

Factors Influencing Low Cost Housing in Sana'a – Yemen

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Abstract

The Purpose of this study to identify the factors influences housing cost in low cost housing projects in Sana'a the capital of Yemen. A questionnaire survey has been used as the tools to carry out this study. The questionnaire survey consisted of 32 factors which were grouped into five major categories named; land factors, materials used factors, construction methods used factors, finishing works factors and external factors. The level of importance of the categories was measured and ranked the relative importance weights. This study found that land cost factor, cement cost factor and steel cost factor are the most important factors influencing housing cost in Sana'a. Based on the analysis of the ranking and intensity of a housing cost factors, this paper suggests possible improvements that could be made in order to decrease the housing cost.

Keywords: housing cost, land cost, materials cost, construction methods cost, and finishing works cost, Sana'a.

1. Introduction

Housing plays a very important role in human life and human society. Housing has tremendous social and economic impact on the total living environment of the world. It has direct and immediate influence on health, education, economy, environment, political and social life of any society. The shortage of houses in developing countries for low-income group is of colossal magnitude. Yemen is one of undeveloped countries that suffer from housing shortage. The high growth of the population and the return of more than a million of immigrants after the 2nd Gulf War execute increased the demands of housing. The continuous use of conventional construction method as well as slow-pace of construction and higher cost, still cannot meet the demand of housing. The problem worsens as the government does not make the necessary plan or arrangements to meet the demands and the caused sequences.

The urban population growth has increased to 33% in (1994), from 9% in (1960) has made the need for adequate housing for low income people a very important concern of the Yemeni Government. However, the rush to respond to these needs seems to result in a low quality housing that does not adequately match the needs of these people (Djebarni & Al-abad 1998).

The main problem lies in the need for houses particularly for low income group. The problem of low-income group can be observed clearly through the unorganized and random housing (informal housing) in squatter and slum areas, which are built as an urgently solution for low income group. It is clear that the rapidly growth of demand for low cost housing. Actually, there is housing gap in which there is mismatch between shortage low cost housing, housing needs and housing supply for low income group in Sana'a. Al-Eriani (2007) presented in workshop of Sana'a city experiences in solving the phenomena of spontaneous residential areas that the shortage of houses in Yemen is 1,279,569 units.

Housing in Yemen

The construction industry and its activities have an important role to play in socioeconomic development and quality of life. Construction activity accounts for more than 50% of the national outlays. Building Construction costs registered an increase in rates year after year at scales much faster than inflation. It is seen that in view of the increase in cost for basic input materials like steel, cement brick timber and other materials as well as the cost of construction labour, buildings cost increase at around 20% to 30% annually even when inflation is in single digit. Even though income levels of people are by and large brought in line with the levels of inflation through inflation indexed rise in salaries, year after year, housing is moving beyond the reach of the majority of the people. The reducing housing size for various categories in consecutive years in respect of the plinth areas, nature of specifications even with increased income levels would indicate the rapid increase in cost of construction (Sultan and Kajewski, 2005).

The report of Macroeconomic and Sectoral performance of housing Supply Policies in Selected MENA¹ Countries: A comparative analysis in April 2005, which it analyzed housing sector policies and their effects on macroeconomic and Sectoral performance in Yemen and in some MENA countries. The report findings are summarized as follow:

- Housing affordability rather than availability is the main problem. This problem is a shortage of supply of housing as a whole, although shortage may exist for certain categories of housing products (e.g., low income housing). The price of housing in extremely high in five of Middle East countries; Algeria, Iran, Lebanon, Morocco, and Yemen. The suggestion that the affordability problem is largely the result of housing and land supply policies. In addition, inadequate housing supply relative to

¹ MENA: Middle East and North Africa countries.

increasing demand and constrained flexibility with which the housing stock is used contribute to high housing prices and low levels affordability (Baharoglu et. al, 2005).

