CASE 1: PRICING (SMAC)

Canadian Product Corporation Limited (CPCL) is a manufacturer of small household appliances. The company has only one manufacturing facility which services all of Canada. CPCL is well established and sells its products directly to department stores.

CPCL wishes to begin manufacturing and marketing its newly developed cordless steam iron. In order to properly evaluate the performance of this new product, management has decided to create a new division for its production and distribution.

Two of CPCL's competitors have recently introduced their own brands of cordless steam irons at a price of $28 each. CPCL's usual pricing strategy for new products is full absorption cost plus a 100% markup. For the new iron, at a production and sales volume of 350,000 units per year, this strategy would imply a price of $31.50. CPCL's president, Mr. T. C. Leopard, is not sure whether this pricing strategy would be appropriate for the new iron and is considering other proposals as follows:

1. Variable product cost plus a 200% markup
2. A price of $27 to undercut the competition

Mr. Leopard hired a market research firm to study the likely demand for CPCL's cordless steam iron at the three proposed prices. The research firm conducted an extensive market test resulting in projected annual sales volumes over the next five years at these prices. These sales projections are summarized in Exhibit 1-1. The research firm, however, made it clear that there were no guarantees that the market would respond according to the projections.

Mr. Leopard was not happy with the probabilities that the market research firm assigned to the various price/volume levels. He therefore used his own knowledge and past experience to assign different probabilities (see Exhibit 1-2). Mr. Leopard then called Joan Helm, the chief financial officer, to analyze the situation and recommend a five-year pricing strategy for the new cordless steam iron. As a first step, Joan assembled some relevant data which is presented in Exhibit 1-3.

Required

As Joan Helm, comply with Mr. Leopard's request. Include in your analysis consideration of both quantitative and qualitative factors in determining a five-year pricing strategy for the new iron.

EXHIBIT 1-1
CPCL
Market Research Data for Cordless Steam Iron

Selling Price	Volume	Probability
$24.00	500,000	20%
	400,000	50
	300,000	30
27.00	400,000	25
	350,000	45
	250,000	30
31.50	300,000	30
	250,000	50
	200,000	20

EXHIBIT 1-2
CPCL
President's Probability Data for Cordless Steam Iron

Selling Price	Volume	Probability
$24.00	500,000	10%
	400,000	50
	300,000	40
27.00	400,000	20
	350,000	40
	250,000	40
31.50	300,000	40
	250,000	50
	200,000	10

EXHIBIT 1-3
CPCL
Other Relevant Data for Cordless Steam Iron

Expected costs based on annual production of 350,000 units:

Total variable costs	$2,800,000
Total fixed overhead	2,712,500

Plant and equipment:

No additional machinery or plant space will be required to produce the cordless steam iron. The plant has capacity available to produce 500,000 units per year.

Inventory levels:

Just-in-time inventory management will result in virtually no inventory being stored at any particular time.

CASE 2: BIDDING (SMAC)

The sales manager of Teak Plastics Limited (Teak), Naomi Moir, was concerned about the company's record in winning bids. Teak was a small manufacturer of high-pressure injection-molded plastic parts, supplied mainly to the automotive industry. Over the past few years, Teak's success in winning large contracts had steadily declined, forcing Teak to pursue greater numbers of small contracts. This has become a serious problem; the company's total business has dropped to such an extent that it is currently operating at only 70% of capacity.

Naomi realized that there was something wrong with her method of preparing bids. In the past year, Naomi found that the rate of success in winning bids increased as the total size of the contract decreased. In her attempt to increase the total amount of sales for Teak during the past year, she had submitted almost double the number of bids compared to previous years. This resulted in two people from the accounting department spending most of their time preparing the cost data for Naomi's bids.

Teak used a standard full-cost accounting system, and bids were prepared with the objective of earning a 20% markup on total costs. Standard hourly operating rates were developed using regression analysis of monthly prior-period costs for each machine and process. These costs included all labour, job setup, and mold development costs as well as fixed and variable processing overhead costs. The job setup and mold development costs were fairly constant from job to job. The coefficients from the regression analysis were used as the rates for variable-cost items and the intercept values were divided by full capacity processing hours to determine the rates for fixed-cost items.

At a recent business luncheon seminar, Naomi had been impressed by the speaker's model for preparing bids. This model involved using contributions, probabilities, and expected values. Accordingly, she decided to test the approach in preparing her next bid for a fairly small contract for instrument panel components. She started with her usual bidding method based on the cost estimate prepared by the accounting department (Exhibit 2-1), and made a mental note that she would normally have submitted a bid of $141,000. She then made her best estimates of the probabilities of winning the contract at various bids (Exhibit 2-2).

