

2012

MERIT Project Report



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MERIT GAME DESCRIPTION:

MERIT, or Management Enterprise Risk Innovation and Teamwork, is designed to encourage teamwork and responsibility in young professionals. The root of MERIT's development began back in the 70s in Great Britain and was originally funded by the Building Research Establishment and by other various contractors associations. Initially developed to examine contractor bidding behavior and response to market conditions, the game developed into a national competition that was sponsored by Balfour Beatty Construction. It was originally a paper-based competition that allowed teams to submit their completed forms and wait for their decisions to be processed. In 1994, the software was developed to exchange the decision data from each team by floppy disk, rather than paper. By 1999 the web-based version now utilized eliminated the need for slow information exchange and processing. This new version provides more streamlined interaction between teams and the MERIT database, and was sponsored not only by Balfour Beatty, but also by DTI (DETR), Mouchels, and CITB. The now-international game is operated by the Civil Engineering Department at Loughborough University in England [MERIT, 2012].

Today, over 20,000 engineers, students, and construction professionals have participated in the MERIT training competition. Through its developmental stages, MERIT has always functioned with two key phases: the early years phase and the competitive phase. The early years is the phase in which all teams participate and compete against the MERIT program's software simulations. These years include the game's Periods 5-12. The second phase, or the competitive phase, allows for the previously ranked top six teams to compete against both each other and the program software [MERIT, 2012].

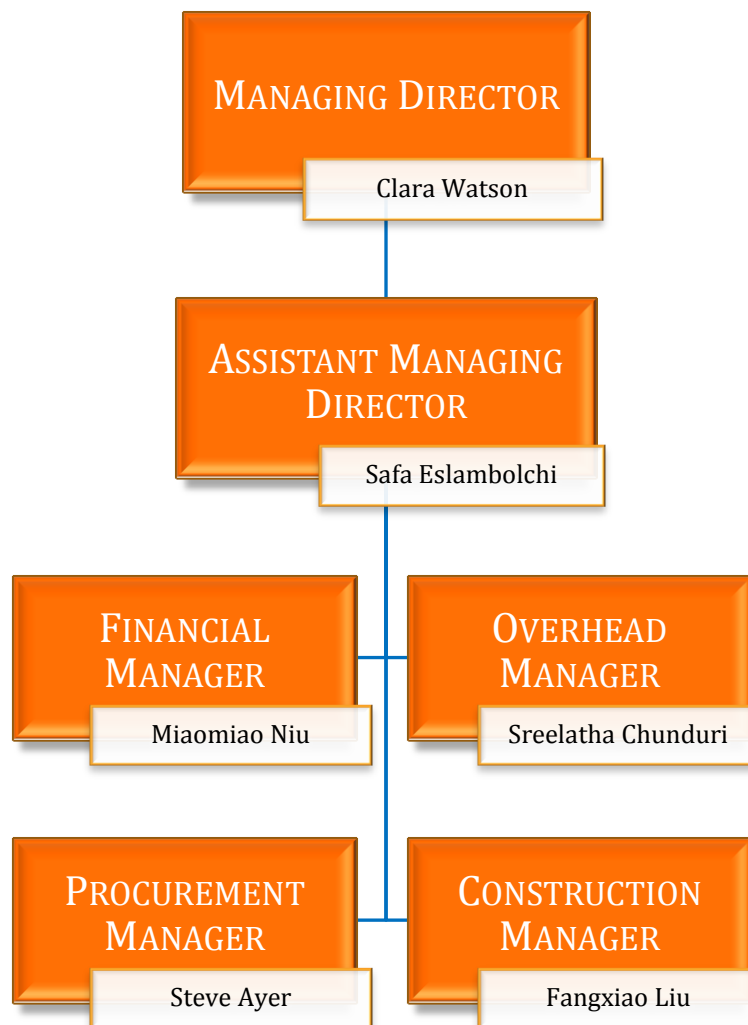
As a competitive computer-based software simulation, MERIT creates realistic situations for participating teams. Each team comprises a theoretical construction company that must react and make decisions to changing market and business scenarios generated by the MERIT game engine [MERIT, 2012].

The participating teams compete to manage and improve their company which is ranked against other teams based on the sum of several criteria, known as Performance Indicators. These Performance Indicators are displayed with the results of each period, and include the Gross Profit to Turnover, Operating Profit to Turnover, Company Value, Capital Employed, Contract Completion, Forward Workload, Forward Margin, Share Price, and finally, Client Satisfaction. Each receives a numerical value that is then totaled for each period and used to determine each team's overall competition ranking.

Decisions made by team members for each period positively and negatively affect these Performance Indicators. Collectively, teams enter decisions based upon their previous performance and changing company scenarios each period. These decisions are entered in six different categories: financial, overheads, estimating, bidding, personnel, and construction and affect the overall company performance and future decisions.

TEAM STRUCTURE AND DYNAMICS:

Because the MERIT game is intended to support individual responsibility as well as positive overall team dynamics, the website recommends manager titles that could aid in the group competition. The following diagram demonstrates the Nittany Lion Construction Company's team structure:



Each manager discussed their decisions with me, the team Managing Director. I then met with Safa, the Assistant Managing Director, to review the decisions before submitting the final MERIT file for each period.

PERIOD FIVE DECISIONS:

The first step to begin making Period 5 decisions was to analyze the information previously generated by the MERIT game simulation. By selecting the “History” tab, it became possible to review the theoretical decisions made for the company in Periods 1-4. Using this information and the results from the three trials performed as a team (shown in Appendices A-C), the company decisions were discussed and input for Period 5.

Financial Decisions

The first financial decision made was to pay a dividend of 1.5% (or \$73,500) to shareholders. This was agreed upon because it was the percentage that had been paid to shareholders over Periods 1-4, and based on the External Performance Review report, the shareholders were “content” with their paid dividend. This affects the overall company Share Price, one of the Performance Indicators used to rank the team in the MERIT competition. This dividend comes out of the company Cash A/C account and temporarily reduces the value of the company.

With a company value of just \$4,450,457, it was Mia’s decision to slightly decrease the company’s Capital Base by \$181,023, or 5% of the existing Capital Base. This decision was agreed upon because this would increase the company’s Cash A/C value, which would allow for more money to be invested, thus generating more cash return. To check this decision, the Work Limits screen was checked, which stated that the current Capital Base was sufficient to provide the workloads for the ongoing construction projects. The Capital Base decrease (or the amount sold off or liquidated) allowed per period is 20% of the total value. It was also noted that the Capital Base depreciation rate is 3.5% per year.

When analyzing the various companies in which to invest, it was necessary to not only look at the percentage of return to investors, but to also look at the size and type of the company. Many of the investment companies were in the construction industry, and would allow for a slight reduction in construction costs on some jobs if a certain amount of money was invested with them. An example of this is the \$211,036 investment with Mockridge and Sons Joinery Ltd, which reduced build costs on one of the jobs by 0.61%.

It was also necessary to consider the total investment required to obtain the benefits associated with investment companies and the increase in investment allowed per period. These numbers are summarized, by company size, in the figure below:

<u>Investment Company Size</u>	<u>Maximum increase in investment allowed each period</u>	<u>Minimum total investment required to obtain benefits</u>	<u>Minimum build cost savings</u>
Large	150,000	300,000	0.9 %
Medium	100,000	200,000	0.6 %
Small	50,000	100,000	0.3 %

The total number of investments cannot exceed: 5 at any point in time

The Period 5 investment decisions made are shown in the table below:

Period 5 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$105,300.00	\$100,000.00	\$ -	\$205,300.00	5.3%	-
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$104,700.00	\$100,000.00	\$ -	\$204,700.00	4.7%	-
Midlands Aggregate Plc	Small	Quarry Products	\$ -	\$ 50,000.00		\$ 50,000.00	6.4%	Industrial; Building & Commercial; Transport
Mockridge & Sons Joinery Ltd	Medium	High Quality Bespoke Joinery	\$211,036.00	\$ -	\$ -	\$211,036.00	3.5%	Building & Commercial - \$28,209
Southern Asset Management Plc	Medium	Assets Management	\$ 98,600.00	\$ -	\$ 98,600.00	\$ -	-1.4%	-
Stressed Out Plc	Medium	Steelwork Structures	\$ -	\$100,000.00	\$ -	\$100,000.00	2.9%	Industrial; Building & Commercial
Walker Mining Corporation	Large	Open Cast Mining Contractors	\$152,850.00	\$ -	\$152,850.00	\$ -	1.9%	-
Total				\$350,000.00	\$251,450.00	\$251,450.00		

Investments were increased for Carter & Crisp BLD Services and DBY Equipment Ltd because they had a larger percent return value for investors. The amount invested with Mockridge & Sons Joinery Ltd was kept the same because it had an average percent return to investors, but also provided building cost savings to Building and Commercial projects. New investments with both Midlands Aggregate Plc and Stressed Out Plc were started because they provided cost savings to the Industrial, Building and Commercial, and Transport areas of construction. Lastly, the investments with Southern Asset Management Plc and Walker Mining Corporation were removed because they had low (or negative) return to investors and did not provide any construction cost savings.

The final company assets after all decisions were made are shown in the image below:

Assets after Decisions	
Cash A/C:	166,481
Capital Base:	3,439,440
Investments:	771,036
Company Value:	4,376,957

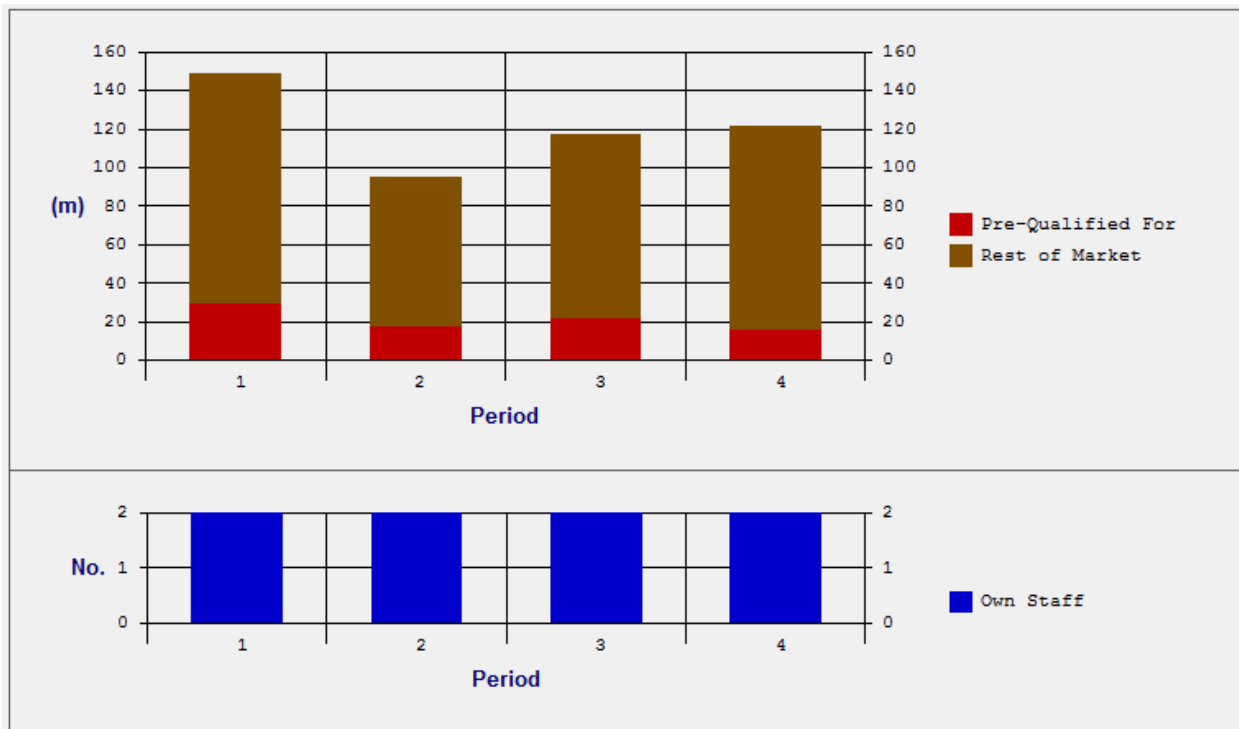
The Cash A/C is the amount of money the company has available in the bank. There is an overdraft limit of \$1,000,000 with a 14% annual bank overdraft rate, though this action is considered a

liability for the company. The Capital Base total shown above dictates the amount of work the company can undertake and accounts for the company's material investment in such things as equipment and buildings. Finally, the Investments category above totals the company's cash investment in other companies.

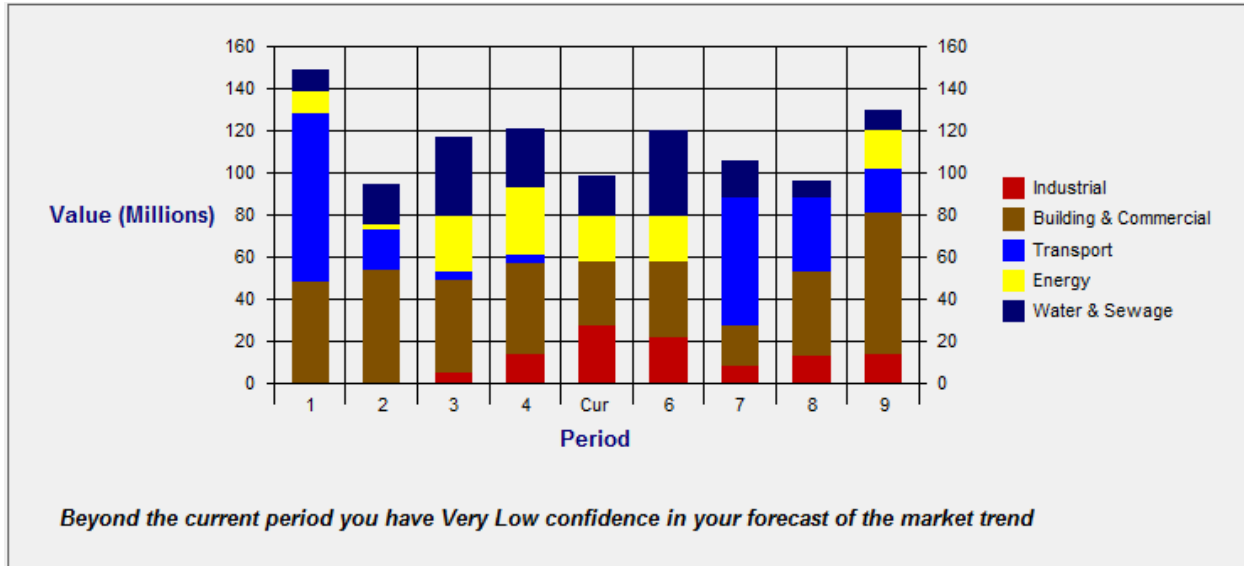
Overhead Decisions

Essentially, the Overhead category of the company consists of the Marketing, Estimating, Head Office, QHSE, and Measurement departments. The people in these departments are utilized in the process of acquiring and winning new construction projects.

The External Performance Review of the company only said two things in the Overhead category, that the overhead department size was limiting the value of jobs pre-qualified for and limiting the accuracy of future market forecasts. The first department analyzed was the Marketing department, which had two company staff members and aimed to allow the company to pre-qualify for new contracts that became available. With this number of Marketing workers, the company was only able to pre-qualify for 18% of the market value. This is visualized in the graphical analysis shown below:



Based upon this past performance in Periods 1-4, the company was only able to pre-qualify for a maximum of approximately 20% of the overall market. The decision was made to increase the Marketing department by the maximum number per period, two staff members. The Market Analysis, or market sectors in which there is new construction work, also needed to be considered. The Market Analysis is shown in the MERIT-provided chart below:



This chart summarizes the company’s forecast for work in various market sectors for upcoming periods. Based upon this chart, the efforts of the Marketing department can be split over the construction sectors with the greatest amount of potential work. Because the percentage of change in each sector is limited to an increase or decrease of 10%, it was important to consider all upcoming periods, not simply the next period. The percentage breakdown for each sector in Period 5 is shown in the chart below:

Split of the Marketing Overhead between Sectors

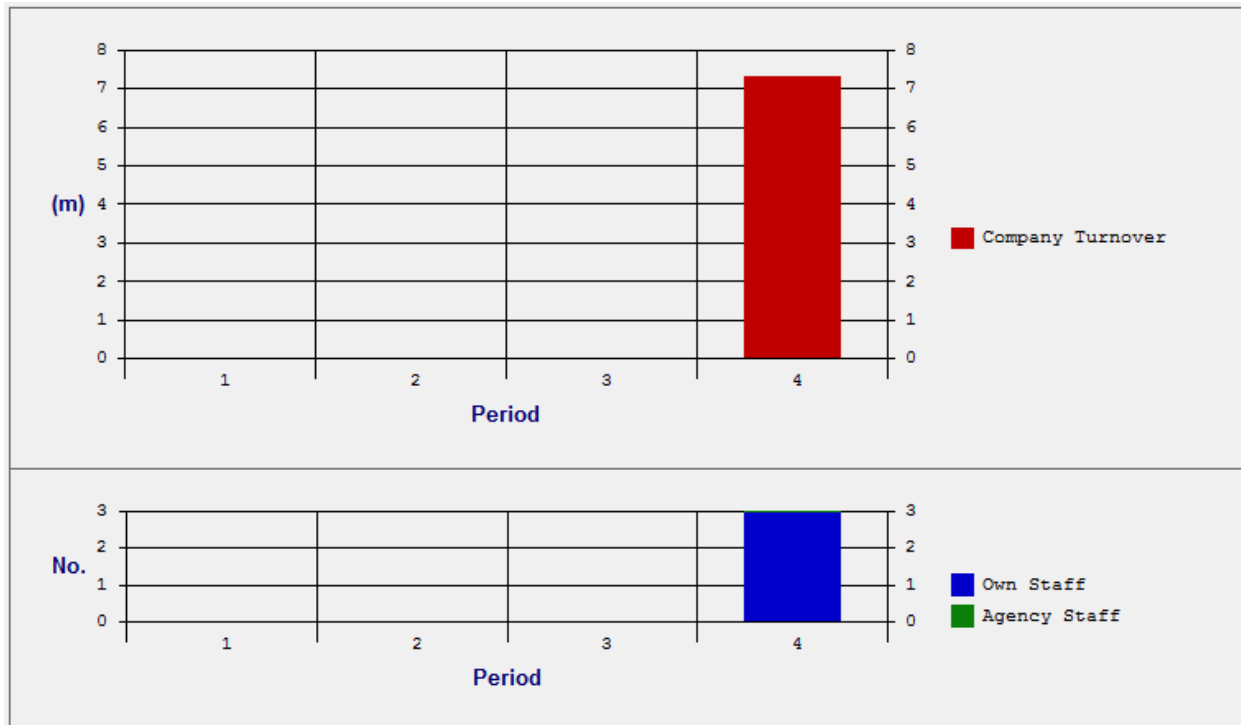
	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	13	10
	2	Building & Commercial	33	36
	3	Transport	6	14
	4	Energy	25	17
	5	Water & Sewage	23	23
				100

The Estimating department was next to be evaluated, as it played a large role in the number of jobs that can be estimated for the company. With three current Estimating staff members, a total of 36 estimating man weeks were available (12 weeks per period multiplied by three staff members). This number must be greater than the required total number of estimating weeks needed for estimating the company’s new prospective jobs. Because only 26 weeks are needed for estimating, the Estimating staff was considered sufficient and did not need to be increased. (The process of deriving the 26 week total is discussed later, in the Estimating Decisions section).

If the number of estimating weeks had not been sufficient, a new member of the Estimating staff would have been hired. If a new member was not hired and the number of hours was still not

sufficient, some of the estimates would not be properly completed. This would have decreased the confidence level in the estimates, and would have required a greater contingency when bidding the job (due to the increased risk).

Lastly, the Head Office, QHSE, and Measurement departments were considered. The process for determining the staffing levels was the same for these three departments. The Head Office department dealt with the company's IT issues, accounting, and buying. Based on the past performance of the Head Office department (shown in the figure below), three staff members can appropriately handle approximately \$7.3M worth of work.