- Demand by low income groups is left to the informal sector. The high cost of housing is not the only housing problem in Yemen. Informal settlements are another consequence of the affordability issue. In Yemen and in several countries demand by lower income groups is reflected in squatter settlements and un-serviced peripheral neighborhoods. This measure of exclusion from formal housing services appears to be a growing concern in countries like Algeria, Morocco, Iran and Yemen, as there are strong signals that informal settlement ratios are increasing. The ratio of informal settlement is already very high in Egypt and in Sana'a the capital of Yemen the informal settlements occupied 70% of the growth in the city (Al-Shalabi et. al, 2006).
- The land development process is inherently risky, and rarely is the public sector well placed to assume a major share of these risks. Public control and ownership of land usually results in these risks being borne in such a way that land is supplied where there is less demand for it, the housing that is built is not responsive to the demands for land use, and the process conveys non-transparent subsidies, often unintentionally, to middle and upper income households rather than the poor. All of these problems cause land and correspondingly house prices to be higher. Public land ownership accounts weak in Yemen and land development costs are high (Baharoglu et. al, 2005).
- The city of Sana'a, within its capacity as capital of the Yemen, has undergone tremendous urban growth in the last half century. It has the fastest-growing towns in the nation (Census, 2004). The census record shows that the number of population in Sana'a city increased rapidly from 1,003,627 in 1994 to 1,747,627 in 2004 with annual growth 5.5%, which increased 2.52% more than the annual population growth for Yemen. The growth has created a higher urban land demand than previous decades, leading to significant change of landscape and land uses (Al-Shalabi et. al, 2006).

The problem is the need for houses in general and particularly for people with low income. The problem of low-income group can be observed clearly through the unorganized buildings, random buildings and urban sprawl, which they built it as a solution for their problem and their economic situation. There is housing shortage of low cost housing in Sana'a that because the rapidly growth of population and the rapidly growth of demand for housing.

Sultan and Kajewski (2005) mentioned that the housing construction costs in Yemen registered an increase in rates year after year at scales much faster than inflation. It is seen that in view of the increase in cost for basic input materials like steel, cement brick, timber and other materials as well as the cost of construction labour, buildings cost increase at around 20% to 30% annually even when inflation is in single digit.

This study is to identify the significant factors influencing low cost housing price in Sana'a.

2. HOUSING COST

2.1 Housing Cost or Housing Price

Fleming (1965) draws a distinction between building (house or other building) prices and building costs by referring to the building prices as the market price for building work payable by a client and the building costs as the costs incurred by a contractor in carrying out work. Building price reflects variation in profits whilst building cost does not. Another way to describe the relation between the concepts is to say that building costs can be estimated and described in two ways. One is the price charged for the finished building - building price according to Fleming - and the other is the cost of the resources to create it (Ferry et al, 1999) - building cost according to Fleming. The seller's price is a buyer's cost, such that the contractor's price is the client's cost.

2.2 Cost Categories

Having discussed the difference between price and cost in the previous section, further clarification of the word "cost" itself is indeed necessary in order to be able to identify whether a specific cost element is quantity, location, or time dependent. In accounting circles, the word "cost" is seldom used without qualifying adjectives and hence different kinds of cost must be clearly explicated (Lock, 200).

There are some costs that are simply recognizable and self-explanatory that relate to a specific item or product such as labour or material costs. Thus, they have been termed as direct costs. Other costs that are neither specific nor easily identifiable, i.e. overhead costs are often labelled as indirect costs. Carr (1989) define direct cost as the costs that are not counted if the activity has not been performed and indirect costs as the ones that would have occurred even if an activity had not been performed. Materials, labour, and equipment qualify as direct costs

because of their physical traceability to the construction activity taken place while project and general overhead, and (perhaps) profits are indirect costs. Indirect costs are also those small costs that would be direct except that assigning them to activities is not economical (Carr, 1989). Ferry et al (1999) did not consider profit as part of the contractor's costs. They see it as the difference between the builders' cost and the client's price. Akintoye and Skitmore (1991) regard the mark-up as a prior estimate of profitability.