EXHIBIT 2-1

TEAK

Cost Estimates for Contract to Supply 100,000 Automobile Instrument Panel Components

	Standard Hours	Standard Rate/Hour	Cost per Unit
Processing on machine 5:			
Variable	500	$51.50	$ 2.575
Fixed	500	35.50	1.775
Total machine processing costs			4.350
Material			4.463
Finishing:			
Variable	100	23.50	0.235
Fixed	100	28.50	0.285
Total manufacturing costs before rejects			9.333
Rejects[1]			0.933
Total manufacturing costs			10.266
Selling and administration[2]			0.337
Total cost before royalty			10.603
Markup (20%)			2.121
			12.724
Royalty of 10% of sales[3]			1.414
Standard price per unit			$ 14.138
Standard bid for 10,000 units[4]			$141,380

[1]A 10% standard allowance was added for defective units which would be rejected during final inspection. This reflected a normal spoilage rate.

[2]Selling and administration costs were all treated as fixed.

[3]A royalty of 10% of sales was payable to the inventor of machine 5, a very specialized machine.

[4]This contract would utilize 2% of Teak's total capacity.

EXHIBIT 2-2

TEAK

Probability Estimates Regarding the Potential Contract to Supply 10,000 Automobile Instrument Panel Components

Bid Amount	Probability of Winning Contract
$136,000	95%
141,000	85
146,000	80
151,000	75
156,000	65

REQUIRED

1. Considering only quantitative factors, what amount should Naomi bid for the instrument panel component contract? What qualitative factors should be considered before deciding on the amount of the bid?
2. Evaluate Naomi's past method of preparing bids and explain how the rate of success in winning bids was affected by this bidding method. Discuss the appropriateness of using probabilities and contributions for preparing bids in Teak's current situation.
3. In order to keep up with technological advances in the industry and in the hope of improving the company's success in winning large contracts, top management has decided to replace the existing production system with a new, completely automated computerized production system. This new system will expand the total production capacity of Teak and eliminate all labour except maintenance and some handling. Fixed costs, however, will be significantly increased.

   Discuss the considerations in determining an appropriate pricing policy (bidding method) for Teak once the new computerized production system is installed.

CASE 3: VARIANCE ANALYSIS (SMAC)

Harry Adams is the production manager of the Zap Co. Ltd., which produces and sells a molded product called Zap. To produce this product, three raw materials are mixed in a special blender and then poured into large molds. The proportion of raw materials required may vary depending on the quality of each material. Since testing the quality of the materials requires a lengthy procedure and the use of expensive chemicals, the production supervisor uses his judgement as to the mix of the three materials to add to a blended batch. The production supervisor's judgement has proven to be accurate 80% of the time. A single batch of blended material is enough to fill 40 molds. Each mold yields 12,000 units of Zap. After the units of Zap are removed from the molds, they are inspected for defects. The standard rejection rate for units of Zap produced is 2%.

The standard material costs and standard input quantities for a single blended batch are as follows:

Input	Standard Cost per Kilogram	Standard Amount per Blended Batch
A	$100	600 kilograms
B	5	1,600 kilograms
C	20	200 kilograms

The company carries raw material inventory at actual cost, but values work in process at standard cost.

In order to take advantage of price decreases for inputs A and C, the production supervisor substituted more of these inputs for less of input B in the most recent batch. He felt the change in mix would not affect the quality or yield of Zaps produced, since this new mix was consistent with his judgement of the quality of input materials. Actual quantities and costs of materials used in the most recent batch of blended material were as follows:

Input	Actual Quantity	Actual Cost
A	610 kilograms	$60,000
B	1,550 kilograms	8,000
C	240 kilograms	4,200

Of the units of Zap produced from this batch, 458,640 passed inspection and were sold for $0.50 each. The higher than normal rejection rate for this batch has caused Harry to be concerned about the production process.

REQUIRED

1. Assume that the change in raw material input mix caused the higher than normal rejection rate. Calculate the raw material production variances in as much detail as the data permit for the most recent batch of Zap, and evaluate the production supervisor's actions with respect to this batch.
2. Assume that the company saves $1,000 of variable costs per batch (i.e., actual variable costs are $1,000 less than standard variable costs for each batch) by changing the mix of raw material inputs from the standard proportions to those proportions used in the most recent batch. The variable cost savings occur regardless of the batch rejection rate.

   Harry does not know whether the higher than standard rejection rate was a result of the change in mix of raw materials, a malfunction in the machinery, or normal random factors. He estimates that there is only a 20% chance that it was caused by the change in mix, a 70% chance that it was caused by a malfunction in the machinery, and a 10% chance that it was caused by random factors.

