Cost Management System: An Operational Overview

by Surendra P. Agrawal, Satish Mehra. Fogelman College of Business and Economics, University of Memphis and Philip H. Siegel, School of Business Administration, Mommouth University.

Abstract

The purpose of the cost management system of a company is to help maximize its profits — now and in the future. To achieve this goal, the company has to meet or beat the competition not only today, but to continuously improve itself in the future. Therefore, it should devise a cost management system that would lead to the achievement of two major objectives: global competition and continuous improvement. A cost management system requires a commitment from the top management of the company, involvement of its workers at all levels, and the establishment of a self-perpetuating system of improvement that will help improve value added activities and decrease non-value added activities. It may begin with activity based costing, but a comprehensive system will also include activity-based management, total quality management, just-in time system and process improvement. This paper provides an operational overview of such a system.

Cost Management System: An Operational Overview

The term 'cost management' is not a well defined term. It builds on both cost accounting and management accounting, but goes beyond the two. Brinker defines it as "a set of techniques and methods for controlling and improving a company's activities and processes, its products and services."[1] The purpose of the cost management system of a company is to help maximize its profits — now and in the future. The biggest hurdle in maximizing profits is competition. Rapid globalization of world economy facilitated by vastly improved transportation and communications has led to global competition in practically every field, whether it involves manufacturing, providing services or retailing. Domestic companies, both large and small,[2] face competition from other domestic as well as international companies in the domestic market. Companies with international operations face similar competition at home as well as abroad. Competition forces companies to become leaner and meaner, with ever-increasing efficiency and effectiveness.

This paper presents an overview of the cost management system and its various components. Figure 1 presents the model of such a system. Achievement of the objectives mentioned above will require:

