

ENGINEUITY TUTORIAL



Job Risk



Job Risk

Job 74 (At the procurement stage)

  **BIM** Building Information Modelling
is being used for the job

Period identified: 4
Country: United Kingdom
Location: Brixton
Type: Design & Build
Size: Medium
Approximate value: 11,000,000
Duration: 3 periods
Description: Social housing development
Sector: Building & Commercial
Client: Lowry Homes

ESTIMATED COSTS / PLANNED LABOUR SCHEDULE

Job	Estimated	Estimated	Planned	Cumul %
Estimated design cost: 11 % of build cost				

No construction project is risk free, and when a job is identified the estimators make an assessment of the potential risks that could arise on a job, which are stored in a **risk register**.



We will take a closer look at the features of each risk.

RISK REGISTER

Risk description	Likelihood occurs	Impact cost	Reduction in cost if BIM used	Expected labour reduction
Archaeological find	Low	175,000	No	10.6 %
Personnel issues	High	51,000	No	2.6 %
Construction defects	Medium	67,000	Yes	7.5 %
Structural defects	Medium	123,000	Yes	2.2 %



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RISK	Likelihood	Chance it hits
	High	70 to 80 %
	Medium	40 to 50 %
	Low	20 to 30 %

LIKELIHOOD OF OCCURRING

The **likelihood** of the risk occurring, or level of risk, is classified as either High, Medium or Low.

The % chance of each level happening is defined in the **Industry parameters**.

If the risks occur they **only occur once** during the planned duration of the contract.

KEY POINTS



If a job is completed early there is a possibility of avoiding risks that may occur towards the end of the job.

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ESTIMATED COSTS / PLANNED LABOUR SCHEDULE

Job period	Estimated build cost	Estimated site cost	Planned labour	Cumul % complete
1	2,516,401	503,280	77	30
2	4,194,000			
3	1,677,000			
	8,388,000			

Estimated design cost: 11 % of build cost

IMPACT COST


The impact cost is the cost incurred if the risk occurs.



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BIM MODEL AFFECTS

If the job is using BIM (Building Information Modelling), there may be an opportunity to reduce the impact cost if the risk occurs.

For example, if there is the risk of structural defects, these may be identified in the BIM model, and the threat mitigated.

KEY POINTS



The cost reductions are graded depending upon the particular risk, and the reductions to date across all jobs can be found in the **Main menu/Assessing performance/Job performance**.

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Client: [redacted]

EXPECTED LABOUR REDUCTION

If a job is won, and being progressed, any risk that strikes can **delay the job**, resulting in a % reduction in the effectiveness of the labour on site in the period when the risk strikes.



Action can be taken to deal with potential job delays by adjusting the labour allocated to site when the job is being progressed, and is discussed in a separate topic.

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ESTIMATED COSTS / PLANNED LABOUR SCHEDULE

Job period	Estimated build cost	Estimated site cost	Planned labour	Cumul % complete
1	2 516 401	503 280	77	30

Estimated design cost: 11 % of build cost



The nature of the potential risks, particularly the likelihood and impact cost, may be some of the deciding factors in determining whether or not the company bids for a job, along with factors such as the job sector, location, size, client etc.

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Job	Estimated	Estimated	Planned	Cumul %	Estimated design cost: 11	% of build cost
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If the decision is made to bid for the job, what mitigating actions can be taken to deal with each risk, and the potential cost incurred ?

The action taken depends upon each risk element.

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Job Risk

Setting the Bid for Job 74

Navigate to "Main menu/Making decisions/Procurement decisions/Set the bid"

Help

ESTIMATED COSTS
 Design cost (% of build cost): 11 %
 Build cost: 8,388,002
 Site cost: 1,677,600
Total estimated costs: 10,988,280

DESIGN CONSULTANT BIM experience required
 Design consultant allocated:

ONCOSTS
 Project manager allowance: 0 (for salary)

Risk register	Likelihood occurs	Impact cost	Risk Contingency
Archaeological find	Low (20 to 30 % chance)	175,000	0
Personnel issues	High (70 to 80 % chance)	51,000	0
Construction defects	Medium (40 to 50 % chance)	67,000	0
Structural defects	Medium (40 to 50 % chance)	123,000	0
			0

