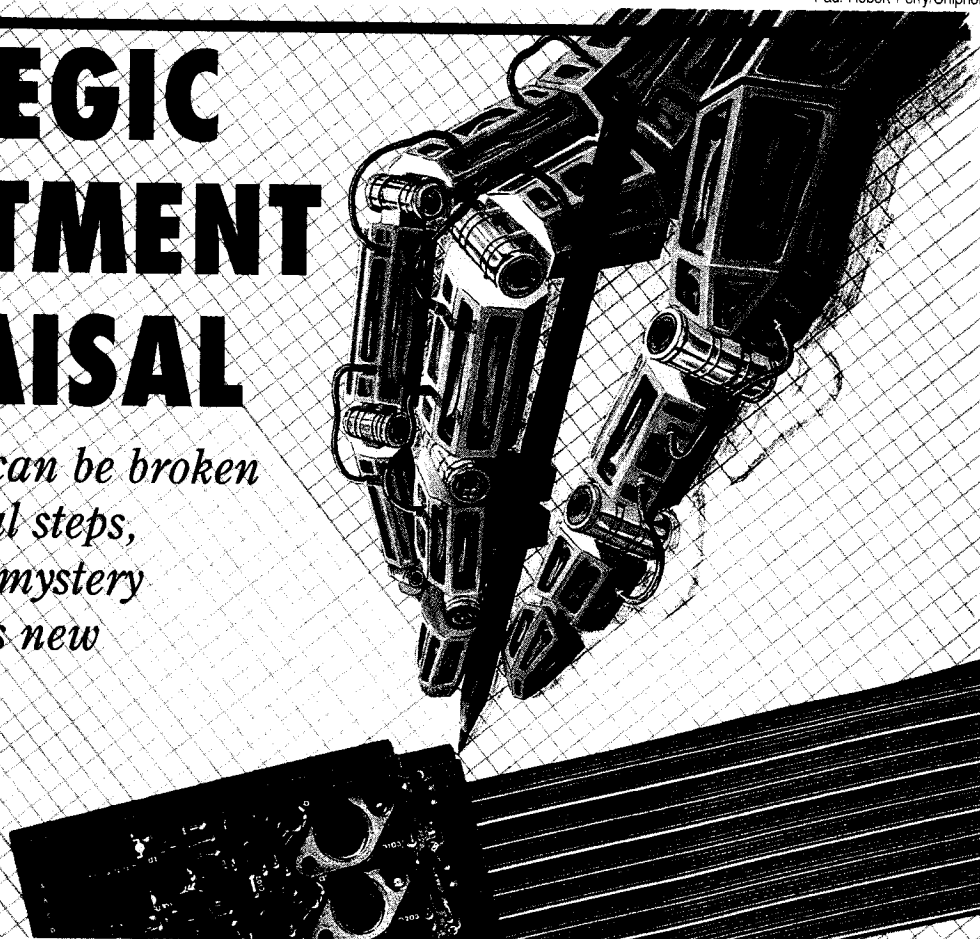


Paul Robert Perry/Uniphoto.

STRATEGIC INVESTMENT APPRAISAL

AMT decisions can be broken down into logical steps, eliminating the mystery surrounding this new approach.



BY MICHAEL BROMWICH
AND AL BHIMANI

Has America lost its competitive edge? Some say yes. And the reason, they claim, is because we refuse to invest in advanced manufacturing technology (AMT).

But Americans just don't think that way. If we can't see immediate tangible results, we lose interest. AMT benefits are often difficult to quantify in financial terms and require long-term consideration. A new approach clearly is needed when evaluating AMT investment decisions.

AMT cost savings appraisal is particularly difficult because it is necessary to compare AMT costs with those incurred using alternative technology. The likelihood that some important items will be ignored also exists. For example, a company operating numerous leisure, entertainment, and catering outlets decided to computerize the data collection of its food production activities on a pilot basis. But the project was abandoned because of heavy worker resistance. The compa-

ny continued to incur high overhead from manual accounting and data processing operations, making it less profitable in a highly competitive industry. A more strategic consideration of the investment proposal would have captured the impact of worker resistance.