A. Establishment of a self-perpetuating system of improvement

B. Commitment of top management

C. Involvement of workers.

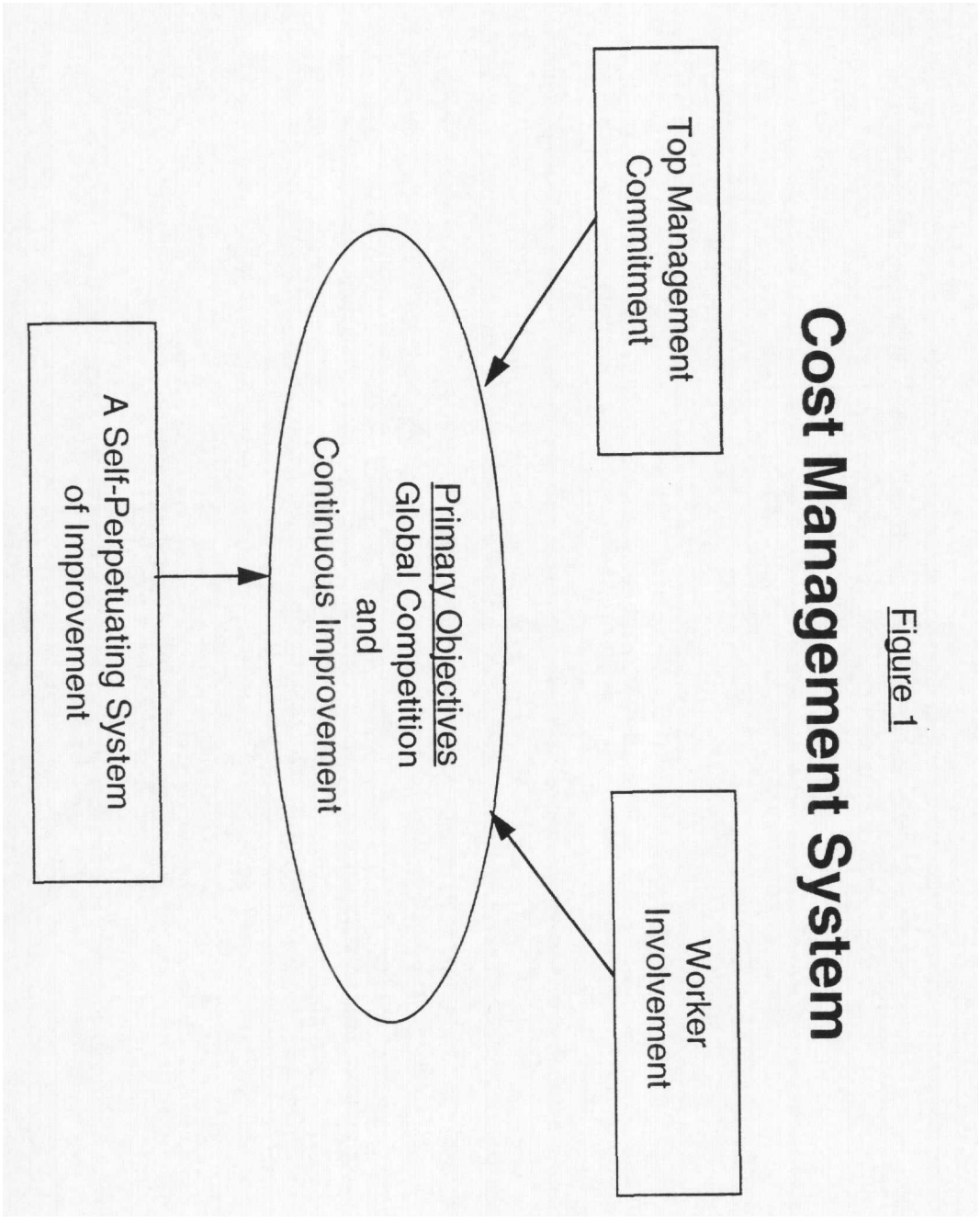


Figure 1

Figure 2

A Self-Perpetuating System of Improvement

Self-Perpetuating System of Improvement

Figure 2 shows the model of a Self-Perpetuating System of Improvement (SPSI) . It indicates two goals of SPSI:

(a) To continuously improve value added activities

(b) To continuously decrease non-value added activities.

Value added activities are those that are judged to contribute to customer value or to satisfy an organizational need. The attribute 'value-added' reflects a belief that the activity cannot be eliminated without reducing the quantity, responsiveness, or quality of output required by a customer or organization.[3] In general, such activities add features to the product that are valued by the customer — external or external — who will be willing to pay for them. All other activities are non-value added. However, many of the non-value added activities are also essential. For example, the company has to train its workers. The training activity is of no concern to the customer who expects a product of consistent quality all the time. The training activity is non-value added, but essential.

Improving value added activities and reducing non-value added activities is a never-ending process. The company must establish a system that will be perpetually involved in the achievement of these goals. Furthermore, the analysis of activities should cover the entire value chain — research and development, design, production, marketing, distribution and service.[4] The starting point to achieve the goals of SPSI is the use of Activity Based Costing (ABC).[5 6]

Activity Based Costing

ABC measures the cost and performance of activities, resources, and cost objects.[7] It recognizes the causal relationships of cost drivers to activities. Peter Drucker includes the information provided by ABC as a part of the information company executives truly need.[8] An ABC system attempts to carry out the following functions:

(i) Identifying all the resources of the company and measuring their practical capacity to carry out various activities

(ii) Analyzing activities actually carried out

(iii) Classifying activities between value-added and non-value-added on the one hand, and between essential and non-essential on the other

(iv) Computing the cost of each activity as well as the cost of unused capacity[9]

(v) Identifying appropriate cost drivers with a causal relationship to cost objects

(vi) Applying the costs with the help of cost drivers to various cost objects, such as products, customers, channels and processes.

The use of ABC tries to follow Drucker's exhortation to measure, not merely count.[10] Its use is not limited to manufacturing companies; rather, it can be used in many service, not-for-profit and governmental organizations.[11]

The use of ABC is most desirable for companies that have a variety of products and incur a large amount of indirect or overhead costs.[12] The greatest impact of ABC is on the allocation of such costs. In recent times there has been a phenomenal growth in overheads as a percentage of total costs. In most companies, the amount of overheads is several times the direct labor cost, so much so that some companies treat direct labor as a component of overheads rather than as a separate category of costs.[13]

In order to make a more accurate allocation, ABC divides activities into several levels, such as unit level, batch level, product level and facility level.[14] One or more drivers are used to allocate costs of these activities to various cost objects in an appropriate manner based upon a causal relationship. This prevents cross-subsidization of product costs. Such cross-subsidization is quite common under the traditional cost system using a single driver (e.g., direct labor or another volume-based measure) to allocate all indirect costs, which leads to many undesirable consequences.

Allocation of costs based on activities helps to determine the profitability of various cost objects more accurately. For example, a company may more accurately compute not only the profitability of various products it makes, but also the profitability of groups of customers or channels of distribution.

ABC may also be used to identify the available capacity of various resources and to determine the cost of capacity that is being utilized and that which remains unutilized.[15] This helps in the identification of the existing and potential constraints of the company.

ABC must not be treated as an end in itself. Rather, information developed under ABC must be used to achieve the goals of SPSI. Important techniques utilized to achieve these goals that use ABC information are discussed below.

Activity Based Management

Activity Based Management (ABM)[16] uses the information developed under ABC. It focuses on the management of activities as the route to improving the value received by the customer and the profit achieved by providing this value. It includes cost driver analysis, activity analysis and performance measurement.[17] Reeves[18] indicates that the an ABM system would help fulfill the managers' need for dynamic information for at least three purposes:

(a) managing and motivating cost improvement;

(b) improving organizational learning; and

(c) supporting cost-based operational decisions.

ABM helps make better strategic and operating decisions. A few examples, based on the study by Swenson,[19] of such decisions are given below.

Strategic Decisions

(i) Product pricing. Elimination of cross subsidization of product costs and allocation of all indirect costs make it possible to develop a more logical pricing policy with respect to each product. Numerous case studies have shown that companies have been able to improve their competitiveness with respect to the products that they make in large volumes, and to increase the prices of low-volume products for which there may be less competition.

(ii) Product mix. Better information about the profitability of each product based upon ABC costs and the new pricing policy makes it possible to maximize the profits of the company by an appropriate product mix.

