

ESTIMATION OF CONCEPTUAL MODELS AND PROGRAMS CONSTRUCTION COSTS OF HOME AND MATERIAL NEEDS

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Abstract

Simple houses are constantly being built, to meet the needs of low and middle income people. And every time you build a house, it requires a fee to buy materials, equipment and to pay workers. So estimating the cost and material requirements at an early stage is very important. But, there is no simple cost and material estimation method, at the conceptual stage, when there is very little data information. This is a problem for the non-professional community in general. The solution to the problem is the model and program. To get a model and program, then this research needs to be done. The quantitative method in this study uses 36 data on the Budget Plan. The data is processed using the *Burgerlijke Openbare Werken (BOW)* method. Then the results of the data process were analyzed using the linear regression analysis method, in order to get the model. The model that has been obtained is then used as a formula, and is compiled into a program. So that in this study produce models and programs, to estimate the cost and material requirements for the construction of simple houses. Using the program, simply enter the building area data information, and automatically, the cost and material requirements for the construction of a simple house will be predictable. This program is a simplification of the *Burgerlijke Openbare Werken (BOW)* method.

Keywords: conceptual estimation, construction costs, model, quantity material

1 Introduction

Classification of house buildings, consisting of simple houses, medium-sized houses and luxury homes (PERMEN / M / 2008). Simple house is a residence that is habitable and affordable for low and middle income people. So that simple home construction is carried out continuously, to meet the needs of human life [12],

[18]. Every time a house is built, it definitely requires money, to buy materials, equipment and pay workers [14], [22]. The success of the construction industry depends on expertise in estimating cost and material requirements [6], [20], [25]. So estimating the cost and material of housing construction is very important [21], to avoid the development delay [3], which can cause a risk of loss [2], [7], [15], [23].

The method for estimating costs and material requirements has been available since February 28, 1921, which was determined by the Netherlands. The method is *Burgerlijke Openbare Werken (BOW)*. contained in the BOW method, including a list of prescribed wage and material coefficients [9]. To use the BOW method there needs to be complete image data. The image is examined, to know the building components and their quantity. From the results of the study, a Bill of Quantity (BOQ) was prepared. After the BOQ is arranged, then the estimated cost and material requirements are estimated, using the BOW method, referring to the coefficient set. This estimate is called unit price analysis, which is then summed and becomes the total Budget Plan.

What if the image data is incomplete, or even no image data. How to estimate the cost and material requirements. Often, when the project is still at an early stage, the information to estimate is not too detailed [24]. For example, only information will build a house with a building area of 60 m². What is the cost of the construction? What materials and quantities are needed?. These questions can only be answered by expert estimators who are quite experienced [1].

But low and middle income people, do not necessarily have experience and ability estimators. While a simple house is a house that will be owned by low and middle income people. Therefore, conducting research to produce models and programs, as a formula for estimating the costs and material of simple housing development, is very important [19]. In order to be used by society in general.

This study aims to find a model, then the model is compiled into a program, to estimate the cost and material requirements for housing construction. The program can be used, simply by entering information on building area data. The program is specifically for the classification of simple houses, with a model of a minimalist house, a maximum building area of 290 m², and a minimum building area of 21 m². The house model in question is exemplified in figure 1.



Figure 1. Example of the type of house studied

2 Related Work and Method

2.1 Literature review

Literature review, which is related to the estimation of construction project cost and material requirements, is explained as follows:

Albani Musyafa, (2016). The very basic initial process in the construction phase is the estimated cost. One way to estimate construction costs is to develop a Budget Plan. But preparing a Budget Plan is not easy, if there is no complete data. To overcome this difficulty, a simplification model was created. The model results of the study, using the method of linear regression analysis [4].