KNOWN RIVAL BIDDERS
 Based in India
 Chota Nagpur Group
 East State Enterprises
 Horizon Group
 Rempstone Building
 The Bommell Group

BIDDING HISTORY

Job	Period	Country	Sector	Markup
1	2	United Kingdom	Building & Commercial	4.3 %
4	2	United Arab Emirates	Building & Commercial	4.4 %
8	2	United Kingdom	Building & Commercial	4.3 %
13	2	Canada	Building & Commercial	4.3 %
15	2	South Africa	Building & Commercial	4.4 %
16	2	United Kingdom	Building & Commercial	4.3 %
17	2	Japan	Building & Commercial	4.5 %
21	2	United States	Building & Commercial	4.2 %
25	3	Qatar	Building & Commercial	4.1 %
30	3	United Kingdom	Building & Commercial	4.1 %
40	3	United States	Building & Commercial	4.2 %
44	3	Qatar	Building & Commercial	4.3 %
45	3	United States	Building & Commercial	4.2 %
53	4	Qatar	Building & Commercial	4.2 %

LIKELIHOOD AND IMPACT COST

For each risk in the risk register the bid itself contains a **contingency** for the likelihood of the risk occurring, and the potential impact cost.

The company are bidding for a job that has a risk register consisting of 4 potential risks.

One of the identified risks is 'Structural defects', which is classified as having a **Medium** likelihood of occurring, and this implies a 40-50% chance the risk will occur **at some point** during the progressing of the job.

If the risk strikes there will be an **impact cost** of 123,000.

There are 3 possible scenarios for determining the risk contingency, and we will investigate each one in turn.



Job Risk

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DESIGN CONSULTANT

BIM experience required

Design consultant allocated:

[Select]

ONCOSTS

Project manager allowance: 0 (for salary)

Risk register	Likelihood occurs	Impact cost	Risk Contingency
Archaeological find	Low (20 to 30 % chance)	175,000	0
Personnel issues	High (70 to 80 % chance)	51,000	0
Construction defects	Medium (40 to 50 % chance)	67,000	0
Structural defects	Medium (40 to 50 % chance)	123,000	0

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16	2	United Kingdom	Building & Commercial	4.3 %
17	2	Japan	Building & Commercial	4.5 %
21	2	United States	Building & Commercial	4.2 %
25	3	Qatar	Building & Commercial	4.1 %
30	3	United Kingdom	Building & Commercial	4.1 %
40	3	United States	Building & Commercial	4.2 %
44	3	Qatar	Building & Commercial	4.3 %
45	3	United States	Building & Commercial	4.2 %

SCENARIO 1: NO RISK CONTINGENCY

If no risk contingency is added then there is a good chance of the company winning the job since their bid could be far more competitive than their rivals who would probably have included some risk contingency.

However, if the contract is secured, and the risk occurs, the additional cost could seriously affect the job profits, and adversely affect the cash flow of the company.

USEFUL INFORMATION

- The job is in the Building & Commercial sector
- The job is based in United Kingdom
- The planned duration of the job is 3 periods
- The annual salary for project managers ranges from 27,000 to 64,000

Chota Nagpur Group have a de-risked business model that enables them to bid competitively on price for the work they tender for, helped enormously by their continuing investment in new technologies.



Job Risk

Setting the Bid for Job 74

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Help

ESTIMATED COSTS

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 Site cost: 1,677,600
Total estimated costs: 10,988,280

DESIGN CONSULTANT

BIM experience required

Design consultant allocated:

ONCOSTS

Project manager allowance: 0 (for salary)

Risk register	Likelihood occurs	Impact cost	Risk Contingency
Archaeological find	Low (20 to 30 % chance)	175,000	0
Personnel issues	High (70 to 80 % chance)	51,000	0
Construction defects	Medium (40 to 50 % chance)	67,000	0
Structural defects	Medium (40 to 50 % chance)	123,000	123000
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			123,000

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BIDDING HISTORY

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44	3	Qatar	Building & Commercial	4.3 %
45	3	United States	Building & Commercial	4.2 %
53	4	Qatar	Building & Commercial	4.2 %
54	4	New Zealand	Building & Commercial	4.4 %
58	4	Qatar	Building & Commercial	4.1 %
59	4	Qatar	Building & Commercial	4.3 %
61	4	United Kingdom	Building & Commercial	4.2 %

SCENARIO 2: FULL RISK CONTINGENCY

If the full cost of the risk is added then there is less chance of the company winning the job since their bid would probably be less competitive than their rivals who may have included some, but not the full risk contingency.

