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Rising Trend in Construction Cost and Housing Price

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Abstract - *Rising house prices in major areas in Malaysia is becoming great concerns to many citizens, especially in big cities like Johor Bahru and Kuala Lumpur. Having a house is a measure of the quality of life of a person. Costs of materials and machinery are two factors that lead to high housing construction cost. This study compares the cost of materials and machinery for the past few years, identify factors that influences housing price and identify effective methods to control the price. The study was carried out by means of questionnaires. Respondents for this study are contractors, engineers, and housing developers, amongst others. A total of 70 questionnaires were distributed among the respondents and 30 questionnaires were returned. The data is analysed using Average Index method. From the study, the building materials price trend for the year 2009 and 2013, material rental rate for the year of 2009 and 2013, plus plant and equipment rental rate for the year of 2009 and 2013 were compared. Increased fuel price, increased production cost, increased import cost, high interest on loan are the main factors to increase housing price. The effective methods to control housing price are limiting purchases by foreigners and controlling material price.*

Keywords: Construction cost, Housing price, Malaysia

1.0 INTRODUCTION

"My home my heaven" is a common expression to Malaysian parable to illustrate the importance of home to oneself. A house is an essential requirement to humans. Since prehistoric times shelter or home has become an important element to the basic needs besides food and water. Nowadays, a house can become an indicator to measure the degree of a person's wealth and life. A house has become a long-term investment to many house owners [1]. The normal criteria in buying a new home is comfort and having basic amenities such as schools, retail stores and so on [2]. Affordable home is one of the essential requirements for people. Housing price is something that affects people at some points of their lives [3]. It is important to realize how the prices are determined and what effects they have on people. Weak economic growth has spurred increase in housing prices. Increase in price of construction materials such as ready mixed concrete, brick, reinforcement steel, sand and aggregate will affect the housing price [4].

In achieving the country's Vision 2020, the process of rapid urbanization has led to an increase in population in all cities throughout Malaysia [5]. This resulted in increased demand for houses. Thus, the housing market plays an important role in the Malaysian economy [6].

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Progressed against the odds, house prices have risen suddenly from year to year. During the period 2010 to 2012 house prices as measured by the Malaysian House Price Index (MHPI) recorded an increase average of 9.1% per annum, defeating previous annual average of 3.2% during the past 10 years [7,8]. Despite the rise in house prices generally widespread, this trend is more pronounced in certain metropolitan areas such as Kuala Lumpur, Selangor and Penang [9]. For these regions, the rise in house prices is unavoidable especially because of high demand. It is common to have increase in demand for housing in line with the increase of local population. It is the most common factor that pushed up home prices every year [10]. In addition, the effect of economic growth can also affect the price range of homes.

Changes in the demographic structure are also one of the main determinants of house prices [11]. When more younger Malaysians enter the job market, they would likely buy their first property at a young age, thus adding new demand for housing [12]. According to the Department of Statistics Malaysia, the population of working age (15 to 64 years) increased to 67.3% in 2010 from 62.8% in 2000 [13]. Moreover, consumer price inflation also has a positive impact on house prices. Through higher input costs, as prices for building materials, land prices and labour costs rise, new housing price becomes more expensive than before.

1.1 Problem Statements

Building materials are defined as materials used in each construction work starting from the underground work until the finishing work. Materials, machinery and equipment are the main element in construction cost other than labour. In the last few years, housing price around Johor Bahru and Kuala Lumpur have become very expensive and non-affordable to many citizens [14]. Therefore, it is important to find out factors related to costing of materials, machinery and equipment towards the increase in housing prices. The aim of this study is to assess the increase of construction cost and the implication of usage of machinery and equipment in construction projects. The objectives of this study are to compare the cost of materials and the usage of plant and machinery in recent years; to identify the factors that influence the housing price; and to identify effective methods of controlling housing price in Malaysia. The study focused on data obtained from the perspective of building engineers, contractors and developers who involved in residential construction in the vicinity of Johor Bahru and Kuala Lumpur. The study only focused on factors that affect housing price regarding materials and machinery without considering labor factor.