Ananta and Syahrizal, (2016) conducted a study to estimate the value of the estimated cost of the project from a conceptual widening of Roads in accordance with the probability of price, knowing the probability percentage of success in the project implemented using Pareto analysis method, and Secondary Data using Monte Carlo Simulation, Crystal Ball. The results of the study model of the distribution of the value of the estimated cost of the project is distributed normally, and with 100,000 iteration then obtained data the results Mean: Median: 25,912,180,758.26, 25,903,784,266.35, 24,734,885,650.83, Minimum: Maximum: 27,222,442,153.81, Mean Std Error: 1,056,264.49 [5].

Cynthia Hayat et al, (2016) renovation of the house building process is sometimes required good planning, in the determination of the material and the

material to be precise. If it isn't right then the cost is much higher than planned costs. Using the method of Analytical Hierarchy Process (AHP). Solutions that are offered, that output the resulting expert system application can identify the type of material the necessary building materials in accordance with user needs [8].

David, (2017) every house construction is inseparable from the use of the material, and the allocation of time, therefore, we have to prepare it before starting the project. The research using the method of Openbare Burgeslijke Werken (BOW) were able to predict the material needs, as well as planned [9].

Akhsa et al, (2015) conducted a study to find out what job the influential significantly to the total cost of the project of rehabilitation and improvement of irrigation networks, using the method of Cost Significant models and methods of statistical analysis regression. The research results showed that the set up of stone and bronjong by each influence quantity against the Y of 74.90% and 69.50% [10]

Fikri and Sekarsari (2015) in their research using a Cost Model for Significant estimates the total cost of reinforced concrete bridge construction project by using method of statistical analysis regression. The conclusion is the concrete significantly influential work against fee increase in the avenues of the concrete in the Tangerang Regency, where the total cost of the increased 85.6% of the concrete path is influenced by the work of concrete, while the rest is influenced by other reasons [11].

Roring et al. (2014) conducted a study to construct a mathematical model of cost estimation of building conceptual stage with parametric method, and linear, non-linear regression analysis (Logarithmic, Power, Exponential). The result of the 6 independent variables is only the variable floor area is significance [13].

Potalangi et al, (2015) implementation of construction projects often found that the factual costs greater than budget plan costs. for that is the construction engineers working to find ways to effectively resource management and efficiently. Research using the method of Demand Supply produce solutions that the supplier can save materials price [16].

Juliana, (2016) in the implementation of construction projects to run out of supplies of materials is a problem that resulted in the recent project, thereby affecting the time and cost of the project. By using the methods of data collection and WINQSB-image data of the project, the schedule of the project as well as the

type of material. The solution by using the techniques of lot-sizing can minimize the risk of the exact occurrence of material delayed [17].

Based on previous research, there are similarities in the problems with different research focuses, and there are several similarities in research methods. But overall it does not solve the problem and objectives, which have been described in the first chapter of this research..

2.2 Hypothesis

This research is expected to produce a model for estimating the cost and material of simple house construction, with the equation:

$$Y = a + b.X (1+i)^n \quad (1)$$

$$Y_1 = a + b.X \quad (2)$$

$$Y_2 = a + b.X \quad (3)$$

The model that has been produced is then compiled using Excel software to be a program to estimate the costs and materials for building simple houses.

2.3 Method

The quantitative method in this study requires sampling data. The data is defined as measurable variables. These variables are determined as dependent variables and independent variables. The data in question is in the contract document or project document. The document is a Cost Budget Plan data. Random sampling of data is obtained from the results of the construction of the author, and from several contractors who are not permitted to be named. The amount of data to be processed consists of 33 data, and 3 data used as validation tests.

The Cost Budget Plan data, then processed in stages:

1. Process data to find out the total construction cost of a house based on the building area.
2. The data process uses the Burgerlijke Openbare Werken (BOW) method to determine the quantity of material, based on the area of the building.

After the data is processed, then it is analyzed using a linear regression analysis method, to get the model. Linear regression analysis conducted in this study, using SPSS software.

The model that has been produced, then compiled using Excel software, becomes a program for estimating the cost and material of simple home construction, with a scheme like Figure 2.

