

Reporting Nonfinancial Performance Measures: A Survey of Electric and Electronic Firms

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EXECUTIVE SUMMARY

- Nonfinancial performance measures help senior managers because they provide information about key competitive factors; nonfinancial performance measures are important to middle- and lower-level managers because they provide timely information that allow timely corrective actions to be taken.
- On average (according to the study discussed in this article), about 10 nonfinancial performance measures on about 5 dimensions of importance are reported to senior managers of manufacturing plants.
- Quality and delivery are the most important dimensions of reporting; maintenance and design/engineering are the least important dimensions.
- Relatively few plants report customer satisfaction (or customer service) and supplier performance measures to plant management—an apparent inconsistency with the accepted wisdom about the importance of the customer's voice.
- About half the plants surveyed rate both financial and non-financial measures as equally important for short- and long-term decision making.

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Managers have traditionally relied on financial measures for decision making and performance evaluation purposes (Seed, 1988; Anthony and Govindarajan, 1995). However, starting with Kaplan (1983), many have criticized managers' excessive reliance on financial measures. Financial measures, these critics claim, arrive too late to be useful (Nanni, Dixon, and Vollmann, 1990) and also "create barriers, often hidden, to executing strategies and achieving competitiveness and profitability" (Maisel, 1992, p. 471). Increasingly, organizations have tended to rethink their strategies and focus more on customer needs (e.g., quality, delivery, service, and price). As a result, organizations have had to redesign their control systems to make them consistent with the firm's strategies and objectives.

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The Survey

A short questionnaire was sent to plant-level senior managers of 123 manufacturing plants (or firms) belonging to the electrical and electronics industry. All the plants were located in the midwestern United States and employed more than 500 people. The list of these firms was compiled from manufacturers' directories for Illinois, Indiana, Iowa, Minnesota, and Wisconsin. Thirty completed surveys were received, for a response rate of over 24 percent. Two firms were deleted from the sample because they were too small (less than 100 employees). (In small firms, informal rather than formal reporting of performance measures may be more important.) Thus, the analysis discussed here represents information from 28 firms. Eighteen out of 28 respondents (64.3 percent) were senior plant managers (vice presidents, directors, or plant managers). Of the remaining 10, 9 were at least second-level plant managers (manufacturing or operations managers.)

One significant change in performance measurement (one aspect of a management control system) is the increased reporting of *nonfinancial* measures on factors such as quality and delivery times (Johnson, 1990; Fisher, 1992; Ramanathan and Schaffer, 1995; Stivers, Covin, Hall, and Smalt, 1998). For example, in a recent survey conducted by the Cost Management Group of the Institute of Management Accountants (IMA), 63 percent of the respondents stated that their companies use nonfinancial measures (IMA, 1997). Although it appears that the use of nonfinancial measures is increasing, little is known about the types of measures reported, the number of measures reported, the frequency of reporting, or the relative importance of financial versus nonfinancial measures. To help remedy this lack of knowledge, this article reports the findings of a survey of 28 manufacturing plants about the formal reporting of nonfinancial performance measures to senior managers of manufacturing plants.

NUMBER OF NONFINANCIAL PERFORMANCE MEASURES REPORTED

On average, the survey shows that about 10 nonfinancial performance measures are reported to plant senior managers (the median is between 9 and 10). More than 71 percent of the plants report between 5 and 14 measures (see Exhibit 1). Moreover, on average, measures pertaining to between five and six *dimensions* (median 5, range 2-9; see Exhibit 2) are reported in these firms. ("Dimensions" include qualities or characteristics such as quality, cycle time, and safety rates, as explained in the next section.) Thus, an average of two measures per dimension are provided to senior plant managers in these firms.