Variable and fixed costs are two often-used terms in the construction literature that relate to direct and indirect costs respectively in an unclear way. While the distinction of direct and indirect costs depends much on traceability of specific cost to a particular activity, variable and fixed costs emphasise the rate at which different costs vary when the level of the work activity changes. Costs that remain virtually unchanged and continue to be incurred even though the workload might fluctuate between extreme limits are termed as fixed costs (Lock, 2003). Indirect costs usually represent the largest component of fixed costs. To the contrary, variable costs are typically confined to the direct costs and their rate of incurrence depends on the level of work activity. Stewart (1982) claims that fixed costs are only truly fixed over a given range of output because of the inflation that swells the operating and general overhead costs over time.

More broadly defined and less used construction cost terms are hard and soft costs. Geltner and Miller (2001) describe the former as direct costs of the physical components of the construction project such as land cost, labour, material and equipment, developer fees, construction management, and overhead costs. The soft costs included cost of design, legal, and financing. Most of the components of construction costs are integrated in the above cost related sets of terms and some authors have tried to quantify them and put a figure on the different weights of these components in the total construction costs. Labour and materials costs have not only been prominently cited as components in the construction cost structure but they have also been tagged as the largest proportions in the total construction costs. Bertelsen and Nielsen (1997) mention that in Denmark the typical building costs for social housing schemes can be divided as follows; materials 50% , labour 30%, heavy equipment 5%, construction management and supervision absorbs the other 15%. The Construction commission (SBI:s Byggekommisionen 2002) reports that construction materials were approximately 40% of contractors' costs in multi-family housing projects though this figure could be lower due to discounts on bulk material. Construction materials account for over half of the final cost of housebuilding while the cost of labour account for less than third, and overheads and profit stand for the rest (Stone and Reiners, 1954).

Adams' (1975) study that examines residential construction industry in the early nineteenth century not only supports the importance of labour and material costs in the total construction costs scheme but it also highlights the ambiguity surrounding the inclusion of other elements in the construction costs structure. He mentions that a simple labour-material breakdown in 1859 of all construction projects surveyed indicated that 56 % of total costs were attributable to direct, on site, labour costs and 44% to materials. Beyond the labour-material structure of the construction costs, Adams (1975) counted overhead and profit in labour costs in the 1959-1962 figures (it is not clear whether he included it in the 1859 figures). However, Xiao and Proverbs (2002) in their comparative analysis of the performance of contractors in three countries used unit price that is composed of labour, materials, plant, overheads and profits as separate percentage components. Adams was surprised to find out that the 1959-1962 cost structures was similar to those of the early century in terms of the total breakdown of costs between labour and materials (52 and 47% respectively). His data show that there has been very little basic change in cost structure of residential building over a period of almost two centuries. He concluded that the cost structure of the industry has been stable for on site building over a long period of time.

Labour and materials costs alone would not provide an accurate picture of the movement of total construction costs (Adams, 1975). Wigren (1995) tries to separate construction costs changes into three main components; change in factor prices, in quality, and in efficiency. He uses a factor price index that measures price changes of all factors of production i.e. wages, prices of different kinds of building materials, transport costs, interest, value added tax, etc. However, the index was not constructed to measure regional cost changes.

Meikle (2001) states that a contractor's construction costs are not generally known and describes them as an aggregate of the costs of materials, labour, and equipment to undertake the work and the contractor's finance, management and various site and office overheads. The contractor then charges these costs plus a margin profit to the developer. When the developer's cost is added then its called the total costs of the production factors (Jagren, 2003). The level of the project costs is dependent on whether the analysis is based on contractor or developer's estimation and the two estimations differ because of the extra costs incurred by the developer such as land cost, finance, etc. Berger (2004) argues that often when we say construction cost we mean total production costs while the term production cost refers to the sum of land cost and construction costs. Construction cost means cost for erecting buildings and construction components but excludes the land cost.

