

A Study on Inflation: Reason Behind Rising Price of Construction Materials in Johor Bahru

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Abstract: Inflation is one of the familiar words in economic and has been plunging countries across the world, making it become the long period of instability. It also become one of the important indicators for economic conditions. The shift in the inflation rate can be a problem to calculate it and track the monetary policies on time. The inflation can affect various sectors including the construction industries. The rising price of construction materials affected by the rate of inflation of the country. The purposes of this study are to find on how the inflation affected the construction materials. The study also being conducted in order to find the reason behind the rising price of construction materials and to study the strategies that being by contractors in order to adapt with the rising price of construction materials. For this study, the data collection used the quantitative method where surveys using questionnaire being produced and distributed to 250 respondents but only 81 respondent's response with the questionnaire. The population of G5, G6 and G7 that are registered under the CIDB and active with managing and handling construction projects in Johor Bahru. the collected data will be analyzed using Statistical Package for the Science Social (SPSS). Data being collected being tabulated into descriptive and reliability test to identify reliability of each objective. Data being presented in the form of tables, chart and graph. From the result of the study, the researchers find that the inflation raised the contractors' cost of borrowing to the banks such as loans, makes the interest rate become high, increasing projects budgets, eroding the purchasing power of the contractors and creating cost overrun.

Keywords: Inflation, Rising price, construction materials, reasons, strategies

1. Introduction

According to the Cambridge Dictionary, inflation is the increase in the amount and the price level of something such as goods and services in the market. Inflation can also be described as the declining of purchasing power of the citizens of given currency of over time. The declining in purchasing power represent the increase of an average price levels in the basket of selected goods and services over the period of time (Fernando, 2022). The inflation can occur at all of the country in the world but what differentiate them is the rate of certain currency. Different country comes with different rate and the higher the rate, the more money needed in order to bought things and services (Musarat, Alaloul, & Liew, 2021). The shift in the inflation rate can be a problem in order to calculate it and track the monetary policies on time. From this forth, any results that showing ambiguity and uncertainty can be a sign of the policy decisions.

In market economic flow, there is always a change in the price of goods and services. Upon this matter, there are times that the price will rise and there are some will fall. If there are broad increase or imbalance in the price of goods and services that occurring at the same time, then the inflation will occur in the market. The terms of inflation often refer to the increases in price levels of goods and services over period of time (Schmidt, How the Inflation Erodes the Value Of Your Money., 2021).

Construction industry has become the driver to the Malaysian economy. As a developing nation, the role of construction industry not only as a booster to economic growth, but it also improving the quality of life for its citizens by providing the infrastructure for productive ventures, home, jobs opportunity with vast knowledge and skills that involved. The construction industry uses a lot of materials as it is the fundamental and the important things in the structural components and the foundation of the buildings (Elkhider & Salma , 2020)

The problem that occurs is the rising price of construction materials in Malaysia which affected by the rate of inflation. Inflation being seen as the important variables for potential economic condition for every nation where they want to reach the sustainable economic growth (Feldkircher & Siklos, 2019). Numerous studies have emphasised the significance of inflation on project cost overruns, and inflation is also having an effect on the construction industry. Every year, the prices of construction materials, labour pay, and machinery rental rates fluctuate due to inflation (Borku W. T., 2022).

The price of construction materials exhibits regular rises for many reasons such as increases in tariff, economic instability, rising fuel prices, scarcity of resources and inflation rate (Elkhider & Salma, 2020). A study being conducted on Gulf Cooperation Council countries to assesses the impact of oil prices on the inflation. The study finds that there are various effects on the inflation by rising and falling prices on oils (Nusair, 2019). The frequency of creative destructions is reduced because of the prices fluctuations makes the innovation hard to be done (Oikawa & Ueda, 2018).

There are various factors that need to be considered to assess the impacts of inflation levels such as the interest rates, potential output, money supply trade openness, exchange rate and expectations (Musarat, Alaloul, & Liew, 2021). The Construction Industry Development Board (CIDB) Malaysia urges for the variation of price (VOP) clause to be allocated to the government project. This being made in order to reduce the financial pressure and burdens that the contractor faced by the rising price of construction materials (CIDB, 2020). Therefore, the research objectives for this study are (i) to identify effect of inflation towards the price of construction materials in Johor Bahru, (ii) to identify the reason behind the rising price of construction materials in Johor Bahru and (iii) to study the strategies that being used in order to adapt with the rising price of construction materials in Johor Bahru

The scope of the study is focused on the local contractor registered under the CIDB that has Grade G5, G6 and G7, registered under the CIDB and handling and managing the building projects in the state of Johor. The study being made to fulfil the requirements of the stated objectives. There are things take into consideration towards this study, which are:

- i. The study will be conducted in the state of Johor Bahru where it will involve the local contractor that registered under the CIDB with the grade of G5, G6 and G7 Johor Bahru
- ii. The study is conducted to find out on how the inflation affected the price of construction materials Johor Bahru.
- iii. It also wants to know the reason behind the rising price of construction materials in Johor Bahru.
- iv. The study also being conducted in order to find the strategies that being used in order to adapt with the rising price of construction materials Johor Bahru.