However, if the contract is secured and the risk occurs the additional cost will have been covered, and will not affect the job margin. If the risk does not occur the margin would be significantly improved.

USEFUL

- The planned duration of the job is 3 periods
- The annual salary for project managers ranges from 27,000 to 64,000



Job Risk

Setting the Bid for Job 74

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Help

ESTIMATED COSTS

Design cost (% of build cost): 11 %
Build cost: 8,388,002
Site cost: 1,677,600
Total estimated costs: 10,988,280

DESIGN CONSULTANT

BIM experience required

Design consultant allocated:

ONCOSTS

Project manager allowance: 0 (for salary)

Risk register	Likelihood occurs	Impact cost	Risk Contingency
Archaeological find	Low (20 to 30 % chance)	175,000	0
Personnel issues	High (70 to 80 % chance)	51,000	0
Construction defects	Medium (40 to 50 % chance)	67,000	0
Structural defects	Medium (40 to 50 % chance)	123,000	55350

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BIDDING HISTORY

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45	3	United States	Building & Commercial	4.2 %

SCENARIO 3: 'SENSIBLE' RISK CONTINGENCY

If a sensible level of contingency is added the bid will still be competitive, and the company have partly covered themselves in case the risk occurs.



Since there is a 40-50% chance of the risk occurring, based upon probability it is reasonable to cover 45% of the risk cost, or 55,350.

If the risk occurs, the company has to find the other 55% of the risk cost, or 67,650, which eats into the margin. If the risk does not occur then the 55,350 is additional margin.

- The job is based in United Kingdom
- The planned duration of the job is 3 periods
- The annual salary for project managers ranges from 27,000 to 64,000



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Client: Lowry Homes

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ESTIMATED COSTS / PLANNED LABOUR SCHEDULE

Job period	Estimated build cost	Estimated site cost	Planned labour	Cumul % complete

Estimated design cost: 11 % of build cost

BIM REDUCTION IN IMPACT COST



No action needs to be taken as the cost reductions are made automatically if the risk occurs, and BIM is being used on the job.

RISK REGISTER

Risk description	Likelihood occurs	Impact cost	Reduction in cost if BIM used	Expected labour reduction
Archaeological find	Low	175,000	No	10.6 %
Personnel issues	High	51,000	No	2.6 %
Construction defects	Medium	67,000	Yes	7.5 %
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MITIGATING ACTIONS TO REDUCE RISK COSTS

As we have seen, **setting 'sensible' levels** of risk contingency in a bid can keep a bid competitive in relation to rival bids, and cover the company for a proportion of the risk cost if a risk occurs.

In addition, if a job is secured and being progressed, the impact costs of any risks incurred can be reduced by taking a number of **mitigating actions**.

We will examine possible mitigating actions further.

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Investment Details

THE JT FLOWER PARTNERSHIP

Desc: Management consultants

Profile: The JT Flower Partnership was established over 30 years ago in the UK, by two friends, John Morton and Thomas White, and since its inception the company have built up an enviable global reputation for providing specialist risk management solutions to contractors in the building and commercial sector of the construction industry, and they have saved their clients millions of pounds in the process.

The company have just relocated their head office to Westminster in London, and are also in the process of establishing offices in Toronto and Johannesburg to meet their continued expansion, and they have invested heavily in the latest digital technologies to keep at the forefront of their industry.

PERFORMANCE HISTORY

PERIOD RETURNS

Period	% return to investors	Company investment		Information for investors
		Amount invested	Investment return	
1	2.7 %	0	0	Nothing to report
2	2.5 %	0	0	Nothing to report
3	2.8 %	0	0	Nothing to report
4	2.5 %	0	0	Nothing to report
5	2.6 %	100,000	2,600	Nothing to report
6	2.5 %	202,600	5,065	Nothing to report
7	2.3 %	207,665	4,776	Nothing to report
8	2.2 %	212,441	4,674	Nothing to report

BENEFITS - REDUCTION IN JOB COSTS

	Build cost	Risk cost	% of total
Industrial	0	0	0 %
Building & Commercial	0	80,359	100 %
Transport	0	0	0 %
Energy	0	0	0 %
Water & Sewage	0	0	0 %
	0	80,359	

TARGETED INVESTMENTS

Target investments on the **Financial Decisions Screen** into **risk management** consultants to the construction industry can reduce any risk costs incurred.