Measuring improved quality from product enhancement presents a similar problem. A large confectionery firm understated the benefits from automating its storage and distribution facilities because it failed to consider the effect of better service to its customers. It therefore delayed its investment.

Some companies base their AMT decision on a desire to create a high-tech image. One kitchen unit manufacturer with an established reputation for innovative design invested heavily in computer-assisted design equipment. Why? Because it felt its customers would ascribe high value to the use of sophisticated automated technology in manufacturing. But because middle managers knew qualitative benefits are given little weight, they forced the investment through by exaggerating financial benefits!

What can be done to change manufacturers' way of thinking?

MAKING THE DECISION

A good approach to the appraisal of advanced manufacturing technology is to evaluate the strategic benefits informally while including a quantitative analysis. The aim is to identify areas where AMT will be beneficial not only in relation to precise short-term incremental cash flows but also in terms of longer-run strategic benefits.

In one case, a medium-sized manufacturer and distributor of specialized leisure products justified investments on the basis of cost savings using the payback method. Long-term non-quantified projects also were considered by top management with the company's future direction in mind. As a result, the company adopted optimized production scheduling integrating material requirements planning (MRP), CAD/CAM technology, and robotized production. These investments failed the company's three-year payback criterion but were accepted after a long

informal decision-making process.

The ability to evaluate benefits in a quantifiable way may differ for different types of benefits. For instance, the results on the final goods market of increased product quality can be expressed in monetary terms. Managerial estimates of benefits may replace more conventional methods. Investment in research, development, and certain marketing and training programs often defies exact measurement.

The first step in the evaluation process is to review the firm's strategic plan and see how AMT can be used to exploit strategic opportunities and remedy weaknesses.

DERIVING BENEFITS

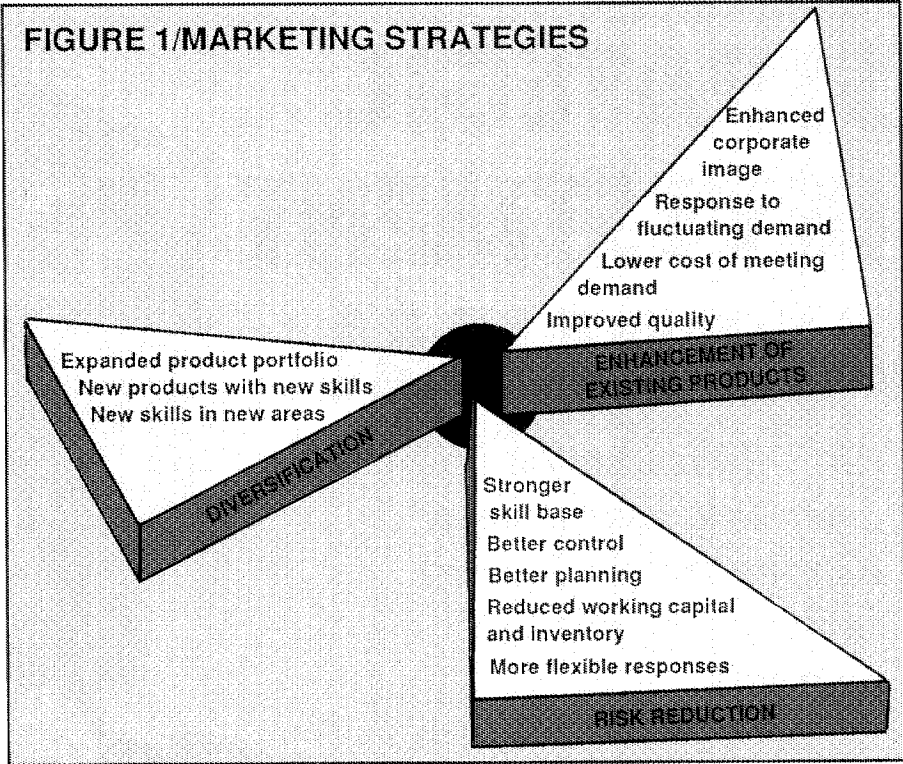
Generally, the types of strategic benefits that can be expected from advanced manufacturing technology can be either external or internal. When management appraises AMT investment, it tends to concentrate on the internal benefits.