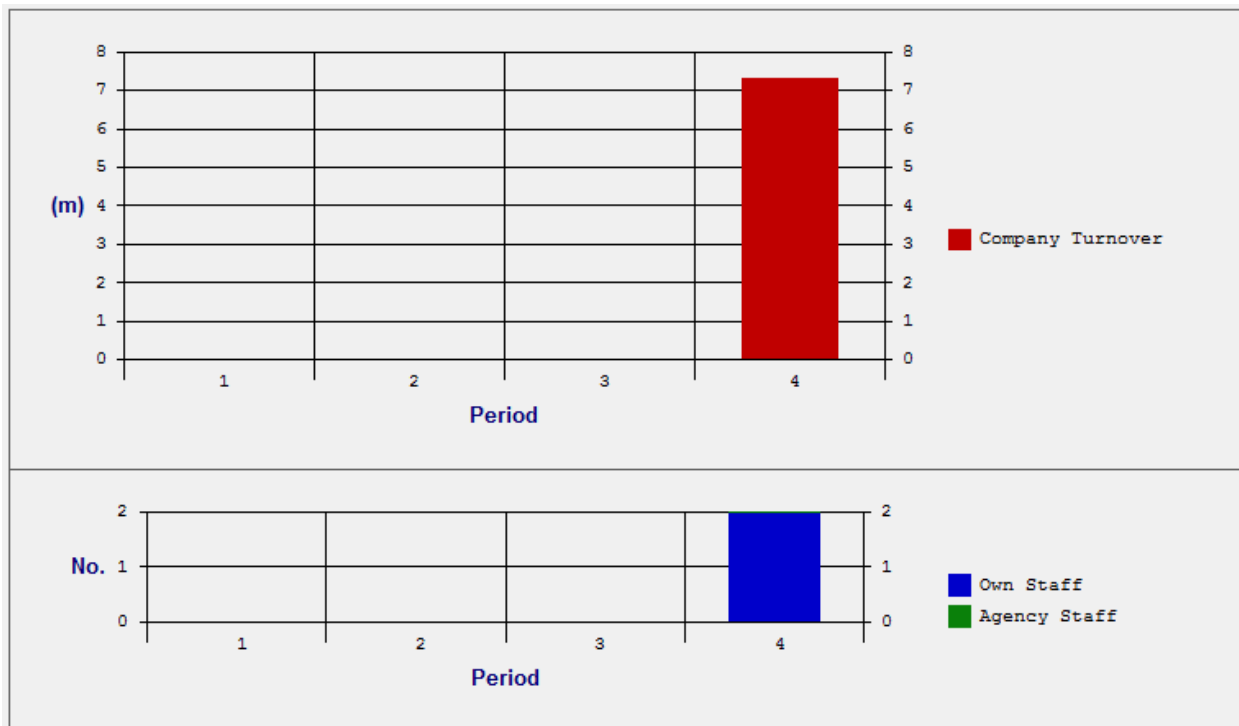


Consequently, each Head Office staff member could handle approximately \$2.43M worth of work per period. With this in mind, it was then necessary to calculate the total turnover for the upcoming period (Period 5). This was done by multiplying the total labor on site for each job by the value per man period, which can be found in the Job Details. The total labor on site is discussed later in the Construction Decisions section. The summary for the Period 5 turnover calculations is shown in the chart below:

Period 5 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
2	38	\$ 46,578.00	\$ 1,769,964.00
3	15	\$ 59,474.00	\$ 892,110.00
12	70	\$ 45,834.00	\$ 3,208,380.00
15	56	\$ 49,101.00	\$ 2,749,656.00
23	14	\$ 62,301.00	\$ 872,214.00
Total			\$ 9,492,324.00

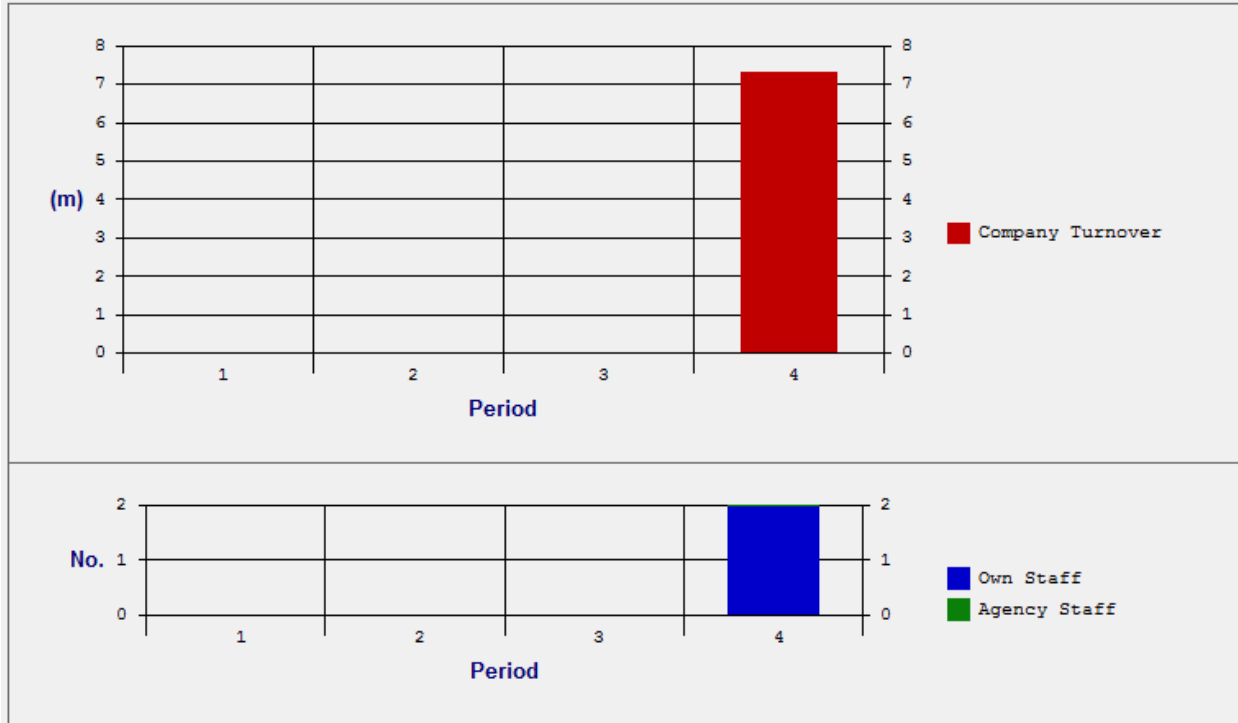
With an anticipated turnover of \$9.4M, the decision was made to hire an additional Estimating staff member to cover this amount. Employing a total of four Head Office staff members would allow approximately \$9.72M worth of turnover, which covered the anticipated amount shown above.

The QHSE staff handled the company quality, health, safety, and environmental issues. Using the same method as discussed for the Head Office department, the average turnover each staff member could handle was approximately \$3.6M. This is shown in the graphs below for the QHSE staff:



With this in mind, an additional QHSE staff member needed to be hired to cover the anticipated turnover of \$9.4M (previously calculated). With the addition of a staff member, the QHSE staff now totaled three people, and could easily cover the anticipated turnover. The QHSE staff could handle a total of \$10.8M in turnover.

The Measurement staff was responsible for acquiring the monetary payments from the clients. Similar to the QHSE staff, two were currently employed, making each able to handle \$3.6M in turnover. The graphs for this are shown below:



The decision was made to hire an additional Measurement staff member to cover the anticipated turnover. Like the QHSE staff, a total of three Measurement staff could handle a total of \$10.8M in turnover.

Not acquiring the proper number of staff for Head Office, QHSE, or Measurement could have negatively affect several areas across the company’s construction jobs. An insufficient number of people in the Head Office staff would increase build costs for each job. An inadequate number of QHSE staff would increase both risk and build costs for each job. Lastly, a deficit in Measurement staff would decrease the company measured value, or turnover.

Estimating Decisions

The Procurement Manager (Steve) was in charge of the Estimating decisions that included decisions on how many man weeks should be allotted to estimate each upcoming job. This must take into account estimating costs and associated risks. Steve discussed with Safa and me which of the jobs for which the company pre-qualified should be bid each period. For Period 5, the company pre-qualified for three jobs: 36, 39, and 40. Two main factors went into the consideration of allocated man weeks to estimate each job. The first was the anticipated estimating cost and the second was the complexity level of the project. Both of these are shown for the three Period 5 jobs in the figure below:

Job	Type	Approx. Value	Desc	Sector	Client	Expected Estimating Cost as a % of Approx Value	Additional % Cost due to Job Complexity	Estimating Effort to be Allocated (man weeks)
36	BO	1,000,000	Construction of Sludge drying beds	5	Devon and Cornwall Water Ltd	0.22	High 20 - 30 %	4
39	DB	3,000,000	Scheme to upgrade tidal defences	5	The Environment Department	0.15	High 20 - 30 %	8
40	BO	12,000,000	New social housing	2	London City Council	0.07	Medium 10 - 20 %	14

For Period 5, the decision was made to bid all three jobs. The additional percentage of cost due to job complexity was discussed and determined for each job based upon our company's ability to handle current risk.

The expected estimating cost is equal to the project's approximate value multiplied by the expected estimating cost percentage. The total estimating effort is then determined by multiplying the additional percentage used by the expected estimating cost and then adding this number to the expected estimating cost. These calculations are shown in the table below:

Period 5 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
36	BO	\$1,000,000.00	0.22	\$2,200.00	20% - 30%	0.27	\$ 2,794.00	3.8	4.0
39	DB	\$3,000,000.00	0.15	\$4,500.00	20% - 30%	0.27	\$ 5,715.00	7.8	8.0
40	BO	\$12,000,000.00	0.07	\$8,400.00	10% - 20%	0.15	\$ 9,660.00	13.2	14.0

Once the estimating effort is determined in dollar form, it must be converted to man weeks needed for each job. To do this, the MERIT tutorial explains that the average salary for a company Estimator (\$35,000) must be divided by the number of weeks worked per year (48 weeks). Note that 48 weeks is used instead of 52 weeks because the MERIT tutorial states that each employee is given four weeks of annual leave. Dividing \$35,000 by 48 weeks provides an estimating effort per man week of approximately \$730. To calculate the man weeks needed for each job (as shown in the chart above), the monetary value for estimating effort is divided by \$730. The numbers are then rounded up if the weeks are available to ensure high confidence in each estimate. The final column shown above dictates the total number of man weeks used for each job in Period 5.

Bidding Decisions

The jobs available for bidding are the jobs that were estimated in the previous period. In this case, there were three jobs: 24, 33, and 34. Two of these jobs were Design-Build, meaning a consultant must be brought on board for the design. For Job 24 (a transportation job), Consultant 8 (DK Risley and Partners) was hired due to their expertise in the Transport sector. The Robotham Group (or Consultant 15) was likewise hired for Job 34 because of their experience in the Building and Commercial industry. The estimated design cost, provided by the MERIT game, was 10% for each Design-Build job.

The chart below summarizes the calculations made in order to calculate the risk contingency for each job:

Job	Type	Desc	Sect	Client	Estimated Costs						
					Design % (of build)	Build Cost	Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted	
▶ 24	DB	New modern transit sheds at c	3	Tyne and Wear City Council	Y	10	3,067,032	8	631,824	5.6	4,229,870
33	BO	Restoration work on Montgom	5	English Waterways	Y		5,894,360		1,245,400	4.8	7,482,468
34	DB	Extension to head office	2	Maddison Bank Ltd	Y	10	8,094,320	15	1,583,000	4.7	10,979,630

The site support costs were determined each period by the company's in-house estimators and are shown in the Procurement tab under Job Details. The addition to the cost if risk occurs is also

project-specific and shown under Job Details. Multiplying this percentage by the build cost provides the possible risk cost if risk does occur on a job.

The percentage to cover risk is job-specific and depends on the project risk level. A low risk project has a 5-20% chance of risk occurring and something going wrong. A medium risk project has a 20-40% chance and a high risk project has a 40-50% chance of something going wrong. A percentage in this range was chosen for each job based on the team discussion. For Period 5, Jobs 24 and 33 were medium risk and Job 34 was low risk. The risk percentages chosen are shown in the table below:

Period 5 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
24	DB	10	\$3,067,032.00	8	\$615,000.00	25%	1.8%	\$55,206.58	25%	\$13,801.64
33	BO		\$5,894,360.00		\$1,180,000.00	30%	1.4%	\$82,521.04	30%	\$24,756.31
34	DB	10	\$8,094,320.00	15	\$1,630,000.00	10%	2.9%	\$234,735.28	10%	\$23,473.53

The percentage to cover risk chosen is then the percentage of the possible risk cost that is used for the risk contingency. This too is shown in the table above.

The next step was to calculate the overall bid that must be submitted for each job. I estimated the average salary of the project managers for each job based upon the type of job. (I read the summary and required salary for each potential project manager that may be hired in each building sector). Steve and I then used the MERIT tutorial that provided 15% estimated project manager bonus for each job. Finally, the predicted project manager cost for each job was calculated, taking into account the duration of the job (there are four periods in a year). This is shown in the chart below:

Period 5 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
24	3	\$46,000.00	15.00	\$41,400.00	1.25%	\$38,337.90	\$631,824.00	5.6%	\$4,229,870.00
33	3	\$46,000.00	15.00	\$41,400.00			\$1,245,400.00	4.8%	\$7,482,468.00
34	3	\$55,000.00	15.00	\$49,500.00	1.50%	\$121,414.80	\$1,583,000.00	4.7%	\$10,979,630.00

The next step was to estimate the predicted cost savings that would be passed onto the client because of the anticipated quality of the design created by the design consultant. (This is only estimated for the jobs that are Design-Build). This percentage must be 0-3%, and chosen by the team based on the relationship with the owner for each job and which job we wanted to win over other jobs. The predicted savings amount was calculated by taking the chosen percentage of the initial build cost. The total on cost amount is then equal to the sum of the risk cost and manager cost minus the predicted savings. Lastly, a percentage of mark-up was selected by the team. This mark-up should generally be 4% for large jobs, 5% for medium jobs, and 4% for smaller jobs. Because our team wanted to win Job 24 more than the other two, we selected a markup of 5.6% which totaled our submitted bid to \$4,229,870.

Personnel Decisions

A project manager was required for each on-going construction job in the company. It was next necessary to determine which project managers should be hired for the two new jobs that were won in Period 4. Joan Bromley was selected for Job 15 because she was an expert in transport jobs and her salary was only \$53,800 with a signing bonus of \$13,000. Chas Cocburn was hired for Job 23 because he had a lot of experience in the building and commercial industry and his salary was only \$32,000 with no required signing bonus. Selecting a project manager with experience in the correct field of construction is key, as it allows the project manager to better handle resources, promote efficiency, and build a stronger relationship with the client.

The bonuses paid to the existing project managers are shown in the image below:

On-Going Jobs				Last Period		This Period	
Job	Desc	Sector	Proj Mgr	Proj Mgr	% Bonus		
2	Upgrade leisure facilities in local park	Building & Commercial	43	43	4	Recruit	
3	Upgrade of ozone treatment plant	Water & Sewage	61	61	3	Details	
12	Extend and upgrade leisure centre	Building & Commercial	47	47	4	Payoff	
15	Car plant access road	Transport	0	22	0	Transfer To Pool	
23	Improve sailing facilities	Building & Commercial	0	24	0	Transfer To Job	

These percentages were the same bonuses as paid in Period 4, which is why they were selected.

Construction Decisions

The last step in the decision-making process was to ensure that the number of on-site workers is appropriate for each stage of each job. If the workforce is insufficient for a particular job, the project will fall behind schedule. If there are too many workers on-site, the job will be considered over-crowded and this will also decrease the efficiency. I also discovered that if a job is completed ahead of schedule, then the relationship with the client is improved.

To calculate these, it was necessary to consider the percentage of completion and duration of each job. The planned labor levels shown in the image above were determined during the estimating stage of the project and were based on a number that would ensure the project was completed on time. They are essentially guidelines, so if a project was ahead of schedule less labor may be needed on-site.

Under Job Details for each job, the completion and performance for each job is described. This is summarized in the table below:

Period 5 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
2	55.3%	45%		84.0			38	\$7,308.00	\$ 277,704.00	\$ 278,000.00
3	51.1%	49.0%		30.0			15	\$9,164.00	\$ 137,460.00	\$ 138,000.00
12	34.2%		20.8%	267.0			56.0	\$6,737.00	\$ 377,272.00	\$ 472,000.00
15	0.0%		40.0%	130.0	52.0	1.2	56.0	\$7,632.00	\$ 427,392.00	\$ 428,000.00
23	0.0%		30.0%	36.0	11.0	1.2	14.0	\$9,526.00	\$ 133,364.00	\$ 134,000.00

If the job is finishing in its current period, we simply had to take the percentage needed for completion out of the total man labor periods needed to complete the construction project; this was done for Jobs 2 and 3. For Job 12, we first took the planned cumulative percentage complete for the current period and subtracted the actual percentage of completion. This provided the percentage needed in order for the project to remain on schedule. Finally, this percentage needed for the project to remain on schedule was taken from the total man labor periods to provide the total manpower required for that particular period. An example of the estimated details by period is shown for Job 12 below:

Estimated Details by Period					
Job Period	Build Cost	Site Cost	Labour Manning	Expected Value	Cumulative % Complete
1	2,248,324	449,665	67	3,059,401	25
2	2,697,989	539,598	80	3,671,281	55
3	2,697,989	539,598	80	3,671,281	85
4	1,348,995	269,799	40	1,835,641	100
Total Labour Manning:			267	man periods	

Jobs 15 and 23 were next to be calculated. The percentage needed to be on schedule (calculated during the estimating stage of the project) was taken into the total man labor periods for the job. This provided the total manpower needed on-site for that period. It should be noted that for these two particular jobs, our company needed to hire additional manpower. New hires are only 80% productive, so a 1.2 productivity factor was used to calculate the total manpower required.

Once the manpower was calculated for each job, the site cost (provided during the estimating stage of the project) was multiplied by the manpower required to come up with the total site cost allocation. Taking all of these into consideration, the following image shows the labor allocation and site costs associated with each job:

On-Going Jobs															
Job	Last Period				Site Cost Paid	Job Status	Planned Labour	This Period			Own Labour Transfers				Site Cost Allocation
	Total	Own	Sub					Total	Own	Sub	From ILP	New	To ILP	Paid Off	
2	46	46	0		339,535	In Second Period	50	38	38	0	0	0	8	0	278000
3	15	15	0		138,841	In Second Period	18	15	15	0	0	0	0	0	138000
12	98	98	0		666,784	In Second Period	80	70	70	0	0	0	28	0	472000
15	0	0	0			In First Period	52	56	56	0	36	20	0	0	428000
23	0	0	0			In First Period	11	14	14	0	0	14	0	0	134000

PERIOD SIX DECISIONS:

Financial Decisions

As previously discussed, the first step was to analyze the results from the Period 5 decisions. The shareholders remained content with their level of dividend paid, so Mia decided to keep it at 1.5% (or \$81,000). Now that the company had a little bit more Cash A/C to work with (thanks to income from our ongoing jobs), we decided to increase the Capital Base so that we had the ability to win more jobs. We noticed that though we won Jobs 24 and 33 bid in Period 5, we lost Job 34 because our Capital Base did not support further workload. (This is shown in the External Performance Review under the Bidding category). We also discovered under the Workload Limits screen that the upper threshold for work load limits could not exceed 11 times the Capital Base (or \$41,253,070 for this period). This was also a contributing factor to why we decided to increase the Capital Base by the maximum amount, or \$340,934.

Mia also decided which investments should be increased or reduced and discussed it with both me and Safa. It was decided that the investments in Carter & Crisp BLD Services, DBY Equipment Ltd, and Midlands Aggregate Plc would all be increased due to their high percentages of return. The investment with Midlands Aggregate Plc was increased the most because it not only had the highest percent of return at 6.6%, but also provided significant building cost savings for several jobs.

The percent investment with Mockridge & Sons Joinery Ltd was reduced by \$50,000 because its percent return decreased in Period 5 from 3.5% to 2.6%. The total invested value of \$100,200 was removed from Stressed Out Plc due to a drop in its percent return from 2.9% to 0.2%.

