

Building your New House

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Background

- ▶ Building your new house can be a costly matter and consequently requires some thought concerning the method in which one will be using.

Methods

- ▶ Cheap and fast
- ▶ Expensive and fast
- ▶ Expensive/ qualitative

Cheap and Fast

- ▶ Low level quality.
 - ▶ Will not last
- ▶ Ends up to be more expensive in the long run

Expensive and fast

- ▶ High end materials
- ▶ Quality of the work itself is low due to the time constraint.
- ▶ Just like the cheap one will have long term problems

Expensive/ qualitative

- ▶ High end materials
 - ▶ High level quality
- ▶ Lasts for many years

- ▶ Best choice

Overview

- ▶ Building a new house based on client's input using the expensive/ qualitative method.
- ▶ My project deals with the cost analysis of a single family, 2 story house plus a basement.

Considerations

- ▶ The consideration was to try and build a house which will include as many as possible high quality materials + high end workmanship as long as it does not exceed the budget set by the client.
- ▶ Another main consideration is space. The client insists that the house will have spatial comfort. Meaning it will have bigger than the average rooms even if it comes instead of luxury.

Objective

- ▶ The goal/ objective of the project is to try and find a method in which a client would have an explicit idea of what he/she can expect under different conditions in which the work is being performed.
- ▶ Objective- Maximize the number of non Standard work/ material that can be embedded as part of the project without exceeding the given Budget
 - ▶ **Important points to remember**
 - ▶ The non standard work category is ranked based on the owner's preference regarding the importance of the work
 - ▶ Any Delay caused by owner will be penalized according to the matching financial lost of the contractor
 - ▶ Crew- all calculations are based on a 5 people crew that will be allocated in between tasks as seen proper by the manager
 - ▶ Some work will be done by sub-contractors and is charged directly to the client plus management fee.

Stages

- ▶ **Budget stage-** Setting a budget for the project.
- ▶ **Design stage-** Design a house that meets the demand.
- ▶ **Data collection stage-** cost/ time
- ▶ **Analysis**
- ▶ **Execution**

Budget

- ▶ The budget set by the owner is \$2,150,000

Design

- ▶ The house perimeters are 50Ft width * 75ft Length
 - ▶ Each floor is 3636 sqft
 - ▶ Basement
- ▶ Study Room
- ▶ Two half Baths
- ▶ Guest Bedroom + Full Bath + Closet
- ▶ Storage
- ▶ Laundry Room
- ▶ Play Room
- ▶ Utilities Room
- ▶ Gym

First Floor

- ▶ Kitchen
- ▶ Two half Baths
- ▶ Living Room
- ▶ Entertainment Room
- ▶ Dining Room
- ▶ Two offices

Second Floor

- ▶ Master Bedroom + Master bath + walk in closet
- ▶ Three Bedrooms + Three Full Baths + Three closets
- ▶ Reading Area

Central units

- ▶ Central smoke detector system
- ▶ Central cooling and heating units. One for the second floor and one for both basement and first floor

Constraints

- ▶ The chosen method is expensive/ qualitative
- ▶ The non standard work is ranked based on the client's preference.
- ▶ 10 is the highest score and 1 is the least important.
- ▶ The calculations will be done based on that input and will add it until it reaches the maximum. If it reaches close to the max and the following one is too high to add, it will automatically jump to the following work until none of them fits into the budget.
- ▶ There is a penalty on any delay caused due to the owner's fault. For example: If the owner has not decided on the tiles to be used and the job is delayed, a charge will be added to the final bill.

Some Posterior knowledge

- ▶ Based on 100 similar projects we have found:
- ▶ 32 projects were delayed on average of 23 days and cost the client \$73,000 more than expected
- ▶ 19 projects were delayed on average of 17 days and cost the client \$56,000 more than expected.
- ▶ 43 projects were finished on time, yet, they exceeded the expected cost by \$34,000
- ▶ 6 projects were finished ahead of time on average of 6 days and met the client's budget

Important facts

- ▶ 49% Chance that the project will be done on time or earlier. Yet, we will have \$29,836.73469
- ▶ 51% Chance that the project will not be done on time \$64,470.58824
- ▶ Although each project is different, the client can get the feel of what to expect in regards to meeting the budget. In which that can help him/her make a decision to how close to the budget he/ she wants to get. Maybe to leave a gap that in a case which the work is delayed and a charge is added, the client would still be meeting his/ her budget. This precaution is very important in the field of construction where mostly projects surpass the budget due to natural delays or changes.