2.0 LITERATURE REVIEW

Construction materials commonly refer to raw materials, component parts and packaging products, consumable, packing and packaging and equipment [15]. Normally, the construction materials used will be a permanent structure of the building such as concrete, brick and steel. There are also substances used only as an aid to construction work such as scaffolding and formwork made of steel or wood. According to Construction Industry Development Board of Malaysia (CIDB), building materials are defined as all activities involving work underground until finishing works and building equipment [16]. In their report, CIDB stated seven main types of building materials such as cement, sand, round iron, steel reinforcement (BRC), aggregates, ready mixed concrete and bricks. When selecting these materials, an engineer must also take into account the location of the suppliers and transportation costs.

The use of modern materials and machineries in construction has improved quality from the traditional method to modern technologies [17]. According to CIDB, seven main materials very

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commonly used in construction works such as cement, sand, steel, reinforced steel (BRC), aggregate, mixed concrete and bricks are very prone to price fluctuation. The cost of building a house has rapidly increased with the increase in cost of construction materials such as cement, steel, sand, and piling materials since 2008 [18]. Furthermore, the rate of increase of some construction materials is difficult to predict. This partially stemmed out from the actions by the government that has stopped from listing out building materials as controlled items since 2008. Consequently, housing developers have to bear the entire cost increase. Table 1 shows how housing price projection in Malaysia every year since 2000 to 2012 in metropolitan areas. Malaysian community had seen these rise in housing prices of all kinds every year except in 1998 (decreased by 9.5%) and 1999 (decreased by 2.4%), during the financial crisis in Southeast Asia [19].

Table 1: Projection of Housing Price year 2000 until 2012

Year	House Types			
	Single-storey Terrace	Double-storey Terrace	Semi-detached	Bungalow
2000	RM 222,500	RM 444,642	RM 1,357,142	RM 3,732,142
2001	RM 229,916	RM 459,464	RM 1,402,380	RM 3,856,547
2002	RM 237,333	RM 474,285	RM 1,447,619	RM 3,980,952
2003	RM 244,750	RM 489,107	RM 1,492,857	RM 4,105,357
2004	RM 252,166	RM 503,928	RM 1,538,095	RM 4,229,761
2005	RM 259,583	RM 518,750	RM 1,583,095	RM 4,354,166
2006	RM 267,000	RM 533,571	RM 1,628,571	RM 4,478,571
2007	RM 274,416	RM 548,392	RM 1,673,809	RM 4,602,976
2008	RM 281,833	RM 563,214	RM 1,719,047	RM 4,727,380
2009	RM 289,250	RM 578,035	RM 1,764,285	RM 4,851,785
2010	RM 296,666	RM 592,857	RM 1,809,523	RM 4,976,190
2011	RM 304,083	RM 607,678	RM 1,854,761	RM 5,100,595
2012	RM 311,500	RM 622,500	RM 1,900,000	RM 5,225,000

Recently, the construction industry has entered another unprecedented crisis as the price of steel bars has increased by more than 50% since January 2016 [20]. The price hike would affect the business of contractors in the country and caused them to raise prices by over 5%, to absorb losses. Penang Master Builders and Building Materials Dealers Association president claimed that the price of steel bars have increased from about RM1,500 per tonne in January this year to about RM2,450 per tonne at April 2016. Contractors who had secured construction jobs from either the Government or the private sector prior to the latest increase in steel pricing are in a great difficulty, as they have to adhere to the old pricing negotiated early this year. The entire situation is topsy-turvy at the moment, as there is also a shortage or zero supply of a variety of essential steel bar products. The shortage has spilled over to steel mesh and pre-cast reinforced concrete products, increasing prices further and causing delayed deliveries. That could be the reason that makes the price jumped drastically, causing the price per tonne to be about 50% higher than it was earlier in 2016.

Many previous studies have shown that price of construction materials like cement, sand, steel, and piling and cost of equipment plays a very important role in determining the construction

cost of a building. Therefore, contractors and developers should take the issue seriously and make appropriate actions so that people are able to have an affordable house to live.