	A	B	C	D	E
1	Building area	X	Inflation (i)	Year (n)	
2	Total Development Costs	= a + b.X	= (1+i) ⁿ	=B2*C2	
3	Material Description	Quantity	Unit price	The amount	
4	Sand (m ³)	= a + b.X			
5	Gravel (m ³)	= a + b.X			
6	Etc			
7					
8					

Figure 2. Program scheme for estimating the cost and material of housing construction

3 Results and Discussion

3.1 Decision variable definitions

Initial discussion about Cost Budget Plan data. All professionals understand that the Budget Plan data consists of information on building area, description of building component work items, quantity, unit price, work item costs, and total construction costs. Thus, the total cost of home construction consists of the cost of work items, the building area consists of the quantity of work items for building components, and building component items consisting of materials. And the value of costs can change from time to time, and the percentage of these changes depends on inflation.

Thus the decision variable definition can be taken:

Y = dependent variable

X = free variable

i = inflation, and

n = year period

So that stated decision variables:

Y = the total cost of building a simple house, Y_1 = Sand (m^3), Y_2 = gravel (m^3), Y_3 = cement (kg), Y_4 = stale bar 12 mm (kg), Y_5 = stale bar 8 mm (kg), Y_6 = red brick (pcs), Y_7 = sills and doors (unit), Y_8 = sills and Windows (unit), Y_9 = C mild steel (rood), Y_{10} = light steel lath (rood), Y_{11} = roof tile (pcs), Y_{12} = roof ridge (pcs), Y_{13} = lisplang (sheets), Y_{14} = iron hollow (rood), Y_{15} = gypsum (sheets), Y_{16} = foundation stone (m^3), Y_{17} = ceramic tile (m^2), Y_{18} = paint (kg), Y_{19} = PVC 4" (rood), Y_{20} = PVC 3" (rood), Y_{21} = PVC $\frac{3}{4}$ " (rood), Y_{22} = PVC $\frac{1}{2}$ " (rood), Y_{23} = baxing (unit), Y_{24} = tap water (unit), Y_{25} = cable (m'), Y_{26} = lamp fittings (unit), Y_{27} = light switch (unit), Y_{28} = stop contact (unit). And variable (X) is the building area.

3.2 Proses data

The Cost Budget Plan data is processed, to determine the total cost of housing construction, based on its area. Because the data consists of different years, namely, 2011, 2012, 2014, 2015, 2016 and 2017, the total cost must be projected to the same year, using the method of future value (FV). With the equation $F = P(1 + i)^n$. The results of the data process are explained in table 1.

Table 1. Process data on total construction costs based on building area

N Data	Building Area (m^2)	Year Data	Construction Costs at the Implementation Year (RP)	Projection to 2018 (RP)
	A	B	C	$D = C(1+i)^n$
1	21	2011	24,030,424	52,561,737
2	36	2011	42,380,602	92,699,074
3	45	2011	54,000,000	118,114,179
4	55	2016	200,193,180	249,108,432
5	60	2016	150,000,000	187,824,150
6	72	2014	187,195,470	294,555,696
7	90	2017	270,000,000	302,130,000
8	100	2014	249,697,561	392,903,946
9	222	2012	517,948,745	1,009,806,800
10	290	2012	601,272,469	1,172,256,972

The results of the data process in table 1, only show part of the data, while the actual data in this study amounted to 36 data. The results in table 1 are examples of data processing.

Inflation data was taken from the Central Statistics Agency, and the average inflation data in 2011 = 11.83%, 2012 = 11.77%, 2014 = 12.00%, 2015 = 11.90%, 2016 = 11.55% and 2017 = 11.55%.

The next data process, using the *Burgerlijke Openbare Werken (BOW)* method, to determine the material quantity based on the building area. By multiplying quantity to the coefficient determined by BOW. The data quantity in question is the Bill of Quantity data contained in the Cost Budget Plan data. This method is exemplified in table 2.