Schedule

▶ Budget	0d	▶ Floors	10d
▶ Analysis	3d	▶ Paint	15d
▶ Plan	5d	▶ Molding	10d
▶ Permit	1d	▶ Installing Fixtures	3d
▶ Excavation	3d	▶ Doors	3d
▶ Foundation	3d	▶ Kitchen	5d
▶ Framing	15d	▶ Bathrooms	3d
▶ Plumber	15d	▶ Patio	10d
▶ HVAC	15d	▶ Walk way	5d
▶ Electrician	10d	▶ Parking	5d
▶ Windows	3d	▶ Landscaping	5d
▶ Closing Walls interior/Exterior	20d		

Total basic cost

▶ \$1,359,750	Total Basic Construction Cost
▶ \$27,400	Windows Cost
▶ \$11,148	Doors Cost
▶ \$217	Electrical Outlets/Cable/Phone
▶ \$85	Electrical Switch Cost
▶ \$7,091	Lighting Cost
▶ \$3,190	Ceiling Fan cost
▶ \$324	Smoke Detector
▶ \$600	Thermostat
▶ \$2,005	Plumbing Cost- Water tanks- Gas Hose
▶ \$30,000	HVAC Duct Schedule Totals-Mechanical
▶ \$7,675	HVAC Component Totals
▶ \$12,368	Framing Stud Schedule Totals
▶ \$3,795	Window/Door Header Schedule Totals
▶ \$45,900	Total Roofing Cost
▶ \$2,255	Roof Truss Schedule Totals
▶ \$181,870	Landscape Lot Cost
▶ \$30,000	Plumbing
▶ \$30,000	Electrician
▶ \$5,000	Parking Area
▶ \$20,000	Plan/Permit
▶ Total = \$1,780,673	

Non Standard work

▶ Work	Material 1	Material 2	Qual.(1-10)	Diff. in Cost
▶ Blinds	Custom	Standard	1	\$4,000.00
▶ Crown Molding	Yes	No	2	\$30,000.00
▶ Pool	Yes	No	3	\$250,000.00
▶ Outdoor Hot-Tub	Yes	No	3	\$15,000.00
▶ Play Ground	Yes	No	3	\$20,000.00
▶ Exterior Light. Sys.	Yes	No	4	\$10,000.00
▶ Prefab Shed	Yes	No	5	\$2,500.00
▶ Guest Parking Area	5	2	5	\$10,000.00
▶ Landscaping	yes	No	5	\$5,000.00
▶ Radiant floor	yes	No	6	\$20,000.00
▶ Separate Car Garage	3 car	2 Car	6	\$7,000.00
▶ Central Irriga. Sys.	Yes	No	6	\$20,000.00
▶ Artistic painting	Yes	No	6	\$10,000.00
▶ Kitc./ Bath.- Wall ti.	Yes	No	7	\$30,000.00
▶ Fan. Entry Way	Yes	No	7	\$15,000.00
▶ Sound Proof	Yes	No	8	\$4,200.00
▶ Outdoor Radiant	Yes	No	8	\$5,000.00
▶ Floors Partially til.	Yes	No	10	\$50,000.00
▶ House exterior Stuc.	Yes	No	10	\$30,000.00
▶ House Interi. Plaster	Yes	No	10	\$90,000.00
▶ Kitchen Cabinets	Custom	Semi	10	\$25,000.00
▶ Patio Stones Vs Wood	Yes	No	10	\$20,000.00
▶	Total			\$672,700.00

The effects of delays

▶ Penalty per a w f delay		Min	Max	▶ Diff. + Diff in penalty
▶ \$250.00	2	2		▶ \$4,000.00
▶ \$750.00	2	3		▶ \$30,750.00
▶ \$6,000.00		3	6	▶ \$268,000.00
▶ \$0.00	0	0		▶ \$15,000.00
▶ \$0.00	0	0		▶ \$20,000.00
▶ \$750.00	1	2		▶ \$10,750.00
▶ \$0.00	1	1		▶ \$2,500.00
▶ \$500.00	1	2		▶ \$10,500.00
▶ \$0.00	1	1		▶ \$5,000.00
▶ \$0.00	0	0		▶ \$20,000.00
▶ \$850.00	3	3		▶ \$7,000.00
▶ \$1,350.00		2	3	▶ \$21,350.00
▶ \$650.00	3	5		▶ \$11,300.00
▶ \$1,500.00		3	5	▶ \$33,000.00
▶ \$1,000.00		1	2	▶ \$16,000.00
▶ \$700.00	1	2		▶ \$4,900.00
▶ \$300.00	1	2		▶ \$5,300.00
▶ \$2,500.00		2	5	▶ \$57,500.00
▶ \$1,250.00		3	4	▶ \$31,250.00
▶ \$3,150.00		4	6	▶ \$96,300.00
▶ \$0.00	0	0		▶ \$25,000.00
▶ \$1,200.00		2	2	▶ \$20,000.00
▶	36	56		▶ Total= \$715,400.00