   An investigation would reveal the cause of the variation with certainty and would cost $15,000. If it is found that the cause was machinery malfunction, it would cost $10,000 to stop the production process to make repairs. (The production process will be stopped after six more batches are processed in order to service, repair, and clean the machinery; this will be done regardless of any earlier stoppage of the process or machinery repair.) If an investigation is not conducted, the mix of materials will not be changed for the next six batches.

   Should the process be investigated now, or should Harry wait until six more batches are processed?

CASE 4: CAPITAL BUDGETING (SMAC)

Galaxy Science Centre (GSC) is a nonprofit organization which was founded in late 20X6 as the first science museum to serve the city of Britannia. GSC's initial construction and startup costs were provided by provincial and municipal government grants and private sector contributions. In return for its initial support, the provincial government expects GSC to operate an annual science fair that is expected to become one of the premier science fairs in the country within ten years.

GSC's board of trustees reports directly to the municipal government which provided GSC with the following mandate: (1) to educate the general public, (2) to support the science programs of local schools, (3) to provide a science resource centre for the municipality, and (4) to operate on a breakeven basis without the need for further government funding. The local university, which has been experiencing declining enrollment in its science programs, especially welcomes the opening of GSC.

The grand opening of GSC is scheduled for the fall of 20X8. Initially, GSC's services will include various scientific exhibits and educational films. The annual science fair will include a contest where science projects entered by students are to be judged and the best three exhibited at GSC. Future plans include adding a gift shop featuring souvenirs of both the science centre and the city. With the grand opening quickly approaching, the board decided to hire an independent consultant to resolve the following issues:

1. Board members questioned how budgeting for operations should be applied to GSC, what performance measures are possible, and what should be considered in selecting output measures.
2. Two options are available for financing the computer and related software needed to assist in the operations of GSC—either buy or lease (see Exhibit 4-1). The board requested a complete quantitative analysis of these two options and a recommendation.
3. Given GSC's mandate, the only source of funding to cover the first year's operating expenses would be through admission charges and a one-time subsidy granted by the municipality. The board requested that data resulting from an initial market study and cost analysis (see Exhibit 4-2) be analyzed and an admission price for the first year of operations be recommended.

EXHIBIT 4-1
GSC
Computer Equipment Financing Options

Analysis had indicated that GSC should obtain a model XTZ computer and related software for its operations. This equipment has an expected useful life of five years with no estimated salvage value. The two financing options identified by the board of trustees are described below. The appropriate discount rate to evaluate these options was stipulated to be 11%.

Option One

The XTZ computer and related software could be purchased for $40,500. Since GSC has only $20,000 available for this acquisition, the balance would be financed by a five-year bank loan at an annual interest rate of 11%. Equal annual payments would be due at the end of each year.

Option Two

The XTZ computer and related software could be leased from Acme Computers Ltd. The lease agreement would be for a five-year period requiring equal payments of $10,000 at the beginning of each year.

EXHIBIT 4-2
GSC
Expected Admission Levels and Operating Cost Data

At the request of the municipality, GSC has agreed to admit senior citizens and preschool children free of charge during the first year of operations. To compensate GSC, the municipality reluctantly granted a one-time subsidy of $1,000,000 for GSC's first year of operations. GSC must find an adult admission price for the first year which would be sufficient to cover operating costs in excess of the subsidy. GSC would be paid full adult admission up to $6 per person by the board of education and the university for students who attend the science centre.

A market study confirmed that demand for admissions to GSC would be relatively inelastic at prices at or below $6.50 per admission. The study also produced the following probability distribution for total admissions (adults, students, senior citizens, and preschool children) for the first year of operations assuming an admission price of zero up to $6.50:

Total Number of Admissions	Probability
950,000 to 1,050,000	0.10
1,050,001 to 1,150,000	0.25
1,150,001 to 1,250,000	0.40
1,250,001 to 1,350,000	0.15
1,350,001 to 1,450,000	0.10

It was estimated that 20% of the admissions would be senior citizens and preschool children, 60% students, and 20% other adults.

Initial cost analysis at various total admission volume levels resulted in the following expected total operating costs for the first year of operations (excluding the XTZ computer and related software costs by including all science fair costs):

Total Number of Admissions	Total Operating Costs
500,000	$6,080,000
1,000,000	6,390,000
1,500,000	6,700,000

(This analysis assumes linear cost behaviour within the relevant range.)

4. Without a subsidy from the municipality after the first year, the board wondered whether it could continue admitting senior citizens and preschool children free of charge and still break even. Three options (see Exhibit 4-3) were put forward by the board for analysis.
5. A general pricing policy for items to be sold in the gift shop was needed.