(iii) Sourcing. Whether to make a part (or carry out a service activity) on its own, or to outsource it, is an important strategic decision for a company. Information provided by ABC makes this decision more accurate. ABC will indicate the activity costs and availability of the capacity of various resources needed to carry out these activities.

(iv) Customer profitability. Post-manufacturing costs, such as marketing, sales and distribution, often comprise a large part of the total costs of a company. ABC may identify these costs with customers, product lines and channels of distribution. Such analysis helps managers to embark upon policies that will maximize company profits.

Operating Decisions

(i) Process improvement. ABC information is most frequently used for process improvement by such means as driver analysis.

(ii) Product design. ABC information may be used to facilitate communication with customers about product design alternatives by giving them more definitive information about the cost of each alternative.

(iii) Performance measurement. This is often viewed as the 'final output' of ABC implementation efforts.

Decision situations mentioned above illustrate a fundamental cost management principle: different costs for different purposes. However, this principle should not be used to justify a proliferation of product costing methods beyond the needs of a particular company, which could undermine the credibility of the cost management information system.

Activity based management uses both financial and non-financial measures of performance. Kaplan and Norton[20] suggest a balance scorecard approach under which managers look at the business from four important perspectives. Goals, often derived

from the company's mission statement, are stated for each perspective, and translated into specific measures.

(i) Customer perspective. How do customers see us? Examples of goals and measures are:
New products — percent sales from new and proprietary products
Responsive supply — on-time delivery
Preferred supplier — share of key accounts' purchases and ranking by key accounts
Customer partnership — number of cooperative engineering efforts.

(ii) Internal business perspective. What must we excel at? Examples of goals and measures are:
Technology capability — manufacturing geometry vs. competition
Manufacturing excellence — cycle time and unit cost yield
Design productivity — silicon efficiency and engineering efficiency
New product introduction — actual introduction schedule vs. plan

(iii) Innovation and learning perspective. Can we continue to improve and create value? Examples of goals and measures are:
Technology leadership — time to develop next generation
Manufacturing learning — process time to maturity
Product focus — percent of products that equal 80% sales
Time to market — new product introduction vs. competition

(iv) Financial perspective. How do we look to shareholders? Examples of goals and measures are:
Survive — cash flow
Succeed — quarterly sales growth and operating income by division
Prosper — increased market share and return on equity.

A study published by the Institute of Management Accountants[21] recommends the use of the half-life measures for continuous improvement. The half-life is the time required for a 50% change, and is approximately constant for a given type of improvement, such as a reduction in defective parts per million. Some examples of performance measures explained in the study are given below.

Production: Cell cycle times; order cycle times; degree of unbalance in a cell; difference between cost objective and actual costs; unscheduled downtime; production backlog.

Quality: Cost of scrap and reworking; returns by customers; customer complaints; cost of warranty repairs; customer surveys.

Purchasing: Cost of materials; percentage of late orders; percentage of partially filled orders.

Management: Manufacturing cost transferred out per employee; inventory turnover and inventory on hand; on-time delivery rate; budgeted vs. actual costs; segment margin for focused factories; return on assets (margin to sales ratio x asset turnover).

Just-in-Time System

Just in Time (JIT) system[22] aims at synchronizing the operations of the company through the entire value chain — from the suppliers to customers.[23] There is no significant inventory at any stage — raw material, in-process or finished goods. Introduction of JIT requires analysis of value added and non-value added activities and their costs, which is provided by ABC.[24]

Under JIT it is essential that suppliers deliver the material of the right quality in right quantities at the right time. This would require long-term contracts with reliable suppliers and use of such techniques as electronic data interchange. JIT may also require a redesign of the manufacturing facilities so as to eliminate waiting time, moving and storage. A kanban system is often used for this purpose. The kanban system ensures that goods are *pulled through* the manufacturing process rather than *pushed through*, thus reducing inventory at every stage.

The company should train its workers to carry out multiple tasks, such as maintenance or repair of equipment on which they work.[25] The company has to have a good marketing function so that it either makes products against orders, or can predict demand in a reliable manner.

It may not always be possible to synchronize all the functions of a company. Constraints may arise anywhere in the value chain, such as in the manufacturing process. Under such circumstances, the Theory of Constraints (TOC) can be used to improve operations.[26] TOC prescribes five steps to help improve performance:

(i) Identify various constraints and determine which of these are binding

(ii) Exploit the binding constraints

(iii) Subordinate everything else to the exploitation of the binding constraints

(iv) Elevate the binding constraints

(v) Repeat the process after a binding constraint has been elevated.

ABC analysis will help identify the constraints, and the acquisition decisions referred to earlier will help elevate the constraints.

Total Quality Management

Total Quality Management (TQM)[27] requires identification and reduction of quality related costs. Such costs often constitute a significant percentage of the total costs of a company.[28] Total elimination of all quality related costs is neither possible nor even desirable, as reduction in some costs may require increase in others. These costs are classified into several categories, as briefly discussed below.