Table 2. Process data on material requirements for wall work

Building Area	Materials	unit	Coeficient	Wall Area (m ²)	Material needs
A	B	C	D	E	F= D * E
100 m ²	Red brick	pcs	70.00	266.87	18,680.90
	Cement	Kg	14.37		3,834.92
	Sand	m ³	0.04		10.67

The results of the process data in Table 2, for example the process of data to determine the material requirements for the construction of a simple house. The table explains the work of the wall on the building area of 100 m². It is known from the Budget Cost Plan that in the building area of 100 m², there is a wall area of 266.87 m². And based on Burgerlijke Openbare Werken (BOW), that wall work consists of red brick material, cement and sand, with a coefficient / m² wall, for red brick = 70.00 (pcs), cement = 14.37 (kg) and sand = 0.04 (m³).

As an example of the process data requirements for wall work material in table 3, all work items are processed, and grouped quantity of material, based on the area of each building. Examples of the results of the process of identifying quantity material data are explained in Table 3.

Table 3 shows an example of the results of a partial data process. And the material description consists of 28 types, which are expressed with Y₁ through Y₂₈.

After the data process is complete, then the data is analyzed using the linear regression analysis method, and the application used is SPSS software.

Table 3. Examples of results of the data process identification of material needs

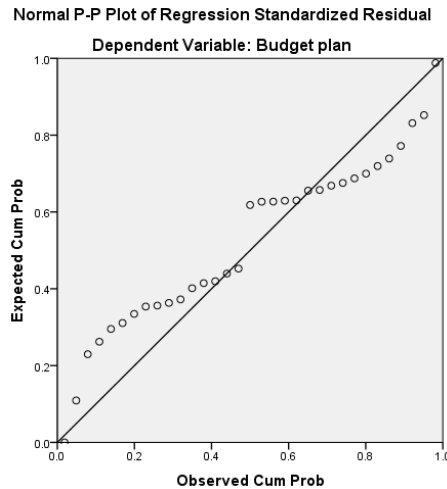
N	Build Area	Sand (Y1)	Gravel (Y2)	cement (Y3)	Stale bare 12 mm (Y4)	Stale bare 8 mm (Y5)	Red Brick (Y6)	Silss, Doors (Y7)	Sills, Windows (Y8)
1	21	13	1	3,388	213	500	6,604	4	4
2	36	15	2	3,996	273	641	7,599	5	4
3	45	27	3	7,133	450	1,056	13,871	5	4
4	55	39	11	11,766	1,590	3,734	19,212	6	5
5	60	26	3	6,896	511	1,200	12,539	6	5
6	72	43	13	13,658	1,969	4,622	17,682	6	7
7	90	28	3	7,260	476	1,118	14,035	7	8
8	100	47	13	14,491	1,922	4,513	18,681	7	12
9	222	86	23	26,002	3,359	7,888	37,862	8	14
10	290	132	37	40,524	5,453	12,803	60,354	15	18

3.3 Analysis of data

Regression analysis using SPSS was done to produce a model. Analysis steps such as data normality test, correlation, significance, coefficient, etc. such as [4], [6], [10], [11], [12], [22], [24]. Linear regression analysis by entering variables as follows:

First, enter the data variable Y and variable x. 2) Enter data variables y_1 and variables x. 3) Enter data variables y_2 and variabel x. 4) Enter data variables y_3 and variabel x. 4) Enter data variables y_4 and variabel x. 5) Enter data variables y_5 and variabel x. 6) Enter data variables y_6 and variabel x. 7) Enter data variables y_7 and variabel x. 8) Enter data variables y_8 and variabel x. 9) Enter data variables y_9 and variabel x. 10) Enter data variables y_{10} and variabel x. And so on until y_{28} .

Regression analysis based on input data variables that have been described, first need to consider the data normality test. Test the normality of data using the graph method. Examples of test analysis for variables y and y_1 , as in Figures 3 and Figures 4.