Figure 1 illustrates market strategies and contributions made by AMT investment appraisal. The figure distinguishes among three types of strategies: product enhancement, diversification, and risk reduction.

The top righthand triangle of the figure indicates that AMT can contribute to product enhancement in a number of ways. A major contribution improves product quality. Such benefits may arise from direct quality improvements or the reduction in quality variations. AMT also contributes to product enhancement by increasing the flexibility of manufacturing, allowing for a more precise response to fluctuating demands. This increase in flexibility allows products to be tailored to customers' requirements.

One firm manufacturing high-pressure casings traditionally had stressed material specification rather than product quality. It decided to reorganize manufacturing operations using the "cell" concept, relying on the payback criterion to recoup its outlay within one year. The firm also achieved such unplanned benefits as a 50% reduction in inventory, a 75% improvement in quality, substantial reduction in lead times, and flexible manning with overall labor reduction. Consequently, the firm now considers strategic investment and synergistic advantages as part of its capital investment appraisal procedures.

FIGURE 1/MARKETING STRATEGIES



The lefthand triangle in the figure indicates that AMT investment can aid the firm's diversification strategy by allowing the introduction of new products incorporating skills embodied in the firm's AMT investments. An example involves the new technology permitting newspapers and magazines to enhance printing quality and the use of color.

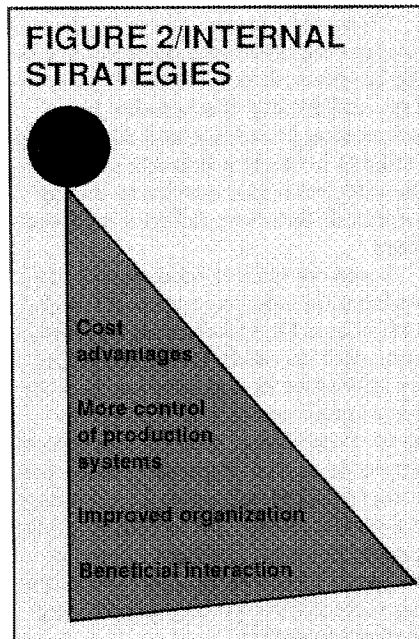
The bottom triangle of the figure in-

dicates some contributions of AMT investments to risk reduction by increasing the firm's ability to diversify and meet changing needs using such techniques as MRP and JIT systems. But to function properly, AMT requires extensive planning and accurate forecasting.

The first two benefits shown in Figure 2 are the most common in the appraisal of advanced manufacturing technology. The cost advantages of AMT stem from higher production controls, particularly for material and brought-in parts. The sophisticated planning required for AMT production further reduces cost by providing additional information to decision makers. AMT rests on a wide information base within the enterprise, allowing greater participation in decision making at all levels. More focused decision making by the various organizational segments reduces top management's involvement in everyday operational decisions. The new corporate structure forces managers to look outward and seize opportunities for the firm.

For example, an electrical switch gear products manufacturer had a turnover of \$32 million, a total staff of 550, and little investment in flexible manufacturing technology. It projected a 25% growth rate as a result of the extensive introduction of new, higher-specification products. The company

FIGURE 2/INTERNAL STRATEGIES



wanted to increase design capacity and improve manufacturing operations by initially using CAD. The aim ultimately was to reach full computer-integrated manufacturing status. The original benefits included reduced lead time in the drawing office and reduced number of employees and WIP inventory. The investment was based on payback. Additional benefits obtained included more accurate, timely transfer of data and a greatly improved competitive edge. Accordingly, the company achieved a new market position.

AMT leads to synergistic interaction between different units of the organization (referred to as beneficial interaction in Figure 2) because of its wide impact across plant and divisional lines.

A company engaged in the manufacture of sheet metal equipment predicted its sales would increase dramatically along with its product diversity. An evaluation was made to determine the optimum mix of manual, semiautomatic, and automatic methods for the welding operations. Labor and space savings were the prime targets. Based on the payback method, the semiautomated method was chosen.