It is also difficult and subjective when one tries to differentiate direct and indirect cost elements from the tender price (Tah et al, 1994) but one can simply define these costs in terms of their tractability to the specific work. Tah et al (1994) note similar components of direct and indirect cost as Carr (1989) but they also include subcontractors' costs as part of the direct cost and allowances for risk as part of the indirect costs. Akintoye (2000) also considers subcontractor costs as a factor of production just like labour, material and equipment. He argues that it is often the case that subcontractors carry out more than 50% of the work of any particular project and hence the main contractors include subcontractors' prices in their estimation.

Friedman, 2005 mentioned that builders divide the cost of housing into categories: hard costs and soft costs. Hard costs are the sums of money that are spent acquiring the site and building the dwellings. Soft costs are the amounts spent on indirect expenses related to the execution and the marketing of the project. Hard costs may include many components such as:

- Land cost,
- Material costs,
- Development costs include (necessary utilities, roads, infrastructure in project site),
- Labour costs, and
- Landscaping costs.

Soft costs expended in the construction of a single home or an entire development may include the following components:

- Financing,
- Professional fees,
- Marketing costs,
- Overhead,
- Taxes, and
- Profit.

Table (1) shows a short summary of the construction cost components according to different references.

Table 1: A short Summary of the construction cost component

Author	Components	Comments
Adams, R. (1965)	Labour and material as well as overhead and profits.	Includes profits and overhead cost in the labour cost
Carr (1989)	Direct costs: labour, material, and equipment. Indirect costs; project overhead, general overhead, and profit	Did not include subcontractor's costs in the direct/indirect costs of the contractor. Considers project overhead as indirect costs.
Tah et al (1994) and Akintoye (2000)	Similar as Carr (1989) plus subcontractor's costs and risk allowance as indirect cost component.	Define mark-up as indirect costs without site overhead.
Jagren (2003)	Material, labour, equipment, transportation utility, electrical power, and overhead costs	Emphasize the difference between total production costs and construction costs.
Friedman (2005)	Hard cost; land cost, material costs, development costs, labour costs, and landscaping costs. Soft cost; Financing, Professional fees, Marketing costs, Overhead, Taxes, and Profit.	More clear and including all costs that do not include in others sources

3. Data Collection

3.1 Sampling Technique

A total of 60 samples selected for the professionals survey for the engineers, architects, and consultants who are working in the field of housing sector.

3.2 The Questionnaire

The instrument used in the study was structured questionnaire. The questionnaire was designed to include all information needed in the study. They include open and close-ended and multi-choices questions regarding the objectives of the study.

The information needed and obtained from the questionnaire of professionals consists of the following:

- a. The respondent's information,
- b. Information pertaining to housing strategies and factors affect the housing strategies in Yemen.
- c. The suggestions and mechanisms to solve low cost housing problems for low income group including; type of houses, materials used in housing projects, construction methods used, and kind of finishing works, and

- d. The factors affect the housing cost in Sana'a. Thirty two factors were grouped into five groups regarding to works and cost of housing projects.

The groups namely; factors related to project location, factors related to materials used, factors related to finishing works, factors related to construction methods used and external factors effect cost of housing projects construction. Every group contains some factors as follows;

The first group contains the variables related to land as follows;

- i. Cost of project land.
- ii. Relation between projects location, services, and transportation.
- iii. Relation between project location and job location,
- iv. Land topography.

The second group contains the variables related to materials used in low cost housing projects in Sana'a as follows;

- i. Cost of building by Stones
- ii. Cost of building by Red Bricks
- iii. Cost of building by Local Bricks (Yagoor)
- iv. Cost of building by Concrete Blocks
- v. Cost of Cement
- vi. Cost of Steel for Reinforced Concretes

The third group contains the variables related to finishing works as follows;

- i. Cost of formwork elements works and preparing for reinforced concrete works
- ii. Cost of plastering works
- iii. Cost of painting works
- iv. Cost of tiling works
- v. Cost of doors and windows works
- vi. Cost of plumping network and requirements works
- vii. Cost of electricity network and requirement works