EXHIBIT 4-3

GSC

Admission Pricing Policy for Second and Subsequent Years

Three admission pricing policy options were identified as follows:

1. Admit senior citizens and preschool children free of charge and promote GSC more vigorously. It was estimated, for example, that a $200,000 increase in annual promotion and advertising expenditures would generate a 10% increase in total number of admissions.
2. Charge a discounted admission price for senior citizens and preschool children.
3. Admit senior citizens and preschool children free of charge and convince the municipality to continue the subsidy.

Required

As Edyth Plum, the independent consultant hired by GSC's board of trustees, analyze the five issues and prepare a report, complete with recommendations, to GSC's board of trustees.

CASE 5: LINEAR PROGRAMMING (SMAC)

You have recently been hired as Executive Assistant to the Board of Directors of Dyna Tech Inc. The financial statements of the company for the year ended December 31, 20X5 have just been released and they are disappointing. After years of success as a "high-tech wonder company," it appears that Dyna Tech has fallen on hard times.

The Executive Committee of the Board of Directors has taken the position that the company's financial difficulties have come about largely because of two projects—the Series 3000 and Zeus. Some of the other directors are not so sure. They feel that, with some guidance from the Board, the company's management can "work things out," since they are essentially on the right track. The Board of Directors was determined to make some decisions at their March 31, 20X6 meeting. In the meantime, they would consider two outside reports on the projects (see Exhibit 5-1 and Exhibit 5-2). The Executive Assistant would also be asked to comment at that time.

The Company

Dyna Tech Inc. was launched over 20 years ago in Calgary by James Cousins, an engineer. The company began by manufacturing touch-tone telephone converters and, later, telephone switchboards and other communications switching equipment for small and medium-sized businesses. As the company grew, more communications equipment was added to round out a Private Branch Exchange (PBX) line of products directed to the same market segment. It did not take long for Dyna Tech Inc. to acquire an image as a high-technology wonder company. Sales grew from $12,000 in its first year to almost $350,000,000 ten years later. This sales success was based largely on the company's ability to supply reliable, state-of-the-art communications products to the middle portion of the market.

As the company grew in size, it expanded geographically. While the head office, including sales management personnel, remained in Calgary, production was shifted to facilities in Toronto and Montreal. Manufacturing was later undertaken in Britain, France, and the United States. Sales offices were located around the world as well.

Over the years, the most popular Dyna Tech products have been the Series 100 and Series 200 analogue solid state switches. Dyna Tech has a worldwide installed base of over 100,000 of its PBX switches, mainly in the low to medium segment of the market. (This market segment is broadly defined as one having an installed cost of $100,000 or less per unit.) Of these switches, more than half are Series 100 or Series 200 products. It has been company policy to "keep the customer happy" by supplying whatever Dyna Tech expertise and equipment might be relevant to the

EXHIBIT 5-1

DYNA TECH INC.

Executive Summary of Findings re: Zeus Project

By: I.M.A. Consultant
Principal Findings

1. My tests indicate that the Zeus MC is entirely compatible with the IBM PC for all commonly available software. All other functions of the Zeus MC performed within specification.
2. In my opinion, the Zeus MC can be produced equally well at either the Toronto or the Montreal assembly facility.
3. No additional money is available to the Zeus project, either for increased levels of R&D or for advertising.
4. The following information is related to the financial aspects of the production and sale of the Zeus MC in 20X6:
   a. The unit selling price to the dealer network should be $2,800.
   b. For internal purposes, assembly functions for the Zeus MC have been broken down into Equivalent Work Units (EWUs).
   c. 30 EWUs are needed to assemble one Zeus MC at the Montreal assembly facility. 20 EWUs are needed to assemble the same machine at the Toronto assembly facility. How ever, because the Toronto assembly plant is more automated, the cost of one EWU is $49.05 in Toronto while the cost of one EWU in Montreal is $8.50.
   d. Due to various constraints, a total of only 120,000 EWUs is available in the two locations combined.
   e. Target production of the Zeus MC in 20X6 is 5,000 units, 1,000 units to be produced in Montreal and 4,000 units to be produced in Toronto. It is conceivable, however, that a more desirable combination may be possible.
   f. The cost of material is $851 per unit in either facility.
   g. The Accounting Department expects to be able to recover the following costs from each Zeus MC that is sold:

Zeus MC development costs	$500
Faulty monitor correction costs	$200

   h. Overhead allocations per unit are:

Variable overhead (based on estimated EWUs)	$100
Fixed overhead (based on allocation formula)	$350

   i. Using the figures from the 20X6 production schedules, the average contribution margin per unit will be $1,113.
   j. For purposes of planning, it is the Total Contribution Margin (TCM) that should be maximized.

changing needs of the customer. This policy has been instrumental in allowing Dyna Tech to dominate its segment of the market.