The company subsequently experienced reductions in lead time, stock, and work-in-process levels not included in the original analysis. A strategic assessment concentrating on these

TABLE 1/ABSTRACT FROM AN INVESTMENT APPRAISAL

Customer Benefits	CHECKLIST		
	Items expressed directly in monetary units	Items converted into monetary units	Scored items not expressed in monetary units
Improved product quality		X	
Lower cost	X		
Longer product use from higher reliability			
Better supply response			
Products better tailored to customer requirements			
Complementarity with other products			
Better service and less product failures			
Outward-looking organization better able to respond to customer needs			X
New skills allow new products to be offered			

benefits and their integrated effects may have led to the adoption of an alternative plan.

CHECKING OUT AMT

Once you've identified the general area to benefit from AMT investment, you can begin a detailed investigation of potential projects. Use a checklist approach including the projected benefits and costs from each project. Break these down into the detailed subdivisions relevant to the busi-

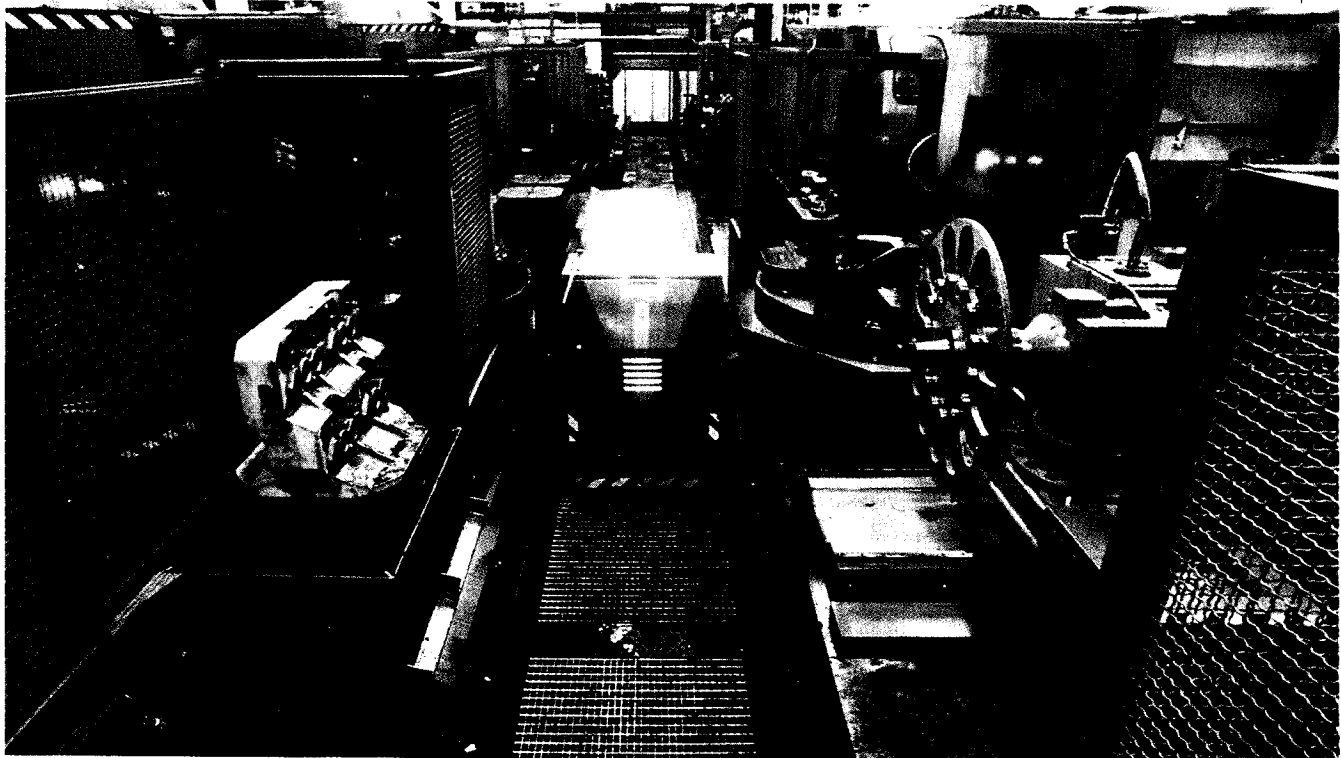
ness and the project and score them for their contributions.