Previous surveys on nonfinancial measures (e.g., Perera, Harrison, and Poole, 1997; Stivers et al., 1998) provide no indication of the average number of nonfinancial measures reported to or used by managers, so no clear norms exist. It is reasonable to assume that the number of measures to be monitored depends on the different objectives pursued simultaneously by a firm. However, common sense suggests that managers can focus on only a handful of key measures pertaining to selected dimensions of a plant's performance, each of which should be linked to the company's strategies. Having too many measures creates confusion, because it can become difficult to sort out which measures are important and how much emphasis to place on each individual measure. That the sample firms reported an average of only five dimensions and provided only two measures per dimension appears reasonable because managers would not be overwhelmed by reports about only 10 measures.

WHICH MEASURES ARE REPORTED

The measures listed by the survey respondents are classified into 14 dimensions:

- Quality
- Delivery
- Manufacturing

Exhibit 1. Number of Nonfinancial Measures Reported

Number of Measures Reported	Number of Firms	Percentage
20 or more	2	7.1
15-19	4	14.3
10-14	8	28.6
5-9	12	42.9
4 or less	2	7.1
Total	28	100.0

- Manufacturing cycle time
- Maintenance
- Supplier
- Design/engineering
- Inventory
- Labor
- Marketing/sales/orders
- Customer satisfaction/service
- Human resources
- Safety
- All others

Exhibit 2. Number of Dimensions of Reporting

Number of Dimensions of Reporting	Number of Firms	Percentage
10 or more	—	—
7-9	8	28.6
4-6	16	57.1
1-3	4	14.3
Total	28	100.0

Exhibit 3a. Dimension of Reporting and Number of Measures Reported

Number of Measures	Quality	Delivery	Manufacturing	Manufacturing Cycle Time
No measures	2	8	11	16
1-2 measures	10	16	12	10
3-5 measures	13	4	4	2
> 5 measures	3	0	1	0
Total	28	28	28	28
	Maintenance	Supplier	Design/Engineering	Inventory
No measures	25	21	25	16
1-2 measures	3	4	2	11
3-5 measures	0	3	0	1
> 5 measures	0	0	1	0
Total	28	28	28	28
	Labor	Marketing/Sales/Orders	Customer Satisfaction/Service	Human Resources
No measures	18	19	22	19
1-2 measures	9	7	5	9
3-5 measures	1	2	1	0
> 5 measures	0	0	0	0
Total	28	28	28	28
	Safety	Other		
No measures	20	20		
1-2 measures	8	6		
3-5 measures	0	2		
> 5 measures	0	0		
Total	28	28		

Of these, 13 dimensions can be linked to three of the four perspectives of the balanced scorecard (Kaplan and Norton, 1992)—customer, internal business processes, and learning and growth. (The fourth perspective of the balanced scorecard is financial, which this study did not examine.)

Three dimensions of the 14 can be linked to the balanced scorecard's customer perspective (delivery, customer satisfaction/service, and marketing/sales/orders), 9 to the internal business process perspec-

Exhibit 3b. Dimension of Reporting and Number of Measures Reported

Dimension of Reporting	Percentage of Firms Reporting One or More Measures in Each Dimension	Average Number of Measures Reported in Each Dimension (Rounded Off)
Quality	92.9	3
Delivery	71.4	2
Manufacturing	60.7	2
Manufacturing cycle time	42.9	1
Inventory	39.3	2
Labor	35.7	2
Marketing/sales/orders	32.1	2
Human resources	32.1	2
Safety	28.6	1
Supplier	21.4	3
Customer satisfaction/service	21.4	2
Maintenance	10.7	2
Design/engineering	10.7	3
Other	28.6	2

The survey results clearly indicate a heavy emphasis on reporting measures pertaining to the internal business process perspective.

tive (quality, manufacturing, manufacturing cycle time, maintenance, design/engineering, supplier, inventory, labor, and safety), and 1 to the learning and growth perspective (human resources). (Quality could also be included under the customer perspective. However, most measures reported in the survey appear to measure quality as it pertains to internal operations.) The survey results clearly indicate a heavy emphasis on reporting measures pertaining to the internal business process perspective. This finding is not surprising given that the survey respondents are plant personnel.