The forth group contains the variables related to construction methods used in low cost housing in Sana'a as follows;

- i. Traditional Methods used (load bearing walls)
- ii. Concrete Frames used
- iii. Using external load bearing walls & central columns
- iv. Using new technology and Industrialized Building Systems (IBS)

The fifth group contains the variables of external factors as follows;

- i. Materials available in local market
- ii. Tools and equipments available in local market
- iii. Political condition
- iv. Economic condition and fixedness exchange money cost
- v. Transportation and fuel cost
- vi. Security condition
- vii. Establish legislations and acts
- viii. Administrative procedures and licensing
- ix. Projects Designs
- x. Projects construction supervision
- xi. Executor Contractors

4. Ranking Factors Affecting Housing Cost

The respondents identify variables that they perceived as likely to contribute to ranking factors affecting housing cost in Sana'a by responding to a scale from 1 (the fastest) to 5 (the slowest). The five rating Likert Scale is, 1 = very strong relationship, 2= strong relationship, 3 = medium relationship 4 = weak relationship, and 5 = very weak relationship or no relationship. This scale was chosen to avoid the neutral answers which do not provide answer on the strongest or the weakest with the statements. Mean score (MS) of each factor was calculated by using the following formula which used also by Chan and Kumaraswamy, (1996) Lew et, al, (2002), Alaghbari (2005) and Alaghbari et, al. (2007):

$$MS = \left(\frac{\sum (f \times s)}{N} \right) (1 \leq MS \leq 5)$$

Where;

MS = mean score

f = frequency of responses to each rating (1 – 5)

s = score given to each factor by the respondents and ranges from 1 to 5.

N = total number of responses concerning that factor.

5. Results

The price of housing is the dependent variable for housing demands everywhere. For example the increasing in housing cost that influences the total number of housing demand which decrease. The housing cost influenced by independent variables that it divided in five groups as follows:

5.1 Factors Related to Project Land

This group contains the following variables;

- i. Cost of project land.
- ii. Relation between projects location, services, and transportation.
- iii. Relation between project location and job location,
- iv. Land topography.

Table (2): Ranking of the Significant Factors Influence Housing Cost Related to Land

Factors Related to Land	Group Ranking	Final Ranking	Mean	Std. Deviation
Cost of project land	1	1	1.02	.144
Relation between projects location, services, and transportation.	2	6	1.79	.713
Land Topography	3	22	2.57	.927
Relation between project location and job location	4	31	3.64	1.009

Table (2) indicated that the “cost of project land” is the most significant factor influence housing cost related to land factors which it is ranking first in the list of all factors influence housing cost. In addition the “relationship between project location, services, and transportation” is the second significant factor related to land.

5.2 Factors Related to Materials Used

This group contains the following variables;

- vii. Cost of building by Stones
- viii. Cost of building by Red Bricks
- ix. Cost of building by Local Bricks (Yagoor)
- x. Cost of building by Concrete Blocks
- xi. Cost of Cement
- xii. Cost of Steel for Reinforced Concretes

Table (3): Ranking of the Significant Factors Influence Housing Cost Related to Materials Used

Factors Related to Materials Used	Group Ranking	Final Ranking	Mean	Std. Deviation
Cost of Cement	1	2	1.30	.507
Cost of Steel for Reinforced Concretes	2	3	1.38	.606
Cost of building by Stones	3	10	1.96	1.010
Cost of building by Concrete Blocks	4	16	2.27	1.020
Cost of building by Local Bricks (Yagoor)	5	25	2.79	.954
Cost of building by Red Bricks	6	28	3.11	.759

Table (3) shows that the “cost of cement” is most significant factors influence housing cost related to materials used which it is ranking second in the list of all factors influence housing cost. “Cost of steel for reinforced concretes” is the second significant factor related to materials used. “Cost of building by red bricks” is the last factor influence housing cost related to materials used.