2. Literature Review

This section will cover the issues that are relevant to a study on inflation: reasons behind the rising price of construction materials. The chapter also being used to know about the inflation, type of inflation, how to calculate and the inflation rate. This section also be used to explain on how the inflation has affected the price of construction materials, the reason of the rising price of construction materials and the strategies that being used in order adapt with the rising price of construction materials.

2.1 Definition of Inflation

Inflation, according to Cambridge Dictionary, is the increase of the amount and the price levels of goods and services that occur in the market at period. Inflation can also be described as the declining of purchasing power of the citizens of given currency of over time. The declining in purchasing power represent the increase of an average price levels in the basket of selected goods and services over the period of time (Fernando, 2022).

Inflation has been known from long time due to its impact and since 1945, it has been placed in research fields as an indexed by the Scopus (Musarat, Alaloul, & Liew, 2021). Milton Friedman, a monetary economist said that inflation is happen everywhere and is a monetary phenomenon, which can be produced by rapid increase in the quantity of money rather than the output. The shift in inflation rates has become challenges in order to calculate and tracked the monetary policy analysis on time and the results that showing ambiguity is a sign of policy decision being made (Gülşen & Kara, 2019).

(a) Type of inflations

There are several types of inflation that can occur in an economy. Different types give different effects and the cause for each type of inflation can be different from each other (Pettinger, 2021).

Demand-pull inflation occurs when the basic caused by the demand side. The increase in demand and the shortage of supply may resulting the price will increase and triggered the inflation. This means that the firms in the economy are not capable to produce goods and services based on the demand of the consumers (Mankiw, 2016).

The cost-push inflation or side inflation refers to the inflation that occur when the cost of production for certain products increases due to the rising price of raw materials and labour cost. Changes in the pricing of production factors lead to an increase in producer prices first, followed by an increase in consumer prices (Tetik & Bilgin, 2022). The increases of price because of the factors of production can leads to the decreases supply of goods and services (Times, 2022).

The built-in inflation is an economic concept that refers to the inflation that resulted from the past events and persist the present events. It occurs when the workers expecting their salaries to increase when prices of goods and services continue to increases in order to maintaining their needs and living cost (Fernando, 2022). This means that the higher the wages resulting higher cost of production, which which leads to a higher price. This leads to the wage-price spiral effects to take places (Zeder, 2020)

(b) Calculating Inflation

Consumer's cost of living is depending on the price of goods and services and the budgets of a household. In order to measure the average of consumer's cost of living, government proxies conducting household surveys in order to identify the baskets of commonly being purchased by average of households such as foods, housing expenses, rents and others. (Oner, 2020). The calculation of the CPI from the data factors in the substitution effects where Consumer's tendency to shift spending away from products and categories relatively grown expensive. The effects also adjusting the data by affecting the product quality and features. This means that it corresponds to the consumer spending patterns that being deprived in a separate way (U.S Bureau of Labor Statistics, 2022)

(c) Inflation Rate

Inflation rate is the annual rate of increase of price indexes, where the consumer price index over the time (O'neil, 2022). By definition, the inflation is a situation where the general prices levels of goods and services rises, and each unit of currency buys fewer goods and services (Shih, 2017). A high inflation rate can be mean that there will be an increase cost of materials involved during production process. But a low inflation rate can lead to a slower economic growth and will lead to a recession with a high unemployment rate (Yusof, Nin, Md Kamal, Ahmad Taslim, & Zainoddin, 2021)

2.2 Effects of inflation towards the price of construction materials in Johor Bahru

The construction industry and its operational process are one of the main sources and drivers to the economic growth as well as the development for a country (Musarat, Alaloul, & Liew, 2020). The construction industries play an important role in the economic growth by generating a lot of jobs, 5 opportunities for over millions of workers, from various positions from skilled, semi-skilled and unskilled construction jobs (Doyle, 2021).