REPORTING BY DIMENSION

Exhibits 3a and 3b show a distribution of the reporting of nonfinancial measures among the firms, and Exhibit 4 contains a detailed list of the nonfinancial measures reported to plant senior managers under the different dimensions of reporting.

QUALITY MEASURES

Quality is the most important dimension, with 26 of 28 firms (92.9 percent) reporting at least one quality measure to managers (see Exhibits 3a and 3b). This finding is consistent with the emphasis on quality in North America since the 1980s and the fact that many firms consider quality a key competitive weapon to generate future revenues.

Exhibit 4. Detailed List of Measures Reported to Plant Senior Management

Quality (36 measures)	Delivery (11 measures)	Manufacturing (19 measures)
Defect reports (13 ¹)	On-time delivery (16)	Manufacturing efficiency (4)
First-pass yield (9)	Compliance to request date (4)	Schedule attainment (4)
Scrap (8)	Past-due items (2)	Production (3)
Customer returns (7)	Customer deliveries	Production versus plan (2)
Customer/field quality (3)	Delivery	Productivity (2)
Rework (3)	Compliance to promise date	Percent up-time (2)
ISO/Quality audits (3)	Lines shipped same day release	Machine utilization (2)
Warranty transactions (2)	On-time shop orders	Volume shipped (2)
Customer complaints (2)	On-time shop order release	Electrical usage report
Rejects (2)	Ship on schedule-service	Lean manufacturing assessment
Product yield (2)	Make-to-market delivery time	Production plan accuracy
Product quality (2)		Bill of materials accuracy
Quality holds (2)		Routing accuracy
Failure analysis (2)		Production backlog
TQC-type measures		Manufactured turns
Department quality reports		Shipping verification
Field repair rates		Percent negative balances
Field repair actions		Receiving forecast
Causes of repairs		Raw materials issued/converted
Statistical process control		
Recalls		
Shipping accuracy		
Number of quality holds		
Transaction error reports		
TQM status		
Lot acceptance		
Corrective actions report		
Quality as a % of sales		
Administrative errors		
Sales PPM errors		
Stockroom PPM errors		
Shipping PPM errors		
Quality index score		
Six sigma charts		
Install quality		
Right on arrival %		

¹ Number of firms reporting the measure.

Stivers and colleagues (1998) found that over 80 percent of their respondents rated product or service quality as important, and about 60 percent measured quality. In our sample, 36 different measures of quality are reported across the 26 firms. Many of these measures are reported in more than one firm, as the number in parentheses alongside the measure in Exhibit 4 suggests.

Measures pertaining to defects, first-pass yield, and scrap appear to be the most popular quality measures. Defect rate is among the two most used nonfinancial measures among respondents to the 1997 IMA

Exhibit 4. Detailed List of Measures Reported to Plant Senior Management (cont'd)

Design/Engineering (8 measures)	Inventory (5 measures)	Labor (7 measures)
Designs released versus planned releases	Inventory levels (6)	Overtime (7)
Design days late to schedule	Inventory accuracy (5)	Labor hours (2)
Actual versus planned design hours	Inventory turns (4)	Labor productivity
Overtime percent	Percent stockouts	Labor utilization
Order change requests processed	Inventory mix	Labor efficiency
Product performance: test/design ratios		Headcount by department
Engineering performance to plan		Labor index
Engineering change processing time		
Marketing/Sales/Orders (11 measures)	Customer Satisfaction/Service (4 measures)	Human Resources (11 measures)
Back-order volume (4)	Customer satisfaction (4)	Absenteeism (2)
Bookings report (3)	Customer service attainment (3)	Headcount (2)
Sales per employee	Service call rates	Employee satisfaction (2)
Sales forecast accuracy	Internal customer satisfaction surveys	Training hours (2)
Bookings forecast accuracy		Suggestion report
Order billings report		Grievances
Sales representative performance against quota		People transfers
Product sales		Performance reviews processed on time
Manufacturing shipping performance		Salary increases processed on time
Market share		Attendance
Quotation volume		Percent skill map accomplishment
Safety (4 measures)	Other (12 measures)	
Safety performance (4)	Housekeeping (3)	
Accident report (2)	Projects: status versus goals (2)	
Health and safety report	New product target schedules	
Safety incidence report	New product performance (efficiency, quality, etc.)	
	Plant incentive results	
	Ergonomics report	
	Environmental	
	Corrective task-force results	
	Compliance regulation status	
	Forecast results	
	Excess/Obsolete report	
	Obsolete disposition report	