Dyna Tech Inc. began as, and continues to be, a company run by engineers, for engineers. To a large extent, its success can be attributed to the technology developed in its research laboratories. In fact, spending on research and development has approached 20% of sales in recent years. Much of the current research is directed to communications networks, intelligent workstations, and generally the technology necessary to make the "office of the future" a reality.

The Founder

The entrepreneurial spirit and drive of Dyna Tech Inc. originated with its founder. James Cousins is a brilliant engineer and salesman. It was he who insisted that the latest semiconductor technology be used in all Dyna Tech products, even the most inexpensive ones, and he spearheaded the worldwide sales effort that earned the company an Export Canada award from the government. In spite of the company's difficulties, Mr. Cousins remains unshaken in his belief that remaining at the forefront of technology is the path that Dyna Tech Inc. must continue to pursue.

EXHIBIT 5-2

DYNA TECH INC.

Summary Report on Series 3000 Project

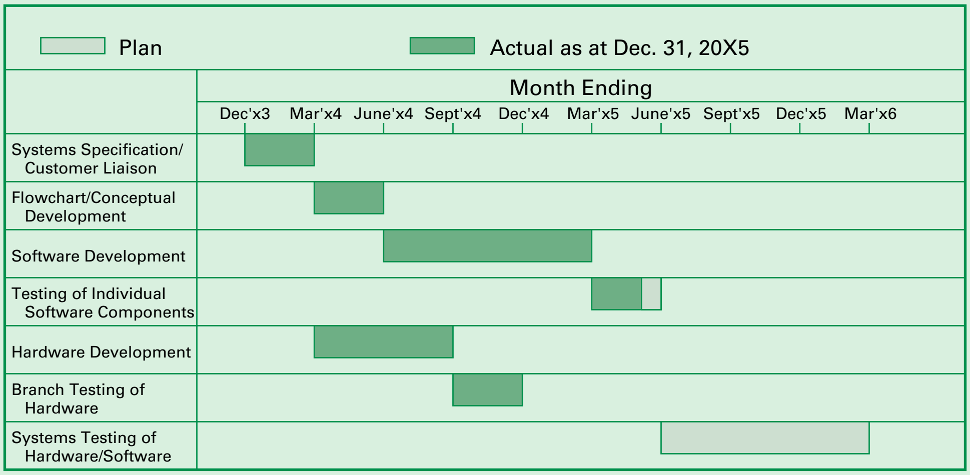
By: I. C. Yu

Three of the most important aspects to be considered in assessing the management control of a project are generally thought to be (1) time, (2) cost, and (3) quality.

This summary will consider each in turn for the Series 3000 project.

Time

Series 3000: Implementation Plan and Status Report:



Comments:

a. Following the anticipated completion of the systems testing of hardware/software, it is now estimated that at least a further six months of preparation will be necessary before production can commence.

b. As at December 31, 20X5, the systems testing of hardware/software was exactly six months behind schedule.

c. As at December 31, 20X5, the testing of individual software components was only two-thirds complete.

d. According to the original schedule, production of the new equipment is scheduled to begin in June 20X6.

e. The Series 3000 project was first made public in June 20X4.

Cost *Table of Accumulated Direct Costs as at December 31, 20X5 (millions)*

	Budgeted	Actual	Variance f(U)
Systems Specification/Customer Liaison	$ 0.50	$ 2.10	$ (1.60)
Flowchart/Conceptual Development	2.75	4.15	(1.40)
Software Development	5.50	18.40	(12.90)
Testing of Individual Software Components (only 2/3 complete)	3.00	3.15	(0.15)
Hardware Development	6.25	5.90	0.35
Bench Testing of Hardware	3.00	3.85	(0.85)
Systems Testing of Hardware/Software	4.00	—	4.00
	$25.00	$37.55	$(12.55)

Quality

Excellence in technology does not in and of itself equal quality. Other factors such as reliability, serviceability, and availability should also be considered.

The Zeus Project

The impetus for the development of a microcomputer compatible with the IBM PC came from development work that had already been carried out by Dyna Tech Inc. In 20X3, the company introduced a telephone/computer workstation to work in conjunction with its Series 100 and 200 PBX products. It seemed only logical, therefore, to make the technology compatible with products being offered by the world's largest manufacturer of computers.