(a) Eroding the purchasing power

The inflation effecting the construction player by eroding their purchasing power towards materials and machineries. This is because of the gradual increase in price and slowly declining of purchasing power of the money over the time (Schmidt, How Inflation Erodes The Value Of Your Money, 2021). In the demand-pull inflation, the demand of goods and services increases but the supply remaining the same, which will make the price rise (Fernando, 2022). After the pandemic, the construction projects start to resume and a lot of new projects being created in order to boost the economic growth (Biörck, 2020).

(b) Raising the cost of borrowing

A large demand for the loans will make the banks to raised charges for that amount of money, hence the inflation makes the borrowing rates become high. High rates of interest will be affecting the construction company as they were needed to pay a high interest rate that they borrow (Baldwin, 2022). High cost of borrowing will increase the debt-burden that being placed by the construction firms.

(c) Cost overruns

During the project lifecycle, cost deviation occurs which could either be positive or negative and if it is positive, it indicates the cost overrun. A significant relationship between cost overrun and inflation in both public and private construction projects can be obtained (Borku & Yeniale, 2022). The most significant cost overrun concern is the inflation-driven increase in construction material prices

(d) High interest rate

When inflation rate is high, the lenders (banks) will charges a higher interest rate in order to cover up and compensate the losses due to the declining purchasing power of the money. High rates of interest will be affecting the construction company as they were need to pay a high interest rate that they borrow (Baldwin, 2022)

(e) Project budgets become high

Due to the inflation, there are many effects that that involved, including the price of the construction materials increased, labour costs makes the project budgets become high. These ongoing cost increases are driving some companies on large capital projects to rethink scope, prolong timetables, or cancel projects, and while government cash will certainly still be used, the quantity of work it encourages may be far less than planned. (Musarat, Alaloul, & Liew, 2020). The inflation not only increased in project budgets, but it also has negative impacts on productivity.

2.3 Reason Behind the Rising Price of Construction Materials in Johor Bahru

The rising price can lead to a higher property price for the consumer. Prices increase of building materials has become a common global trend, and even the developed countries are not left out from the trend. Several developed countries are in recent times experiencing the problem with prices increase of building materials (Danso & Obeng-Ahenkora, 2018)

(a) Scarcity

Scarcity or shortage of materials sources such as soil, aggregates, steels and bricks. Since the outbreak of COVID-19, many industries are starting to work from home concepts and some of the industries need to closed temporarily such as gravel, steel industries and cement industries. The construction industries facing a hardship as the industries are mainly labour intense. The new concepts to curb the pandemic leads the scarcity of essential building supplies and affecting the ongoing construction project (Wright, 2021).

(b) Local taxes and tariff increase

A tariff is a tax being used to increase the price and makes the imports goods to make it less desirable, competitive. (Business Encyclopedia, 2022). It also being one of the tools 6 that being used by the governments in order to collect revenues and protecting local product that have same features as the goods. This will become one of the reasons behind the rising price of construction materials as most of the raw materials are the imports goods such as steels that being imported from Japan, China, South Korea and Indonesia (OEC World, 2021).

(c) Energy Cost

Increase Energy cost can be referred as the fuels price that have a significant impact on the construction industry (Kamaruddeen, Mohd Noor, & Wahi, 2020). If the cost of fuel is high, the cost of building materials will increase because it will have a direct effect on the shipping cost of all the building materials. When involving a lot of transportation cost, the contractors need to pay more for the materials. Due to this matter, the increases price of fuels and energy intensive building materials such as concrete, cement and bricks will rise too (Sante, 2021).

(d) Monetary Policies

Monetary policy is being used for assessing the supply of money and interest rates to achieve the objectives of the desired economic policy (Mathai, 2020). If there is a need for a reduction in economic activity due to rate of inflation, the government would put deflationary monetary policy in operation so as to increase interest rates and reduce the rate of growth in the money supply (Yusof et.al 2021).

(f) Maximization of profit by manufacturer

When manufacturers firms maximizing its profit by operating with the marginal revenue is equal to marginal costs. This means that the manufacturers sell their product for the maximum amount of their cost in the products. A higher price of materials resulting a higher profits or total revenue to the manufactures when products being sold (Lumen, 2021).

(f) Labour

Labour shortage in the manufacturing of raw materials can be one of the reasons that the price of construction materials increased. Labour shortage can make the production process slow as the materials cannot be processed into product and delivery time to the consumer being delayed. A lot of factors that contribute to the labour shortage such as lower participation of younger people, low wages, migration to other sectors, emergence of gig economy and shortage of migrant workers (Ramskogler, 2022).