We then decided to open a new investment with Youngs Surveyors because we were able to have a maximum of five investments at once and we felt it was safer to spread our money out over different companies. We also selected Youngs Surveyors over other options because at 3.8% it had one of the highest percentage rates of return. These investment decisions are demonstrated in the chart shown below:

Period 6 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$214,744.00	\$ 25,000.00	\$ -	\$239,744.00	4.6%	-
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$214,526.00	\$ 25,000.00	\$ -	\$239,526.00	4.8%	-
Midlands Aggregate Plc	Small	Quarry Products	\$ 53,300.00	\$ 50,000.00	\$ -	\$103,300.00	6.6%	Industrial; Building & Commercial; Transport
Mockridge & Sons Joinery Ltd	Medium	High Quality Bespoke Joinery	\$216,523.00	\$ -	\$ 50,000.00	\$166,523.00	2.6%	Building & Commercial
Stressed Out Plc	Medium	Steelwork Structures	\$100,200.00	\$ -	\$100,200.00	\$ -	0.2%	Industrial; Building & Commercial
Youngs Surveyors	Medium	Property Management & Chartered Surveyors	\$ -	\$ 25,000.00	\$ -	\$ 25,000.00	3.8%	-
Total								

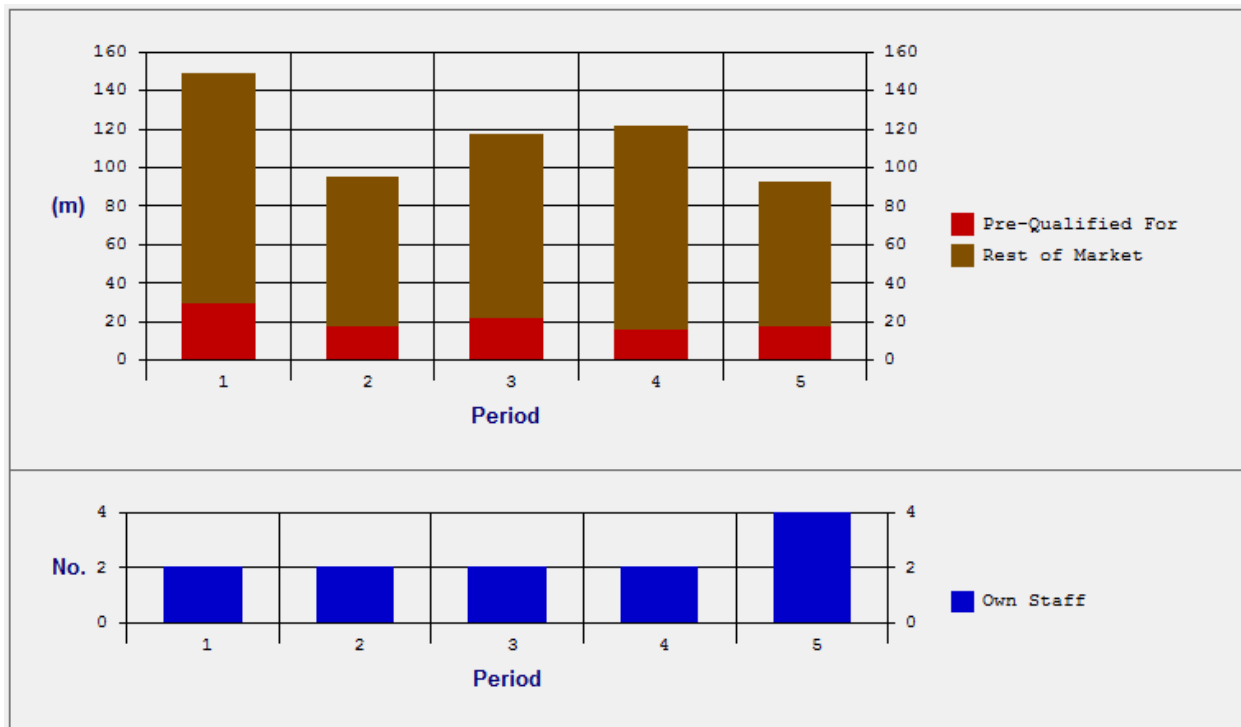
The final company assets after all decisions were made are shown in the image below:

Assets after Decisions

Cash A/C:	98,824		
Capital Base:	3,750,279		
Investments:	774,093	Company Value:	4,623,196

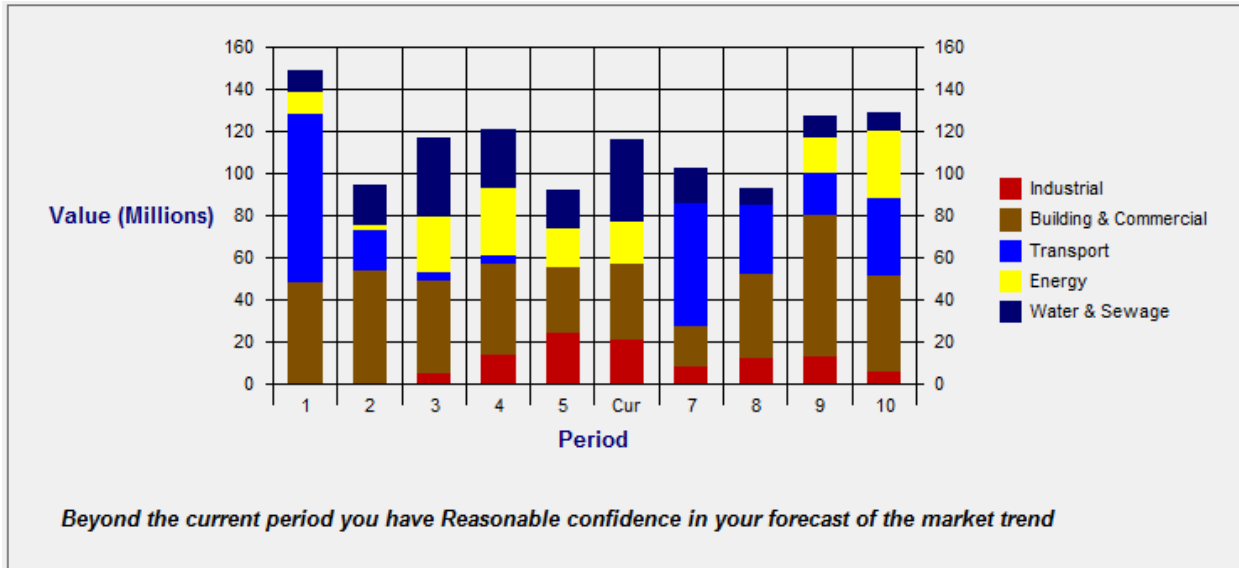
Overhead Decisions

When analyzing the External Performance Review for the Overheads category, we saw only positive comments from the decisions we made in Period 5. Building costs were reduced across all of our jobs because the staffs of the Head Office, QHSE, and Measurement were all able to support the company turnover. With a total of four staff members, the Marketing department allowed the company to pre-qualify for approximately 22% of the total market. This is shown in the chart below:



Though this improved over the previous period, we decided to increase the number by another two staff members, the maximum allowed number.

The company's Market Analysis was analyzed and the percentage breakdown for each sector was based upon the predicted sector distributions. Both the predicted breakdown for future periods and the percentage breakdown for Period 6 are shown below:



Split of the Marketing Overhead between Sectors

			Last Period	This Period
	Sector	Desc	% split	% Split
▶	1	Industrial	10	9
	2	Building & Commercial	36	46
	3	Transport	14	24
	4	Energy	17	7
	5	Water & Sewage	23	14

100

The Estimating department was next to be evaluated. With three current staff members, a total of 36 estimating man weeks were available (12 weeks per staff member). This number was greater than the total 28 weeks needed, so no additional staff members were hired. Note that the derivation of the needed 28 weeks for estimating is shown in the Estimating Decisions section.

Based on what was calculated in the Period 5 decision discussion, each Head Office staff member could handle \$2.43M worth of work per period. The total turnover was calculated for this period using the method previously discussed and is shown in the chart below:

Period 6 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
12	70	\$ 45,834.00	\$ 3,208,380.00
15	78	\$ 49,101.00	\$ 3,829,878.00
23	18	\$ 62,301.00	\$ 1,121,418.00
24	26	\$ 48,067.00	\$ 1,249,742.00
33	38	\$ 58,457.00	\$ 2,221,366.00
Total			\$ 11,630,784.00

Based on this turnover, we should have hired an additional Head Office staff member, but failed to catch a mistake in Sreelatha's math and decided to keep the current number at four staff. This mistake was also made for the QHSE and Measurement departments and their staffing levels were kept at three people for each department.

Estimating Decisions

There were an additional three jobs to bid in Period 6: Jobs 47, 49, and 54. The following man weeks needed were calculated using the same process discussed in Period 5 and are shown in the chart below:

Period 6 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
47	BO	\$2,000,000.00	0.18	\$3,600.00	10% - 20%	0.17	\$ 4,212.00	5.8	6.0
49	BO	\$8,000,000.00	0.08	\$6,400.00	10% - 20%	0.18	\$ 7,552.00	10.4	11.0
54	BO	\$8,000,000.00	0.08	\$6,400.00	10% - 20%	0.19	\$ 7,616.00	10.4	11.0

Because the total man weeks was 28 and well under the allotted 36 provided by our three estimating staff members, we decided as a team to bid all three jobs. These numbers are again based on an Estimating staff member salary of \$35,000 when they work 48 weeks per year.

Bidding Decisions

Based on the jobs estimated in Period 5, there were three possible jobs to bid in Period 6. We discovered this period the cost of bidding associated with the size of each job, which is shown in the Company and Financial Information under the Procurement tab. Despite these costs (shown below), we decided we wanted to estimate all three jobs in order to increase our company profit and reputation with prospective clients.

Costs	
The cost of Bidding is:	10,000 for a Large job
	7,500 for a Medium job
	5,000 for a Small job

Though Job 36 was considered a small job and our relationship with the client was only "satisfactory", we decided to bid that job because we wanted more experience in the water and sewage sector of the construction industry. We bid Job 39 for much the same reason, as it was again a small job in the water and sewage sector. This job, however, was a Design-Build job, meaning we could accrue a potential savings with the use of a design consultant. Consultant 19, James Every and Partners, was selected because of their expertise in the water and sewage sector and because the company has won several awards for their work.

Job 40 was the last job bid and was a medium-sized job in the building and commercial sector. We decided to bid Job 40 because we had a "fairly good" relationship with the client and because it was

in the building and commercial sector of the construction industry, which was our company's specialty. It was also only 132 miles from the head office (a relatively short distance when compared with some of the previous jobs bid and won by our company). We noticed this period that under the External Performance Review, we could see that some of the project manager's performance levels decreased because they did not like the far distance from the head office.

Our risk contingency was calculated the same way as Period 5, and we made sure to include a higher risk contingency for Job 39 because it was considered high risk. These calculations are shown in the chart below:

Period 6 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
36	BO		\$1,177,247.00		\$236,000.00	10%	3.1%	\$36,494.66	30%	\$10,948.40
39	DB	10	\$2,568,964.00	19	\$515,000.00	45%	2.4%	\$61,655.14	60%	\$36,993.08
40	BO		\$9,660,081.00		\$1,935,000.00	30%	3.6%	\$347,762.92	25%	\$86,940.73

The bid calculations were again calculated the same way as Period 5, though we decided to increase the estimated project manager cost for the first two jobs based upon the possible available water and sewage managers. We also increased the project manager cost of Job 40 because when we analyzed the performance of our project managers and compared it with their salaries, we noticed that the higher paid managers performed at a higher level. The bid calculations can be seen in the chart below:

Period 6 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
24	3	\$55,000.00	15.00			\$0.00	\$296,500.00	6.0%	\$1,562,172.00
33	2	\$55,000.00	15.00		0.50%	\$12,844.82	\$574,750.00	5.9%	\$3,601,246.00
34	4	\$60,000.00	15.00			\$0.00	\$2,091,000.00	4.5%	\$12,279,880.00

As seen in this chart, we selected a small predicted cost savings (only 0.5%), because of the high risk level associated with Job 33. We also placed a higher markup on the first two jobs because we were mainly focused on winning the bid of the third and largest job.

The image below summarizes the overall bidding decisions made for Period 6:

Estimated Costs										
Job	Type	Desc	Sect	Client	Design % Bid (of build)	Build Cost	Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted
36	BO	Construction of Sludge drying	5	Devon and Cornwall Water	Y	1,177,247		296,500	6.0	1,562,172
39	DB	Scheme to upgrade tidal defer	5	The Environment Department	Y	2,568,964	19	574,750	5.9	3,601,246
40	BO	New social housing	2	London City Council	Y	9,660,081		2,091,000	4.5	12,279,880

Personnel Decisions

We discovered this period that we could see factors that affected our project manager's performance levels (and their overall performance) under the External Performance Review screen

with the construction category selected. After reviewing all of our project managers, there were two problems that we came across. The first was the fact that Project Manager 47 resigned because he was poached by another company. The second problem was that one of our new hires from Period 5 (Project Manager 24) had an overall poor performance.

Our first step was to replace Project Manager 47, because his job was still ongoing. We chose to use Brock (Project Manager 43), who was already employed with the company and had just completed his job. We made this decision because he was an expert in the building and commercial sector and because he had previous experience with the company. We also relocated Ahmed (Project Manager 61) to Job 33 because his previous job was completed. Ahmed was considered a good fit for this job because he specialized in the water and sewage industry and because his past performance was always “very good”.

I then proposed the idea to move Project Manager 24 to Job 15, a transport job. This decision was made because we hoped it would improve his poor performance and because he had experience in all sectors of the construction industry.

We then hired one new project manager for Job 23, Roberta Brand (Project Manager 14), who specialized in the building and commercial industry and had many years of experience. Roberta required a salary of \$48,600 and no signing bonus, so we thought this was an acceptable amount based upon her past experience and history.

The bonuses paid to the existing project managers are shown in the image below:

On-Going Jobs							
				Last Period	This Period		
				Proj Mgr	Proj Mgr	% Bonus	
Job Details	▶	12	Extend and upgrade leisure centre	Building & Commercial	0	43	4
		15	Car plant access road	Transport	22	24	2
		23	Improve sailing facilities	Building & Commercial	24	14	0
		24	New modern transit sheds at docks	Transport	0	22	0
		33	Restoration work on Montgomery canal	Water & Sewage	0	61	3

Recruit

Details

Payoff

Transfer To Pool

Transfer To Job

We kept the bonuses paid to Project Managers 22, 43, and 61 the same, but increased the bonus paid to Project Manager 24 to 2% (even though his performance was poor). We did this because according to the MERIT game, the percentage of bonus paid increases the performance level of the project manager and we were hoping it would improve the performance of Project Manager 24.

Construction Decisions

The first thing noted when reviewing the construction information was that because two jobs completed in Period 5, there were now 53 workers in the idle pool. If these workers were not used on a job in Period 6, they could either remain in the pool or be paid off. Paying off each worker

costs \$3,000 a person, and allowing them to remain idle in the pool costs \$22,500 annually per worker. It was therefore in our best interest to ensure these workers were located on new jobs.

The site cost calculations for Period 6 were calculated the same way as detailed in Period 5. The results are shown in the chart below:

Period 6 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
12	61.1%		23.9%	267.0	30.0	1.2	70	\$6,737.00	\$ 471,590.00	\$ 472,000.00
15	41.6%	58.4%		130.0			78	\$7,632.00	\$ 595,296.00	\$ 595,000.00
23	32.7%		47.3%	36.0			18.0	\$9,526.00	\$ 171,468.00	\$ 172,000.00
24	0.0%		30.0%	88.0			26.0	\$6,971.00	\$ 181,246.00	\$ 182,000.00
33	0.0%		30.0%	36.0			38.0	\$9,210.00	\$ 349,980.00	\$ 350,000.00

This labor allotment ensured that we used all 53 workers in our idle pool and also hired an additional 30 workers. We chose to hire these new workers on an ongoing job (Job 12) because it was ahead of schedule. New workers are not as productive as experienced workers and we did not want our two new jobs to fall behind schedule. The final labor allocation and site costs associated with all of these decisions are shown in the image below:

On-Going Jobs																
Job	Last Period					This Period										
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation		
	Total	Own	Sub				Total	Own	Sub	From ILP	New	To ILP	Paid Off			
12	70	70	0	472,000	In Third Period	80	70	70	0	0	37	37	0	472000		
15	56	56	0	428,000	In Second Period	78	78	78	0	22	0	0	0	595000		
23	14	14	0	134,000	In Second Period	18	18	18	0	4	0	0	0	172000		
24	0	0	0		In First Period	26	26	26	0	26	0	0	0	182000		
▶ 33	0	0	0		In First Period	38	38	38	0	38	0	0	0	350000		

PERIOD SEVEN DECISIONS:

Financial Decisions

The shareholders were again content with the level of dividend paid in Period 6, so we decided as a team to keep the percent paid at 1.5% (or \$87,000). We also wanted to increase the Capital Base to ensure that we could bid as many jobs as possible, but could not increase it by the maximum amount (\$371,746) because we did not have enough cash in our Cash A/C account. We therefore decided to increase the Capital Base by \$171,000, which would keep approximately \$100,000 in our Cash A/C account. We did not want to go below \$100,000 in our Cash A/C account in case risk was incurred on a project and we needed this money to cover it.

Because we did not have much cash in our account to play with this period, most of the investments remained the same. They are shown in the table below:

Period 7 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$251,731.00	\$ -	\$ -	\$251,731.00	5.0%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$251,263.00	\$ -	\$ -	\$251,263.00	4.9%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$110,324.00	\$ -	\$ -	\$110,324.00	6.8%	Building & Commercial; Transport
Mockridge & Sons Joinery Ltd	Medium	High Quality Bespoke Joinery	\$171,519.00	\$ -	\$ -	\$171,519.00	3.0%	Building & Commercial
Youngs Surveyors	Medium	Property Management & Chartered Surveyors	\$ 25,925.00	\$ -	\$ 25,925.00	\$ -	3.7%	-
Total				\$350,000.00	\$251,450.00	\$251,450.00		

Mia decided to remove the Youngs Surveyors account, because we needed the cash to add into the Capital Base and because it had the second lowest rate of return to investors. Though Mockridge and Sons Joinery Ltd had the lowest rate of return, we decided to keep this investment the same because they had saved our company a total of \$52,701 in the building and commercial sector.

The final company assets after all decisions were made are shown in the image below:

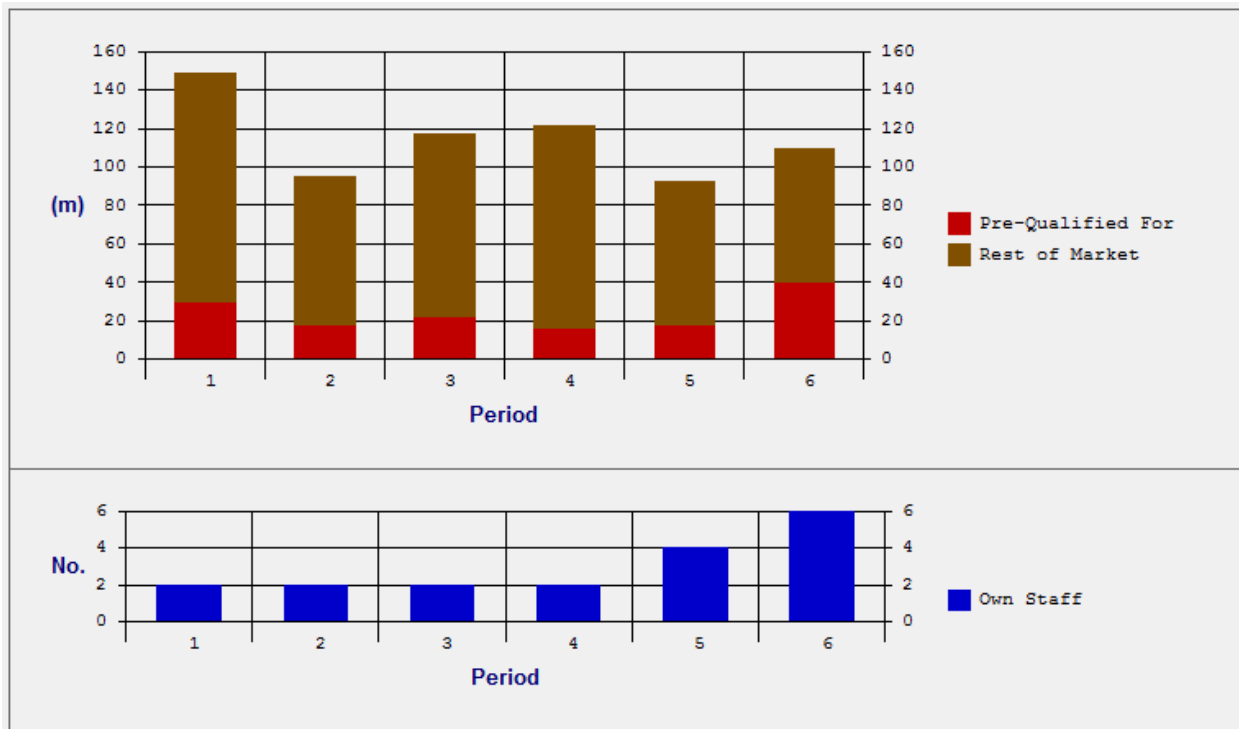
Assets after Decisions	
Cash A/C:	100,402
Capital Base:	3,888,464
Investments:	784,837
Company Value:	4,773,703

Overhead Decisions

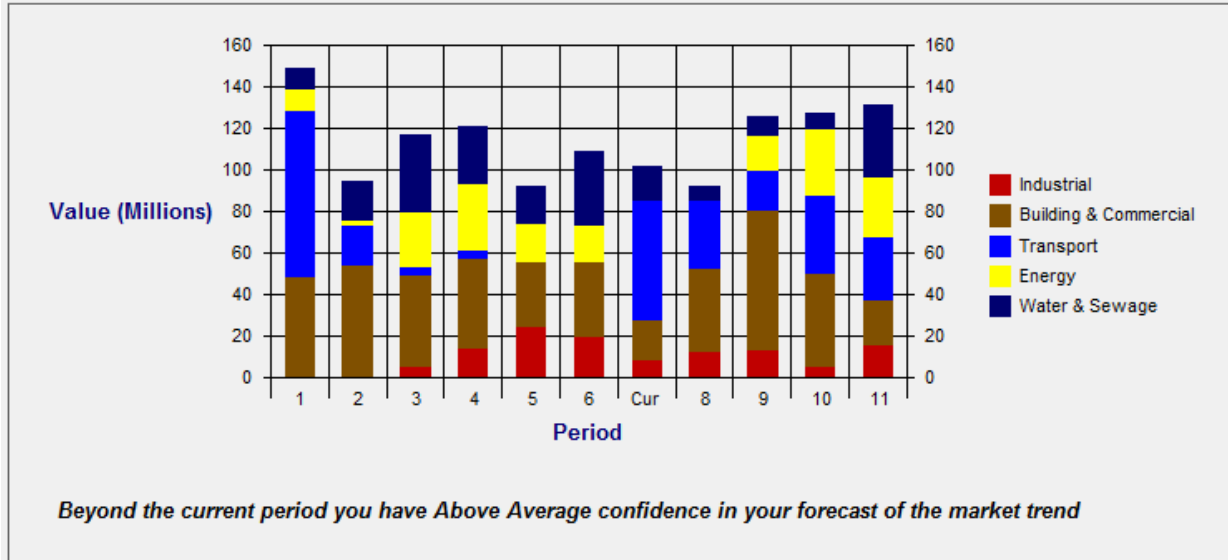
Because of the mistake we failed to catch in the previous period calculations for Head Office, QHSE, and Measurement staff, the External Performance review explained that we had a "slight understaffing" in all three departments. We did, however, have positive feedback in the Marketing

department, because our results stated that pre-qualification for Job 64 was permitted because of our standing relationship with the client.

As shown in the Past Performance chart for the Marketing department below, the company was able to pre-qualify for approximately \$40M of \$110M worth of the jobs (approximately 36% of the market). Sreelatha suggested we increase the Marketing department by the maximum number (two staff members) in order to pre-qualify for more jobs in the market. This brought our total number of Marketing staff to eight people.



Based upon the company's Market Analysis (shown below) for future periods, the percentage breakdown for each sector was discussed and input to the MERIT game.