survey. Whereas defects and scrap pertain to product quality, first-pass yield is a measure of process quality (i.e., whether the process is well designed and operating well enough so that the product passing through its various steps comes out at the other end within predetermined standards). Some plants in this study's sample also extend the quality notion to include measures on administrative errors, stockroom errors, and transaction errors.

DELIVERY TIMES

Delivery is the second most important dimension: 20 of 28 firms (71.4 percent) report at least one measure (see Exhibits 3a and 3b). This finding is consistent with the findings in Stivers and colleagues (1998) that just under 80 percent of their respondents measured delivery performance. A total of 11 delivery measures are reported across the 20 plants, the most reported being on-time delivery (see Exhibit 4).

On-time delivery performance can be measured against customer request date, promise date to customer, or shipping schedule date. Some firms may be measuring on-time delivery in more than one way. Regardless of how it is measured, delivery is (along with quality) becoming an important source of competitive advantage in today's business environment (Johnson, 1990); that over 71 percent of the plants report on this dimension is consistent with this fact. According to the 1997 IMA survey, on-time delivery is among the three most used nonfinancial measures. This survey's results are consistent with those findings.

MANUFACTURING MEASURES

The third important dimension is manufacturing, with 17 of 28 firms (60.7 percent) reporting at least one measure; 19 measures are reported across the 17 firms (see Exhibits 3a, 3b, and 4). The most popular measures are manufacturing efficiency and schedule attainment.

The focus on manufacturing efficiency is consistent with the notion that manufacturers are conscious about achieving a cost advantage by increasing efficiency. Manufacturing efficiency also increases productivity, which is considered important by about 85 percent of the respondents to the survey by Stivers and colleagues (1998). That 39 percent of the firms do not report measures to senior management on this dimension is a little surprising, given that this survey is targeted at senior plant managers whose primary responsibility probably is managing the plant's operations, a large portion of which would be manufacturing. However, senior managers may have chosen to concentrate on measures that affect the customer (e.g., quality and delivery) and delegated the monitoring of internal efficiency measures to subordinates.

MAINTENANCE AND DESIGN/ENGINEERING

Maintenance and design/engineering are the least important dimensions, with only 3 of 28 firms (10.7 percent) reporting one or more measures to their managers (see Exhibits 3a and 3b). This finding is rather surprising because maintenance is important to achieving high

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quality. This is particularly important in just-in-time (JIT) and total quality management (TQM) environments, which more and more firms are adopting to at least some extent.

Design/engineering is critically important for at least two reasons. First, an increased customer focus means that manufacturers must constantly improve product features. Moreover, as product life cycles get shorter because of technological changes, firms must develop new products faster than ever before.

Second, proponents of life-cycle cost management and target costing argue that the design stage of the production life cycle is extremely important: It is often claimed that 80 percent of the total costs of a product are locked in at this stage (see Horngren, Foster, Datar, and Teall, 1997, p. 430). In addition, design/engineering is an important aspect in achieving mass customization (Feitzinger and Lee, 1997), which appears to be the strategy adopted by some firms toward simultaneously fulfilling the objectives of flexibility and growth. Possibly some of the plants surveyed are not responsible for carrying out the design/engineering function, which means that measures pertaining to this function would not be reported at the plant level.