(g) Disruption of supply chain

Disruption in supply chain can be one of the reasons that price spike in construction materials to the site. The material cannot be distributed and being blocked. One of the reason that disruption of supply chain can occur is because there is price fluctuation occur in the market this include the economic indicators such as inflation. A lot of risk need to be taken to ensure the project can run smoothly if the materials distribution affected (Musarat, Alaloul, & Liew, 2020)

2.4 Strategies Being Used in Order to Adapt the Rising Price Of Construction Materials in Johor

Bahru

The unstable and volatile global markets can give a lot of implication towards the manufacturing organizations. This means from the increases of labour cost until the unexpected fluctuation in the raw material costs and disruption in the supply chain become the obstacles in order to maintain and remaining in the industry (Sante, 2021). With the sudden increase in the raw materials and the scarcity of them will lead the firms in a hard time. They can either absorbing the price spikes or find another way to adapt with the situations.

(a) Embracing Prefabrication

The prefabrication construction method involving the pre-assembling construction structures components at factories or any other manufacturing places. Using prefabricated 7 components for building, the number of construction waste such as cements, bricks soils and others can be reduced and the construction site much safer due to the materials being produced in another places (Ellis, 2018).

(b) Adapting lean construction

Lean method can be improving one performance of construction companies, which can be used by the contractors as the key for their performance (Mahyar *et al*, 2022). The implementation of lean construction can reduce the effect of rising cost of raw materials. According to Lean Construction Institute (2022), lean design and construction involving the planning projects which can have an increased level of productivity and reducing the usage of materials as well as reducing waste.

(c) Reassessing Materials Procurement Method

A procurement system's primary purpose is to identify the duties and tasks of each and every project participant. One should be familiar with the functions and parties engaged in the building sector. This includes the inception briefing, feasibility and viability, the type of decision, the risk involved and how it will be divided among the contracting parties, and the manner of dispute resolution. In terms of working materials, labour, and whether the environment supports the way that people work, cultural issues must also be addressed (Bako, 2016)

(d) Review Site crew structure.

The reviewing site crew structure can reduce the cost. This will find the right people to lead and managing the site project. Hiring the skilled worker to do jobs on-site can reduce the materials wastage and reducing the time to executed the project. A proper planning, ordering and preparing effective procedures for material uses on-site can be reduced the material waste. (Orji et al., 2016)

(e) Adapting sustainable construction

Sustainable construction is the production and maintenance of a healthy built environment based on the judicious use of resources and ecological principles (Musir, Mohd Nasir, & Hassan, 2022). Adapting sustainable construction means that the building being made using recyclable materials such as used concrete, soils, recycle water from toilet and rainwater. This will reduce the cost of construction as well as the finished products. It also has become one of the ways being used in order to reduce waste as well as reducing the natural resources involved during the project life cycle (Koutsogiannis, 2018)

(f) Reviewing project budgets based on the current market pricing

By reviewing the project budgets, one can determine and reducing expenditure that is not needed and can create a better financial profile by cutting unwanted events as well as spending during project execution. Project cost analysis can determine the project feasibility, helping prioritize project based on critical action as well as minimized the financial risk and avoiding exceeding budgets (Musarat, Alaloul, & Liew, 2020).

(g) Planning with Building Information Systems (BIM) and CAD software.

BIM is a new approach to object-oriented modelling and integration of multi-dimensional construction data, which providing the correlation and collaborative attitude among construction practitioners. It was a promising platform being used in order to mitigate and solves uncertainty, project delays, cost overrun and low-quality projects and materials (Ibrahim, Hashim, & Ahmad Jamal, 2019). The BIM also can be used to reduce uncertainty, delays, cost overruns and knowing early failures before the project started (Montenegro, 2021)

(h) Optimizing resources management where material is bought by bulk or purchased ahead of time.

Optimizing resources to use it at maximum level such as raw materials, machinery and human efficiency. This to reduce the construction waste as well as reducing deficits in the project. Optimizing resources can also reduce over allocation to certain projects. Other than that, buying raw materials by bulks or ahead of the time can save a lot of money and cost especially during the inflation rate is high (Davies, 2021).

(i) Gaining the trust of the supplier so that the materials can be procure with the best deals

Setting up new deals to new suppliers can be tough. Contractors can create beneficial relationship between suppliers to ensure that they get the best deals with great products. A good relationship with supplier can create a cost saving and reduce availability problem that can occur. It also can increase efficiency and minimizing market volatility and price fluctuations (Davies, 2021)

(j) Using technologies such as Visual Reality (VR) and Augmented Reality (AR)

The integration of VR and AR can create a lower cost and reducing time. This is because when using the AR/VR during the process of projects can ensure the lessen time to finished the project. The technologies can also create a safe training method inside the construction site where worker can experience the site virtually. The AR/VR technologies can be used to plan a project from beginning to end, streamline the processes involved in most building projects, and decrease guesswork, saving a lot

of time and money while providing design that meets client's satisfaction, giving them the visual interpretation before their project finished (Morozova, 2018).