Normality of data Y

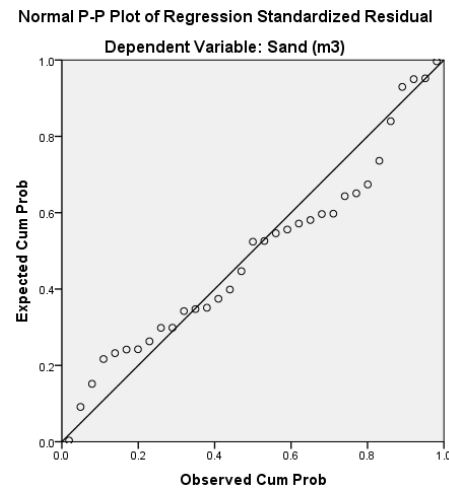
Figure 4. Normality of data Y_1

Figure 3.

Figure 3, and Figure 4 are examples of data normality tests. Figure 3 is the result of the normality test of data in linear regression analysis, to get the Y model, namely the Budget Plan. Figure 3 is the data normality test to get the Y_1 model, namely sand (m3). The data normality test uses a probability plot test, as a whole, on data Y to Y_{28} , fulfilling the assumption of normality of data. This is shown in plot probability graphics, that data spreads around the diagonal line and follows the direction of the diagonal line, meaning the regression model meets the assumptions of normality.

The next analysis is the model summary method. Test this analysis to determine the value of R, significance and Durbin-Watson (D-W). Basic decision making such as [4], [6], [10], [11], [12], [22], [24]. Example results of summary model analysis such as Table 4.

Table 4. Example of a Y analysis summary model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.961 ^a	.924	.922	78,977,584.872	.924	378.123	1	31	.000	2.271

An example of a model analysis summary in Table 4, explains that, multiple R 0.961 means that the Budget Plan can be explained significantly by the building area, amounting to 96.1%. Significance is indicated by the value 0.000 which is

below the probability of 0.050. And the value of Durbin - Watson 2,271 means that the model does not occur autocorrelation. The results of the model summary test for 29 models are summarized in Table 5.

Table 5. Summary of the results of analysis of summary models

Model	R	<i>Sig. F Change</i>	Durbin-Watson
Y	0.961	0.000	2.271
Y ₁	0.879	0.000	2.038
Y ₂	0.730	0.000	1.784
Y ₃	0.882	0.000	1.803
Y ₄	0.726	0.000	1.784
Y ₅	0.726	0.000	1.784
Y ₆	0.855	0.000	2.682
Y ₇	0.790	0.000	1.403
Y ₈	0.901	0.000	0.502
Y ₉	0.735	0.000	1.672
Y ₁₀	0.734	0.000	1.678
Y ₁₁	0.735	0.000	1.674
Y ₁₂	0.735	0.000	1.688
Y ₁₃	0.735	0.000	1.672
Y ₁₄	0.975	0.000	1.617
Y ₁₅	0.975	0.000	1.616
Y ₁₆	0.431	0.012	1.462
Y ₁₇	0.969	0.000	1.723
Y ₁₈	0.958	0.000	2.166
Y ₁₉	1.000	0.000	1.936
Y ₂₀	1.000	0.000	1.592
Y ₂₁	1.000	0.000	1.811
Y ₂₂	1.000	0.000	2.415
Y ₂₃	0.495	0.003	1.380
Y ₂₄	0.686	0.000	1.659
Y ₂₅	1.000	0.000	1.581
Y ₂₆	1.000	0.000	2.127
Y ₂₇	1.000	0.000	1.909
Y ₂₈	0.999	0.000	1.843

From the analysis of the probability models summary 0:05, shows that the model to be used as a formula, the program cost estimates and project materials home construction, overall eligible, no autocorrelation, and is significantly

affected by the building area. Significance is shown in Table 5 column Sig. F Change, which all values are below the probability of 0.050. And the percentage weight of the influence of building area, each shown in table 5 column R.