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
	1	Industrial	9	7
	2	Building & Commercial	46	50
	3	Transport	24	29
	4	Energy	7	7
	5	Water & Sewage	14	7

100

For the Estimating department, it was decided that an additional two staff members be hired in order to bring the total man hours of estimating up to 60. It was calculated that 56 man hours would be needed to estimate all of the jobs in Period 7 (see the Estimating Decisions section); with two new hires, the Estimating department totaled five workers, each capable of working 12 weeks (for a total of 60 weeks). This would be sufficient to cover the new estimating work.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With four workers in the department, the department was able to handle \$9.73M in turnover. It was then necessary to calculate the anticipated turnover for the current period. This is detailed in Period 5 and shown in the chart below:

Period 7 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
12	45	\$ 45,834.00	\$ 2,062,530.00
23	10	\$ 62,301.00	\$ 623,010.00
24	46	\$ 48,067.00	\$ 2,211,082.00
33	70	\$ 58,457.00	\$ 4,091,990.00
36	10	\$ 57,858.00	\$ 578,580.00
40	49	\$ 65,668.00	\$ 3,217,732.00
Total			\$ 12,784,924.00

We made a decision to hire an additional Head Office staff member, making the department able to handle approximately \$12.15M in turnover. While we should have hired an additional staff member to make up the difference, Sreelatha's calculations for this period (and every other period) used the total labor on site for the last period rather than the current period. I did not catch this mistake until the completion of the MERIT game.

We also decided to hire an additional staff member for both the QHSE and Measurement departments. As previously discussed, each staff member in both departments was able to handle \$3.6M worth of turnover. Hiring an additional person for each of these two departments made a total of four people in each department able to handle \$14.4M in turnover, well over the anticipated amount of \$12.7M.

Estimating Decisions

Because we increased the number of Marketing staff in the previous period, there were four additional jobs to bid this period: 57, 60, 63, and 64. The first three jobs were in the building and commercial sector (our company's specialty) and the last job was in the water and sewage industry.

The first step was to calculate the estimated allotted man weeks that would be needed to estimate each job. This was done the same way as previous periods and is shown in the chart below:

Period 7 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
57	DB	\$10,000,000.00	0.08	\$8,000.00	10% - 20%	0.16	\$ 9,280.00	12.7	14.0
60	BO	\$10,000,000.00	0.08	\$8,000.00	10% - 20%	0.16	\$ 9,280.00	12.7	14.0
63	DB	\$9,000,000.00	0.08	\$7,200.00	10% - 20%	0.15	\$ 8,280.00	11.4	13.0
64	DB	\$11,000,000.00	0.07	\$7,700.00	20% - 30%	0.23	\$ 9,471.00	13.0	15.0

With a total allocation of 56 weeks, we hired an additional two Estimating staff to cover this work (discussed in the Overhead Decisions section). We wanted to estimate all four jobs so that we could bid and hopefully win as many as possible. These numbers are again based on an Estimating staff member salary of \$35,000 when they work 48 weeks per year.

Bidding Decisions

We had three possible jobs to bid this period and decided to bid all three, as we wanted to win as many as possible. Jobs 47 and 49 were in the building and commercial sector, and Job 54 was in the water and sewage sector. Job 47 was only 97 miles from the Head Office and also had a client with whom we had a “fairly good” relationship at the time. Job 49 was only 108 miles from the Head Office with a client relationship of “satisfactory”. We saw this as an opportunity to improve our relationship with this client. Job 54 was 142 miles away and had a client relationship of “satisfactory”. This was largest of the three jobs even though it had the highest risk, which was the main reason for bidding this job.

The risk calculations associated with each job were first calculated and are shown in the table below:

Period 7 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
47	BO		\$2,075,306.00		\$420,000.00	10%	3.9%	\$80,936.93	10%	\$8,093.69
49	BO		\$6,610,710.00		\$1,325,000.00	10%	3.7%	\$244,596.27	10%	\$24,459.63
54	BO		\$6,820,027.00		\$1,370,000.00	30%	1.3%	\$88,660.35	35%	\$31,031.12

Because there were not any Design-Build jobs this period, no consultants needed to be hired for the jobs. The overall bid calculations were next calculated, using the same methods as discussed in previous period discussions. These are shown in the table below:

Period 7 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
47	2	\$55,000.00	15.00	\$35,750.00		\$0.00	\$463,900.00	5.8%	\$2,686,480.00
49	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$1,404,500.00	4.8%	\$8,399,940.00
54	4	\$60,000.00	15.00	\$69,000.00		\$0.00	\$1,475,100.00	4.9%	\$8,701,588.00

We decided as a team that winning the first two jobs was a priority, because we were unsure if our capital base would support the winning of all three. We therefore made the markup on the first two jobs slightly lower than the third job. The image below summarizes all of the calculations and inputs for the Bidding Decisions section:

Estimated Costs											
Job	Type	Desc	Sect	Client	Design % Bid (of build)	Build Cost	Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted	
47	BO	Music academy refurbishment	2	London City Council	Y	2,075,306		463,900	5.8	2,686,480	
49	BO	Facelift to paralympic training f	2	Sport England	Y	6,610,710		1,404,500	4.8	8,399,940	
▶	54	BO	Construct Headworks and trar	5	Dales Water Services Ltd	Y	6,820,027	1,475,100	4.9	8,701,588	

Personnel Decisions

With two new jobs starting in Period 7, it was necessary to hire two new project managers: one in the water and sewage sector and one in the building and commercial sector. We also made the

team decision to payoff (or fire) Project Manager 24, whose performance remained poor and did not improve this period. His job had just completed, so we did not have to hire an additional manager to take his place.

The two managers we decided to hire were Project Manager 40 and Project Manager 59. Project Manager 40 (Jane Prince) had a bio that described her as detail-oriented and also listed her experience on a water supply project. It was for these reasons that we decided to hire her and pay her salary of \$52,800 and signing bonus of \$5,500. Project Manager 59 (Bacon), on the other hand, was highly regarded in the building and commercial industry, had 30 years of experience, but no formal qualifications. Though the team had an intense discussion on hiring Bacon, I believed he was a good candidate based upon his many years of experience. Bacon required a salary of \$53,600 and a signing bonus of \$5,400.

The next step was to assign the bonuses associated with each existing project manager. We increased the bonus paid to Project Manager 43 by 1% (now paying him a 5% bonus). This was hoping to improve his average performance level as a project manager. Project Manager 14 performed with a “very good” performance level and Project Manager 22 performed with an “excellent” performance level. We decided to give them each a bonus of 1%. Project Manager 61 also had an “excellent” performance level, but we kept his bonus the same at 3%. These bonuses paid are summarized below:

On-Going Jobs							
				Last Period	This Period		
Job Details	Job	Desc	Sector	Proj Mgr	Proj Mgr	% Bonus	
	12	Extend and upgrade leisure centre	Building & Commercial	43	43	5	Recruit
	23	Improve sailing facilities	Building & Commercial	14	14	1	Details
	24	New modern transit sheds at docks	Transport	22	22	1	Payoff
	33	Restoration work on Montgomery canal	Water & Sewage	61	61	3	Transfer To Pool
	36	Construction of Sludge drying beds	Water & Sewage	0	40	0	Transfer To Job
	▶ 40	New social housing	Building & Commercial	0	59	0	

Construction Decisions

Because Job 15 ended in Period 6, 78 workers were left in the labor pool. As previously discussed, it was in the company’s best interest to ensure these workers were allocated onto a job. We first calculated what manpower was required this period for each job using the methods previously discussed. This is shown in the chart below:

Period 7 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
12	85.5%	15%		267.0	40.0		40	\$ 6,737.00	\$ 269,480.00	\$ 304,000.00
23	83.7%	13.3%		36.0			5	\$ 9,526.00	\$ 47,630.00	\$ 96,000.00
24	30.4%		49.6%	88.0			44.0	\$ 6,971.00	\$ 306,724.00	\$ 321,000.00
33	30.4%		49.6%	36.0			64.0	\$ 9,210.00	\$ 589,440.00	\$ 645,000.00
36	0.0%		30.0%	27.0			8.0	\$ 8,720.00	\$ 69,760.00	\$ 88,000.00
40	0.0%		25.0%	187.0			47.0	\$10,332.00	\$ 485,604.00	\$ 507,000.00

Using the total manpower required for each job would still leave 22 workers in the idle labor pool. Because we did not want to leave any in the pool, we over-manned the jobs to make the idle pool zero. This labor allocation used is shown in the image below:

On-Going Jobs															
Job	Last Period					This Period									
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation	
	Total	Own	Sub				Total	Own	Sub	From ILP	New	To ILP	Paid Off		
12	70	70	0	472,000	In Fourth Period	40	45	45	0	0	0	0	25	0	304000
23	18	18	0	172,000	In Third Period	7	10	10	0	0	0	0	8	0	96000
24	26	26	0	182,000	In Second Period	44	46	46	0	20	0	0	0	0	321000
33	38	38	0	350,000	In Second Period	64	70	70	0	32	0	0	0	0	645000
36	0	0	0		In First Period	8	10	10	0	10	0	0	0	0	88000
▶ 40	0	0	0		In First Period	47	49	49	0	49	0	0	0	0	507000

Over-manning jobs increases their percent completion more quickly, and prevents us from paying \$22,500 annually per worker in the idle labor pool.

PERIOD EIGHT DECISIONS:

Financial Decisions

Though the shareholders were again content with the level of dividend paid to them (1.5%), I suggested increasing this amount to 1.6% (\$101,600) to increase their investment satisfaction. We also wanted to increase the Capital Base so that we could win as many jobs in the future as possible. We noticed that though we won the first two jobs we bid the previous period, we lost the third due to our Capital Base being unable to support the workload. We therefore increased the Capital Base by \$200,000.

We decided to keep most of the investments the same this period because most of them had a high percentage of return. We decided to increase the investment with Mockridge and Sons Joinery Ltd, however, because they continually saved us on building costs in the building and commercial sector. Our investment decisions are shown in the chart below:

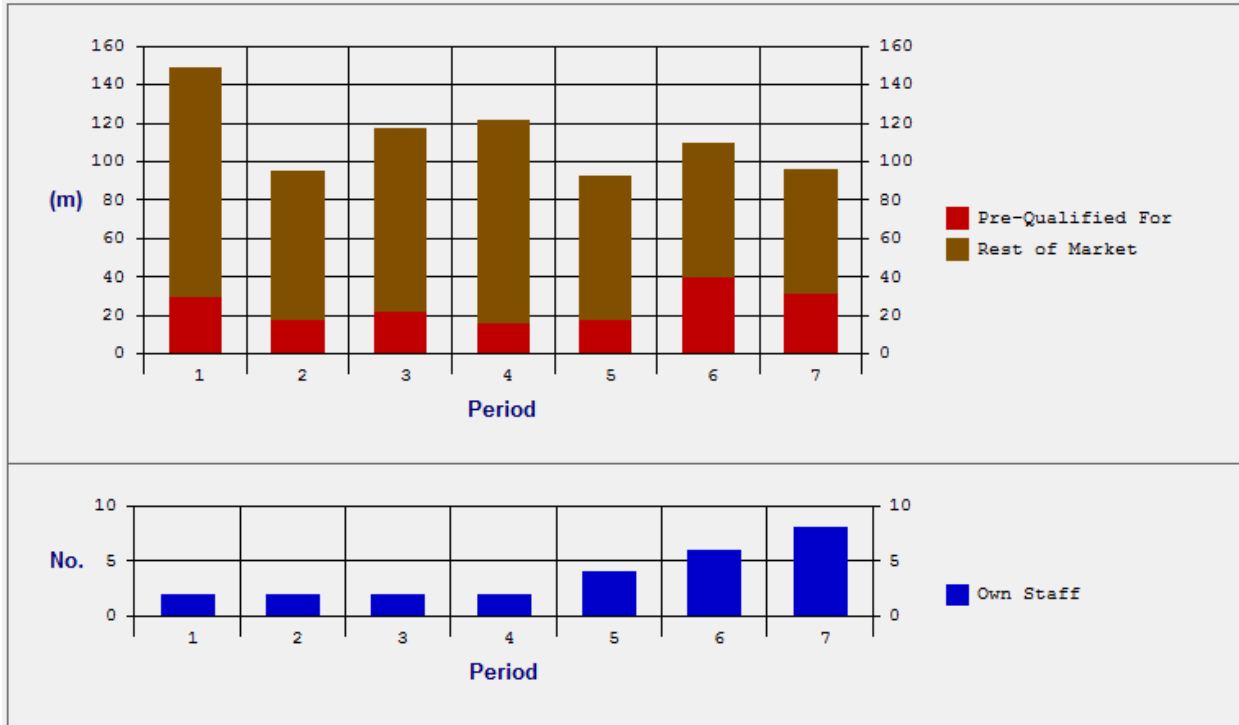
Period 8 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$263,814.00	\$ -	\$ -	\$263,814.00	4.8%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$262,319.00	\$ -	\$ -	\$262,319.00	4.4%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$119,040.00	\$ -	\$ -	\$119,040.00	7.9%	Building & Commercial; Transport
Mockridge & Sons Joinery Ltd	Medium	High Quality Bespoke Joinery	\$176,493.00	\$ 30,000.00	\$ -	\$206,493.00	2.9%	Building & Commercial
Total								

This provided us with the following assets after all decisions were made:

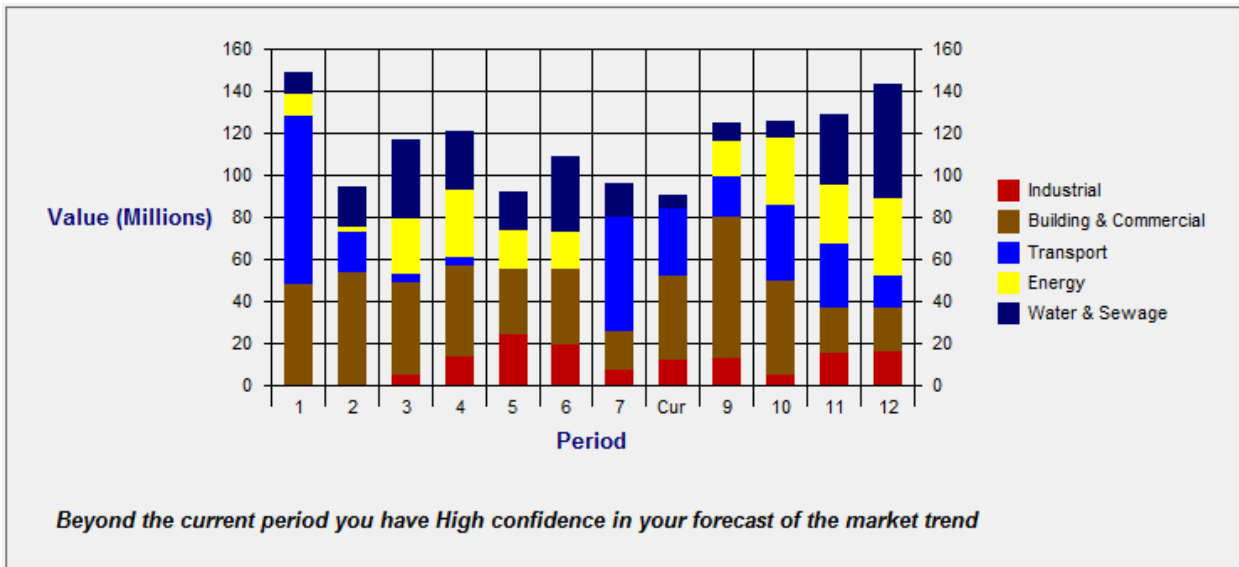
Assets after Decisions	
Cash A/C:	122,641
Capital Base:	4,054,440
Investments:	851,666
Company Value:	5,028,747

Overhead Decisions

The eight staff members in the Marketing department allowed our company to pre-qualify for 33.6% of the market jobs. This is shown in the chart below:



This meant that we had five jobs to estimate this period, even though our Capital Base would not support bidding and winning all of these jobs. For this reason I recommended leaving staffing level in the Marketing department at eight people. Based upon the company’s Market Analysis (shown below) for future periods, the percentage breakdown for each sector was discussed and input to the MERIT game.



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	7	4
	2	Building & Commercial	50	50
	3	Transport	29	22
	4	Energy	7	17
	5	Water & Sewage	7	7
				100

The Estimating department had five staff members, meaning they worked a collective total of 60 weeks (12 per worker). Because only 54 weeks were needed for this period, we kept the number of Estimating staff the same. The estimating weeks needed for this period are calculated in the Estimating Decisions section.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With five staff members currently employed in the Head Office department, the department was able to handle \$12.15M worth of turnover. The calculations for the anticipated company turnover for Period 8 are shown below:

Period 8 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
24	26	\$ 48,067.00	\$ 1,249,742.00
33	32	\$ 58,457.00	\$ 1,870,624.00
36	17	\$ 57,858.00	\$ 983,586.00
40	68	\$ 65,668.00	\$ 4,465,424.00
47	29	\$ 48,845.00	\$ 1,416,505.00
49	58	\$ 58,333.00	\$ 3,383,314.00
Total			\$ 13,369,195.00

Because of the miscalculations already discussed on the anticipated turnover, Sreelatha suggested that we hire three new staff members for the Head Office department (instead of the needed one member).

We then decided to hire two additional staff in both the QHSE and Measurement departments. Each worker could handle \$3.6M worth of turnover, making both departments able to handle \$21.6M each (with six workers). This is well over the anticipated turnover.

Estimating Decisions

Increasing the number of Marketing staff in Period 7 allowed for us to be pre-qualified for five jobs to estimate this period. The first step was to calculate the estimated allotted man weeks that would

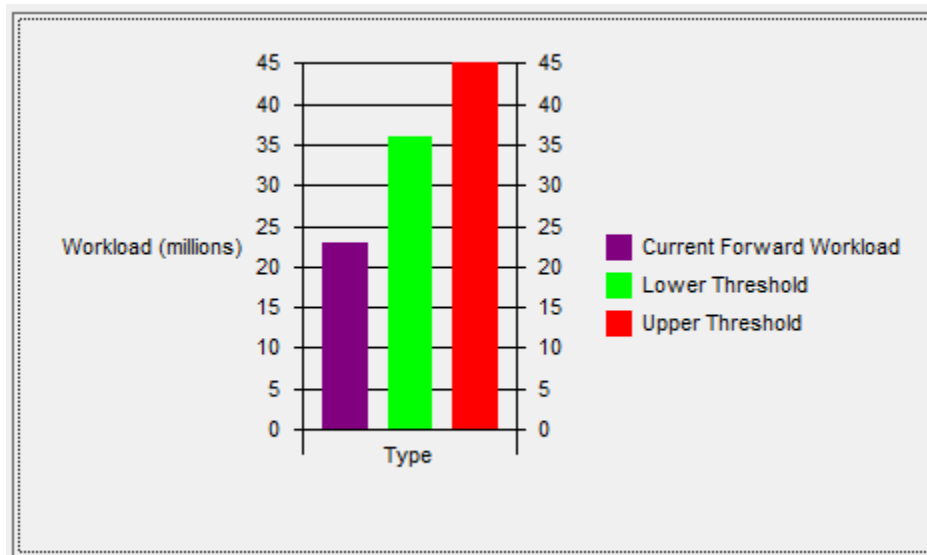
be needed to estimate each job. This was done the same way as previous periods and is shown in the chart below:

Period 8 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
66	BO	\$2,000,000.00	0.18	\$3,600.00	10% - 20%	0.2	\$ 4,320.00	5.9	7.0
67	BO	\$3,000,000.00	0.15	\$4,500.00	10% - 20%	0.2	\$ 5,400.00	7.4	9.0
68	BO	\$7,000,000.00	0.09	\$6,300.00	10% - 20%	0.12	\$ 7,056.00	9.7	11.0
69	BO	\$9,000,000.00	0.08	\$7,200.00	10% - 20%	0.12	\$ 8,064.00	11.1	13.0
74	BO	\$11,000,000.00	0.07	\$7,700.00	10% - 20%	0.12	8624	11.8272	14

Because we had the man weeks needed (54 weeks), Steve recommended that we bid all five jobs: 66, 67, 68, 69, and 74. Job 66 was a small job in the water and sewage industry, Jobs 67, 68, and 69 were in the building and commercial industry, and Job 74 was in the transport industry. These numbers are again based on an Estimating staff member salary of \$35,000 when they work 48 weeks per year.

Bidding Decisions

Because I noticed that we again lost the third job we bid in Period 7 due to our Capital Base not supporting further workload, I wanted to find a way to anticipate this and calculate our workload so as to better select which jobs we should bid. I discovered under the MERIT Information column that the Workload Limits window explains that the upper threshold for work is eleven times the current Capital Base (in this case, \$44,598,840). With a forward workload of \$22,716,280, we had the potential to win \$21,882,560 worth of new work. The upper and lower workload thresholds are shown in the graph below:



To proceed, we had to calculate the risk contingency and then bid decisions to see which jobs we could bid that would fall into the permitted workload amount. The risk calculations associated with each job were first calculated and are shown in the table below:

Period 8 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
57	DB	10	\$7,904,520.00	15	\$1,590,000.00	45%	3.9%	\$308,276.28	45%	\$138,724.33
60	BO		\$8,511,340.00		\$1,750,000.00	30%	3.1%	\$263,851.54	25%	\$65,962.89
63	DB	10	\$7,134,909.00	18	\$1,450,000.00	30%	1.5%	\$107,023.64	30%	\$32,107.09
64	DB	10	\$8,163,246.00	24	\$1,370,000.00	30%	2.1%	\$171,428.17	30%	\$51,428.45

The Robotham Group (Consultant 15) was selected for Job 57 because of their experience in the building and commercial industry and their reputation as a successful family-run company over the past 25 years. Consultant 18, Chester Consultants, was chosen for Job 63 because the company specialized in new building design in the building and commercial industry and was known for its teamwork, planning, communication, and commitment. The ORT Partnership (Consultant 24) was selected for Job 64 because they worked solely in the water and sewage industry and had high quality due to their work in computer-aided design.