3. Research Methodology

Methodology is an important part of the thesis which used to explain the process of getting information and data for answering the research objectives. Explanation toward research methods, procedures, and ways to get data will be clarified in this section. This section also provides the detailed explanation towards the research procedure, population, size of the sample, and how to gain the data to achieve the research objective.

3.1 Research Design

Survey method is the suitable for the researcher being used in social science, marketing, and management to conducting study. It refers to a set of strategies, techniques and assumptions used to study psychological, social, and economic processes through the exploration of numeric patterns by gathering numerical data. For this study, the data collection used the quantitative method where surveys with series of questions being produced and distributed to the sample or the respondents. The questionnaire will be divided into four section which is section A, B, C and D. In section A, the researcher collects the demographical data from the 81 respondents and the remaining section will cover the data that comply with the research objectives of the study. The collected data can be analyses using Statistical Package Science Social (SPSS) and be ranked based on generated mean

Specific research designs such as description of research methodology selection, research population, research sampling, research instrument, and research flow process need to be explained clearly.

3.2 Data Collection

Data can be classified into two types: primary data and secondary data. Primary data is often gathered using quantitative and qualitative methods. Secondary data can be obtained from a research study or previous research such as a journal, article.

(a) Primary data

Primary data is the raw data that are not being interpreted. In this study, the primary data being collected from questionnaire using google form as the platform. The form being distributed to the respondents via social medias such as WhatsApp, Telegram, and email.

(b) Secondary data

Secondary data is being done by reading from academical sources. The method being used in this study are survey, read, recite and reviewing scholarly article. It also collected data from previous study. Secondary data can be obtained from journals, scholarly article, research papers, academic websites, and previous study. Specific data collection procedures/methods require to be described clearly.

3.3 Data Analysis

The data for this study will collected using a survey method. Researchers use descriptive statistics to analysis the data of the survey. This method describes the data collected in a simple and understandable manner. The Statistical Package Science Social (SPSS) is being used as part of the data analysis process. The respondent which randomly picked among the contractors G5, G6 and G7 that are registered under the CIDB that managing and handling construction project in the state of Johor Bahru.

3.4 Pilot Test

By doing the pilot test, the researcher can improve the quality of misleading or difficult questions. The pilot test is conducted by the researcher before the real questionnaire is distributed. The questionnaire ensures that the question is relevant, practical, and realistic about the research objective. The table below shows the result of the Pilot test that was conducted before starting this study. For this study, the question has been tested by five selected respondents where they are from the same background as the targeted respondents.

Table 1: Cronbach's alpha rule of thumb

Cronbach's alpha(α) rule of thumb	Reliability
$\alpha > 0.9$	Excellent
$\alpha > 0.8$	Good
$\alpha > 0.7$	Acceptable
$\alpha > 0.6$	Questionable
$\alpha > 0.5$	Poor
$\alpha < 0.5$	Unacceptable

The reliability and understanding of the questionnaire survey was tested by pilot test and the results from the survey is tested using Cronbach's alpha which to determine consistency and reliability of the questions. High value of Cronbach's alpha can be categorized as good and the acceptable reliability value of the alpha are range between 0.70 to 0.95. (Tavakol & Dennick, 2011) From the pilot survey of the five respondents that are related to the population, the results being tabulated in the Table 2 below.

Table 2: The result of cronbach's alpha for the pilot test

Section questionnaire	Item	Question item	Cronbach's Alpha
Section B	The effect of inflation towards construction material in Johor Bahru.	5	0.968
Section C	The reason behind the rising price of construction materials in Johor Bahru.	7	0.923
Section D	Strategies being used to adapt the rising price of construction material in Johor Bahru	10	0.911

The result of the pilot test shows that the Cronbach's Alpha is equal to 0.968 in Section B, 0.923 in Section C and 0.911 in Section D. All the Alpha is greater than 0.9 meaning that the items are excellent (according to table 1). The test results explained that the questionnaire surveys used in this study are

reliable and consistent. There are no significant changes that needed to be made for the questionnaire. However, based on the comment of the respondents during Pilot test, the words being rephrasing and adding dual language as well as spelling checking so that the changes can make sure that it improves understanding and reliability of the questionnaire.