(i) Prevention costs. These prevent low quality from happening. Examples of such costs are: higher payments to reliable suppliers to assure delivery of only high quality material, maintenance of equipment, and training of workers.

(ii) Appraisal costs. These are costs of carrying out checks at different stages, such as inspecting incoming material, work in process, and finished goods prior to shipment.

(iii) Internal failure costs. These result from goods rejected prior to shipment to customers, and include such things as cost of scrap and rework. There is also an opportunity cost of internal failures in terms of lost profits.

(iv) External failure costs. These relate to goods found unacceptable to customers after delivery, such as costs of replacement and warranty work. Administrative costs of handling customer complaints and returns are also included in this category. In addition to the opportunity cost of external failures in terms of lost profits, there is a significant but non-measurable opportunity cost of lost sales due to low quality.[29]

When a company adopts TQM, it may initially need to increase prevention and appraisal costs so as to reduce or eliminate internal and external failure costs. After a robust system of preventing bad quality has been set up, the appraisal costs may be reduced or eliminated.[30]

Quality related costs are often well hidden, and ABC provides considerable help in their measurement, making the management aware of such costs.[31] TQM provides significant help in the reduction of non-value added activities and improvement of value added activities.

Process Improvement

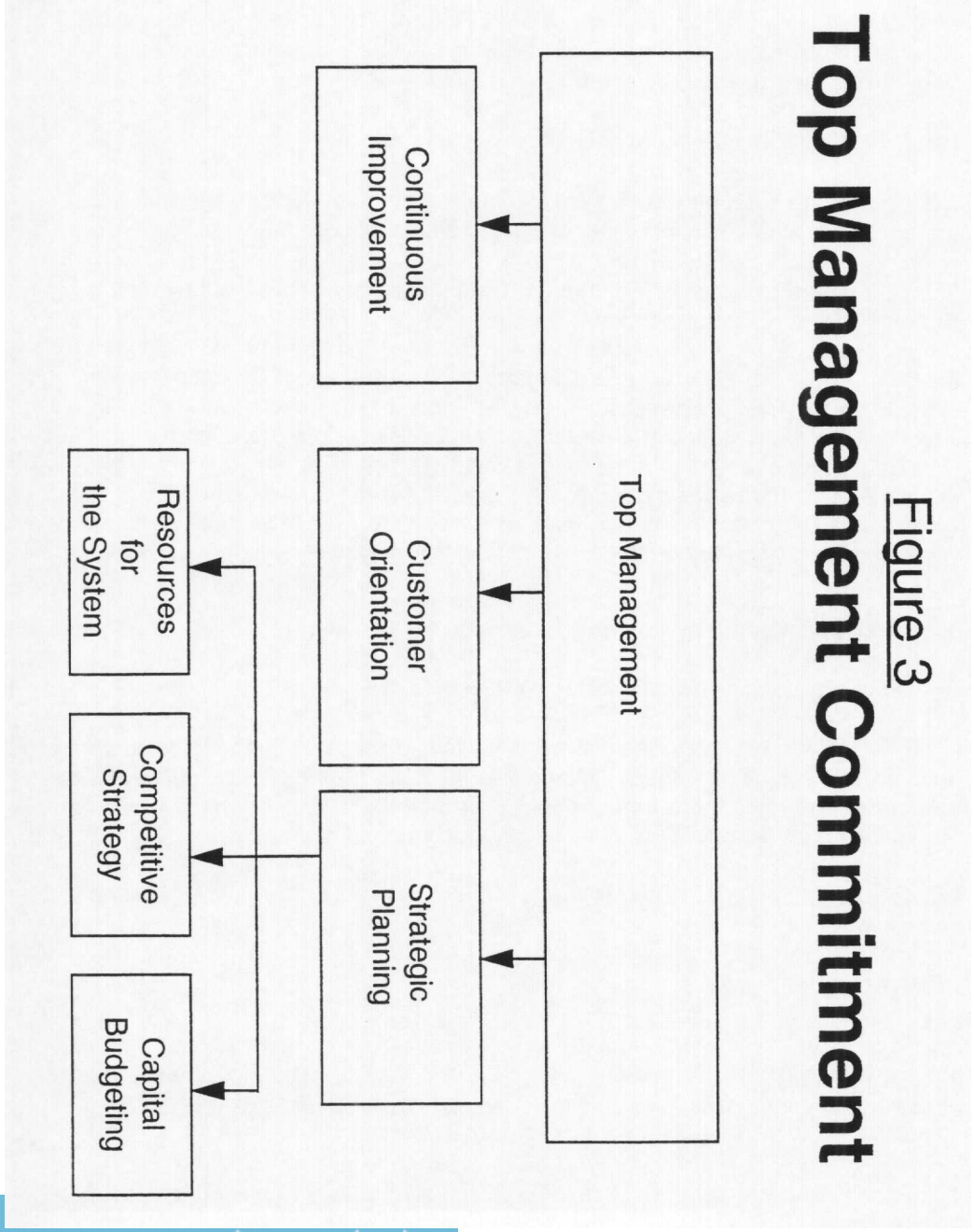
Process Improvement begins with the identification of various processes carried out by the company that involve numerous activities and cut across functional lines. A mapping of the processes may lead to significant reduction in non-value added activities and improvement of value added activities.[32] ABC analysis provides considerable help in process improvement.