The profile of the **JT Flower Partnership** shows that they appear to be an ideal company to invest in for reducing risk costs on building and commercial contracts, and to date risk costs have been reduced by over 80,000.

KEY POINTS

Although there are a number of risk management companies, many management consultants do not specialise in this area, and would not reduce risk costs on jobs undertaken. The clues always lie in the investment profile.



Job Risk

Industry parameters

FINANCE

OVERHEADS

PROCUREMENT

JOB PROGRESSION

CASH ACCOUNT

Credit rate: 1.1 % per annum
Overdraft rate: 6.5 % per annum
Overdraft limit: 600,000

CAPITAL BASE

Increase limited to: 6 % this period
Sold off limited to: 21 % this period
Depreciation rate: 2.5 % per annum
Capital writing down: 25 % per annum

INVESTMENTS

Restrictions

There cannot be more than: 6 investments at any point in time
For each investment the maximum increase in the investment is limited to: 100000 each period

Benefits for jobs in progress

A minimum amount of: 200000 needs to have been invested to obtain any benefits for jobs in progress

For investments that deliver build cost reductions, once the minimum amount has been invested to obtain benefits, depending upon how much has been invested, the build cost reductions are between: 0.3 and 0.5 %

For investments that provide risk management services, once the minimum amount has been invested to obtain benefits, and depending upon the size of the investment, for risks that strike :-

risk cost reductions are between: 30 and 40 %
job delay reductions are between: 25 and 30 %

Cease trading

The **Industry parameters** show the risk cost reductions that can be achieved if investments are targeted effectively.

KEY POINTS

If the company are already investing in an appropriate risk consultant e.g., that serves the sector of a job being bid for, then the risk contingency in the bid may be reduced below the 'sensible' level. This would make the chances of securing the job even better, **in the knowledge that should any of the job risks strike, they will be reduced by the investment made.**

Can vary each period



Job Risk

Job performance

Management consultant report

Navigate to "Main menu/Assessing performance/Job performance"

ALL JOBS IDENTIFIED

RISK ANALYSIS (JOBS WON)

RETENTION ANALYSIS (JOBS WON)

☒ Cost analysis

☐ Delay analysis

Job details					Risk details			The bid	Risk status		Mitigation adjustments				Adjusted cost	
Job	Status	In	BIM job	Sector	Risk description	Chance occurs	Impact cost	Contin in bid	Struck	In period	Invest	QHSE staff	Project mgr	BIM model	Adjusted risk cost	% of contin
4	Completed early	UK	Yes	IND	Personnel issues	High	36,000	27,000	Yes	3	0.00 %	0.00 %	-6.33 %	0.00 %	33,721	125 %
					Accident on site	Low	75,000	18,750	No							
					Client alterations to the specification	High	26,000	19,500	Yes	4	-30.05 %	0.00 %	-6.70 %	-7.50 %	14,495	74 %
					Poor decision making	Low	46,000	11,500	No							
					JOB TOTALS			76,750							48,216	63 %

As well as targeted investments, risk costs incurred can be reduced by employing a **good project manager**, who will be able to identify and address the potential effects of the risk.

Conversely, **risk costs may be increased if the project manager is inadequate, or if the QHSE Department is understaffed.**

In addition, **where BIM (Building Information Modelling) has been used on a job**, some risk costs may be reducing by using the BIM model, but this will not apply to all risks.

The **Risk analysis for all jobs won and progressed** displays a detailed risk analysis for all jobs progressed.

					Utility failure to site	Medium	22,000	5,500	No							
					Site access issues	Low	74,000	18,500	No							
					JOB TOTALS			64,100							42,918	67 %
49	Completed early	US	Yes	B&C	Unable to work at nighttime	Low	97,000	24,250	No							
					Structural defects	Medium	89,000	40,050	No							
					Specification issues need resolving	Medium	98,000	44,100	Yes	6	-30.04 %	0.00 %	-4.70 %	-10.00 %	54,155	123 %
					JOB TOTALS			108,400							54,155	50 %
50	Completed early	UK	Yes	B&C	Archaeological find	Low	126,000	31,500	No							