4. Results and Discussion

Table 3: Demography of the respondents

Item		Frequency	Percentage
Gender	Male	53	65.4
	Female	28	34.6
Total		81	100
Age	Below 30	22	27.2
	31 to 40	20	24.7
	41 to 50	35	43.2
	50 and above	4	4.9
Total		81	100
Race	Malay	65	80.2
	Indian	3	3.7
	Chinese	12	14.8
	Other	1	1.2
Total		81	100
Level of education	Sijil Pelajaran Malaysia (SPM)	14	17.3
	Sijil Tinggi Pelajaran Malaysia (STPM)	8	9.9
	Diploma	31	38.3
	Bachelor's degree	24	29.6
	Master	4	4.9
	Total		81
Contractor's grade registered under CIDB Malaysia	G5	32	39.5
	G6	33	40.7
	G7	16	19.8
Total		81	100
Type of client	Government	9	11.1
	Private	17	21
	Both	55	67.9
Total		81	100
Experience in the industry	Below 5 years	27	33
	6 to 10	30	37
	11 to 15	17	21
	16 to 20	5	6.2
	21 and above	2	2.5
Total		81	100

Most of the respondents are male (65.4%). While the female respondents are at (34.6%). This is because the nature of the construction industry which is considered as 3D (dirty, dangerous, and demanding) makes the participation of women in the industry incredibly low. From the table above,

most of the respondents come with the age of 41 to 50 years old (43.2%), followed by below 30 years old (27%) and the age of 31 to 40 years old (24.7%). Lastly is the age of 50 years and above (4.9%). It is shows that most of the contractors are still active even during their early 40s to involved in the industry and contribute a lot for creating residential, commercials and infrastructures.

Next is the respondent's level of education. It shows that most of the respondents have a diploma (38.3%), followed by bachelor's degree (29.6%) and Sijil Pelajaran Malaysia (SPM) where it's percentage of (17.3%). While Sijil Tinggi Pelajaran Malaysia (STPM) is (9.9%) and Master is (4.9%). The respondent's grade that registered under the CIDB Malaysia shows that majority of the respondents are from G6 (40.7%) followed by G5 (39.5%) and G7 (19.8%). Showing that they are affected by the rising price of construction materials that occur in the market.

Next, the majority of the respondents' clients are both from the government and private sectors (67.8%), followed by the Private client which is (21%). Lastly is the Government as the client f(11.1%). Most of the respondents involved with both clients from both government and private, creating projects from various residential buildings to commercial buildings to ensure that the project can be done within time given.'

Respondents' experience in the industry, majority of the respondent's experiences are within 6 to 10 years (37%), followed by below 5 years (33%) and respondents with experience within 11 to 15 years is (21%). 16 to 20 years (6.2%) experience comes in fourth, while 21 years and above (2.5%). Most of the respondents were quite familiar with the industry in Malaysia. The experience of the respondent will give significant impact to the findings of this research. The results and discussion section presents data and analysis of the study. This section can be organized based on the stated objectives, the chronological timeline, different case groupings, different experimental configurations, or any logical order as deemed appropriate.

4.1 Analysis of the research objective 1: To identify the effect of inflation towards the price of construction materials in Johor Bahru.

This section consists of 5 questions that are asked to the respondents. In this part, the researcher wants to identify the effect of inflation towards the price of construction material in Johor Bahru.

Table 4: The effect of inflation towards rising price of construction materials in Johor Bahru

No	Item	Mean	Standard deviation	N	Ranking
1	The inflation erodes the purchasing power of the contractor.	4.49	0.760	81	4
2	The inflation creates cost overrun during the project execution	4.43	0.688	81	5
3	Inflation raised the cost of borrowing of the contractors to the banks such as loans.	4.62	0.582	81	1
4	Inflation makes the interest rate become high.	4.56	0.632	81	2

5	Inflation makes project budgets increased during project lifecycle	4.51	0.635	81	3
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Table 4 shows the effect of inflation towards the rising price of construction materials in Johor Bahru. As the table shows, it finds that the effect of inflation towards the rising price of construction material in Johor Bahru is that the inflation raised the cost of borrowing of the contractors to the banks such as loans (Rank 1, mean 4.62) due to the bank raised charges for money. Followed by the inflation makes the interest rate become high (Rank 2, mean 4.56) and inflation makes the project budgets increase during project lifecycle (Rank 3, mean 4.51). The inflation erodes the purchasing power of the contractor comes in (Rank 4, mean 4.49) and the inflation creates cost overruns comes in (Rank 5, mean 4.43)

This happen because during inflation, large demand for the loans will make the banks to raised charges for that amount of money, hence the inflation makes the borrowing rates become high, making it hard for the contractor to roll their money for other projects. The high interest rate can also give impacts to the contractors. It occurs when the lenders (banks) will charge a higher interest rate in order to cover up and compensate the losses due to the declining purchasing power of the money.

