Richard Ivey School of Business
The University of Western Ontario

IVEY

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DESIGNING OPTIMAL CAPACITY PLANNING STRATEGIES

Owen P. Hall, Jr. and Charles J. McPeak wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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Richard Rubrics, vice-president and general manager of Mapleleaf Corporation, had recently returned from a suppliers' conference in Champaign, Illinois. On his desk was a report from Mapleleaf's chief marketing director, Bib McDougall, regarding forecasted product demand. McDougall's forecast showed that, within five years, demand would outstrip the firm's current capacity of 10,000 cartons per day (see Exhibit 1). McDougall's report also showed a proposed capacity expansion plan design to meet the challenge of growing product demand.

BACKGROUND

Mapleleaf Corporation was a midsized manufacturer and distributor of paper products. The firm operated four production facilities located throughout North America. Product from these facilities was shipped to Mapleleaf's seven distribution centers. In some cases both the production facility and the distribution center were located at the same site. After reviewing the planning report, Rubrics called a meeting of Mapleleaf's planning committee. Rubrics began the meeting by indicating that the demand forecast was troubling since it indicated that the company would be operating at full capacity of 10,000 cartons per day within four years. At that point Joe Curley, Mapleleaf's chief engineer, spoke up and said that effective capacity would be exceeded in three to four years since the system could not operate above 90 per cent on an ongoing basis. Curley said that downtime was required for both facility maintenance and repair.

McDougall spoke next and said that the demand forecast was an aggregate and that there was a wide variance in growth patterns among the seven distribution centers. He said that demand in Mexico, in particular, was growing at a significantly larger rate and that this demand was currently provided primarily from the Los Angeles distribution facility. Rubrics stated that one option to address the problem of growing demand would be to construct a new production plant adjacent to Mapleleaf's current distribution center in Guadalajara, Mexico. He stated that he had more than once visited the Guadalajara center and found the area to have a number of important characteristics including a modern road system and a well trained labor force. McDougall indicated that another possibility was to increase the capacity of the existing plants. Curley chimed in and said that several of the current facilities were quite old and

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inefficient. “Production costs differ,” said Curley, between facilities due to varying costs of labor, materials, and operational efficiencies. The average production cost ($/carton) and capacity (cartons) for each of the current facilities are presented in Exhibit 2.

“The average daily demand (cartons) and distribution costs (facility to center) for each distribution center also vary,” said Curley as he presented the cost data shown in Exhibit 3. Distribution costs, which include delivery and handling, were impacted by both the distance of the market area from the facility, and the distance between deliveries in the market area. Included in this projection were the estimated distribution costs between the proposed plant at Guadalajara and other market areas. McDougall jumped into the conversation and stated that the standard capacity planning approach involved a six-step process: 1) estimate future demand requirements, 2) identify gaps, 3) develop alternatives, 4) evaluate alternatives and select optimal strategy, 5) determine capacity cushion, and 6) specify timing.

Rubrics asked what size facility might be able to meet Mapleleaf’s needs over the next 10 years. McDougall stated that a 4,000 carton daily capacity with an initial investment of $30 million should get the job done. Curley chimed in and reported that the production costs for the new plant should be on the order of $10/carton. He further said that the total construction time should be on the order of two years. Rubrics then said that the project was all about sizing and timing — two of the key factors in capacity planning. He further stated that the proposed 4,000 carton capacity plant would provide a 1,000 carton cushion based on the projected demand in 10 years. As the meeting was nearing the end, Rubrics asked McDougall to prepare an analysis on the new capacity planning project for his review by week’s end. McDougall stated that he would use the firm’s standard planning parameters of a 40 per cent tax rate, straight line depreciation, 10-year useful life with no salvage value, a 10 per cent discount rate, a two-year construction cycle and a 300-day/year operating schedule. Rubrics nodded his head in approval.

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Exhibit 1

FORECASTED DEMAND OVER THE NEXT 10 YEARS

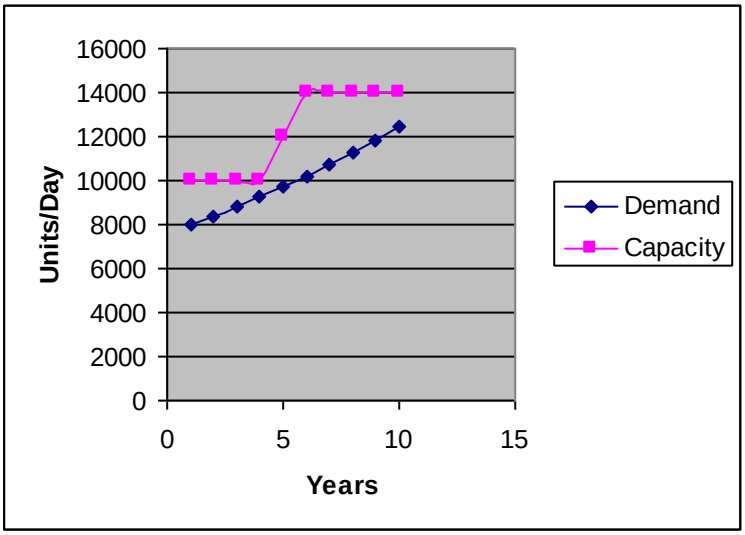

Exhibit 2

PRODUCTION COSTS AND CAPACITIES

Facility	Production Cost per Carton	Daily Capacity per Carton
Toronto	$14	2,500
Denver	$19	1,500
Los Angeles	$13	3,500
Seattle	$17	2,500

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Exhibit 3

PRODUCT DISTRIBUTION COSTS AND 5- AND 10-YEAR DEMAND (DAILY CARTONS)

	Production Facilities					Forecast	
Centers	**Toronto**	**K.C.**	**L.A.**	**Seattle**	**Guadalajara**	**5-Yr.**	**10-Yr.**
Toronto	0.75	2.50	4.50	4.75	5.25	1000	1000
K.C.	2.50	1.00	2.50	2.75	3.25	750	1000
L.A.	4.50	2.50	0.50	2.25	1.75	2500	3000
Seattle	4.75	2.75	2.25	0.75	2.50	1500	2000
Chicago	1.50	1.50	3.75	2.50	3.75	1500	2000
Atlanta	3.00	2.25	3.00	3.50	3.50	750	1000
Guadalajara	5.25	3.25	1.75	3.75	0.50	2000	3000

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