtained data is analysed and tabulated using IBM SPSS Statistics Version 29.0. The descriptive analysis is used to determine the mean of the data and the standard deviation. Table 1 shows the respondents' profiles of the research. Most of the respondents are from Grade G7, 73.8%, while 26.2% are G6. While the majority

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(57.1%) were assigned to those in Quantity Surveyor positions, followed by Others (23.8%). Both (9.5%) were assigned as Project Manager and Site Supervisor, respectively. The designation that someone holds in an organisation represents their employment experience. Interestingly, most respondents (59.5%) had working experience ranging from less than 5 years, and only 8% had experience in construction projects of more than 15 years. But a youthful workforce may bring new perspectives. In fast-growing industries like construction, the blend of youthful energy and seasoned expertise may create a balanced and forward-thinking environment.

Table 1. Respondent's Profiles

Items	Sub-Items	Percentage (%)
Grade of Contractor	G6	26.2
	G7	73.8
Job Position	Project Manager	9.5
	Quantity Surveyor	57.1
	Site Supervisor	9.5
	Others	23.8
Works Experience	< 5 years	59.5
	5-10 years	14.3
	11-15 years	7.1
	> 15 years	19.0

Source: Authors (2024)

This analysis aims to identify the factors influencing the escalating construction material costs in construction projects. Table 2 shows the mean rank score identified by the respondents. The findings reveal that economic factors are the most significant factors influencing the escalating construction material costs (mean=3.56, SD=.548), followed by transportation costs & fuel price increases (mean=3.53, SD=.735). Other factors that influence the construction projects include supply chain disruptions & material shortages (mean=3.40, SD=.623), tariff increases & trade policy changes (mean=3.33, SD=.644), Government policies & regulations (mean=3.28, SD=.734), higher labour costs (mean=3.26, SD=.693), demand increases (mean=3.19, SD=.627), labour shortages (mean=3.02, SD=.771) and health & safety costs increase (mean=2.91, SD=.781).

Table 2. Mean Rank Score for Factors Influencing the Escalating Construction Material Costs

Factors Influencing the Escalating Construction Material Costs	Mean	Std. Deviation	Rank
Economic Factors	3.56	0.548	1
Transportation Costs & Fuel Price Increases	3.53	0.735	2
Supply Chain Disruptions & Material Shortages	3.40	0.623	3
Tariff Increases & Trade Policy Changes	3.33	0.644	4
Government Policies & Regulations	3.28	0.734	5
Higher Labour Costs	3.26	0.693	6
Demand Increases	3.19	0.627	7
Labour Shortages	3.02	0.771	8
Health & Safety Costs Increase	2.91	0.781	9

Source: Authors (2024)

This is exemplified by the prior research carried out by Ogwueleka & Okon (2023), which reveals that economic factors are the most influential factor of the escalating construction material costs due to inflation, exchange rates, and interest rates. In addition, Bunyan (2024) also agrees that transportation costs & fuel

price increases are among the factors influencing the escalating construction material costs. The results are also parallel to the previous research carried out by Fernanda & Ellitan (2023), Barbour (2023) and Kapadia (2024), which explain that the top three (3) factors influencing the escalating construction material costs are economic factors, transportation costs & fuel price increases and supply chain disruptions & material shortages. The findings raise awareness concerning the need for planning in the construction industry to deal with unplanned circumstances such as a pandemic.

CONCLUSION

It can be concluded that the factors influencing the escalating construction material costs, particularly in the post-pandemic period, have been enormous in the construction industry, and many parties are actively involved in the construction projects, including Contractors. There are nine (9) factors that were identified, which are transportation costs & fuel price increases, supply chain disruptions & material shortages, labour shortages, higher labour costs, demand increases, economic factors, tariff increases & trade policy changes, health & safety costs increase and Government policies & regulations. Therefore, the findings can be beneficial for construction industry parties, particularly Contractors, to comprehend unexpected and uncontrollable circumstances such as pandemics in construction projects. This will aid in the formulation of strategic strategies to deal with any unforeseen events in the future.

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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.

AUTHORS' CONTRIBUTIONS

All authors involved in carrying out the research wrote, revised the article, conceptualised the central research idea, designed the research, supervised the research progress, reviewed and approved the article submission.

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