The inflation makes project budgets become high. When the price of the construction materials increased, labour costs which make the project budgets become high. The inflation effecting the construction player by eroding their purchasing power towards materials and machineries. When there is sudden increase in projects, demands for construction materials will increase but the supply for raw materials are the same, which will lead to an increase price for the materials. When the prices spiked too high, it will erode the purchasing power and the value of money for the construction firms.

Results can be presented in the form of tables, figures, charts, diagrams or other relevant forms. If needed, raw data that is too lengthy to be presented in this section can be transferred to the appendix section.

4.2 Analysis of the research objective 2: To identify the reason behind the rising price of construction materials in Johor Bahru.

This part consists of 7 questions that are asked to the respondents. This part complies with the second objective of this study which to find the reasons behind the rising price of construction material in the state of Johor Bahru.

Table 5: The reasons behind the rising price of construction material in the state of Johor Bahru

No.	Item	Mean	Standard deviation	N	Ranking
1	Shortage of raw materials or scarcity.	4.35	0.839	81	7
2	Increases in the local tariff and taxes.	4.43	0.774	81	6

3	Increases in the cost of energy (example: fuel and electricity)	4.53	0.634	81	1
4	Labour shortage in the manufacturing of the raw materials.	4.44	0.775	81	5
5	Profit maximization by the manufacturer which is selling the materials at the highest price.	4.52	0.635	81	2
6	Disruption of supply chain which makes the procuring process of the construction materials become hard.	4.48	0.743	81	4
7	Monetary policies where central bank or Bank Negara Malaysia reducing the supply of money in the economy by increases interest rate and reducing the price of bonds.	4.48	0.654	81	3

The table 5 shows the item that comply with the second objective of this study which to find the reasons behind the rising price of construction material in the state of Johor Bahru. From the table above, it shows that the Increase in cost of energy (Rank 1, mean 4.53) followed by profit maximization by the manufacturer which is selling materials at the highest price (Rank 2, mean 4.52) and Monetary policies where central bank or Bank Negara Malaysia reducing the supply of money in the economy by increases interest rate and reducing the price of bonds (Rank 3, mean 4.48). The disruption of supply chain which makes the procuring of construction material becomes hard was (Rank 4, mean 4.48) and labour shortage in the manufacturing of the raw materials was (Rank 5, mean 4.44). As for the increase in local tariff was (Rank 6, mean 4.43) and Shortage of the raw material comes in (Rank 7, mean 4.35).

The increase in the price of energy (fuels and electricity) can give a significant impact on the construction industry. This is because when the cost of fuel is high, the cost of building materials will increase because it will have a direct effect on the shipping cost of all the building materials. When involving a lot of transportation cost, the contractors need to pay more for the materials. The increases price of fuels and energy intensive building materials such as concrete, cement and bricks will rise too.

Profit maximization is when manufacturers and firms maximizing its profit by operating with the marginal revenue equal to marginal costs. This means that the manufacturers sell their product for the maximum amount of their cost in the products. A higher price of materials resulting a higher profits or total revenue to the manufactures when products being sold.

Disruption in supply chain can be one of the reasons that price spike in construction materials to the site. The material cannot be distributed and being blocked. One of the reason that disruption of

supply chain can occur is because there is price fluctuation occur in the market this include the economic indicators such as inflation. Labour shortage can make the production process slow as the materials cannot be processed into end product and delivery time to the consumer being delayed.

4.3 Analysis of the research objective 3: To study the strategies that are being used to adapt with the rising price of construction materials in Johor Bahru

This part consists of 10 questions that are asked to the respondents. This is the last part of the study which is to discuss and find the strategies that can be used to adapt to the rising price of construction materials in Johor Bahru, which covers the third objectives in this study.