Once the consultants were selected and the risk contingency was calculated for each job (using the same method as discussed in Period 5), the submitted bid had to be calculated for each job. This is shown below:

Period 8 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
57	3	\$55,000.00	15.00	\$49,500.00	1.50%	\$118,567.80	\$1,659,000.00	4.9%	\$10,861,320.00
60	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$0.00	0.0%	\$0.00
63	3	\$50,000.00	15.00	\$45,000.00	1.50%	\$107,023.64	\$1,420,000.00	5.1%	\$9,741,088.00
64	3	\$45,000.00	16.00	\$40,950.00	1.50%	\$122,448.69	\$1,340,000.00	5.0%	\$10,835,550.00

Based on the job build costs alone (shown below) we realized that we would not be able to bid and win all four jobs.

Estimated Costs												
Job	Type	Desc	Sect	Client	Bid	Design % (of build)	Build Cost	Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted	
57	DB	Build state-of-art fencing comp	2	Sport England	Y	10	7,904,520	15	1,659,000	4.9	10,861,320	
60	BO	Construction of a fast-food uni	2	Saintesc Foods	N		8,511,340		0	0.0	0	
63	DB	Build mental health unit	2	New Forest County Council	Y	10	7,134,909	18	1,420,000	5.1	9,741,088	
64	DB	Build interceptor sewer	5	London Water Services Ltd	Y	10	8,163,246	24	1,340,000	5.0	10,835,550	

We therefore decided to not bid Job 60, because it was a Build Only job and we would not be able to accrue any cost savings with the use of a consultant. Based upon the calculated bid, we knew we could only win two of the three other potential jobs. We decided to bid Jobs 57, 63, and 64 in case we lost one to other reasons, because we would still have two other chances. To ensure that we would win at least two of the jobs, we set up what MERIT calls Sequential Tendering. Because the jobs are bid in order, this option allowed us to decrease the markup on Jobs 63 and 64 by 0.3% if and only if we did not win Job 57. This is shown in the image below:

Activate Sequential Tendering:

If we win jobs then for all subsequent jobs that we bid for, the markup should be increased by %
 If we lose jobs then for all subsequent jobs that we bid for, the markup should be decreased by %

Personnel Decisions

Because two of our jobs completed in Period 7, two project managers were now present in the idle pool for this period. Though we had two new jobs that needed managers, only Project Manager 14 could be used on Job 49 because she specialized in the building and commercial industry. We hired Project Manager 19 (Charlie Burbridge) for the other job, as he was highly qualified in the building and commercial sector and considered a good team leader. Charlie cost \$53,500 with a signing bonus of \$11,000.

Unfortunately, Project Manager 22 resigned this period due to his bonus not being high enough (according to the External Performance Review). This left an opening on Job 24 that needed to be filled by a new or existing manager. We moved Project Manager 43 from the idle pool to Job 24, a transport job. I proposed this idea because he had experience in both the building and commercial and transport sectors, and I hoped it would improve his “average” performance.

The bonuses were then assigned for each of our company project managers. We decided to increase the bonus for Project Manager 43 by 1% up to 6% to see if this would improve his average performance rating. We also increased the bonus for Project Manager 61 by 1% up to 4% because this PM was doing a superior job and had an “excellent” rating. We also did this to ensure that he would not quit due to not receiving a high enough bonus. We increased the bonus for Project Managers 40 and 59 from 0% to 3% also trying to ensure they would not leave the company. Because Project Manager 19 was new to the company, we decided to provide a bonus of only 2%. Lastly, we increased Project Manager 14’s bonus from 1% to 3%. These bonus changes are shown below:

On-Going Jobs

Job Details	Job	Desc	Sector	Last Period		This Period		Recruit	Details	Payoff	Transfer To Pool	Transfer To Job
				Proj Mgr	Proj Mgr	Proj Mgr	% Bonus					
	24	New modern transit sheds at docks	Transport	0	43	6						
	33	Restoration work on Montgomery canal	Water & Sewage	61	61	4						
	36	Construction of Sludge drying beds	Water & Sewage	40	40	3						
	40	New social housing	Building & Commercial	59	59	3						
	47	Music academy refurbishment	Building & Commercial	0	19	2						
	49	Facelift to paralympic training facilities	Building & Commercial	0	14	4						

Construction Decisions

There were 55 workers in the idle labor pool after the completion of Period 7. The first step in relocating these workers was to calculate the manpower required for each site and the associated site costs. This is shown in the chart below:

Period 8 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
24	83.9%	16.1%		88.0			15.0	\$ 6,971.00	\$ 104,565.00	\$ 182,000.00
33	83.7%	13.3%		128.0			18.0	\$ 9,210.00	\$ 165,780.00	\$ 295,000.00
36	37.6%		42.4%	27.0			17.0	\$ 8,720.00	\$ 148,240.00	\$ 149,000.00
40	26.9%		28.1%	187.0			55.0	\$10,332.00	\$ 568,260.00	\$ 703,000.00
47	0.0%		40.0%	55.0			22.0	\$ 7,547.00	\$ 166,034.00	\$ 219,000.00
49	0.0%		30.0%	144.0			43.0	\$ 9,182.00	\$ 394,826.00	\$ 533,000.00

Because the total manpower required did not use all of the idle workers, we over-manned all five of the above jobs. The total number of workers allocated to each site is shown in the image below:

On-Going Jobs																
Job	Last Period					This Period										
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation		
	Total	Own	Sub				Total	Own	Sub	From ILP	New	To ILP	Paid Off			
24	46	46	0	321,000	In Third Period	18	26	26	0	0	0	0	20	0	182000	
33	70	70	0	645,000	In Third Period	26	32	32	0	0	0	0	38	0	295000	
36	10	10	0	88,000	In Second Period	14	17	17	0	7	0	0	0	0	149000	
40	49	49	0	507,000	In Second Period	56	68	68	0	19	0	0	0	0	703000	
47	0	0	0		In First Period	22	29	29	0	29	0	0	0	0	219000	
▶ 49	0	0	0		In First Period	43	58	58	0	58	0	0	0	0	533000	

PERIOD NINE DECISIONS:

Financial Decisions

All of the feedback shown in the External Performance Review was positive for this period. Shareholders were “pleased” with the amount of dividend we had paid them, so we decided to keep it at 1.6% or \$126,736. The other two positive comments mentioned that both the increasing company value and increasing future profitability improved industry confidence in our company. Now that we were beginning to receive more profit and had more cash in our Cash A/C account to work with, we decided to increase our Capital Base by the maximum amount of \$401,896. This would ensure that we were able to support as many ongoing jobs as possible.

The next step was to analyze the investments we had with other companies. We decided to increase the investments with both Carter and Crisp BLD Services and DBY Equipment Ltd by \$100,000 each and remove our investment with Mockridge and Sons Joinery Ltd. These decisions are shown in the table below:

Period 9 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$274,894.00	\$100,000.00	\$ -	\$374,894.00	4.2%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$273,336.00	\$100,000.00	\$ -	\$373,336.00	4.2%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$127,968.00	\$ -	\$ -	\$127,968.00	7.5%	Building & Commercial; Transport
Mockridge & Sons Joinery Ltd	Medium	High Quality Bespoke Joinery	\$211,036.00	\$ -	\$211,036.00	\$ -	2.2%	Building & Commercial
Total								

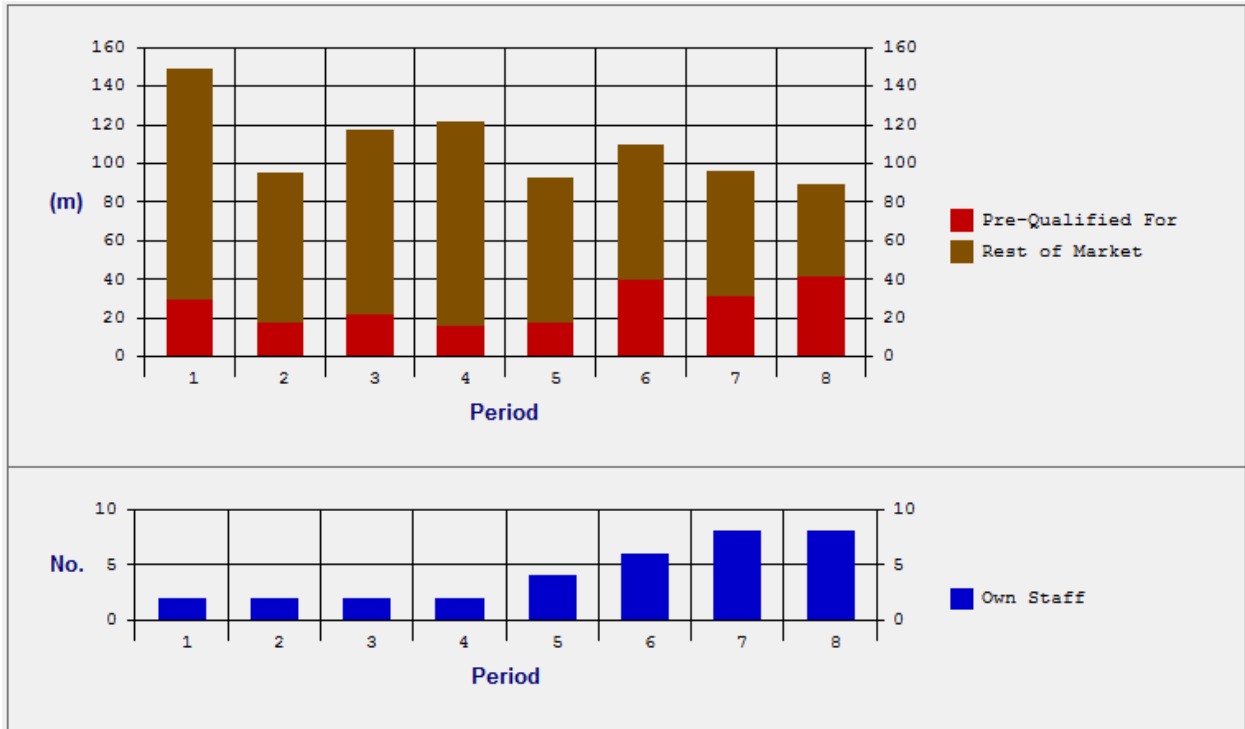
These two increases in investment were due to the relatively high percentage of return on investment, but mainly due to the savings in build costs associated with both companies. Carter and Crisp BLD Services saved our company a total of \$112,212 on all jobs and DBY Equipment Ltd did likewise, savings us a total of \$210,412. We removed our investment with Mockridge and Sons Joinery Ltd because its percent return had been steadily decreasing over the past three periods.

This provided us with the following assets after all decisions were made:

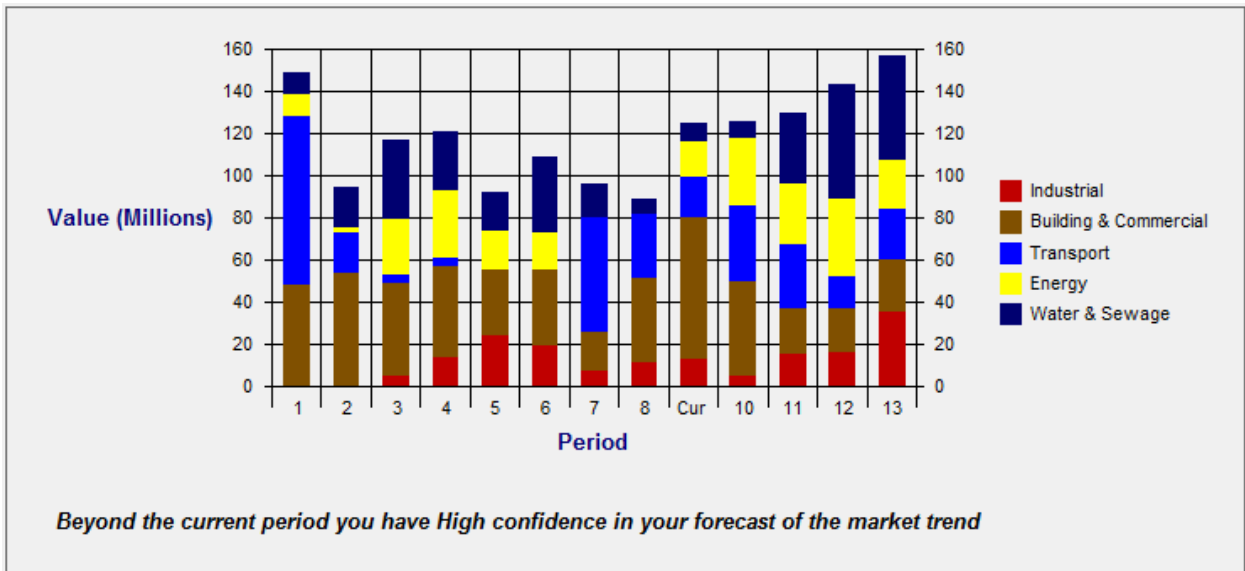
Assets after Decisions			
Cash A/C:		75,366	
Capital Base:		4,420,860	
Investments:	876,198		Company Value: 5,372,424

Overhead Decisions

The eight staff members in the Marketing department allowed our company to pre-qualify for approximately 46.5% of the market jobs. This is shown in the chart below:



We decided as a team that this was a significant enough amount for the time being to prevent us hiring any new Marketing staff members. We therefore moved on to analyze the estimated market trends for each construction sector. These are shown in the graph below:



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	4	4
	2	Building & Commercial	50	40
	3	Transport	22	19
	4	Energy	17	20
	5	Water & Sewage	7	17
				100

We decided to increase the percentage split in the energy sector by the maximum amount, or 10%, because it was trending towards greatly increasing over the oncoming periods.

The Estimating department had five staff members, meaning they worked a collective total of 60 weeks (12 per worker). Because only 44 weeks were needed for this period, we kept the number of Estimating staff the same. The estimating weeks needed for this period are calculated in the Estimating Decisions section.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With eight staff members currently employed in the Head Office department, the department was able to handle \$19.4M worth of turnover. The calculations for the anticipated company turnover for Period 9 are shown below:

Period 9 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
40	39	\$ 65,668.00	\$ 2,561,052.00
47	29	\$ 48,845.00	\$ 1,416,505.00
49	56	\$ 58,333.00	\$ 3,266,648.00
57	44	\$ 74,906.00	\$ 3,295,864.00
63	70	\$ 42,724.00	\$ 2,990,680.00
Total			\$ 13,530,749.00

Because of the miscalculations already discussed on the anticipated turnover, Sreelatha suggested that we hire one new staff member for the Head Office department, even though the eight existing staff could have easily handled the turnover.

We then decided to hire one additional staff member in both the QHSE and Measurement departments. Each worker could handle \$3.6M worth of turnover, making both departments able to handle \$25.2 each (with seven workers). This was well over the anticipated turnover.

Estimating Decisions

There were three possible jobs to estimate this period: Job 78, Job 80, and Job 83. Because we had 60 allotted estimating weeks and only 44 were needed to estimate these three jobs, we found it only logical to estimate all three jobs. The 44 total estimating hours were calculated in the chart below:

Period 9 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
78	BO	\$10,000,000.00	8%	\$8,000.00	0% - 10%	7%	\$ 8,560.00	11.7	13.0
80	BO	\$20,000,000.00	5%	\$10,000.00	10% - 20%	10%	\$11,000.00	15.1	17.0
83	DB	\$12,000,000.00	7%	\$8,400.00	10% - 20%	10%	\$ 9,240.00	12.7	14.0

These numbers are again based on an Estimating staff member salary of \$35,000 when they work 48 weeks per year.

Bidding Decisions

With five available jobs to bid this period, we knew that we would not be able to win them all and we were therefore selective in our choices. With an upper threshold workload limit of \$48,629,460, our current forward workload allowed us only \$17,482,360 worth of new work. We consequently decided to not bid the first two jobs, Jobs 66 and 67, because both were small jobs and both were approximately 250 miles from the Head Office. Focusing on Jobs 68, 69, and 74 (all medium-sized jobs), would allow us to theoretically win two of the three. The risk calculations associated with each job were first calculated and are shown in the table below:

Period 9 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
66	BO		\$1,271,660.00		\$255,000.00	45%	2.5%	\$31,791.50	45%	\$14,306.18
67	BO		\$2,465,126.00		\$500,000.00	30%	3.6%	\$88,744.54	30%	\$26,623.36
68	BO		\$5,617,701.00		\$1,125,000.00	45%	2.3%	\$129,207.12	45%	\$58,143.21
69	BO		\$7,141,410.00		\$1,430,000.00	10%	1.8%	\$128,545.38	10%	\$12,854.54
74	BO		\$9,426,360.00		\$1,890,000.00	30%	1.2%	\$113,116.32	25%	\$28,279.08

Because all of the jobs this period were Design-Build, it was not necessary to allocate any consultants. The bid calculations were then performed and are shown in the table below:

Period 9 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
66	3	\$45,000.00	16.00	\$49,500.00		\$0.00	\$0.00	0.0%	
67	3	\$55,000.00	15.00	\$51,300.00		\$0.00	\$0.00	0.0%	
68	3	\$57,000.00	15.00	\$49,500.00		\$0.00	\$1,236,000.00	4.7%	\$7,175,826.00
69	3	\$55,000.00	15.00	\$69,000.00		\$0.00	\$1,493,000.00	4.7%	\$9,040,228.00
74	4	\$60,000.00	15.00			\$0.00	\$1,987,500.00	4.7%	\$11,950,310.00

We knew that we would only be able to handle winning two of the three jobs, so we made the mark-up on all three 4.7%, because they were all generally the same size and we were not particular about which of the three we won. The summary of the build costs and bids submitted is shown in the image below:

Job	Type	Desc	Sect	Client	Bid	Estimated Costs		Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted
						Design % (of build)	Build Cost				
66	BO	Lake water transfer scheme	5	Devon and Cornwall Water	N		1,271,660		0	0.0	0
67	BO	Refurbish officers mess	2	The Defence Agency	N		2,465,126		0	0.0	0
68	BO	New respite and rehabilitation	2	South Wales County Council	Y		5,617,701		1,236,000	4.7	7,175,826
69	BO	New operating theatre at local	2	South Wales County Council	Y		7,141,410		1,493,000	4.7	9,040,228
74	BO	Construction of new jetty	3	Fenlands County Council	Y		9,426,360		1,987,500	4.7	11,950,310

Personnel Decisions

With three jobs ending in Period 8, we had three project managers present in the idle pool this period. We also lost Project Manager 59 because he resigned from the company due to his bonus not being high enough. With two new jobs, this left three openings on projects and three project managers in the idle pool.

We decided to pay off (or fire) Project Manager 43 because his performance was dreadful. We chose to keep Project Manager 61 in the idle labor pool for a period because his performance had been excellent but we had no water and sewage job in which to place him. Though the performance of Project Manager 40 had also been excellent, we chose to pay him off as well because we had no current water and sewage jobs and did not want to be paying two idle water and sewage project managers.

We then hired three new project managers, Project Manager 28, 36, and 47. All were highly qualified, had ample experience, and specialized in the building and commercial sector. Project Manager 28, or MacMillan, was hired at \$58,000 and a signing bonus of \$16,000. Project Manager 36 (Mowe) was hired with a salary of \$57,750 and a signing bonus of \$19,000. Project Manager 47, or Razali, was hired with a salary of \$59,850 and no signing bonus.