3.0 METHODOLOGY

There are several factors that influence housing price in Malaysia. In this study, perpective viewpoints from the engineers, contractors and developers will be collected and analysed. Among the issues addressed are rising cost of building materials, cost of machinery and equipment. In addition, methods of controlling the increase in house prices in Malaysia are also identified. An analysis was performed to determine the comparative cost of building materials and the use of machinery and construction equipment in the past few years, namely for 2009 and 2013. The methodology use in this study can be divided into three stages as follows:
Phase 1: Preliminary Stage - Study relevant issue on the effect of materials, machinery and equipment cost towards increasing housing price. Problems, scope and objectives of the study were identified. These are mostly performed through literature review.
Phase 2: Data Collection - Performed through questionnaires. Respondents were asked information regarding past projects as case studies to ensure all objectives were achieved.
Phase 3: Data Analyses and Conclusions - Data obtained through questionnaires were analysed using Average Index (AI) method [21]. Calculations are performed using the following formula:

$$\text{Average Index} = \frac{\sum a_i x_i}{\sum N}$$

Where:

a_i = weighting given to each factor by respondents (1 to 5 scale)
x_i = frequency of the responds
N = total number of respondents

In identifying the cost of building materials and the cost of the use of machinery on a construction project, the average index uses five scales which have been formed to describe the frequency of the response. The scales used are:

1 = Strongly Disagree ($1.0 \leq$ average ≤ 1.5)
2 = Disagree ($1.5 \leq$ average ≤ 2.5)
3 = Indifference ($2.5 \leq$ average ≤ 3.5)
4 = Agree ($3.5 \leq$ average ≤ 4.5)
5 = Strongly Agree ($4.5 \leq$ average ≤ 5.0)

The results and the average points for each of these factors are shown in the same table.

4.0 RESULTS AND DISCUSSION

A total of 70 sets of questionnaires were distributed to the persons involved in the construction field such as engineers, contractors, developers, amongst others, in the Federal Territory of Kuala Lumpur and Selangor. Out of these, only 30 completed questionnaires were returned by mail. The number of questionnaires returned according to professions is engineers 34%, contractors 33%, and developers 13%, while the remainder of the questionnaire returned by others 20%. About 80% of the respondents have working experience between 1 and 9 years.

4.1 Costs Comparison

The study compares prices of materials, equipment and machinery used in construction since the year 2009 to 2013. This leads to identifying factors that influence the increase of housing price based on materials and machinery rental rates, and developing effective methods to control the increase in housing price. Table 1 shows the rate of construction materials in 2013 and 2009. Among the building materials used are bricks, BRC A10 steel reinforcement, river sand, cement, and low tensile round iron R10. According to Table 2, building materials are more expensive in 2013 than in 2009. Bricks pallet has the highest price increase compared to other building materials, namely by 51.9% [22].

Table 2: Building Materials

Building Materials	Rate (RM)		Difference (%)
	2009	2013	
Bricks (Pallet)	0.27	0.41	51.9
BRC A10 Steel Reinforcement	16.36	16.64	1.71
River Sand (Normal)	25.00	37.00	48.0
Cement	14.25	16.95	18.9
Low tensile round iron R10, MS 146	2073.33	2500.00	20.6

Table 3 shows the percentage difference of daily rental rate for construction machinery for the year of 2009 and 2013 [23]. Based on Table 3, the daily rental rate for machinery has increased significantly from 2009. The highest increase was for the hydraulic excavator, which is 4.8%, while lorry rental rate remains the same. For the big machinery like mobile crane and bulldozer, the percentage differences were between 2.2% and 2.8%, respectively.

Table 3: Machinery Rental Rate

Machine Category	Rate(RM)		Difference (%)
	2009	2013	
Hydraulic Excavator - Hitachi (EX8-2B)	375.00	393.00	4.8
Mobile Crane - Kato (KR25H III)	600.00	617.00	2.8
Soil Compactor - Caterpillar (825H)	663.00	672.00	1.4
Bulldozer - Komatsu (D70LE-8)	783.00	800.00	2.2
Lorry – Hino	893.00	893.00	0

Table 4 shows the percentage difference of rental rates for the construction plant equipment for the year of 2009 and 2013 [23]. Table 4 shows that the rental rate for the plant equipment is increasing from the year of 2009 to 2013. Concrete mixer, for example, has recorded a percentage difference of 9.5%. Other equipment shows increase between 0.1% and 5.2%.