5.3 Factors Related to Finishing Works

This group contains the following variables;

- viii. Cost of formwork elements works and preparing for reinforced concrete works
- ix. Cost of plastering
- x. Cost of painting
- xi. Cost of tiling
- xii. Cost of doors and windows
- xiii. Cost of plumping network and requirements works
- xiv. Cost of electricity network and requirement works

Table (4) Ranking of the Significant Factors Influence Housing Cost Related to Finishing Works

Factors Related to Finishing Works	Group Ranking	Final Ranking	Mean	Std. Deviation
- Cost of doors and windows	1	13	2.04	.798
- Cost of electricity network and requirement works	2	19	2.46	.840
- Cost of plumping network and requirements works	3	20	2.49	.688
Cost of formwork elements works and preparing for reinforced concrete	4	21	2.52	.989
Cost of tiling	5	24	2.76	.794
Cost of painting	6	26	2.83	.975
Cost of plastering	7	27	2.85	.899

It is evident from Table (4) that the most significant factor influencing housing cost in Sana’a related to finishing works is “cost of doors and windows” which it was ranking thirteen in the list of all factors influence housing cost. The second significant factor in the ranking related to

finishing works is “cost of electricity network and requirement works”. The last factor in the ranking list related to finishing work is “cost of plastering”.

5.4 Factors Related to Construction Methods Used

This group contains the following variables;

- v. Traditional Methods used (load bearing walls)
- vi. Concrete Frames used
- vii. Using external load bearing walls & central columns
- viii. Using new technology and Industrialized Building Systems (IBS)

Table (5): Ranking of the Significant Factors Influence Housing Cost Related to Construction Methods Used

Factors Related to Construction Methods Used	Group Ranking	Final Ranking	Mean	Std. Deviation
Concrete Frames used	1	5	1.66	.745
Using new technology and Industrialized Building Systems (IBS)	2	12	2.02	1.151
Using external load bearing walls & central columns	3	18	2.36	.685
Traditional Methods used (load bearing walls)	4	23	2.64	.838

It is very clear from Table (5), that the “concrete frame used” in housing project is the most significant factor influence housing cost related to construction methods which it is ranking fifth in the list of all factors influence housing cost. In addition “using new technology and Industrialized Building Systems IBS” is the second factor. “Traditional methods used” is ranking the last factor influence housing cost related to construction methods used.

5.5 External Factors Influence Cost of Projects Construction

This group contains the following variables;

- xii. Materials available in local market
- xiii. Tools and equipments available in local market
- xiv. Political condition
- xv. Economic condition and fixedness exchange money cost
- xvi. Transportation and fuel cost
- xvii. Security condition
- xviii. Establish legislations and acts
- xix. Administrative procedures and licensing
- xx. Projects Designs
- xxi. Projects construction supervision

xxii. Executor Contractors

The result in Table (6) illustrated that the “economic condition and incertitude cost of exchange money” is the most significant external factor which it is ranking forth in the list of all factors influence housing cost. The “materials available in local market” is the second important external factor influence housing cost. The table shows that the “projects designs” and “projects construction supervision” are ranking ninth and tenth in the ranking.

Table (6): Ranking of the Significant External Factors Influence Housing Cost

External Factors	Group Ranking	Final Ranking	Mean	Std. Deviation
Economic condition and incertitude cost of exchange money	1	4	1.50	.762
Materials available in local market	2	7	1.81	1.006
Political condition	3	8	1.86	1.060
Transportation and fuel cost	4	9	1.91	.936
Tools and equipments available in local market	4	9	1.91	1.109
Establish legislations and acts	5	11	2.00	1.104
Security condition	6	14	2.07	1.043
Administrative procedures and licensing	7	15	2.20	1.173
Executor Contractors	8	17	2.30	1.036
Projects Designs	9	29	3.28	1.202
Projects construction supervision	10	30	3.33	1.358

6 The Top Ten Significant Factors Influence Housing Cost in Sana'a - Yemen

Mean value used to rank the factors to get the most significant factors influence housing cost. The ranking illustrated that "cost of project land" the most significant factors with mean value of 1.02 then the second factor is "cost of cement" with mean value of 1.30 and then the third factor is "cost of steel for reinforced concretes" with mean value of 1.38.