After the results of the model analysis meet the requirements, then it is necessary to do a coefficient analysis, to find out the value of the constant and the parameter value, on the expected model. Summary of coefficient test results, and models, which are generated from this study, are summarized in table 6.

Table 6. Results of analysis, test coefficients and models

Dependent variable symbol	Constant value a	Parameter Value Independent variable X b	Model $Y = a + b.X$
Y	-10,069,112.00	3,792,276.69	$Y = -10,069,112.00 + 3,792,276.69.X$
Y ₁	12.96	0.40	$Y_1 = 12.96 + 0.40.X$
Y ₂	2.43	0.13	$Y_2 = 2.43 + 0.13.X$
Y ₃	3,629.83	129.08	$Y_3 = 3,629.83 + 129.08.X$
Y ₄	382.87	19.21	$Y_4 = 382.87 + 19.21.X$
Y ₅	898.93	45.11	$Y_5 = 898.93 + 45.11.X$
Y ₆	7,059.32	148.87	$Y_6 = 7,059.32 + 148.87.X$
Y ₇	4.75	0.02	$Y_7 = 4.75 + 0.02.X$
Y ₈	3.27	0.05	$Y_8 = 3.27 + 0.05.X$
Y ₉	37.32	0.46	$Y_9 = 37.32 + 0.46.X$
Y ₁₀	56.14	0.69	$Y_{10} = 56.14 + 0.69.X$
Y ₁₁	673.47	8.34	$Y_{11} = 673.47 + 8.34.X$
Y ₁₂	17.92	0.22	$Y_{12} = 17.92 + 0.22.X$
Y ₁₃	37.06	0.46	$Y_{13} = 37.06 + 0.46.X$
Y ₁₄	20.33	1.43	$Y_{14} = 20.33 + 1.43.X$
Y ₁₅	20.33	1.43	$Y_{15} = 20.33 + 1.43.X$
Y ₁₆	2.09	0.14	$Y_{16} = 2.09 + 0.14.X$
Y ₁₇	0.45	1.07	$Y_{17} = 0.45 + 1.07.X$
Y ₁₈	25.41	1.07	$Y_{18} = 25.41 + 1.07.X$
Y ₁₉	0.06	0.27	$Y_{19} = 0.06 + 0.27.X$
Y ₂₀	- 0.13	0.45	$Y_{20} = - 0.13 + 0.45.X$
Y ₂₁	0.20	0.30	$Y_{21} = 0.20 + 0.30.X$
Y ₂₂	- 0.13	0.34	$Y_{22} = - 0.13 + 0.34.X$
Y ₂₃	0.92	0.00	$Y_{23} = 0.92 + 0.00.X$
Y ₂₄	3.02	0.01	$Y_{24} = 3.02 + 0.01.X$
Y ₂₅	- 0.09	2.00	$Y_{25} = - 0.09 + 2.00.X$
Y ₂₆	- 0.02	0.20	$Y_{26} = - 0.02 + 0.20.X$
Y ₂₇	0.09	0.13	$Y_{27} = 0.09 + 0.13.X$
Y ₂₈	- 0.16	0.12	$Y_{28} = - 0.16 + 0.12.X$

Based on linear regression analysis, now it has obtained the model as shown in table 6. And then, the model will be used as a formula, in the program of estimating costs and simple housing construction materials. Before compiling the program, it is necessary to explain in advance how to use the model. Examples of how to use the Y model. The model is: $Y = -10,069,112.00 + 3,792,276.69.X$. Y = estimated cost of home construction, and X = building area. To use the model, it is necessary to know in advance the information on building area of the house. For example, it is known that the building area of a house is planned to be 100 m². So, using the model are: $Y = -10,069,112.00 + 3,792,276.69.X$ then $Y = -10,069,112.00 + 3,792,276.69 * 100$ so $Y = 369,158,557.16$. Thus, the cost of building a house with a building area of 100 m² is Rp. 369,158,557.16.