4.2 Factors Affecting Housing Price

Three factors were identified from literature review that may significantly affect housing price. These factors are related to construction materials, construction equipment and machinery, and other general factors. These factors were analysed through responses from questionnaires distributed to three different categories of construction professional parties, namely engineers, contractors and developers.

Table 4: Equipment Rental Rate

Equipment	Rate (RM)		Difference (%)
	2009	2013	
Concrete Mixer - Izumi 3T	1400.00	1533.00	9.5
Power Trowel – Toyo TPT36A	1537.00	1617.00	5.2
Concrete Vibrator – Yoko Yoko 2	1127.00	1128.00	0.1
Vibratory Plate Compactor – Toyo TPC90	587.00	603.00	2.7
Concrete Cutter - Toyo TCS1820	1050.00	1060.00	0.9
Fuel Generator Set – Yamaha ET950	715.00	725.00	1.4

Table 5: Engineers Viewpoint

Rank	Material Price Factors	Frequency					Average Index
		1	2	3	4	5	
1	Increased fuel price	0	0	1	2	7	4.60
2	Increased production cost	0	0	2	4	4	4.20
3	High demand	0	0	2	5	3	4.10
4	Price manipulation	0	0	4	2	4	4.00
5	Ceiling price	0	1	2	5	2	3.80
6	Simultaneous demand	0	1	2	6	1	3.70
7	High interest on loan	0	3	1	3	3	3.60
8	Increased import cost	0	2	2	4	2	3.60
9	Supplier management cost	0	1	3	5	1	3.60
10	Sustainable material cost	0	1	4	4	1	3.50

Table 6: Contractors Viewpoint

Rank	Material Price Factors	Frequency					Average Index
		1	2	3	4	5	
1	Increased production cost	0	1	0	4	5	4.30
2	Increased import cost	0	0	1	6	3	4.20
3	High interest on loan	0	0	3	3	4	4.10
4	Increased fuel price	0	1	2	2	5	4.10
5	Supplier management cost	0	0	2	6	2	4.00
6	High demand	0	1	2	6	1	3.70
7	Sustainable material cost	0	1	3	5	1	3.60
8	Ceiling price	0	2	3	5	0	3.30
9	Lack material supply	1	2	2	5	0	3.10
10	Price manipulation	0	2	5	3	0	3.10

Based on Table 5, engineers strongly agree that increased fuel price is the most significant factor that leads to increased material price which then caused housing price to increase. With the AI ranking score of 4.60, the increase of fuel price is always regarded as the impetus to the good or poor environment to housing price and construction. Other top five factors significant in increasing material price were increased production cost, high market demand, price manipulation by vendors and unstated ceiling price.

Based on Table 6 contractors did not classified any specific factor as the very significant factor contributing to increasing housing price. The top five factors considered significant in increasing material price were increased production cost, increased import cost, high interest on loan, increased fuel price and supplier management cost.

Table 7: Developers View Point

Rank	Material Price Factors	Frequency					Average Index
		1	2	3	4	5	
1	High interest on loan	0	0	0	1	3	4.75
2	Increased fuel price	0	0	0	2	2	4.50
3	High demand	0	0	1	1	2	4.25
4	Increased import cost	0	0	0	3	1	4.25
5	Supplier management cost	0	0	0	3	1	4.25
6	Simultaneous demand	0	0	0	3	1	4.25
7	Increased production cost	0	0	0	4	0	4.00
8	Lack material supply	0	0	2	1	1	3.75
9	Sustainable material cost	0	0	1	3	0	3.75
10	Ceiling price	0	0	1	3	0	3.75