Table (7) shows the ranking of the significant factors influence housing cost; the smallest mean value became the most significant factor influence housing cost in the market. It is clarified that 2 factors related to land factors group allocated in the top ten significant factors influence housing cost. "Cost of project land" the first and "Relation between projects location, services and transportation" the sixth factor in the top ten significant factors influence housing cost in Sana'a. In addition the result revealed that 5 of external factors in the top ten significant factors. "Economic condition and incertitude cost of exchange money" the forth and "Materials available in local market", "Political condition" allocated in the ranking of the top ten significant factors seventh, eighth. Then "Transportation and fuel cost" and "Tools and equipments available in local market" both factors rank ninth because they have same mean value of 1.91. The table shows that 3 factors related to Materials used in

housing projects at which "Cost of cement" the second and "Cost of steel for reinforced concretes" the third of the top ten significant factors influence housing cost in Sana'a. Only one factor in the top ten significant factors related to construction methods used in housing project that "Concrete frames used" and it rank fifth the list. The table also shows the ranking for all other factors in the five different groups.

Table (7): Final Ranking of the Significant Factors Influence Housing Cost

Factors	Group	Rank	Mean	Std. Deviation
Cost of project land	Land	1	1.02	.144
Cost of Cement	Materials	2	1.30	.507
Cost of Steel for Reinforced Concretes	"	3	1.38	.606
Economic condition and incertitude cost of exchange money	External	4	1.50	.762
Concrete Frames used	CM*	5	1.66	.745
Relation between projects location, services, and transportation.	Land	6	1.79	.713
Materials available in local market	External	7	1.81	1.006
Political condition	"	8	1.86	1.060
Transportation and fuel cost	"	9	1.91	.936
Tools and equipments available in local market	"	9	1.91	1.109
Cost of building by Stones	Materials	10	1.96	1.010
Establish legislations and acts	External	11	2.00	1.104
Using new technology and Industrialized Building Systems (IBS)	CM*	12	2.02	1.151
Cost of doors and windows works	Finishing	13	2.04	.798
Security condition	External	14	2.07	1.043
Administrative procedures and licensing	"	15	2.20	1.173
Cost of building by Concrete Blocks	Materials	16	2.27	1.020
Executor Contractors	External	17	2.30	1.036
Using external load bearing walls & central columns	CM*	18	2.36	.685
Cost of electricity network and requirement works	Finishing	19	2.46	.840
Cost of plumping network and requirements works	"	20	2.49	.688
Cost of formwork elements works and preparing for reinforced concrete works	"	21	2.52	.989
Land Topography	Land	22	2.57	.927
Traditional Methods used (load bearing walls)	CM*	23	2.64	.838
Cost of tiling	Finishing	24	2.76	.794
Cost of building by Local Bricks (Yagoor)	Materials	25	2.79	.954
Cost of painting	Finishing	26	2.83	.975
Cost of plastering	"	27	2.85	.899
Cost of building by Red Bricks	Materials	28	3.11	.759
Projects Designs	External	29	3.28	1.202
Projects construction supervision	External	30	3.33	1.358
Relation between project location and job location	Land	31	3.64	1.009

CM*: Construction Methods

RECOMMENDATIONS

1. Land should be set aside which is free from encroachment of squatters and other parties.

2. Support the high rise housing project to decrease the land cost and thus to decrease the housing cost.
3. Sourcing for cheaper and appropriate financial resources needs to be taken seriously as one of the key factors in the provision of low cost housing.
4. Building codes should be written down and revised to incorporate indigenous and appropriate building materials and standards for low cost housing.
5. Support the investment of cement and steel to increase the production of cement and steel to meet the rapidly growth of demand for these materials.
6. Support the studies to get the best low cost materials to use in low cost housing projects in Sana'a

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