Because we had now lost two total project managers because they felt they had not received enough bonus, I played around with the program and found that we could view the Project Manager Performance History of each PM employed by our company. According to the MERIT tutorial, we are supposed to view the history and notice what percentage bonus paid provides a “noticeable” improvement in the project manager’s performance. An example of this is shown below:

Project Manager: **14 Brand, R**

Per Job	Sector	Basic Performance	Factors Improving Performance			Factors Deteriorating Performance			Overall Performance	Reason for leaving, if applicable	
			Time with the Company	Bonus payments in the period	% Bonus Improvement	Distance of the job from Head Office (miles)	Deterioration	Taking over from another Deterioration			
6	23	Building & Commercial	very good	none	0	none	199	noticeable	marginal	very good	
7	23	Building & Commercial	very good	marginal	1	marginal	199	noticeable	none	very good	
8	49	Building & Commercial	very good	marginal	4	noticeable	108	noticeable	none	excellent	

According to this, a percent bonus of 4% provides a noticeable improvement. We therefore increased all of our project manager’s bonuses to 4% (even the new hires) with the exception of Project Manager 49, who was decreased from a 6% to 5% bonus. This is summarized in the image shown below:

On-Going Jobs

			Last Period		This Period			
Job	Desc	Sector	Proj Mgr	Proj Mgr	% Bonus			
40	New social housing	Building & Commercial	0	28	4	Recruit		
47	Music academy refurbishment	Building & Commercial	19	19	4	Details		
49	Facelift to paralympic training facilities	Building & Commercial	14	14	5	Payoff		
57	Build state-of-art fencing complex	Building & Commercial	0	47	4	Transfer To Pool		
63	Build mental health unit	Building & Commercial	0	36	4	Transfer To Job		

Construction Decisions

Because of completed jobs in the previous period, there were 75 total workers in the idle labor pool this period. The first step in relocating these workers was to calculate the manpower required for each site and the associated site costs. This is shown in the chart below:

Period 9 Site Cost Calculations

Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
40	64.3%		15.7%	187.0			30.0	\$ 10,332.00	\$ 309,960.00	\$ 403,000.00
47	53.9%	46.1%		55.0			26.0	\$ 7,547.00	\$ 196,222.00	\$ 219,000.00
49	41.5%		38.5%	144.0			56.0	\$ 9,182.00	\$ 514,192.00	\$ 515,000.00
57	0.0%		30.0%	145.0			44.0	\$ 10,903.00	\$ 479,732.00	\$ 480,000.00
63	0.0%		30.0%	228.0			69.0	\$ 6,259.00	\$ 431,871.00	\$ 439,000.00

Because the total manpower required did not use all of the idle workers, we over-manned all five of the above jobs. The total number of workers allocated to each site is shown in the image below:

On-Going Jobs

Job	Last Period				This Period										
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation	
	Total	Own	Sub				Total	Own	Sub	From ILP	New	To ILP	Paid Off		
40	68	68	0	703,000	In Third Period	56	39	39	0	0	0	0	29	0	403000
47	29	29	0	219,000	In Second Period	33	29	29	0	0	0	0	0	0	219000
49	58	58	0	533,000	In Second Period	72	56	56	0	0	0	2	0	0	515000
57	0	0	0		In First Period	44	44	44	0	44	0	0	0	0	480000
63	0	0	0		In First Period	68	70	70	0	62	8	0	0	0	439000

PERIOD TEN DECISIONS:

Financial Decisions

Due to our many ongoing jobs generating profit, the amount of cash in our Cash A/C account increased this period. With more cash available, we increased the amount of dividend to pay shareholders to 1.8% (or \$176,400). We also increased our Capital Base by the maximum amount, or \$438,218. This still left us with a significant amount of cash to consider investing. The increase in our investments is shown in the table below:

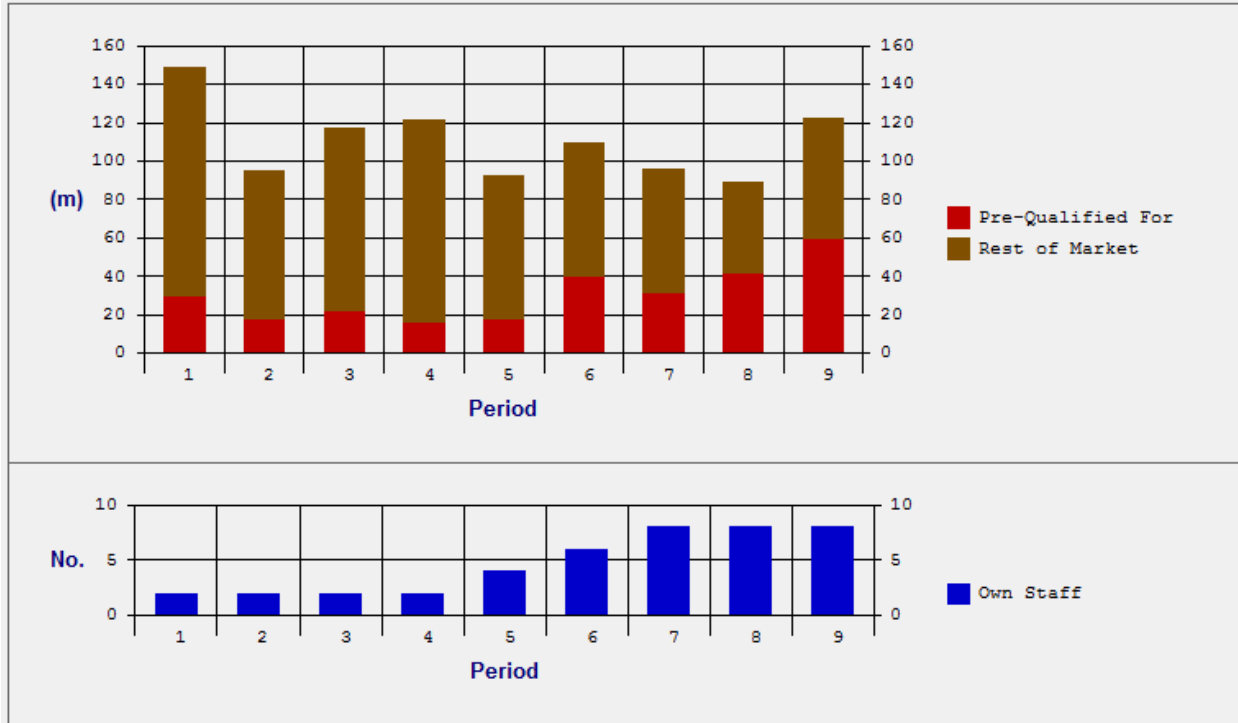
Period 10 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$396,263.00	\$ -	\$ -	\$396,263.00	5.7%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$389,016.00	\$100,000.00	\$ -	\$489,016.00	4.2%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$136,030.00	\$ 50,000.00	\$ -	\$186,030.00	6.3%	Building & Commercial; Transport
Total								

We increased our last two investments by the maximum amount permitted for that size of company. We increased with DBY Equipment Ltd because it provided a building cost savings in the highest number of industry sectors (three) and we increased with Midlands Aggregate Plc because it paid the highest percentage of return. After all of our decisions were made and input into the MERIT game, the follow totals comprised our company assets:

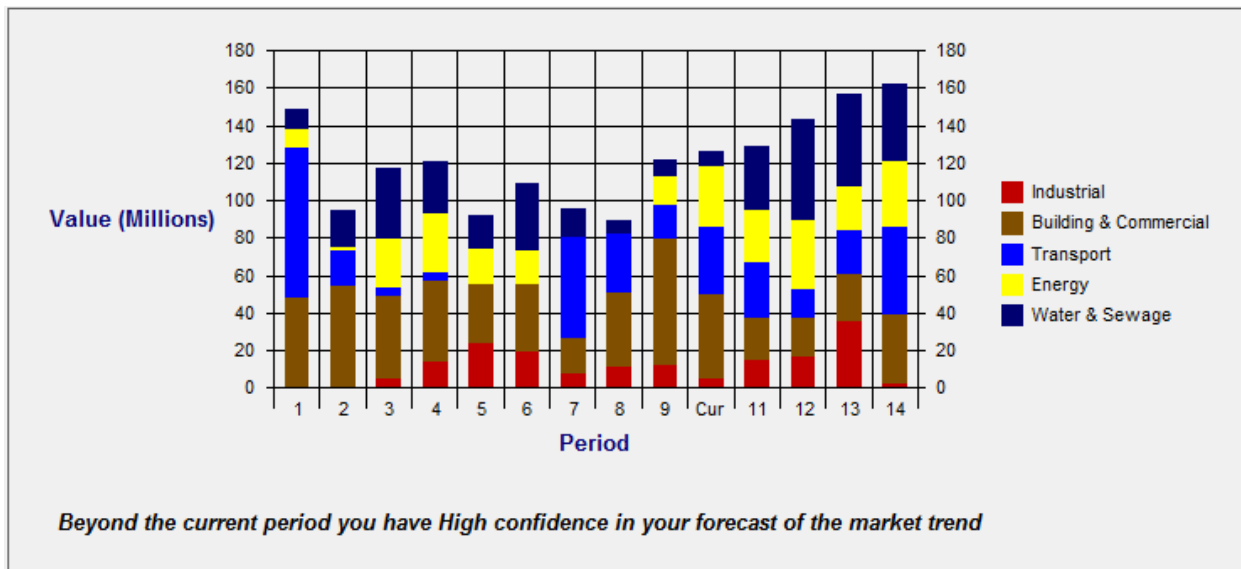
Assets after Decisions	
Cash A/C:	161,037
Capital Base:	4,820,395
Investments:	1,071,309
Company Value:	6,052,741

Overhead Decisions

The eight staff members in the Marketing department allowed our company to pre-qualify for approximately 49.2% of the market jobs. This is shown in the chart below:



We made the executive decision that we wanted more jobs to estimate, and thus needed to pre-qualify for more jobs. To do this, we hired one additional Marketing department staff member, bringing the number up to nine. Then we moved on to analyze the estimated market trends for each construction sector. These are shown in the graph below:



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	4	0
	2	Building & Commercial	40	40
	3	Transport	19	18
	4	Energy	20	15
	5	Water & Sewage	17	27
			100	

I brought up the idea of eliminating any percent split in the industrial sector, because it was such a small percentage that it had not provided us with any jobs to estimate up to this point in the game. It would also allow that 4% of Marketing overhead to focus on other areas.

The Estimating department had five staff members, meaning they worked a collective total of 60 weeks (12 per worker). Because less than 60 weeks were needed for this period, we kept the number of Estimating staff the same. The estimating weeks needed for this period are calculated in the Estimating Decisions section.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With ten staff members currently employed in the Head Office department, the department was able to handle \$24.3M worth of turnover. The calculations for the anticipated company turnover for Period 10 are shown below:

Period 10 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
40	27	\$ 65,668.00	\$ 1,773,036.00
49	28	\$ 58,333.00	\$ 1,633,324.00
57	71	\$ 74,906.00	\$ 5,318,326.00
63	113	\$ 42,724.00	\$ 4,827,812.00
68	68	\$ 38,580.00	\$ 2,623,440.00
69	46	\$ 58,324.00	\$ 2,682,904.00
Total			\$ 18,858,842.00

As previously mentioned, the calculations were initially performed incorrectly, and we therefore decided to hire an additional two Head Office staff.

We then decided to hire one additional staff member in both the QHSE and Measurement departments. Each worker could handle \$3.6M worth of turnover, making both departments able to handle \$28.8M each (with eight workers). This was well over the anticipated turnover.

Estimating Decisions

With six jobs to estimate this period, we decide we now had the luxury to be more selective in choosing which jobs to estimate. We would never be able to bid and win all six in the upcoming period, so being more selective in the estimating phase saved time and money for our Estimating department. Though Steve calculated the estimating weeks necessary for each job, we ultimately chose to estimate four of the six jobs. This is shown in the chart below:

Period 10 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
84	BO	\$3,000,000.00	15%	\$4,500.00	20% - 30%	25%	\$ 5,625.00	7.7	0.0
85	BO	\$8,000,000.00	8%	\$6,400.00	20% - 30%	25%	\$ 8,000.00	11.0	12.0
86	BO	\$1,000,000.00	22%	\$2,200.00	20% - 30%	25%	\$ 2,750.00	3.8	0.0
87	DB	\$24,000,000.00	5%	\$12,000.00	10% - 20%	15%	\$13,800.00	18.9	20.0
88	BO	\$12,000,000.00	7%	\$8,400.00	20% - 30%	25%	\$10,500.00	14.4	15.0
92	DB	\$12,000,000.00	7%	\$8,400.00	0% - 10%	5%	\$ 8,820.00	12.1	13.0

We decided not to estimate Jobs 84 and 86 because both were in the energy sector, meaning we would have to hire a new project manager if we bid and won those jobs.

Bidding Decisions

There were three possible jobs to bid this period: Jobs 78, 80, and 83. With an upper threshold workload limit of \$53,024,340, our current forward workload allowed us only \$19,270,800 worth of new work. This meant that because of the size of the three jobs, we would only be able to win one of the three. We decided to first calculate the risk and bids to be submitted before deciding which of the three jobs to bid. The risk calculations are shown in the chart below:

Period 10 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
78	BO		\$7,923,224.00		\$1,600,000.00	45%	3.8%	\$301,082.51	50%	\$150,541.26
80	BO		\$16,878,010.00		\$3,380,000.00	0%	0.0%	\$0.00	0%	\$0.00
83	DB	10	\$8,872,112.00	15	\$1,780,000.00	15%	3.1%	\$275,035.47	15%	\$41,255.32

Consultant 15, The Robotham Group, was selected for Job 83 in the building and commercial sector. Steve selected this consultant not only because they had an excellent reputation, but because we had previously worked with this consultant and their expertise slightly reduced our build costs on Job 57. The bid calculations were then done for all three jobs:

Period 10 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
78	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$1,800,041.26	0.0%	
80	4	\$55,000.00	15.00	\$63,250.00		\$0.00	\$3,443,250.00	0.0%	
83	3	\$50,000.00	15.00	\$45,000.00	1.50%	\$133,081.68	\$1,733,500.00	4.8%	\$12,044,480.00

We ultimately decided to bid only the third job, Job 83. This is shown in the image below:

Job	Type	Desc	Sect	Client	Bid	Estimated Costs			On-Cost	% Mark-Up	Bid Submitted
						Design % (of build)	Build Cost	Consultant Allocated			
78	BO	Provide fully signalled rail conr	3	Railline	N		7,923,224		0	0.0	0
▶ 80	BO	New squadron building	2	The Defence Agency	N		16,878,010		0	0.0	0
83	DB	Construct nurses accomodatic	2	London City Council	Y	10	8,872,112	15	1,733,500	4.8	12,044,480

Job 78 was not appealing to us because it was in the transport sector and we had project managers freeing up in the building and commercial sector. The second job, Job 80, was the most attractive to us due to its large size, industry sector, and proximity to the head office. However, once the On Costs were added to the Build Costs, the project cost more than \$20M, meaning our current Capital Base could not support the work. This left us with the third job, Job 83, which we bid with a relatively low markup to ensure we got the job. We also had a very good relationship with this client because of previous work so we were confident we would acquire this job.

Personnel Decisions

We had two project managers in the idle pool after Period 9, Project Managers 19 and 61. We chose to keep Project Manager 61 in the idle labor pool for a period because his performance had been excellent but we had no water and sewage job in which to place him. We relocated Project Manager 19 to our new building and commercial job, Job 68. Finally, we hired Emma Small (Project Manager 15), who was extremely expensive but had a great deal of experience and qualifications. Emma, who was placed on our new building commercial job (Job 69), cost \$58,750 with a signing bonus of \$19,000.

We paid all of our project managers a 4% bonus, which we discovered in Period 9 was the level that provided a “noticeable” improvement. This is summarized in the image below:

On-Going Jobs							
Job Details	Job	Desc	Sector	Last Period		This Period	
				Proj Mgr	Proj Mgr	Proj Mgr	% Bonus
	40	New social housing	Building & Commercial	28	28	4	
	49	Facelift to paralympic training facilities	Building & Commercial	14	14	4	
	57	Build state-of-art fencing complex	Building & Commercial	47	47	4	
	63	Build mental health unit	Building & Commercial	36	36	4	
	68	New respite and rehabilitation care centre	Building & Commercial	0	19	4	
▶	69	New operating theatre at local hospital	Building & Commercial	0	15	4	

Construction Decisions

There were 29 workers in the idle labor pool after the end of Period 9. The site costs and labor allocations were calculated and are shown below:

Period 10 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
40	85.7%	14.3%		187.0			27.0	\$10,332.00	\$278,964.00	\$279,000.00
49	81.2%	18.8%		144.0			28.0	\$9,182.00	\$257,096.00	\$258,000.00
57	31.2%		48.8%	145.0			75.0	\$10,903.00	\$817,725.00	\$775,000.00
63	30.9%		49.1%	228.0			113.0	\$6,259.00	\$707,267.00	\$708,000.00
68	0.0%		30.0%	186.0	56.0	1.2	68.0	\$6,041.00	\$410,788.00	\$411,000.00
69	0.0%		30.0%	155.0			46.0	\$6,259.00	\$287,914.00	\$564,000.00

Because only 75 new recruits can be taken on per period, we had to hire 40 workers from a subcontractor, which cost an additional \$3,500. This is summarized in the image below:

On-Going Jobs														
Job	Last Period				This Period									
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation
Total	Own	Sub	Total				Own	Sub	From ILP	New	To ILP	Paid Off		
40	39	39	0	403,000	In Fourth Period	28	27	27	0	0	0	12	0	279000
49	56	56	0	515,000	In Third Period	29	28	28	0	0	0	28	0	258000
57	44	44	0	480,000	In Second Period	72	71	71	0	27	0	0	0	775000
63	70	70	0	439,000	In Second Period	114	113	113	0	36	7	0	0	708000
68	0	0	0		In First Period	56	68	68	0	0	68	0	0	411000
▶ 69	0	0	0		In First Period	46	46	6	40	6	0	0	0	564000

PERIOD ELEVEN DECISIONS:

Financial Decisions

Because the shareholders were very happy with the level of dividend paid, we kept it at 1.8% or \$214,200. We also increased our Capital Base by the maximum amount, or \$477,822. This still left us with a significant amount of cash to consider investing. The increase in our investments is shown in the table below:

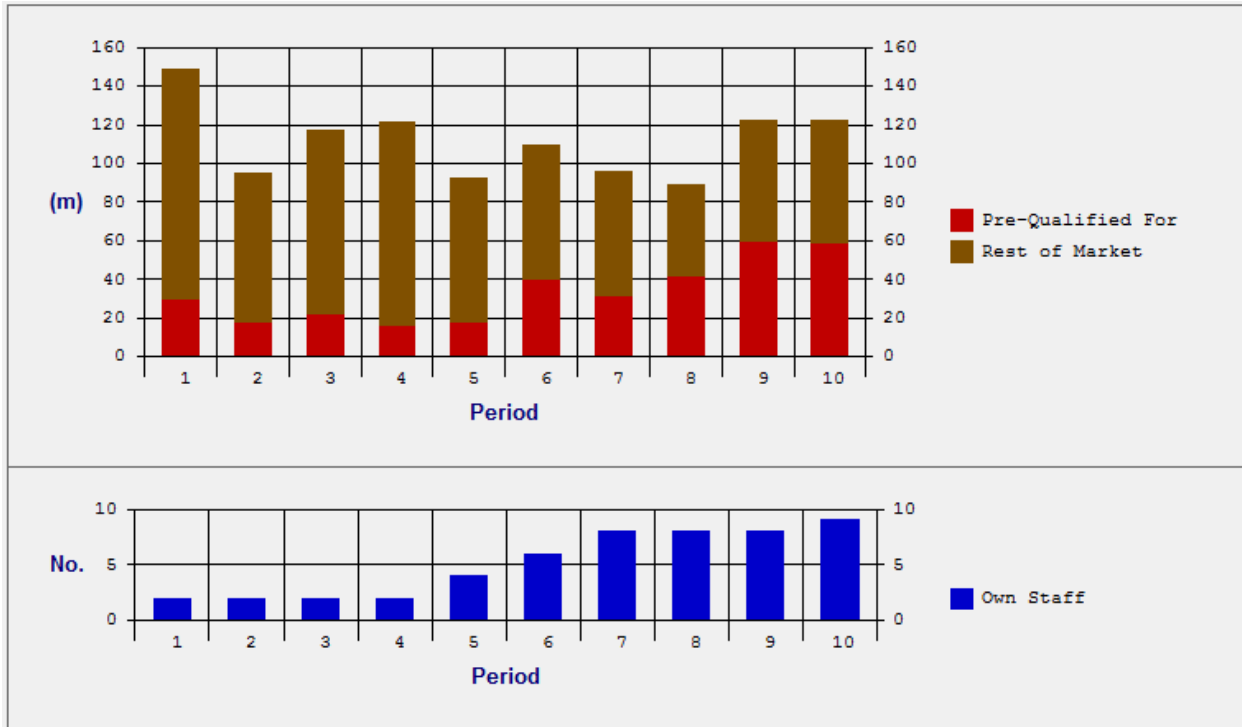
Period 11 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$417,265.00	\$100,000.00	\$ -	\$517,265.00	5.3%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$514,445.00	\$100,000.00	\$ -	\$614,445.00	5.2%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$201,843.00	\$ 50,000.00	\$ -	\$251,843.00	8.5%	Building & Commercial; Transport
Mockridge and Sons Joinry Ltd	Small	High Quality Bespoke Joinery	\$ -	\$100,000.00	\$ -	\$100,000.00	4.0%	Building & Commercial
Total								

We increased our investment in the first three companies by the maximum amount permitted for that size of company. We also reinvested in Mockridge and Sons Joinery Ltd because their percentage of return was now higher and they provided a building cost savings in the building and commercial sector. After all of our decisions were made and input into the MERIT game, the following totals comprised our company assets:

Assets after Decisions	
Cash A/C:	59,578
Capital Base:	5,256,039
Investments:	1,483,553
Company Value:	6,799,170

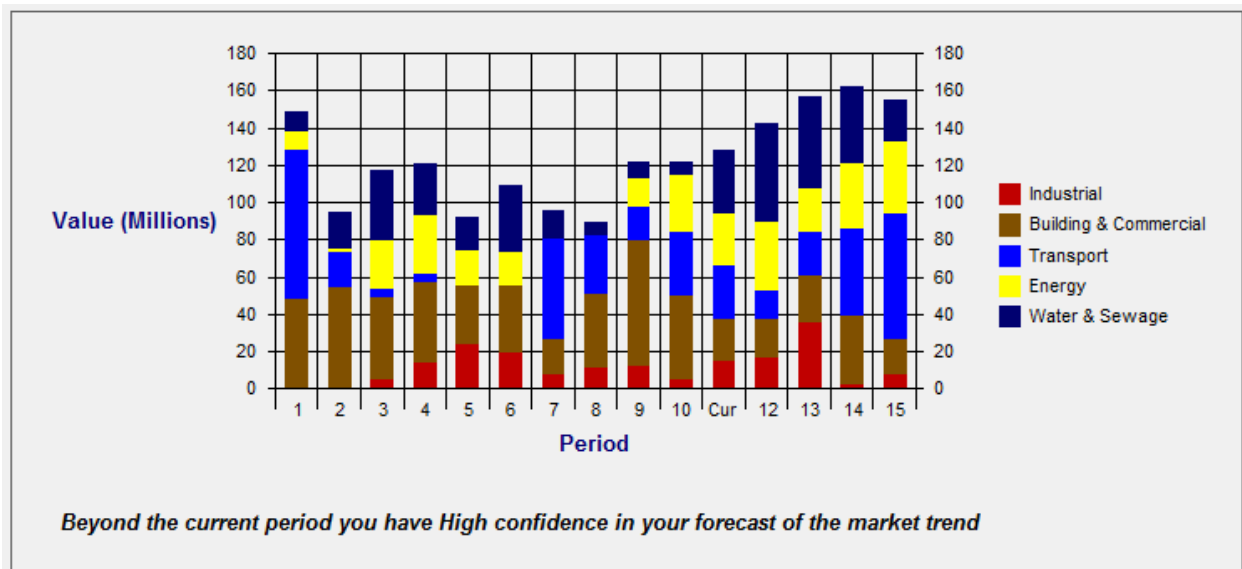
Overhead Decisions

The nine staff members in the Marketing department allowed our company to pre-qualify for approximately 49.1% of the market jobs. This is shown in the chart below:



We therefore decided that the current number of Marketing staff (nine) was enough for the current period, because we could no longer bid and/or estimate all of the jobs for which we were prequalified.