It would, the reasoning went, allow Dyna Tech into the mainstream of the office automation market more quickly. The particular attraction of this approach was that the microcomputer, code-named the Zeus, would be a Canadian product designed for world markets. After all, Dyna Tech already had a worldwide marketing network for its other products. In other words, the development, manufacture, and sale of the Zeus MC microcomputer would be immediately profitable while at the same time advance the relevant technology for expansion into the office automation market.

The Dyna Tech Zeus MC was introduced in 20X5. With its special monitor, built-in software, communications, high-tech design, and IBM compatibility, it looked like a sure winner. Almost immediately, however, buyers began reporting that the special monitor, provided by an outside supplier, malfunctioned under sustained use. True to its code of customer satisfaction above all, Dyna Tech resolved the problem, but at a cost of approximately $1,000 to repair each of the more than 2,000 units that had already been sold.

Actual sales of the Zeus MC in 20X5 were less than the sales forecast. Nevertheless, since the monitor problems have been corrected, Dyna Tech plans to manufacture and sell 5,000 Zeus computers in 20X6.

The Series 3000 Project

The Series 3000 was a personal project of James Cousins. He could see the trend toward large-scale integrated transmission and switching of voice (analogue) and computer (digital) information. He also recognized that Dyna Tech Inc. had, by choice, confined itself to the low-to-medium end of the market for communications products (as defined earlier). And, finally, he felt a personal thrill at the prospect of having his name associated with the development of new, state-of-the-art technology that would lead the world.

The result was an announcement, in June 20X4, that Dyna Tech Inc. had begun development of the integrated communications centre of the future. Using the latest digital technology, the Dyna Tech equipment would be at the centre of an all-encompassing information network, directing everything from telephone calls to the computer mainframe. The project was code-named Series 3000.

The proposed installations would be expensive, probably selling for approximately $1 million per installation. Only the very largest corporations and, perhaps, governments and major universities would have use for equipment of such sophistication. James Cousins saw this as an opportunity. After all, this was the very segment of the communications market in which Dyna Tech Inc. was not active. If the company was to continue its significant growth into the future, it must have products to offer in this market.

Mr. Cousins recognized that competition in this market would be more intense. Dyna Tech would have to compete not only against the major computer manufacturers but also against all of the companies that supplied equipment to the telephone utilities throughout the world. He felt, however, that inasmuch as it was Dyna Tech that had initiated the development, the company had about two years as a "window of opportunity" between the time the Series 3000 project became common knowledge and the time the other companies became serious competition. The true extent of the competitive position of Dyna Tech would, however, not be known until all of the competing products were available and actually being sold in the marketplace. The decision was made to proceed, and a development budget of $25 million, exclusive of any capital costs, was allocated to the project.

Required

Write a report for your discussion at the next board meeting, including quantitative and qualitative analyses and recommendations with respect to the two projects and the management of the company as a whole.

Riverside Mining and Manufacturing is a vertically integrated company that mines, processes, and finishes various non-precious metals and minerals. Riverside has decentralized both on a geographical and on an operational basis. For example, Exploration and Development, which includes all mining operations, has been designated a strategic business unit (SBU). There are multiple divisions within this SBU, such as North American Exploration and Development, South American Exploration and Development, and other divisions. Similarly, Refining, which has often been located near the mines, is another strategic business unit and is divisionalized by geographical region.

Riverside has a clearly stated management control system that includes longstanding policies on transfer pricing, performance evaluation, and management compensation. Transfers are made at full cost plus a markup to approximate net realizable value. Riverside's primary operating divisions (such as mining) are required to fill internal orders before servicing outside orders. Each division has full responsibility over setting prices and sales targets as well as monitoring costs. Also, divisional managers have decision-making authority over fixed investments (capital equipment) up to $0.5 million as long as the investments can be internally financed. For any investment exceeding $0.5 million, final approval must be given by the SBU and head office.

For performance evaluation purposes, Riverside uses two basic measures to evaluate managers. First, it uses budgeted income, and second, return on investment (ROI). Divisional managers develop their budgets in line with goals set centrally for the organization. All budgets must be approved by the SBU and central executive before final acceptance. Net income includes headquarters' allocations based on a percentage of divisional sales. ROI is calculated as net income divided by total assets. As with the budget target, the ROI target has to be approved. Although the weighted average cost of capital for the company is 12%, each division negotiates its target ROI according to past performance and perceived risks and uncertainty in the environment. Progress toward the budgeted income and ROI targets are evaluated on a quarterly basis.