Checklists of this type may be very long and detailed, depending on the characteristics of the investment under consideration. Table 1 presents an extract from a possible checklist.

This approach yields three possible cost benefit estimates for each item. The first category scores those items using conventional investment appraisal methods.

A second category zeros in on those items that can be translated into mon-

Worldwide/Uniphoto.



More American manufacturers need to evaluate the benefits of advanced manufacturing technology.

TABLE 2/STRATEGIC PLANNING MATRIX

Strategies/ Benefits	Improved Revenues	Lower Costs	Higher reliability	Better supply response	Meeting customer requirements	Fit with other products	Enhanced image	New skills	Better information	Risks of not investing	Cost of investment	Costs of operation	Organizational plans	Total
Product enhancement	X*						X**							
New Products	X*			X*			X**	X**						
Risk reduction				X**										
Cost advantages		X		X										
Improved organizational structure														
Company wide impact														
Monetary items														
Items which can be expressed in monetary terms*														
Scored items**														
TOTALS														

*Items which can be converted into monetary terms

**Items which can be expressed in monetary terms scored on a 'points' scale (1 to 10)

etary terms. Increased net sales must be estimated if the justification for the investment is to be based on enhanced product quality, but because detailed monetary estimates are usually unavailable, all that is required is a general idea of the magnitudes involved.

If such estimates are unavailable, benefits and costs fall into the third category, composed of items that can't be converted into monetary amounts. Each benefit or cost associated with an AMT investment must be scored from one to ten, with ten representing high benefits. Similarly, minus ten represents major costs.

A detailed plan is required for each item on the checklist. Such plans include organizational changes, required management actions and commitments, the acquisitions of the new skills, and the concomitant training required.

A STRATEGIC PLANNING MATRIX

The final stage in strategic investment appraisal is to construct a planning matrix. One possible format for such a matrix is shown in Table 2. The categories at the top represent aggregations of the items in the checklist. Only important benefits and costs need to be shown separately. On the left of the figure are those strategies that might contribute to AMT appraisal.

The Xs marked in the figure represent examples of likely combinations of strategies, benefits, and costs. Thus,

the two entries in the lefthand column indicate that product enhancement leads to increased revenues.

An illustration of an item expressed in monetary terms is the cost advantages shown in the column headed Lower Costs. By contrast, items shown in the first lefthand column are examples of benefits not originally expressed in monetary terms. Other examples are marked by one asterisk.

Examples of nonquantifiable benefits are shown in the column labeled Enhanced Image. Additional examples of items that may have to be scored are marked by two asterisks.

The matrix gives three total scores for each project. The first is for those items expressed directly in monetary terms (discounted where necessary) shown in the row labeled Monetary Items. This score is the focus of conventional appraisal techniques. The overall total is obtained by summing the scores for this class shown in each column in the matrix and then totaling for all columns. The results are shown in the first subtotal row in Table 2. The second type of score in the figure is for those benefits and costs that can be translated into monetary terms. Again, these scores are totaled for each column and then added for a grand total. These totals are segregated from monetary items because they may not be as precise as those obtained directly in monetary amounts. The final scores for those items that cannot be expressed in monetary terms are shown in the last row of the

figure.

One firm that adopted a strategic investment appraisal approach in evaluating the first stage of computer-integrated manufacturing investment calculated the tangible benefits. It was determined that the investment cost was \$1.86 million while the quantifiable benefits were only \$860,000. The excess million dollars was chalked up to intangible benefits.

In order to obtain an overall view of the project, management needs to weigh the three scores. The emphasis on each score will depend on top management's attitude toward the factors contributed by the project. The combined score for a project in each column obtained using these weightings is shown in the final row of the matrix.

Revised forecasts of this type should be made regularly over the lifetime of the project, incorporating the effects of new forecasts. ■

Michael Bromwich is the Chartered Institute of Management Accountants' professor of accounting and finance management at the London School of Economics. Telephone 44-71-955-7323. Al Bhimani is a lecturer of accounting and finance at the London School of Economics. Telephone 44-71-955-7329.

Is this article of interest to you? If so, circle appropriate number on Reader Service Card.

Yes	No
76	77