Then we moved on to analyze the estimated market trends for each construction sector. These are shown in the graph below:



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	0	0
	2	Building & Commercial	40	40
	3	Transport	18	8
	4	Energy	15	22
	5	Water & Sewage	27	30
				100

The Estimating department had five staff members, meaning they worked a collective total of 60 weeks (12 per worker). Because only 57 weeks were needed for this period, we kept the number of Estimating staff the same. The estimating weeks needed for this period are calculated in the Estimating Decisions section.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With twelve staff members currently employed in the Head Office department, the department was able to handle \$29.1M worth of turnover. The calculations for the anticipated company turnover for Period 11 are shown below:

Period 11 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
57	30	\$ 74,906.00	\$ 2,247,180.00
63	48	\$ 42,724.00	\$ 2,050,752.00
68	93	\$ 38,580.00	\$ 3,587,940.00
69	78	\$ 58,324.00	\$ 4,549,272.00
83	64	\$ 56,547.00	\$ 3,619,008.00
Total			\$ 16,054,152.00

As previously mentioned, the calculations were initially performed incorrectly, and we therefore decided to hire an additional Head Office staff member.

Each worker in the QHSE and Measurement departments could handle \$3.6M worth of turnover, making both departments able to handle \$28.8M each (with eight workers). This was well over the anticipated turnover, so we chose not to hire any additional staff members for these departments.

Estimating Decisions

There were five possible jobs to estimate this period, so we decided to estimate four of them, eliminating one we were positive we would not want to bid. Though Steve calculated the estimating weeks necessary for each job, we ultimately chose to estimate those shown in the chart below:

Period 11 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
94	BO	\$7,000,000.00	9%	\$6,300.00	20% - 30%	25%	\$ 7,875.00	10.8	0.0
95	DB	\$5,000,000.00	10%	\$5,000.00	10% - 20%	20%	\$ 6,000.00	8.2	9.0
96	DB	\$26,000,000.00	5%	\$13,000.00	10% - 20%	20%	\$15,600.00	21.4	22.0
103	BO	\$9,000,000.00	8%	\$7,200.00	20% - 30%	30%	\$ 9,360.00	12.8	13.0
104	BO	\$12,000,000.00	7%	\$8,400.00	0% - 10%	10%	\$ 9,240.00	12.7	13.0

Job 94 was not estimated for two reasons: because it was high risk and because it was 262 miles away from the Head Office, which would decrease the performance of any project manager chosen for the job.

Bidding Decisions

There were four possible jobs to bid this period: Jobs 85, 87, 88, and 92. With an upper threshold workload limit of \$57,816,430, our current forward workload allowed us only \$30,698,100 worth of new work. This meant that because of the size of the three jobs we were bidding, we could either win Job 87 (because it was a large job) or we could win Jobs 88 and 92 (because both were medium sized jobs). The risk calculations are shown in the chart below:

Period 11 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
85	BO		\$6,265,480.00		\$1,260,000.00	15%	1.3%	\$81,451.24	10%	\$8,145.12
87	DB	9	\$18,877,630.00	15	\$3,780,000.00	45%	3.2%	\$604,084.16	50%	\$302,042.08
88	BO		\$9,856,730.00		\$1,990,000.00	45%	3.5%	\$344,985.55	50%	\$172,492.78
92	DB	10	\$8,869,577.00	7	\$1,780,000.00	45%	3.2%	\$283,826.46	50%	\$141,913.23

Consultant 15, The Robotham Group, was selected for Job 87 in the building and commercial sector. Steve selected this consultant not only because they had an excellent reputation, but because we had previously worked with this consultant and their expertise slightly reduced our build costs on Job 57. Consultant 7, Reighton Consulting Ltd, was selected for Job 92. This consultant was chosen because they have always operated in the transport sector and have been in business for 37 years, meaning they have plenty of experience. The bid calculations were then done for all three jobs:

Period 11 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
85	3	\$50,000.00	15.00	\$45,000.00		\$0.00	\$0.00	0.0%	\$0.00
87	5	\$55,000.00	15.00	\$77,000.00	1.25%	\$235,970.38	\$3,924,000.00	3.8%	\$25,431,640.00
88	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$212,500.00	4.7%	\$12,636,480.00
92	3	\$55,000.00	15.00	\$49,500.00	1.25%	\$110,869.71	\$1,860,500.00	4.7%	\$12,163,040.00

We decided to bid the last three jobs, Jobs 87, 88, and 92. We put a low markup on Job 87, as it was the largest job and the one we were most anxious to win. We also bid Jobs 88 and 92, with relatively low markups, in case we didn't win Job 87. The summary of the bids is shown in the image below:

Estimated Costs											
Job	Type	Desc	Sect	Client	Design % Bid (of build)	Build Cost	Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted	
85	BO	Improvements to outlet tunnel	5	Dales Water Services Ltd	N	6,265,480		0	0.0	0	
87	DB	Extension and redevelopment	2	The Defence Agency	Y	18,877,630	15	3,924,000	3.8	25,431,640	
88	BO	Laying ethylene 100km pipelin	4	Crawford Petrochemicals UK	Y	9,856,730		2,212,500	4.7	12,636,480	
92	DB	Construction of heliport	3	Kegworth Airport	Y	8,869,577	7	1,860,500	4.7	12,163,040	

Personnel Decisions

Three project managers were left in the idle labor pool after the end of Period 10. Because we decided not to estimate any water and sewages jobs this period and because there were none in the bid stage, we decided to pay off Project Manager 61 from the idle pool. We were able to reassign Project Managers 14 and 28 to Jobs 57 and 83 respectively. We also kept all bonuses paid at 4% for each project manager. A summary of this is shown in the image below:

On-Going Jobs							
				Last Period	This Period		
				Proj Mgr	Proj Mgr	% Bonus	
Job Details	▶	57	Build state-of-art fencing complex	Building & Commercial	0	14	4
		63	Build mental health unit	Building & Commercial	36	36	4
		68	New respite and rehabilitation care centre	Building & Commercial	19	19	4
		69	New operating theatre at local hospital	Building & Commercial	15	15	4
		83	Construct nurses accomodation	Building & Commercial	0	28	4

Recruit

Details

Payoff

Transfer To Pool

Transfer To Job

Construction Decisions

There were 55 workers in the idle labor pool after the end of Period 10. The site costs and labor allocations were calculated and are shown below:

Period 11 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
57	81.4%	18.6%		145.0			30.0	\$ 10,903.00	\$ 327,090.00	\$ 328,000.00
63	81.1%	18.9%		228.0			48.0	\$ 6,259.00	\$ 300,432.00	\$ 301,000.00
68	31.6%		48.4%	186.0			93.0	\$ 6,041.00	\$ 561,813.00	\$ 562,000.00
69	30.2%		49.8%	155.0			78.0	\$ 9,215.00	\$ 718,770.00	\$ 719,000.00
83	0.0%		30.0%	213.0			64.0	\$ 8,331.00	\$ 533,184.00	\$ 534,000.00

This allocation of labor left zero workers in the idle labor pool. The labor summary is shown below:

On-Going Jobs

Job	Last Period				This Period									
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation
Total	Own	Sub	Total				Own	Sub	From ILP	New	To ILP	Paid Off		
▶ 57	71	71	0	775,000	In Third Period	29	30	30	0	0	0	41	0	328000
63	113	113	0	708,000	In Third Period	46	48	48	0	0	0	65	0	301000
68	68	68	0	411,000	In Second Period	93	93	93	0	25	0	0	0	562000
69	46	6	40	564,000	In Second Period	78	78	78	0	72	0	0	0	719000
83	0	0	0		In First Period	64	64	64	0	64	0	0	0	534000

PERIOD TWELVE DECISIONS:

Financial Decisions

Because the shareholders were very happy with the level of dividend paid, we kept it at 1.8% or \$281,700. We also increased our Capital Base by the maximum amount, or \$521,005. This still left us with a significant amount of cash to consider investing. The increase in our investments is shown in the table below:

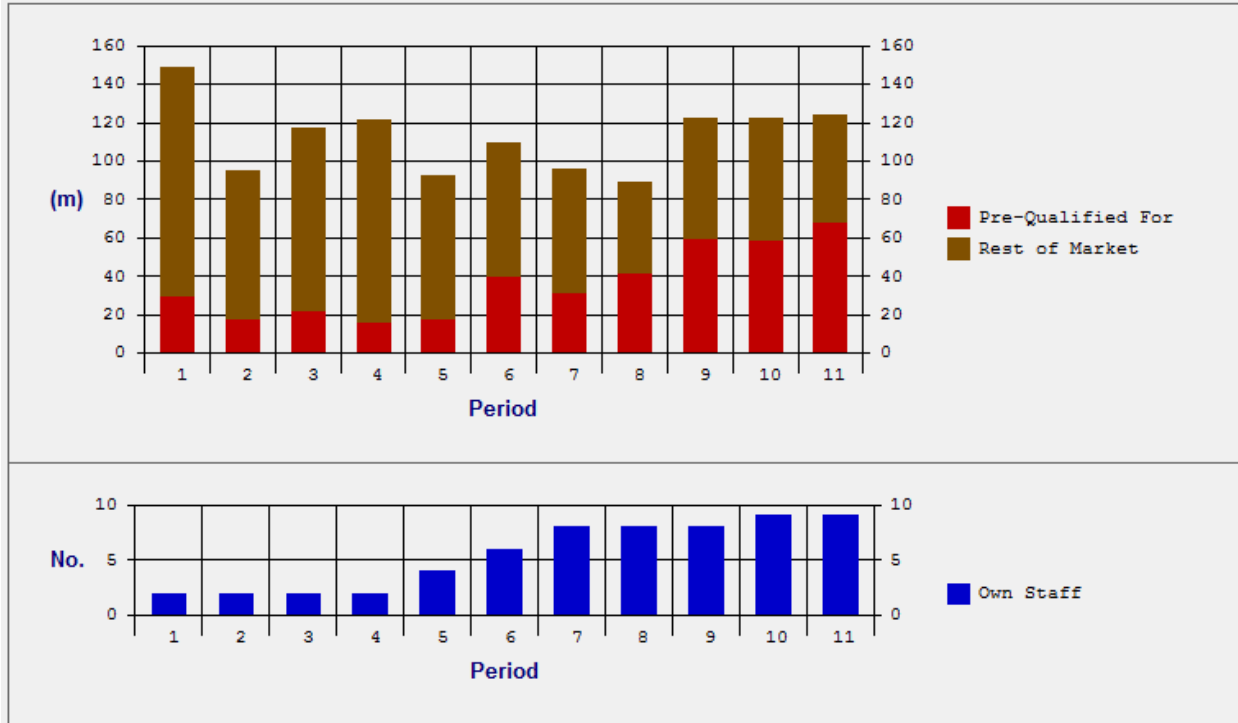
Period 12 Investment Decisions								
Available Investments	Size	Description	Initial Value	Increase	Reduction	Required	% Return	Building Cost Savings
Carter & Crisp BLD Services	Medium	MEP Services	\$538,473.00	\$100,000.00	\$ -	\$638,473.00	4.1%	Building & Commercial
DBY Equipment Ltd	Medium	Construction Equipment Manufacturing	\$639,023.00	\$100,000.00	\$ -	\$739,023.00	4.0%	Industrial; Building & Commercial; Transport
Midlands Aggregate Plc	Small	Quarry Products	\$269,724.00	\$ 50,000.00	\$ -	\$319,724.00	7.1%	Building & Commercial; Transport
Mockridge and Sons Joinry Ltd	Small	High Quality Bespoke Joinery	\$102,100.00	\$ -	\$102,100.00	\$ -	2.1%	Building & Commercial
Total								

We increased our investment in the first three companies by the maximum amount permitted for that size of company. We also decided to remove our investment with Mockridge and Sons Joinry Ltd because their rate of return drastically dropped to 2.1%. After all of our decisions were made and input into the MERIT game, the following totals comprised our company assets:

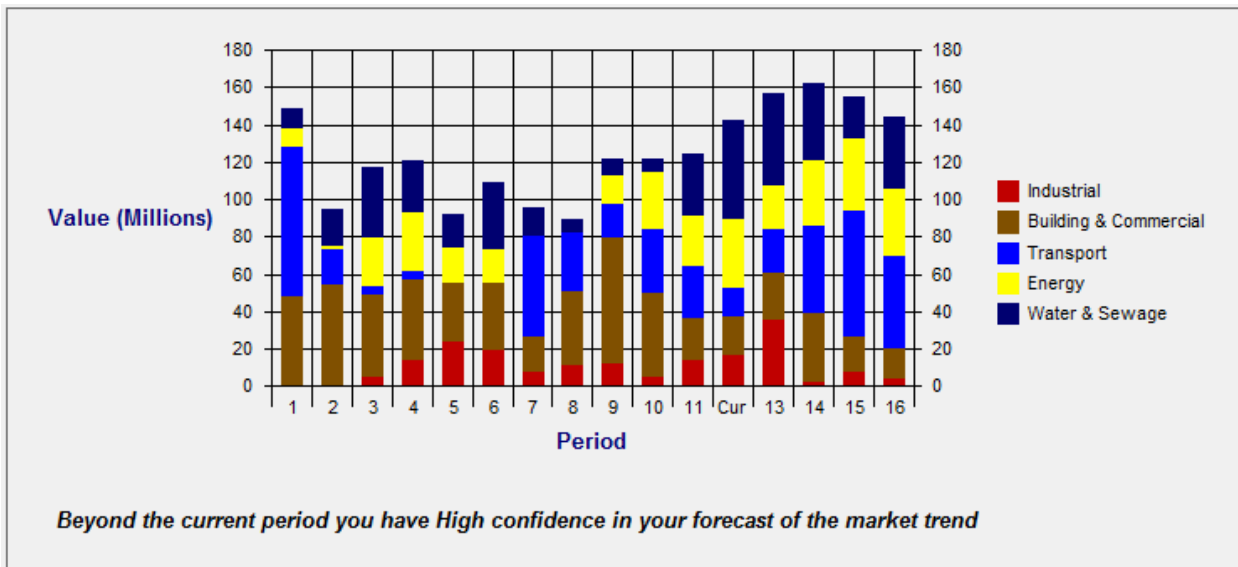
Assets after Decisions	
Cash A/C:	73,417
Capital Base:	5,731,054
Investments:	1,697,220
Company Value:	7,501,691

Overhead Decisions

The nine staff members in the Marketing department allowed our company to pre-qualify for approximately 55.3% of the market jobs. This is shown in the chart below:



We therefore decided that the current number of Marketing staff (nine) was enough for the current period, because we could no longer bid and/or estimate all of the jobs for which we were prequalified. Then we moved on to analyze the estimated market trends for each construction sector. These are shown in the graph below:



The split of the Marketing Overhead between the market sectors is shown below:

Split of the Marketing Overhead between Sectors

	Sector	Desc	Last Period % split	This Period % Split
▶	1	Industrial	0	0
	2	Building & Commercial	40	40
	3	Transport	8	15
	4	Energy	22	15
	5	Water & Sewage	30	30
				100

The Estimating department had five staff members, meaning they worked a collective total of 60 weeks (12 per worker). Because 84 weeks were needed for this period, we hired two new staff members to increase the work weeks to 84. The estimating weeks needed for this period are calculated in the Estimating Decisions section.

The Head Office department was the next to be calculated. As calculated in Period 5, each Head Office staff member could handle \$2.43M worth of work each period. With thirteen staff members currently employed in the Head Office department, the department was able to handle \$31.5M worth of turnover. The calculations for the anticipated company turnover for Period 11 are shown below:

Period 12 Anticipated Turnover Calculations			
Job	Total Labor on Site	Value per Man Period	Turnover
68	49	\$ 38,580.00	\$ 1,890,420.00
69	41	\$ 58,324.00	\$ 2,391,284.00
83	106	\$ 56,547.00	\$ 5,993,982.00
87	117	\$ 56,017.00	\$ 6,553,989.00
Total			\$ 16,829,675.00

The existing number of Head Office staff is more than significant to cover the anticipated turnover.

Each worker in the QHSE and Measurement departments could handle \$3.6M worth of turnover, making both departments able to handle \$28.8M each (with eight workers). This was well over the anticipated turnover, so we chose not to hire any additional staff members for these departments.

Estimating Decisions

There were six possible jobs to estimate this period, and we ultimately chose to estimate all of them, shown in the chart below:

Period 12 Estimating Calculations									
Job	Type	Approx Value	Expected Estimating Cost %	Expected Estimating Cost	Additional % Cost due to Job Complexity	Additional % Used	Estimating Effort	Man Weeks (Calc'd)	Man Weeks Used
106	BO	\$5,000,000.00	10%	\$5,000.00	10% - 20%	20%	\$ 6,000.00	8.2	9.0
107	BO	\$10,000,000.00	8%	\$8,000.00	10% - 20%	20%	\$ 9,600.00	13.2	14.0
109	BO	\$2,000,000.00	18%	\$3,600.00	10% - 20%	20%	\$ 4,320.00	5.9	6.0
110	DB	\$25,000,000.00	5%	\$12,500.00	20% - 30%	30%	\$16,250.00	22.3	23.0
111	BO	\$16,000,000.00	6%	\$9,600.00	20% - 30%	30%	\$12,480.00	17.1	18.0
115	DB	\$10,000,000.00	8%	\$8,000.00	10% - 20%	20%	\$ 9,600.00	13.2	14.0

Because this was the last period and because we had the cash able to support the additional Estimating staff required to estimate all of these jobs, we decided to go ahead and estimate all of them.

Bidding Decisions

There were four possible jobs to bid this period: Jobs 95, 96, 103, and 104. With an upper threshold workload limit of \$63,041,590, our current forward workload allowed was \$26,432,800 worth of new work. This meant that because of the size of the jobs we were bidding, we could either win Job 96 (because it was a large job) or we could win Jobs 103 and 104 (because both were medium sized jobs). The risk calculations are shown in the chart below:

Period 12 Calculated Risk										
Job	Type	Design %	Build Cost	Consultant Allocated	Site Support Costs	Risk % Chance	Addition to Cost if Risk Occurs	Possible Risk Cost	% to Cover Risk	Risk Contingency
95	DB	10	\$4,080,815.00	15	\$818,000.00	30%	3.8%	\$155,070.97	30%	\$46,521.29
96	DB	10	\$19,669,610.00	15	\$3,940,000.00	10%	2.9%	\$570,418.69	15%	\$85,562.80
103	BO		\$7,865,688.00		\$1,578,000.00	10%	2.3%	\$180,910.82	15%	\$27,136.62
104	BO		\$9,824,448.00		\$1,970,000.00	30%	3.2%	\$314,382.34	30%	\$94,314.70

Consultant 15, The Robotham Group, was selected for Jobs 95 and 96 (because it was impossible for us to win both jobs) in the building and commercial sector. Steve selected this consultant not only because they had an excellent reputation, but because we had previously worked with this consultant and their expertise slightly reduced our build costs on Job 57. The bid calculations were then done for all three jobs:

Period 12 Bid Calculations									
Job	Periods	Estimated PM Cost	Estimated PM Bonus % of Salary	Predicted Job PM Cost	Predicted Cost Saving (0 - 3%)	Predicted Saving Amount	On Cost	% Mark Up	Bid Submitted
95	2	\$50,000.00	15.00	\$32,500.00	1.25%	\$51,010.19	\$0.00	0.0%	\$0.00
96	4	\$55,000.00	15.00	\$63,250.00	1.25%	\$245,870.13	\$3,823,850.00	3.8%	\$26,427,910.00
103	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$1,657,000.00	4.7%	\$9,970,255.00
104	3	\$55,000.00	15.00	\$49,500.00		\$0.00	\$2,114,000.00	4.7%	\$12,499,560.00

We decided to not bid for the first job (Job 95) because if we won it, it would prevent us from winning the largest job, Job 96. We put a low markup on Job 96, as it was the largest job and the

one we were most anxious to win. We also bid Jobs 103 and 104, with relatively low markups, in case we didn't win Job 96. The summary of the bids is shown in the image below:

Job	Type	Desc	Sect	Client	Bid	Estimated Costs		Consultant Allocated	On-Cost	% Mark-Up	Bid Submitted
						Design % (of build)	Build Cost				
▶ 95	DB	Build new immigration hall	2	Kegworth Airport	N	10	4,080,815		0	0.0	0
96	DB	Build a new flagship secondary	2	South Wales County Council	Y	10	19,669,610	15	3,823,850	3.8	26,427,910
103	BD	Extension to gas processing p	4	UK Gas Supplies	Y		7,865,688		1,657,000	4.7	9,970,255
104	BD	Railway re-alignment	3	Railline	Y		9,824,448		2,114,000	4.7	12,499,560

Personnel Decisions

Two project managers were left in the idle labor pool after the end of Period 11. Because it was the last period of competition and we had no additional jobs, we decided to pay off Project Manager 14 from the idle pool. We were able to reassign Project Manager 36 to Job 87, meaning we didn't have to hire any new project managers this period. We also kept all bonuses paid at 4% for each project manager. A summary of this is shown in the image below:

On-Going Jobs												
Job Details	Job	Desc	Sector	Last Period		This Period		Recruit	Details	Payoff	Transfer To Pool	Transfer To Job
				Proj Mgr	Proj Mgr	Proj Mgr	% Bonus					
▶	68	New respite and rehabilitation care centre	Building & Commercial	19	19	19	4					
	69	New operating theatre at local hospital	Building & Commercial	15	15	15	4					
	83	Construct nurses accommodation	Building & Commercial	28	28	28	4					
	87	Extension and redevelopment of barracks	Building & Commercial	0	36	36	4					

Construction Decisions

There were 78 workers in the idle labor pool after the end of Period 11. The site costs and labor allocations were calculated and are shown below:

Period 12 Site Cost Calculations										
Job	% Complete	% Needed for Completion	% Needed to be on Schedule	Total Man Labor Periods	No. of new Employees to Recruit	Productivity Level with New Hires	Total Manpower Required	Site Cost	Site Cost Allocation Needed	Site Cost Allocation Input
68	82.7%	17.3%		186.0			37.0	\$ 6,041.00	\$ 223,517.00	\$ 297,000.00
69	82.0%	18.0%		155.0			19.0	\$ 9,215.00	\$ 175,085.00	\$ 378,000.00
83	30.2%		49.8%	106.0			106.0	\$ 8,331.00	\$ 883,086.00	\$ 884,000.00
87	0.0%		30.0%	117.0			117.0	\$ 8,316.00	\$ 972,972.00	\$ 973,000.00

Because this would have left men in the idle labor pool, we wanted to increase the manpower on each project. However, based upon the External Performance Review we lost efficiency in Period 11 due to heavy project over-manning. I found a chart (shown below) in the Company and Financial Information that stated the over-manning limits for each type of job.