Riverside's bonus compensation scheme was extended to its divisional managers last year. The bonus consists of a "50/50 cash plus deferred payment" scheme that is measured each quarter. For example, if a division manager exceeds budgeted income and ROI targets for the division, then the manager is awarded a bonus, 50% of which is paid immediately in cash and 50% of which is invested in "phantom shares" that can be redeemed three years hence, given continued good performance. The total value of the bonuses range from 10 to 100% of regular salary, depending on how well managers did and their level in the organization. Actual amounts of bonuses earned in any given year depend on the centrally calculated bonus pool, which is defined as a percentage of overall company income.

Some of the divisional managers have been unhappy with the bonus compensation scheme. They felt they were at a disadvantage because of their lack of control over their prices (due to the nature of the external market), and their inability to achieve the growth in the ROI required by central headquarters. The division managers believed that a shift to residual income would help, but Riverside's CEO rejected this, feeling that residual income would not allow comparison of divisional results. The results of three of these divisions are shown in Exhibit 6-1.

As well, the managers of the Primary Operating Divisions wanted the restrictions on the internal versus external sales lifted so that they could achieve better results than they were currently experiencing.

Required

1. **a.** Calculate the residual income figure for each of the three divisions.
   b. In point form, list the advantages and disadvantages that residual income might have over the use of ROI at Riverside.
2. Evaluate the manage ment control system currently in place at Riverside, outlining its strengths and weaknesses, and make recommendations for any changes you feel are necessary.

EXHIBIT 6-1
RIVERSIDE
Selected Divisional Results for the Most Recent Quarter (in thousands)

	Division A	Division B	Division C
Budgeted net income	$ 185	$1,964	$ 895
Actual net income	$148	$1,968	$1,020
Budgeted total assets	$1,310	$8,755	$6,978
Actual total assets	$1,109	$8,811	$6,955
Target ROI	14.12%	22.4%	12.8%
Actual ROI	13.3%	22.3%	14.7%

CASE 7: RELEVANT COST ANALYSIS (CICA)

Fence Company Ltd. (FC) was incorporated in March 20X4, and is equally owned by Robert and Morris Wood. The company constructs residential wood fences.

FC's first year was a difficult one. It is now late March 20X5, and the Wood brothers are making plans to improve FC's performance. Having decided that they need outside advice, they asked you to meet with them.

At the meeting, you asked the brothers to describe their operations and to highlight their major concerns. The following paragraphs are your notes from the meeting.

- FC lost business last year because it could not meet its promised installation dates during the peak period. The owners consider, however, that their biggest problem last year was caused by the need to repair fences. They guarantee their work, and they had to go back and change broken boards and clean up work sites, which cost them money and did nothing for their reputation.
- The owners project that FC will construct 50,000 linear metres of fence this year. To achieve this target, they think that one work team will be needed during the 12 weeks of April, October, and November, and three teams during the 20 weeks from May through September. Their projection assumes an eight-hour day and a regular five-day week. Last year they found that a good work team consisting of three people could build a 100-linear-metre fence in an eight-hour day.
- The average labour cost including benefits last year was $5 per hour. Labour and material costs are expected to increase 10% in 20X5. Last year there was little control over the amount of wood used on projects; the owners want to change this situation.
- The brothers recognize that fence building is not a year-round activity and are willing to cover any cash deficiency as long as there are prospects of profitability.
- The owners need to take out at least $15,000 each per year. In addition, they intend to hire a full-time receptionist to start on April 1 and to employ this person year-round. They expect that the salary will be about $12,000 a year but think that the cost will be worth it to ensure continuity and maintain the company's image.
- A truck will have to be rented for each work team, at $500 per month. Robert Wood thinks that they should keep two of the trucks from December to March for snow removal. He and Morris could do the work and lay off everyone except the receptionist.
- FC will also need to rent a machine for $600 a month to dig holes. In addition, it will cost approximately $120 to move the machine from one work site to another.
- The company spent $8,000 on gas and maintenance and $1,200 on telephone last year. The owners expect to hold the line on these costs this year.

- Morris Wood estimates that their costs last year were approximately $6 per linear metre for wood and $1 for nails and stain.
- The standard selling price last year was $11 per linear metre. Robert Wood thinks that they should try for $13 this year. FC's salesperson complained last year because he could not discount the price. The brothers think that it might be a good idea to allow the salesperson to go down to $12 if forced to do so in order not to lose the sale. They are considering offering a special in April—perhaps 4% off—to get things rolling. They may also offer a 10% discount on group orders for fences for four or more houses. This discount offer worked well last year.
- According to the owners, a good incentive for their salesperson is crucial to increased sales. Last year, they paid the salesperson 5% of gross revenue for a basic one-house order for a fence of about 100 linear metres. For a two- or three-house order, they paid 6%, and for a four-house order, which is about 400 linear metres, they paid 8%. They believe that the incentive was responsible for the fact that FC had a lot of two-house orders last year.
- Starting in April, FC will pay $2,500 a month to rent a warehouse for storing wood and equipment for the year. The landlord wants a security deposit of one month's rent. The company also has to buy new tools that cost at least $3,000, since the work teams either stole or broke all the tools used last year.