Table 6: The strategies that can be used to adapt to the rising price of construction materials in Johor Bahru

No	Item	Mean	Standard deviation	N	Ranking
1	Embracing prefabrication to reduce wastage of raw materials such as cements, sands, bricks, and others.	4.57	0.611	81	5
2	Reassessing materials procurement methods that being used to reconsider the price increase and delays during project execution	4.44	0.758	81	10
3	Adapting lean construction where it can reduce the rising cost of raw materials and reducing construction waste.	4.54	0.613	81	6
4	Adapting sustainable construction where it used recyclable materials or green materials to construct buildings.	4.48	0.691	81	8
5	Reviewing project budgets based on the current market pricing	4.68	0.520	81	1
6	Reviewing site crew structures using management software that can help to communicate, sharing data and altering project details	4.49	0.654	81	9
7	Planning with Building Information Systems (BIM) and CAD software to reduce uncertainty, delays, cost overruns and knowing early failures before the project started.	4.48	0.635	81	7

8	Optimizing resources management where material is bought by bulk or purchased ahead of time.	4.62	0.514	81	2
9	Gaining the trust of the supplier so that the materials can be procure with the best deals	4.62	0.624	81	3
10	Using technologies such as Visual Reality (VR) and Augmented Reality (AR) to plan a project from beginning to end, streamline the processes involved in most building projects, and decrease guesswork, thus saving time and money while providing substantial design to the clients.	4.60	0.646	81	4

Table 6 shows the strategies that can be used in order to adapt to the rising price of construction materials in Johor Bahru, which covers the third objectives in this study. Based on the result, reviewing project budgets based on the current market pricing (Rank 1, mean 4.68), followed by the optimizing resources management where material is bought by bulk or purchased ahead of time comes in (Rank 2, mean 4.62) and Gaining the trust of the supplier so that the materials can be procure with the best deals (Rank 3, mean 4.62). While Using technologies such as Visual Reality (VR) and Augmented Reality (AR) to plan a project from beginning to end, streamline the processes involved in most building projects, and decrease guesswork, thus saving time and money while providing substantial design to the clients is (Rank 4, mean 4.60). Embracing prefabrication to reduce wastage of raw materials such as cements, sands, bricks, and others is (Rank 5, mean 4.57).

The last strategies to adapt with rising price of construction materials is reassessing materials procurement methods that being used to reconsider the price increase and delays during project execution which is (Rank 10, mean 4.44).

By reviewing the project budgets, contractors can determine and reducing expenditure that is not needed and can create a better financial profile by cutting unwanted events as well as spending during project execution. Project cost analysis can determine the project feasibility, helping prioritize project based on critical action as well as minimized the financial risk and avoiding exceeding budgets.

Optimizing resources management where materials being bought by bulks can also become one of the strategies being used to minimize the effect of price increase. This to reduce the construction waste as well as reducing deficits in the project. Optimizing resources at its maximum level can also reduce over allocation to certain projects budgets.

The reviewing site crew structure can reduce the cost. This will find the right people to lead and managing the site project. Hiring the skilled worker to do jobs on-site can reduced the materials wastage and reducing the time to execute the project.

To adapt price increase is by gaining the trust of the supplier so that the materials can be procure with the best deals. This is because contractors can create beneficial relationship between suppliers to ensure that they get the best deals with great products. A good relationship with supplier can create a cost saving and reduce availability problem that can occur. It also can increase efficiency and minimizing market volatility and price fluctuations. Using prefabricated components for building, the number of construction waste such as cements, bricks soils and others can be reduced and the construction site much safer due to the materials being produced in another places.

5. Conclusion

This research is being done to find the relationship between economic indicators such as inflation to the price of construction materials. It is hoped that it will give benefits to the construction players as they can use the strategies to minimize and adapt to the current market pricing. The increase in price of construction materials can give a lot of disturbance and affect the project lifecycle. Secondly, the construction industry can do joint venture and introduce any other integration to the construction industries. The integration of technologies as well as widen the usage of green materials to the industry. This is because the integration of the technologies and implementation of green materials as substitution can reduce the construction waste and the green materials are really cheap compared to the other materials. It will not only reduce the cost but also give opportunity to save the environment.

Lastly, the university should provide more seminar or training to educate construction players to use and integrate to the latest technologies. They can also educate the construction players to change their perspectives towards the new method being applied. The university can also make use of R&D so that they can produce materials that are cheap and sturdy using green materials. The materials being produced can be mass produced and be sold by joint venture to private company so that they can mass produce the materials being made.

Upon that matter, it is hoped that the study being used by the university and any future researcher so that they can provide and make more study on economic indicators and their consequences towards the construction industry. This will ensure that people especially construction players are aware that it is related towards one and another. It also hopes that the university will do collaboration with other agencies such as CIDB Malaysia to educate and make research about inflation and how to mitigate and find other strategies to be used to adapt with the effect as well as the impacts of inflation so that they can benefit the construction players in the industry. The conclusion should summarize the main findings of the study, and restate the key points inferred from trends observed and discussed regarding the data. Some suggestions should be included to encourage the continuation of the current research.

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