Process improvement is an incremental approach under which existing processes are examined and improved. Examples of such improvement are: elimination of unnecessary paper work, reduction in the number of approvals needed, improvement in communication, and change form manual analysis to electronic analysis of data. In contrast, process innovation or reengineering involves a total change in the way the work is done. Examples of such innovation would include the first time use of target costing in the development of new products,[33] flexible manufacturing systems or cellular manufacturing.[34] In either case, time is considered to be a crucial element in all phases of the value chain. Companies use time as a competitive element.[35]

Commitment of Top Management

SPSI cannot be established without the active support of the top management of the company. Top management's commitment is a prerequisite to the successful implementation of any strategy or innovation.[36] As shown in Figure 3, this requires the following:

Figure 3



1. Commitment on the part of the top management inculcating a culture of continuous improvement.[37] It may appoint a team with members from different functional areas to suggest and implement changes that need to be made, with an individual acting as the champion of the cause. Some of the questions the management must decide are:

(i) Should the company use outside consultants and/or available packages?

(ii) Should the various components of SPSI be developed as stand-alone systems or should they be integrated from the very beginning with the existing system (e.g., ABC with the existing financial accounting system)?

(iii) Which department should have the ownership of a new system?

(iv) Should the components of SPSI be implemented on a company-wide basis or incrementally at different divisions starting with a pilot project?

2. Commitment to customer orientation. What industry leaders have long realized is that customer service means more than just fulfilling immediate needs. Anticipating future needs is what makes companies successful — and that attitude must pervade the entire corporate culture. A firm commitment on the part of the top management is the key here. Companies must divide customers into segments, and decide which segments are most valuable, developing their marketing programs appropriately.[38] Changing needs of the customer must be treated as the guiding light for the company's development.[39] In this context, customer is not merely the external party that pays for the company's products. Rather, even internally the user of a service should be considered as a customer by the department providing the service.[40]

3. Strategic planning. This may involve several considerations.

(i) Commitment of resources needed to establish SPSI

(ii) Competitive strategy of the company, its divisions and products.[41] The company must decide whether it wants to compete on the basis of prices or product differentiation. Similarly, it must formulate policy regarding different segments of its business based upon their stage of development, such as build, hold or harvest.

(iii) Capital budgeting.[42] This will provide direction to the long term plans of the company.

Involvement of workers

Employee involvement means using the creative and synergistic effects of all employees to solve problems. In other words, the objective of an employee involvement program is to tap the resources of employee ideas, creativeness, and energies to solve operating problems and ensure continuous improvement.[43]

For a successful implementation of SPSI, it is necessary to have active involvement of workers at all levels — from factory floor to middle management. In addition

to being involved with the manufacturing process, workers must also become involved with each other's responsibilities. The Commission On the Future of Worker-Management Relations indicates that most U.S. workers want to participate in decisions that affect their jobs and their company.[44] As shown in Figure 4, this would require the following:

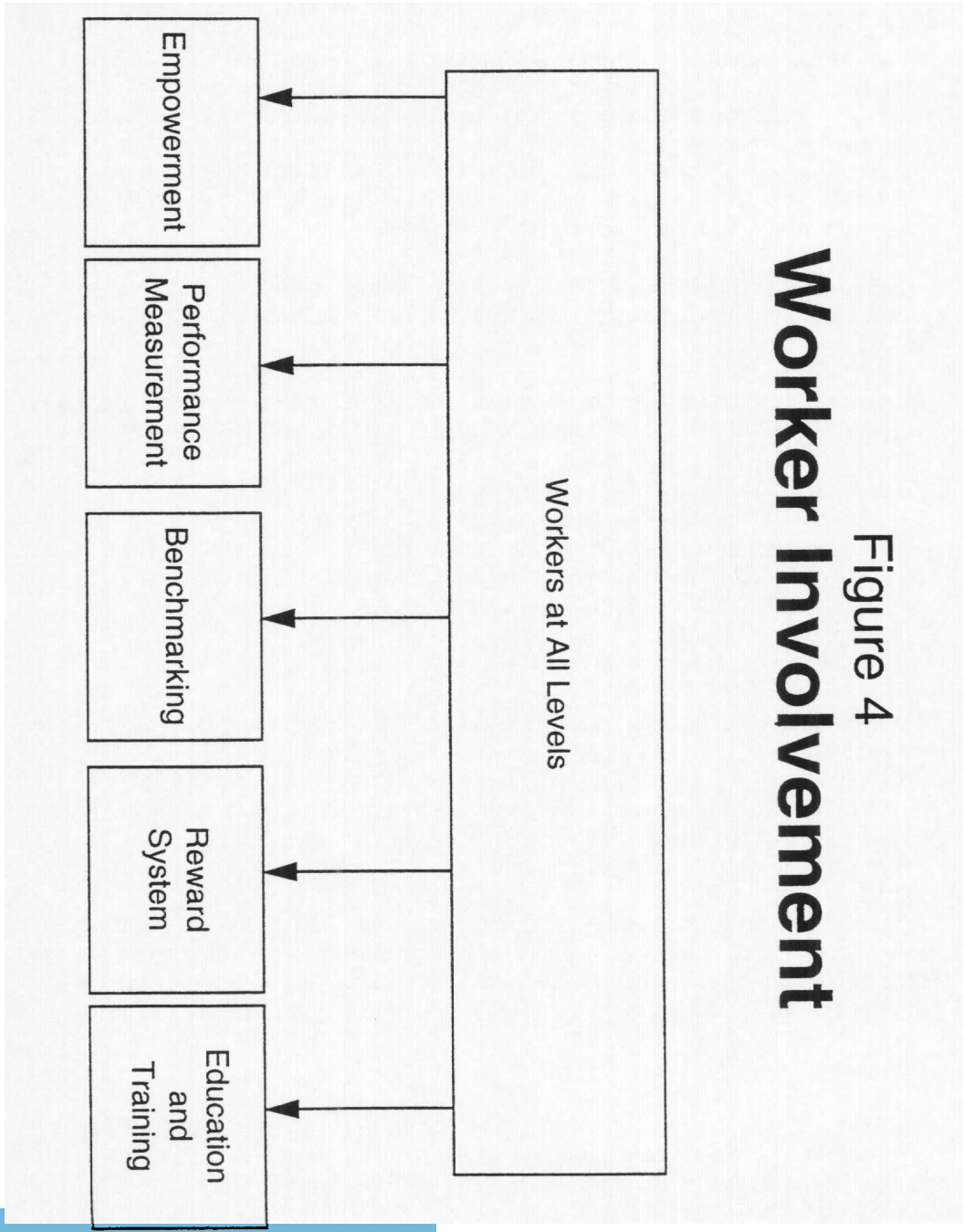


Figure 4

1. Empowerment of individuals and teams.[45] Many companies find it beneficial to use worker teams. Workers, or their teams, need to be empowered, such as to make changes in the process, or stopping the production line when a difficulty is encountered.[46] This may be translated into self-managed teams (SMTs) that are completely responsible for a portion of a product or service. As such, they monitor quality, perform maintenance, analyze costs, and track production or service volume. Supervisors are replaced by team managers who monitor team progress and ensure that the team is proceeding in the same direction as the rest of an operation.[47] For SMTs to be successful, major paradigm shifts in thinking usually must occur among executives, managers, staff support personnel, and workers. For example, workers must often change their orientation toward competition with fellow workers to one of true functional teamwork with a commitment of reaching shared mutual goals. Often, team members must develop new skills in areas such as communication, planning, setting job standards, problem solving, and administration.[48]

2. Performance measurement techniques that would include both financial and nonfinancial measures. Some of these would be carried out at operations level in real time.

3. Benchmarking, as distinct from traditional standard setting.[50] Effective managers benchmark and baseline their operations considering a number of factors, such as:[51]

(i) their cost versus that of their competition
(ii) the lowest cost attainable with equipment currently in place
(iii) the best cost potential with new equipment, and
(iv) long-range cost attainable with new equipment, automation, methods and systems that have the potential of eliminating entire processes.

4. Linking the reward system with the performance measures.

5. Continuous education and training of workers. Education programs should include three elements:[52]

(i) awareness training of those in the company from top management to work floor
(ii) education of the implementation teams and their leaders, and
(iii) further specialist training as required by the individual projects.

Education and training programs are important not only inside the organization but also outside the organization such as suppliers and/or customers. Perhaps the most important objective of education and training is to ensure the suppliers or customers thoroughly understand the main purpose for implementing the system.:[53]

Conclusion

A cost management system requires a commitment from the top management of the company, involvement of its workers at all levels, and the establishment of a self-perpetuating system of improvement that will help improve value added activities and decrease non-value added activities. It may begin with activity based costing, but a comprehensive system will also include activity-based management, total quality

management, just-in time system and process improvement. Such a system will help the company in meeting global competition now and in the future with emphasis on continuous improvement.

An effective cost management system helps in good management and control of costs. However, it should also assist in the atainment of operational excellence by providing timely and reliable information for management use. We hope that this paper has shed some light on this goal.

References

1. B. J. Brinker in the Preface to *Emerging Practices in Cost Management,* 1996 Edition, Warren, Gorham & Lamont.

2. See: T. Smart and K. Hayes, "Look Who's Showing Small Fry the Ropes," *Business Week/Enterprise,* E6-8.

3. See *Glossary of Activity-Based Management,* edited by N. Raffish and P. B. B. Turney, Computer Aided Manufacturing - International, Inc.

4. J. Shank and V. Govindarajan, "Strategic Cost Management: The Value Chain Perspective," *Journal of Management Accounting Research,* Volume 4, 1992, pp. 17-198. Also see: M. D. Shields and S. M. Young, "Managing Product Life Cycle Costs: An Organizational Model," *Cost Accounting for the 90's Responding to Technological Change* National Association of Accountants, Montvale, N.J., 1988.