REQUIRED

Draft a report to the Wood brothers that presents your analysis of the issues and your recommendations.

CASE 8: REGRESSION ANALYSIS (CGAC)

Berengar Ltd. is a small manufacturing company that produces a variety of products using a number of different processes in different-sized job lots. For example, some products will be ordered in lots of 10 or less, while others are produced in batches of up to 1,000 units.

Berengar will modify products as required by customer order and, thus, there is little product standardization. Despite the high level of product differentiation, Berengar has, up until now, used a single factorywide overhead rate based upon direct labour-hours. The company president, J. P. Blomer, believes that this oversimplified way of applying overhead has led to the loss of several contracts for long production runs (that is, large job lots) of two of Berengar's most popular products.

Blomer has consulted with the operations staff in the machining department to see whether they have any suggestions for alternative overhead bases (other than direct labour-hours for their department). Because of the recent addition of five numerically controlled machines, the supervisor of scheduling has noticed that direct labour-hours in the department have declined considerably. The chief production engineer for machining believes that, with the new machine environment, production overhead probably varies more with machine-hours per batch and setup time than it does with the current overhead application base, direct labour-hours.

Blomer asked the controller to run four regressions to assist in predicting overhead cost in the machining department. The four regressions were based on:

1. Direct labour-hours
2. Machine-hours
3. Setup hours
4. Machine-hours and setup hours

One problem that the controller had to deal with was that approximately 35% of departmental overhead consisted of various lump sum monthly charges for central services such as personnel and power. The controller decided that these charges were justifiably an expense of running the machining department and left them in for the regression analyses.

EXHIBIT 11-1
BERENGAR

Berengar Ltd.
Machine Department
Data for Regression Analysis
(most recent 24 weeks)

	Overhead Cost	Direct Labour-Hours	Machine-Hours	Set-up Hours
Week 1	$72,892	2,036	379	98
2	76,451	2,125	385	101
3	75,930	2,012	378	110
4	78,591	1,900	390	112
5	77,870	1,934	401	108
6	75,420	2,095	376	110
7	73,529	1,966	365	95
8	78,210	1,924	387	103
9	85,620	1,865	464	130
10	84,322	1,912	451	110
11	89,621	1,901	496	125
12	79,739	1,864	401	101
13	81,221	1,850	425	95
14	85,130	1,812	456	102
17	87,870	1,718	485	135
18	90,565	1,741	502	129
19	89,032	1,622	491	142
20	87,979	1,639	487	110
21	86,646	1,641	479	124
22	90,772	1,628	516	99
23	85,542	1,598	472	125
24	90,159	1,597	508	160

The results of the regressions (using the most recent 24 weeks of data) are given in Exhibit 11-1.

Required

1. From the results of the regression output of overhead cost with machine-hours and setup hours (Exhibit 11-1, regression 4), identify the following:
   a) The independent variables
   b) The marginal cost of an additional setup hour
   c) The regression equation
2. Using the information provided in Exhibit 11-1, evaluate the results of the regressions, using the coefficient of determination (R^2).

Regression 1

Regression output: overhead cost with direct labour-hours:

Constant		135479.2
Std. err. of Y est.		3523.623
R^2		0.642200
No. of observations		24
Degrees of freedom		22
X coefficient(s)	–28.8174	
Std. err. of coeff.	4.585940	
t-statistic	–6.28387	

Regression 2

Regression output: overhead cost with machine-hours:

Constant		33310.56
Std. err. of Y est.		1010.593

R^2		0.970568
No. of observations		24
Degrees of freedom		22
X coefficient(s)	112.6582	
Std. err. of coeff.	4.182588	
t-statistic	26.93505	

Regression 3

Regression output: overhead cost with setup hours:

Constant		56802.56
Std. err. of Y est.		4524.324
R^2		0.410114
No. of observations		24
Degrees of freedom		22
X coefficient(s)	226.8502	
Std. err. of coeff.	58.00416	
t-statistic	3.910930	

Regression 4

Regression output: overhead cost with machine-hours and setup hours:

Constant			33060.920	
Std. err. of Y est.			1025.838	
R^2			0.971052	
No. of observations			24	
Degrees of freedom			21	
X coefficient	machine hours	110.6029	10.06200	setup hours
Std. err. of coeff.	machine hours	5.482857	16.98414	setup hours
t-statistic	machine hours	20.17249	0.592435	setup hours