Results

- ▶ Maximize the number of non basic work on the optimistic scenario
- ▶ Meaning there is neither delays nor extra charge.
- ▶ Cost- \$2,149,373
- ▶ there is a \$10,000 Charge on a week delay in the basic construction stage.
- ▶ We can see that there are two feasible solutions to the following part. The first is based on quality and the second one is based on cost
- ▶ Pessimistic scenario –penalties are applied
- ▶ Cost- \$2,147,573
- ▶ Pessimistic scenario in which we try to maximize the cost
- ▶ Cost- \$2,148,573.19

Final Numbers

\$2,453,373.00 - Total

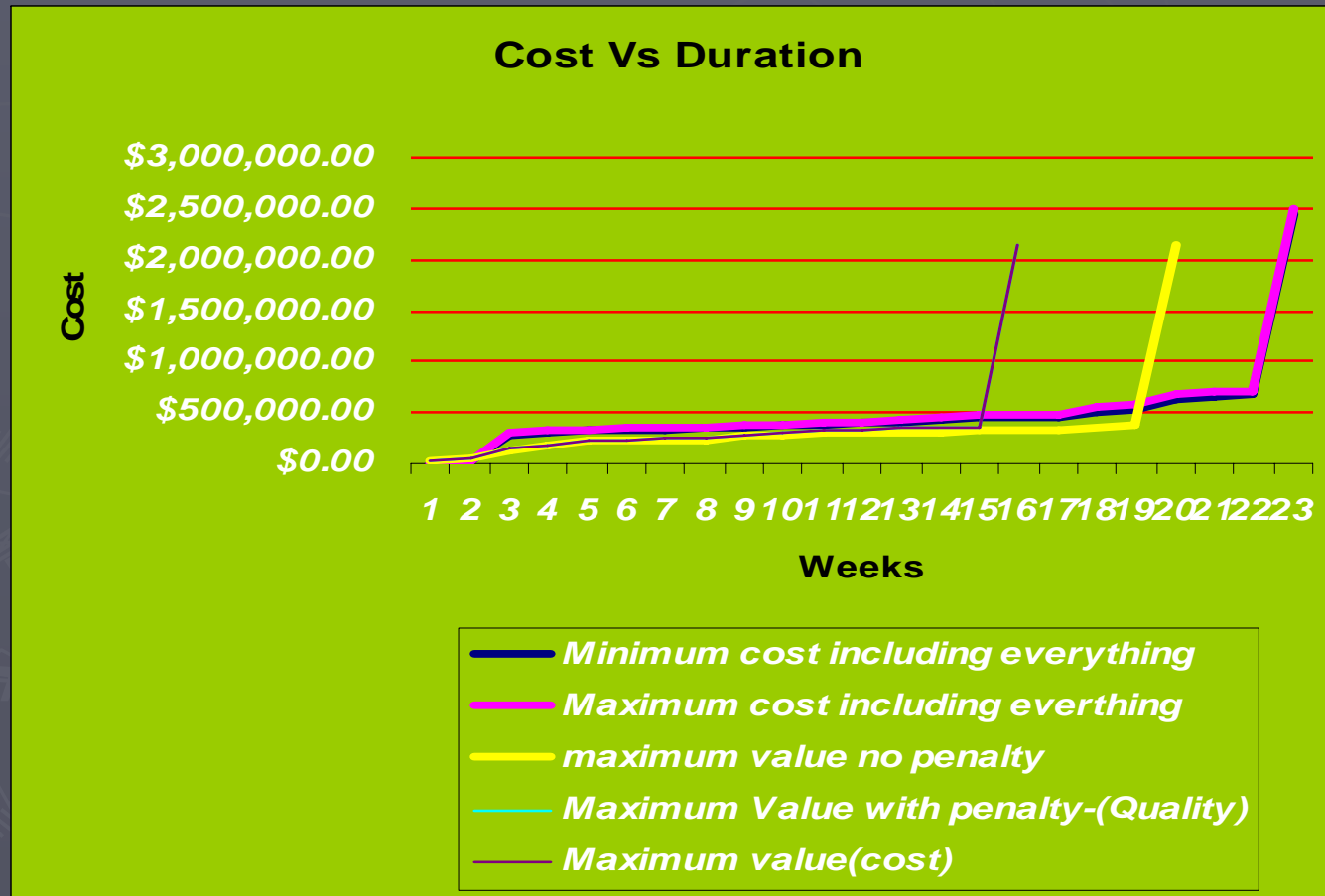
\$2,506,073.00 – Total with Penalty

\$2,149,373 – Maximize/ ideal

\$2,147,073.00 Maximize-panelized- stick with quality

\$2,148,573.19 Maximize- Panelized

Results



Conclusion

- ▶ Although building a new house can be costly matter, one can still minimize the cost and maximize the work. Indeed a detailed plan is required to avoid any unnecessary delays/ penalties.

Questions

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