5. Development of ABC in the U.S. received considerable impetus from services of articles published by R. Cooper in *Journal of Cost Management,* "The Rise of Activity-Based Costing — Part One: What is an Activity-Based Cost System?'" (Summer 1988, pp. 45-54); "The Rise of Activity-Based Costing — Part Two: When Do I Need an Activity-Based Cost System?'" (Fall 1988, pp. 41-48); "The Rise of Activity-Based Costing — Part Three: How Many Cost Drivers Do You Need, and How Do You Select Them?'" (Winter 1988, pp. 34-46); "Implementing an Activity-Based Cost System," (Spring 1990, pp. 3-42).

6. P. B. B. Turney and A. J. Stratton, "Using ABC to Support Continuous Improvement," *Management Accounting*, September 1992, pp. 6-50.

7. See Glossary.

8. P. F. Drucker, "The Information Executives Truly Need," *Harvard Business Review* January-February 1995, pp. 54-62.

9. See: R. Cooper and R. S. Kaplan, "Activity-Based Systems: Measuring the Cost of Resource Usage," *Accounting Horizons*, September 1992, pp. 1-13.

10. P. F. Drucker, "We Need to Measure, Not Count," *The Wall Street Journal*, April 13, 1993.

11. For example, see: J. W. May and R. B. Sweeney, "Activity-Based Costing in Banking: A Case Study," *CMA Magazine,* May 1994, pp. 19-23; J. Antos, "Activity-Based Management for Service, Not-for-Profit, and Governmental Organization, " *Journal of Cost Management,* Summer 1992, pp. 31-23; W. Rotch, "Activity-Based Costing in Service Industries, " *Journal of Cost Management,* Summer 1990, pp. 4-14; and D. J. Harr, "How Activity Accounting Works in Government," *Management Accounting*, September 1990, pp. 36-40.

12. A list of warning signals that may point toward the need of ABC is provided by R. Cooper, "You Need a New Cost System When ...," *Harvard Business Review,* January-February 1989, pp. 77-82.

13. However, there are many who disagree with this view. For example, See: G. Boer, "Five Modern Management Accounting Myths," *Management Accounting,* January 1994, pp. 22-27.

14. R. Cooper, "Cost Classification in Unit-Based and Activity-Based Manufacturing Cost Systems," *Journal of Cost Management,* Fall 1990, pp. 4-14.

15. R. Cooper and R. S. Kaplan, 1992.

16. For a more detailed discussion, see: P. B. B. Turney, Activity-Based Management," *Management Accounting,* January 1992, p. 20-25. Also see J. M. Reeves, "Projects, Models, and Systems-- Where Is ABM Headed?" *Journal of Cost Management,* Summer 1996, pp. 5-17. See Glossary.

18. J. M. Reeves, "Projects, Models, and Systems — Where Is ABM Headed?" *Journal of Cost Management,* Summer 1996, pp. 5-16.]

19. D. Swenson, "The Benefits of Activity-Based Cost Management to the Manufacturing Industry," *Journal of Management Accounting Research,* Fall 1995, pp. 167-180.

20. R. S. Kaplan and D. P. Norton, "The Balanced Scorecard — Measures that Drive Performance," *Harvard Business Review,* January/February 1992, pp. 71-79.

21. D. G. Dhavale, Management Accounting Issues in Cellular Manufacturing and Focused Factory Systems, Montvale, NJ: Institute of Management Accountants, 1995.

22. For a more detailed description of JIT systems see, for example, W. J. Stoddaard and N. W. Rhea, "Just-in-Time Manufacturing: The Relentless Pursuit of Productivity," *Materials Handling Engineering,* March 1985, pp. 70-76; A. Inman and S. Mehra, Financial Justification of JIT Implementation," *International ournal of Operations and Production Management,* Vol. 13(2), 1993, pp. 33-39.

23. Experience has indicated that about 80 percent of the benefits of going to a completely integrated factory can be achieved simply by implementing JIT manufacturing. See: S. M. Hronec, "The Effects of Manufacturing Productivity on Cost Accounting and Management Reporting," *Cost Accounting for the 90s,* pp. 117-125.

24. J. C. Bailes and I. K. Kleinsorge, "Cutting Waste with JIT," *Management Accounting,* May 1992, pp. 28-32.

25. See: F. M. Barton, S. P. Agrawal and L. M. Rockwell, Jr., "Meeting the Challenge of Japanese Management Concepts," *Management Accounting,* September 1992, pp. 49-52.

26. This brief discussion is based on E. M. Goldratt and R. E. Fox, *The Race,* North River Press, Inc., 1986.

27. For a survey of the authoritative literature on TQM, see: J. K. Shank and V. Govindarajan, "Measuring the 'Cost of Quality': A Strategic Cost Management Perspective," *Journal of Cost Management* Summer 1994, pp. 5-17.

28. For example, see: L. Carr and T. Tyson, "Planning Quality Cost Expenditures," *Management Accounting*, October 1992, pp. 52-56.