3.4 Cost and material estimation programs

The model, then compiled in the Excel software. The way to arrange it is:

1. In column A1, write "Building area", in B2 column input variable x, in column C3 enter the inflation data, and in column D1 enter the year period.
2. In column A2 write "Total Construction Cost", in column B2 enter model Y, in column C2 write " $= (1 + C1) ^ D1$ ", and in column D2 write " $= B2 * C2$ ".
3. In column A3 write "Material Description", in column B3 write "Quantity", in column C3 write "Unit Price", and in column D3 write "The Amount".
4. In the A4 column, up to column A31, write sequentially starting from "Sand (m³), ending up with the stop contact (unit)".

Based on these steps, a program for estimating the cost and material of simple home construction has been arranged. By using this program, to find out the costs and materials, in the construction of a simple house, just enter the building area data, in column B1. Program that has been created, as shown in Figure 5.

The formula for the program as shown in Figure 5, is a model that can be used in 2018. If the program will be used the following year, it is necessary to enter data i (inflation) in column C1, and enter data n (year period) in column D.

	A	B	C	D
1	Building Area	100	0.1	1
2	Total Development Costs	$=-10069112+3792276.69*B1$		
3	Material Description	Quantity	Unit Price	The Amount
4	Sand (m ³)	$= 12.96 + 0.4*B1$		
5	Gravel (m ³)	$=2.43+0.13*B1$		
6	cement (kg)	$=3629.83+129.08*B1$		
7	Steel bar 12 mm (kg)	$=382.87+19.21*B1$		
8	Steel bar 8 mm (kg)	$=898.93+45.11*B1$		
9	Red brick (pcs)	$=7059.32+148.87*B1$		
10	Sills, door (unit)	$=4.75+0.02*B1$		
11	Sills, window (unit)	$=3.27+0.05*B1$		
12	C light steel (rod)	$=37.32+0.46*B1$		
13	Mild steel lath (rod)	$=56.14+0.69*B1$		
14	Roof tiles (pcs)	$= 673.47 + 8.34*B1$		
15	Roof ridge (pcs)	$= 17.92 + 0.22*B1$		
16	Lisplang (pcs)	$= 37.06 + 0.46*B1$		
17	Steel hollow (rod)	$= 20.33 + 1.43*B1$		
18	Gypsum (Sheets)	$= 20.33 + 1.43*B1$		
19	Side stones (m ³)	$= 2.09 + 0.14*B1$		
20	ceramics (m ²)	$= 0.45 + 1.07*B1$		
21	Paint (kg)	$= 25.41 + 1.07*B1$		
22	PVC 4" (rod)	$= 0.06 + 0.27*B1$		
23	PVC 3" (rod)	$= - 0.13 + 0.45*B1$		
24	PVC ¾" (rod)	$= 0.2 + 0.3*B1$		
25	PVC ½" (rod)	$= - 0.13 + 0.34*B1$		
26	Baxing (unit)	$= 0.92 + 0*B1$		
27	Tap water (unit)	$= 3.02 + 0.01*B1$		
28	Cable 2x1.5 (m')	$= - 0.09 + 2*B1$		
29	Fitting lamp (unit)	$= - 0.02 + 0.2*B1$		
30	Switch (unit)	$= 0.09 + 0.13*B1$		
31	Stop contact (unit)	$= - 0.16 + 0.12*B1$		

Figure 5. Cost and material estimation program

4 Conclusion

New knowledge from the results of this study, with the existence of the model, which has been compiled into a program, now, the total cost and quantity of material, in simple housing construction, can be easily estimated. Simply knowing the plan of building area of the house, it will automatically know the cost and material requirements, without having to have complete data. So that this program is stated conceptual estimation of simple house construction costs and materials. This program is specifically used for a minimum building area of 21 m² and a maximum of 290 m².

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