Overmanning Limits

The effective labour overmanning that is allowed above the planned labour levels in a period is:

- 35 % for Industrial jobs
- 35 % for Building and Commercial jobs
- 45 % for Transport jobs
- 18 % for Energy jobs
- 25 % for Water and Sewage jobs

The image below shows the inputs for Period 12 with the first two jobs over-manned appropriately, ensuring that we would not have to pay any workers off or have any in the idle labor pool.

On-Going Jobs

Job	Last Period				This Period									
	Labour On Site			Site Cost Paid	Job Status	Planned Labour	Labour Allocation			Own Labour Transfers				Site Cost Allocation
	Total	Own	Sub				Total	Own	Sub	From ILP	New	To ILP	Paid Off	
▶ 68	93	93	0	562,000	In Third Period	37	49	49	0	0	0	44	0	297000
69	78	78	0	719,000	In Third Period	31	41	41	0	0	0	37	0	378000
83	64	64	0	534,000	In Second Period	106	106	106	0	42	0	0	0	884000
87	0	0	0		In First Period	91	117	117	0	117	0	0	0	973000

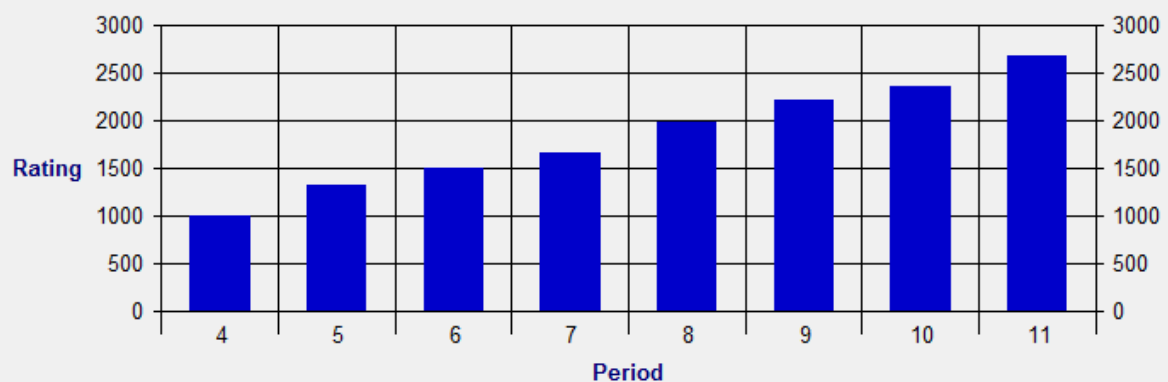
REFLECTION:

Overall, I feel that the MERIT competition was a fantastic learning experience for me, and for the rest of my team. Not only did we improve our ability to work together as a team, but I also improved my managerial skills, as I was the group's Managing Director. Working together not only allowed us to discuss decisions as a group, but it also allowed us to bounce ideas off of each other and catch mistakes that an individual may have overlooked.

Each period posed new and unique challenges for our team, ensuring that we had to adapt to differing ideas and think on feet. It also provided us with the dynamic challenges associated with running a company in today's changing construction industry. Competing with other teams all over the world made the competition more fun and more of a challenge. We improved our ranking all but one of the competition weeks, finishing at 18th.

Each period we were ranked on the sum of several criteria, known as Performance Indicators. These Performance Indicators were displayed with the results of each period, and include the Gross Profit to Turnover, Operating Profit to Turnover, Company Value, Capital Employed, Contract Completion, Forward Workload, Forward Margin, Share Price, and finally, Client Satisfaction. Each received a numerical value that was then totaled for each period and used to determine each team's overall competition ranking. The results shown below summarize these Performance Indicators and totals for all periods of competition:

Per	Total	Turnover	Gross Profit to Turnover	Operating Profit to Turnover	Company Value	Capital Employed	Contract Completion	Forward Workload	Forward Margin	Share Price	Client Satisfaction
4	1000	80	75	60	120	100	120	80	120	120	125
5	1324	146	125	148	127	140	150	90	121	132	145
6	1496	206	117	159	131	168	165	100	134	142	174
7	1655	255	126	171	138	187	195	94	128	156	205
8	1973	291	139	183	148	208	245	129	189	193	248
9	2202	327	164	205	168	224	260	140	196	240	278
10	2346	377	173	216	189	233	290	112	152	291	313
11	2682	408	183	227	210	242	320	152	212	383	345



As discussed throughout this report, the decisions our team made each period either positively or negatively affected these Performance Indicators. Our team made these decisions based upon the scenarios generated by the MERIT program every period, and collectively entered these decisions into the six different categories; these categories were financial, overheads, estimating, bidding, personnel, and construction and affect the overall company performance and future decisions.

Looking back at the decisions we made as a group and the positive and negative effects they had on our team ranking and future decisions, there are a few things I would have changed or done differently. The first of these changes would have been to increase the dividend paid to shareholders as soon as the Cash A/C account allowed for it. This decision greatly affects our company's Share Price, one of the main Performance Indicators used to rate our company.

The second change would have been to increase the company Capital Base as soon as possible, as this allows for an increase in the upper threshold of the workload limit. This would, in turn, increase the number of jobs that could be bid and won and generate more profit for the company. Our team should have also noticed and analyzed the workload limits with each MERIT submission. We did not notice this until part way through the competition, meaning several jobs were lost due to lack of Capital Base.

The next change I would have made would be to analyze the amount of bonus paid to each project manager and ensure that the percent employed is enough to improve the performance level of each project manager "noticeably". This would have prevented us from losing two excellent project managers.

Lastly, I would have started out by hiring more expensive project managers, as they typically outperformed those paid at a lower amount. Though their wage cost may be higher, this would have saved us from having to lay off a project manager because of his poor performance.

Overall, I would recommend MERIT as a great learning experience that is not only fun, but teaches users valuable lessons about how to run a company in the construction industry. It improves one's ability to work as a collective group and also increases independence and interpersonal skills. MERIT is a combination of fun and challenging obstacles that stimulate learning and overall knowledge of how a construction company functions behind the scenes.

RESOURCES:

"MERIT." *The International Construction Business Game*. Web. 9 Apr. 2012.
<<http://meritgame.com/>>.

Appendix A: First Trial Submission



Clara Watson <ckw5012@gmail.com>

trial2012: * Trial Results (merit1203401232011~) *****

MERIT Controller <controller@meritgame.com>
 To: Clara Watson <ckw5012@psu.edu>

Tue, Jan 24, 2012 at 1:48 AM

Hi

** The results of your trial are now available in your teams' online store **

Some major problems (based on reviewing all the decisions).

Please note the comment(s) below, and the references to where further information can be found.

Finance

=====

No comments.

Overheads

=====

<COMMENT> Marketing split by sector has not changed.

<COMMENT> You may need to employ more Head Office staff this period to cope with the anticipated turnover on ongoing jobs.

<COMMENT> You may need to employ more QHSE staff this period to cope with the anticipated turnover on ongoing jobs.

<COMMENT> You may need to employ more Measurement staff this period to cope with the anticipated turnover on ongoing jobs.

<SUPPORTING HELP>

The staffing levels required for the Head Office, QHSE and Measurement Departments depend upon the company's turnover.

The benchmark is the staffing levels set for the last period of the History, in relation to the turnover in the period. This information can be gleaned from the "Financial Report" and "Overhead Report".

For example :-

If the turnover in the last period of the History was 10m, and a particular overhead department consisted of 2 staff, then each person can cope with 5m of turnover without any adverse affects.

If the turnover in the current period is likely to be around 20m, then 4 staff are required.

Any shortfall in staffing levels can be addressed by:

- > Employing more permanent company staff, bearing in mind the limitation on the number of new staff that can be taken on each period.
- > Employ temporary agency staff for the current period only.

Allocating staffing levels above the 'required' levels can reduce costs (Head Office and QHSE effort) and increase value (Measurement effort) on on-going jobs, and up to a point the benefits outweigh the higher staff costs.

Conversely, allocating inadequate staffing levels will increase costs and

reduce value, and costs far outweigh the benefit of lower staffing costs.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Overhead Decisions"/"Entering Decisions" demo)

Estimating

=====

<COMMENT> More than sufficient estimating effort on job 44.

Bidding

=====

<COMMENT> Risk Contingency appears too low for job 28.

<COMMENT> Project Manager cost allocation (On-Cost) appears too low for job 28.

<SUPPORTING HELP>

Oncosts cover the additional elements not included in the build cost, and consist of :-

Additional costs (all to be added)

-
- > Site support costs
 - >Contingency for risk
 - > Project manager costs (salary and recruitment charges)

Opportunities for Savings (to be subtracted) - D&B Jobs only

An amount representing the anticipated savings on the build cost from the design produced by the consultant, which is to be passed onto the Client. This makes the bid more competitive.

If an appropriate consultant has been chosen up to 3% can be saved on the build cost, due to the quality of the design produced. Rival bidders will try and allocate a good consultant, although not the very best, and will pass on around 1% of the anticipated build cost saving onto the client, making the rival bid more competitive.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Bidding Decisions"/"Entering Decisions" demo)

<POSSIBLE_ERROR> No Mark-up entered for job 28

<SUPPORTING HELP>

To determine the mark-up to be applied when bidding for a job, a number of factors need to be taken into account :-

> What is the minimum mark-up the company needs to apply to cover other company costs, such as overheads, dividend payments etc ?

> What level of mark-ups are rival bidders likely to apply ?

Look at the "Company and Financial Information" to see the minimum mark-ups your rivals (simulation companies) are likely to add, which varies depending upon the job size.

> What does past bidding history reveal ?

Use the "Mark-Up" button in the "Performance Statistics" to assess the mark-ups that have won/lost jobs to date.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Bidding Decisions"/"Entering Decisions" demo)

Personnel

=====

<COMMENT> No golden hello offered to try and acquire the services of project manager 34

<COMMENT> Project Manager 6 (Noval, J) is not the most suitable for job: 14 which is a Building & Commercial contract

<COMMENT> Project Manager 34 (Gourlay, J) is not the most suitable for job: 15 which is a Building & Commercial contract

<SUPPORTING HELP>

The top project managers i.e., those with experience and expertise in one or more sectors, can command 'golden hellos' to attract them to particular companies.

The 'golden hello' could be in the form of perks, such as special pension rights, share schemes, medical insurance etc. In this scenario the perk is in the form of a cash incentive, which incorporates all of the above and more.

When entering the 'golden hellos' you are given clues as to the likely incentive required.

If the incentive required is "None", and it's the Early Years, you don't need to enter a cash incentive. However, in the Final Years, when there may be other rival companies trying to secure the services of the project manager, the company offering the largest incentive will be successful.

If enough incentive is not offered to secure the project manager's services, you will be allocated an unnamed agency project manager for the period, whose performance is considered to be average.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Personnel Decisions"/"Entering Decisions" demo)

Construction

=====

<COMMENT> Job 4 is in its final planned period, and you have not allocated enough labour to complete the job in the period.

<SUPPORTING HELP>

It is unlikely that any job will be progressed exactly in line with the planned progress, as determined at the estimating stage, even if that is the intention.

There are numerous reasons for this, including :_

> Ineffective labour due to the training of new recruits.

->Changes in anticipated productivity levels due to the expertise of the project manager on the site.

> A job may have been overmanned to complete it early, making the planned progress figures redundant.

Bearing this in mind, if a job is likely to complete in the current period, great care has to be taken in setting the correct level of labour to ensure that the job finishes as near to the end of the period as possible.

If a job finishes too early in the period, the labourforce is retained until the end of the period, incurring additional costs, and excess labour is being used on the site that could have been utilised elsewhere.

In the final period of a job, you can ignore the planned labour level, concentrate instead on the % of the job left to complete.

For example :-

- > Job 5 has a planned duration of 3 periods.
- > The job has been overmanned in its first 2 periods, and is now in the 3rd period, its final 'planned' period.
- > The job is 91.4% complete after 2 periods, when the planned completion after 2 periods was only 80% i.e., 11% ahead of schedule.
- > There is only 8.6% of the job left to complete.
- > The total labour required to complete the job was 200 man periods. Based upon this figure, 17.2 men are required to complete the job (8.6% of 200).
- > To allow for productivity losses, round up to the nearest man, giving a revised figure of 18 men required on site.
- > The site cost should be allocated to reflect the labour allocation.

The 'Job Details' button on the Construction Management Decisions Screen provides all the information needed to determine the labour allocation.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Construction Decisions"/"Progressing a job" demo)

<POSSIBLE_ERROR> Site cost allocation far too high for the labour allocation on job 4

<POSSIBLE_ERROR> No site cost allocation made for job 14

<POSSIBLE_ERROR> No site cost allocation made for job 15

<SUPPORTING HELP>

Site costs pay for the support staff and services that are needed to run a site.

Each period the company must decide how much site cost to allocate to the job, depending upon the level of labour allocated, irrespective of whether the labour is the company's own or subcontractors. .

Allocating insufficient site cost can adversely affect the productivity of the labour on the site, and the value achieved, and delay a job. Conversely, allocating more site cost than is required can marginally improve the productivity, but the cost of paying too much can soon outweigh any benefit accrued.

To set the site cost, refer to the Procurement information on the Job Details screen.

If there is high estimating confidence, then the site cost per man period (estimated) will be a good measure of the site cost to allocate for each man, and this can be multiplied by the number of men on the site.

For example: a ratio of 3,314 per man period, and 100 men, gives site cost allocation of 331,400.

It may also be worth adding on a small amount, say 1,000, to cover any estimating inaccuracy.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Site Administration Decisions"/"Entering Decisions" demo)

Further Help

=====

The Tutorial is the comprehensive guide to using the Merit simulation.

However, to analyse your specific company results there are a number of sources of information :-

- > Your company performance indicators give an overall indication of the progress of the company.
- >The Performance Statistics present a summary of performance to date in a number of key areas.
- > The External Performance Review, compiled by an external consultant you employ each period, gives detailed information about each business area each period
- > There is a comprehensive set of company reports

Regards
The Merit Team

Appendix B: Second Trial Submission



Clara Watson <ckw5012@gmail.com>

trial2012: * Trial Results (merit1203401241119~) *****

MERIT Controller <controller@meritgame.com>
 To: Clara Watson <ckw5012@psu.edu>

Tue, Jan 24, 2012 at 11:49 AM

Hi

** The results of your trial are now available in your teams' online store **

An excellent attempt (based on reviewing all the decisions).

Please note the comment(s) below, and the references to where further information can be found.

Finance

=====

No comments.

Overheads

=====

No comments.

Estimating

=====

<COMMENT> More than sufficient estimating effort on job 44.

Bidding

=====

<COMMENT> Risk Contingency appears too low for job 28.

<SUPPORTING HELP>

Oncosts cover the additional elements not included in the build cost, and consist of :-

Additional costs (all to be added)

- > Site support costs
- >Contingency for risk
- > Project manager costs (salary and recruitment charges)

Opportunities for Savings (to be subtracted) - D&B Jobs only

An amount representing the anticipated savings on the build cost from the design produced by the consultant, which is to be passed onto the Client. This makes the bid more competitive.

If an appropriate consultant has been chosen up to 3% can be saved on the build cost, due to the quality of the design produced. Rival bidders will try and allocate a good consultant, although not the very best, and will pass on around 1% of the anticipated build cost saving onto the client, making the rival bid more competitive.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Bidding Decisions"/"Entering Decisions" demo)

Personnel

=====

<COMMENT> No golden hello offered to try and acquire the services of project manager 34

<SUPPORTING HELP>

The top project managers i.e., those with experience and expertise in one or more sectors, can command 'golden hellos' to attract them to particular companies.

The 'golden hello' could be in the form of perks, such as special pension rights, share schemes, medical insurance etc. In this scenario the perk is in the form of a cash incentive, which incorporates all of the above and more.

When entering the 'golden hellos' you are given clues as to the likely incentive required.

If the incentive required is "None", and it's the Early Years, you don't need to enter a cash incentive. However, in the Final Years, when there may be other rival companies trying to secure the services of the project manager, the company offering the largest incentive will be successful.

If enough incentive is not offered to secure the project manager's services, you will be allocated an unnamed agency project manager for the period, whose performance is considered to be average.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Personnel Decisions"/"Entering Decisions" demo)

Construction

=====

<COMMENT> Job 4 is in its final planned period, and you have not allocated enough labour to complete the job in the period.

<SUPPORTING HELP>

It is unlikely that any job will be progressed exactly in line with the planned progress, as determined at the estimating stage, even if that is the intention.

There are numerous reasons for this, including :_

> Ineffective labour due to the training of new recruits.

->Changes in anticipated productivity levels due to the expertise of the project manager on the site.

> A job may have been overmanned to complete it early, making the planned progress figures redundant.

Bearing this in mind, if a job is likely to complete in the current period, great care has to be taken in setting the correct level of labour to ensure that the job finishes as near to the end of the period as possible.

If a job finishes too early in the period, the labourforce is retained until the end of the period, incurring additional costs, and excess labour is being used on the site that could have been utilised elsewhere.

In the final period of a job, you can ignore the planned labour level, concentrate instead on the % of the job left to complete.

For example :-

- > Job 5 has a planned duration of 3 periods.
- > The job has been overmanned in its first 2 periods, and is now in the 3rd period, its final 'planned' period.
- > The job is 91.4% complete after 2 periods, when the planned completion after 2 periods was only 80% i.e., 11% ahead of schedule.
- > There is only 8.6% of the job left to complete.
- > The total labour required to complete the job was 200 man periods. Based upon this figure, 17.2 men are required to complete the job (8.6% of 200).
- > To allow for productivity losses, round up to the nearest man, giving a revised figure of 18 men required on site.
- > The site cost should be allocated to reflect the labour allocation.

The 'Job Details' button on the Construction Management Decisions Screen provides all the information needed to determine the labour allocation.

(Further Information: Merit Tutorial/"Entering Decisions"/ "Construction Decisions"/"Progressing a job" demo)

Further Help

=====

The Tutorial is the comprehensive guide to using the Merit simulation.

However, to analyse your specific company results there are a number of sources of information :-

- > Your company performance indicators give an overall indication of the progress of the company.
- > The Performance Statistics present a summary of performance to date in a number of key areas.
- > The External Performance Review, compiled by an external consultant you employ each period, gives detailed information about each business area each period
- > There is a comprehensive set of company reports

Regards
The Merit Team

Appendix C: Third Trial Submission



Clara Watson <ckw5012@gmail.com>

trial2012: * Trial Results (merit1203401242246~) *****

MERIT Controller <controller@meritgame.com>
To: Clara Watson <ckw5012@psu.edu>

Wed, Jan 25, 2012 at 2:15 AM

Hi

** The results of your trial are now available in your teams' online store **

A good attempt (based on reviewing all the decisions).

Please note the comment(s) below, and the references to where further information can be found.

Finance
=====

No comments.

Overheads
=====

No comments.

Estimating
=====

No comments.

Bidding
=====

No comments.

Personnel
=====

No comments.

Construction
=====

No comments.

Further Help
=====

The Tutorial is the comprehensive guide to using the Merit simulation.

However, to analyse your specific company results there are a number of sources of information :-

- > Your company performance indicators give an overall indication of the progress of the company.
- >The Performance Statistics present a summary of performance to date in a number of key areas.
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- > There is a comprehensive set of company reports

4/19/12

Gmail - trial2012: *** Trial Results (merit1203401242246~) ***

Regards
The Merit Team