29. Several methods have been suggested in the literature to estimate such hidden costs: the multiplier method, the market research method, and the Taguchi quality loss function. See: T. L. Albright and P. R. Roth, "The Measurement of Quality Costs: An Alternative Paradigm," *Accounting Horizons*, June 1992, pp. 15-27.

30. See: J. Campanella (editor), *Principles of Quality Costs,* ASQC Quality Press, Milwaukee, 1990.

31. M. R. Ostrenga, "Return on Investment Through the Cost of Quality," *Journal of Cost Management,* Summer 1991, pp. 37-44.

32. M. R. Ostrenga and F. R. Probst, "Process Value Analysis: The Missing Link in Cost Management," *Journal of Cost Management,* Fall 1992, pp. 4-13

33. Target costing was first developed by Toyota. See T. Tanaka, Target Costing at Toyota," *Journal of Cost Management,* Spring 1993, pp. 4-11

34. For a detailed discussion of the need to automate, see Howell and Soucy, "The New Manufacturing Environment: Major Trends for Management Accountant," *Management Accountant,* July 1987, pp. 1-27

35. For an analysis of time as a competitive element, see: A. F. Borthick And H. P. Roth, "Accounting For Time: Reengineering Business Processes To Improve Responsiveness," *Journal of Cost Management,* Fall 1993, pp. 4-14.

36. S. Hunt, L.S. Chonko and V.R. Word, "Organizational Commitment and Marketing", *Journal of Marketing,* 1985, pp. 112-126.

37. For a detailed discussion, see: M. D. Shields and S. M. Young, "A Behavioral Model for Implementing Cost Management Systems," *Journal of Cost Management,* Winter 1989, pp. 17-27.

38. K. J. Blois, "The Manufacturing/Marketing Orientation and its Information Needs, *European Journal of Marketing,* 1980, pp.354-364.

39. See: A. Griffin, G. Gleason, R. Preiss and D. Shevenaughs, "Best Practice for Customer Satisfaction in Manufacturing Firms," *Sloan Management Review*, Winter 1995, pp. 87-98.

40. B. Pfau, D. Detzel and A. Geller, "Satisfy Your Internal Customers," *Journal of Business Strategy*, November/December 1991, pp. 3-13.

41. J. K. Shank and V. Govindarajan, "Strategic Cost Management and the Value Chain," in *Handbook of Cost Management,* edited by B. J. Brinker, New York, Warren Gorham and Lamont, 1993. Also see: V. Govindarajan and J. K. Shank, "Strategic Cost Management: Tailoring Controls to Strategies," *Journal of Cost Management,* Fall 1992, pp. 4-24.

42. R. A. Howell and S. R. Soucy, "Capital Investment in the New Manufacturing Environment," *Management Accounting,* November 1987, pp. 26-32.

43. R.W. Hall, *Attaining Manufacturing Excellence.* Homewood, IL: Down Jones-Irwin, 1987.

44. See: R. Eisman, "Government Reports on Worker Involvement," *Incentive,* August 1994, p. 7.

45. C. Meyer, " How the Right Measures Help Teams Excel," *Harvard /Business Review,* May-June 1994, pp. 95-103.

46. B. R. Williams, "The Realities of Empowering Teams: A Case Study,"*Hospital Materiel Management Quarterly*, February 1996, pp. 60-66.

47. F. Daly, "Technology may be te tool, but people provide the Power", *PEM: Plant Engineering & Maintenance,* 1991, p. 10.

48. A. B. Cheney, "Self-Managed Work Teams", *Executive Excellence,* 1991, pp. 11-12.

49. For examples, see: L. S. Maisel, "Performance Measurement: The Balanced Scorecard Approach," *Journal of Cost Management,* Summer 1992, pp. 44-49; J. Hoffecker and C. Goldenberg, " Using the Balanced Scorecard to Develop Company-wide performance Measures," *Journal of Cost Management,* Fall 1994, pp. 5-17; C. J. McNair, Responsibility Accounting and Controllability Networks," *Handbook of Cost Management,* Boston: Warren Gorham Lamont, 1993, pp. E4-1-4-33; R. G. Eccle *Management Accounting*, October 1992, pp. 41-44; F. B. Green, F. Amernkhienan and G. G. Johnson, Performance Measures and JIT," *Management Accounting,* February 991, pp. 50-53; J. Fisher, "The Use of Nonfinancial Measure," *Journal of Cost Management,* Spring 1992, pp. 31-38.

50. See: American Productivity and Quality Center, *The Benchmarking Management Guide,* Productivity Press, Portland, 1993; D. Ottenhouse, "Making Benchmarking Faster, Cheaper, and Easier," CMA, February 1994, pp. 23-26.

51. F. C. Wilson, "Benchmarking for Staple Carpet Yarns", *Textile World,* 1996, pp. 37-38.

52. R.J. Schonberger. *Japanese Manufacturing Techniques: Nine Hidden Lessons in Simplicity*, New York: The Free Press, 1982.

53. Several approaches are available to educate and train suppliers and custoerms. For futher details, see Schonberger. 1982.