Table 8: Machinery and equipment factors

No.	Machinery and equipment factors	Frequency					Average Index
		1	2	3	4	5	
	Engineers view						
1	Increase in fuels price	0	0	1	4	5	4.40
2	High administrative cost	0	0	3	3	4	4.10
3	High rental rate	0	0	1	7	2	4.10
4	High maintenance cost	0	1	1	6	2	3.90
5	Increase electric tariff	0	1	1	6	2	3.90
	Contractors view						
1	Increase in fuels price	0	0	1	5	4	4.30
2	High rental rate	0	0	1	7	2	4.10
3	High bank interest rate	0	1	4	1	4	3.80
4	High administrative cost	0	0	3	7	0	3.70
5	High maintenance cost	0	2	1	6	1	3.60
	Developers view						
1	High rental rate	0	0	0	2	2	4.50
2	High maintenance cost	0	0	1	0	3	4.50
3	Increase in fuels price	0	0	0	2	2	4.50
4	High demand	0	0	1	1	2	4.25
5	High administrative cost	0	0	1	2	1	4.00

Based on Table 7, developers strongly agree on two factors as very significant in contributing to the increased housing price. These factors were high bank interest on loan and increased fuel price. Other top five factors were high market demand, increased import cost and supplier management cost.

For the equipment and machinery factors as shown in Table 8, the top five factors rated by engineers affecting housing price were increasing fuel price (AI 4.40), high administrative cost (AI 4.10), high rental rate (AI 4.10), high maintenance cost (AI 3.90) and increasing electrical tariff (AI 3.90). From the viewpoint of contractors, the top five factors were increasing fuel price (AI 4.30), high rental rate (AI 4.10), high interest on loans (AI 3.80), high administrative cost (AI 3.70) and high maintenance cost (AI 3.60). This is in close proximity with the viewpoint of the engineers. Developers rated high equipment rental (AI 4.50), high maintenance cost (AI 4.50), increasing fuel price (AI 4.50), simultaneous demand by contractors (AI 4.25) and high administrative cost (AI 4.00).

Table 9: General factors

No.	Machinery and equipment factors	Frequency					Average Index
		1	2	3	4	5	
	Engineers view						
1	Habit of profiteering	0	0	2	3	5	4.30
2	Rising real estate prices	0	0	3	4	3	4.00
3	Increase of goods and services tax	0	0	4	2	4	4.00
4	Entry of foreign investors	0	0	4	3	3	3.90
5	Poor monitoring house prices	0	1	3	2	4	3.90
	Contractors view						
1	Rising real estate prices	0	0	1	1	8	4.70
2	Habit of profiteering	0	0	1	4	5	4.40
3	Poor monitoring house prices	0	0	0	7	3	4.30
4	Increase of goods and services tax	0	0	3	3	4	4.10
5	Entry of foreign investors	0	0	2	6	2	4.00
	Developers view						
1	Rising real estate prices	0	0	0	1	3	4.75
2	Labour shortage	0	0	1	1	2	4.25
3	Increase of goods and services tax	0	0	1	1	2	4.25
4	Entry of foreign investors	0	0	1	2	1	4.00
5	Poor monitoring house prices	0	1	0	1	2	4.00

For the general factors as shown in Table 9, the overall viewpoints of the respondents have considered habit of profiteering, rising real estate prices, increase of goods and services tax, entry of foreign investors, poor monitoring house prices and labour shortage as the top factors. Contractors and developers showed very strong opinion about rising real estate prices.

4.3 Effective Method to Control Increasing Housing Price

For this part, the most effective methods obtained from literature were included in the questionnaire. From the questionnaire, all the methods were analysed based on viewpoints from three different parties like before, namely engineers, contractors and developers. As shown in Figure 1, from the viewpoints of engineers, constructing at least 30% low-cost housing units (AI 5.00) was the most significant strategy or effective method of controlling the increase in housing prices. Next effective methods were limiting home purchases by foreigners (AI 4.40), regulation for construction of affordable housing (AI 4.40), establishing programs such as PPR, PR1MA and RMR1M (AI 4.30), and providing subsidised home (AI 4.30). Contractors pointed

out many strong viewpoints such as making mandatory the construction of affordable housing at every housing area (AI 4.70), controlling materials price (AI 4.70), controlling the price of property (AI 4.60), limiting home purchases by foreigners (AI 4.60), and providing additional areas for housing construction (AI 4.50). Developers also pointed out many strong opinions such as limiting purchases by foreign buyers (AI 4.75), making it mandatory to construct affordable housing for medium and low income groups (AI 4.75), limiting the involvement of real estate agents (AI 4.50), enforcing stricter housing regulations (AI 4.50) and providing government subsidised housing schemes to fulfill private housing development quota (AI 4.50).

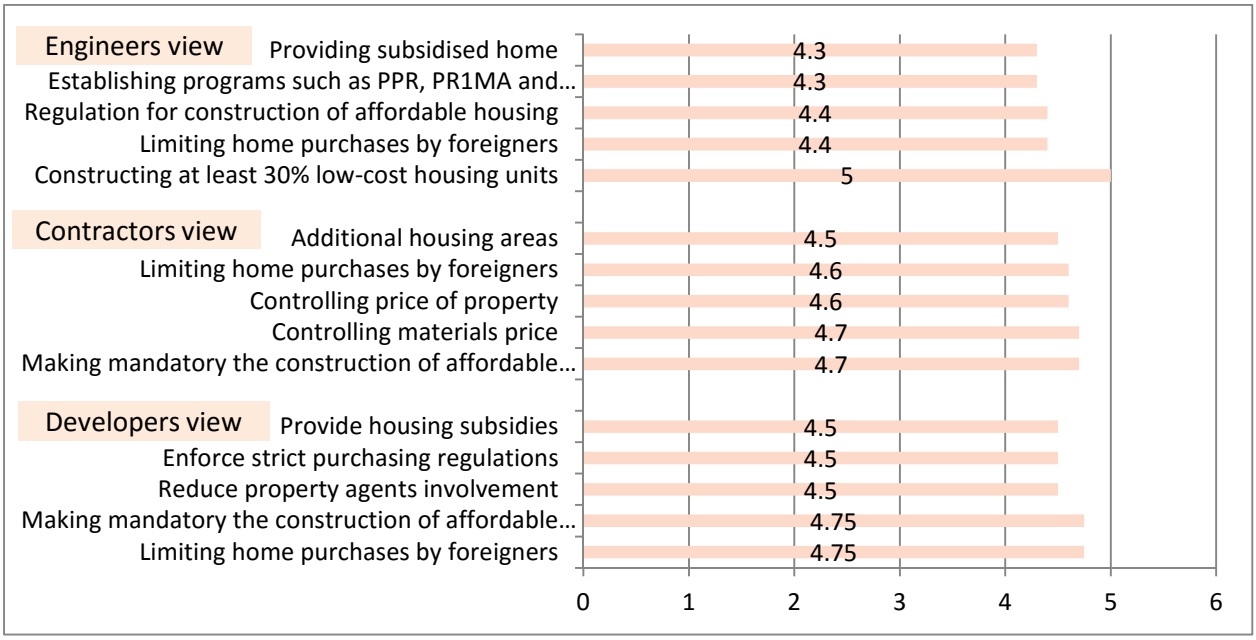

Figure 1: Methods for Controlling House Price

5.0 CONCLUSIONS

Material prices have significantly increased especially from the year 2008 onwards. The price was not only high but also unpredictable. This happened after the government stopped including these construction materials in the price-controlled materials list. Materials average price can increase more than 10% per year. They can be very unpredictable and can reach more than 50% increase in a short time. Machinery and equipment rental rate can increase 4% to 10% per year. The most significant factor affecting housing price was high fuel price. Other significant factors were the high production cost, high import cost and high bank interest on loans. For the machinery and equipment, the most significant factor was also increased fuel price, high administrative cost, high rental rate, high maintenance cost, and high interest on loans. For general factors, the most significant elements were the habit of profiteering, rising real estate price, increasing goods and service tax, lack housing price monitoring and purchasing power of foreign investors. The most effective method to control increasing housing price suggested were constructing adequate low-cost housing units, limiting home purchases by foreigners, establishing programs such as PPR, PR1MA and RMR1M, and regulate the construction of affordable housings. The increase of construction material price, especially significant increase up to 50% in periods of less than 6 months can be detrimental to building contractors. They usually work based on a signed contract which cannot foreseen the sudden changes in price. If the situation is not monitored and regulated, not only the contractors will

run out business, the people will lose the opportunity to have their house build promptly at affordable cost.

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