CUSTOMER SATISFACTION/SERVICE

Customer satisfaction/service and supplier performance are the second and third least important dimensions, with only 21 percent and 25 percent of the firms reporting one or more measures (see Exhibits 3a and 3b). That so few plants report customer (supplier) measures to plant management appears inconsistent with what is preached about the importance of customers (or suppliers) in the total value chain and how plants must pay attention to them (Shank, 1989). For example, proponents of TQM claim that supplier performance is extremely important to firms that are pursuing quality and delivery goals. The quality of raw materials, parts, and components is very important in achieving first-time quality. Similarly, supplier delivery performance can facilitate JIT production and a reduction in the overall lead time from receipt of order to delivery of goods.

It is also strategically important to recognize that unless customers' needs are clearly understood and satisfied, customers will take their business elsewhere. That only 20 percent of the plants report customer satisfaction/service measures contradicts the findings of Stivers and colleagues (1998) that at least 70 percent of the firms in their sample measured customer satisfaction. However, two important points should be considered.

First, although customer satisfaction per se is not reported, most firms in the sample do report on factors leading to customer satisfaction (such as quality and delivery times). Thus, these firms may not feel it is necessary to report separately about customer satisfaction.

Second, it is important to note that the survey by Stivers and colleagues (1998) was filled out by top corporate managers, whereas this one was completed by plant senior managers. It is quite likely that customer satisfaction measures are reported in many of the sample firms,

but at the corporate level rather than at the plant level. Nonetheless, it is important to note that information pertaining to customer satisfaction (or at least certain aspects of the measure) should be related to plant management so that appropriate actions can be taken at the plant level.

HOW FREQUENTLY NONFINANCIAL MEASURES ARE REPORTED

We asked respondents to indicate how frequently nonfinancial measures are reported to them. On average, 38 percent of the measures are reported daily or weekly, 58 percent are reported monthly, and the rest are reported quarterly or annually. Eighteen of 28 firms (64.3 percent) report 25 percent of their measures on a daily or weekly basis, 10 (35.7 percent) report 50 percent or more of their measures either daily or weekly, 6 (21.4 percent) report 75 percent or more of their measures daily or weekly, and 2 (7.1 percent) report all their measures daily or weekly. This suggests that the senior managers in these firms realize the importance of timely information for decision making (Daft and MacIntosh, 1978).

We further analyzed the frequency of reporting for the three important dimensions of reporting: quality, delivery, and manufacturing. Fifty-two percent of the firms reporting quality measures report at least one measure on a daily or weekly basis. Moreover, 39 percent of all the quality measures reported by the firms in the sample are made available to managers on a daily or weekly basis, and over 57 percent either once every two weeks or monthly. Sixty percent of the firms reporting delivery measures report at least one measure on a daily or weekly basis. Furthermore, more than 53 percent of the delivery measures reported by the firms in the sample are reported daily or weekly, with just under 44 percent reported biweekly or monthly.

Finally, with respect to manufacturing, 69 percent of the firms reporting manufacturing measures report at least one measure on a daily or weekly basis. As in the case of delivery, more than 53 percent of the manufacturing measures reported by the firms in the sample are made available to managers on a daily or weekly basis, with just under 44 percent reported biweekly or monthly.

These findings support the conclusion that many firms believe that more frequent reporting of measures pertaining to these three important dimensions can greatly assist managers in taking timely actions. For example, one firm in the sample reports a quality index measure daily; this measure is analyzed the following morning in a meeting where production and quality issues are discussed. Another firm reports several measures pertaining to quality and delivery each week. These measures are discussed in three different weekly meetings, two of which deal exclusively with quality issues.

An additional analysis pertains to the number of firms reporting at least one measure of quality, delivery, or manufacturing for a period of 10 years or longer. About 38 percent, 33 percent, and 48 percent of the firms have been reporting at least one measure of quality, delivery, and manufacturing (respectively) for 10 years or longer. This finding sug-

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gests that a significant proportion of the sample firms has been committed to measuring quality and delivery performance since the mid-1980s, which is when the quality revolution was taking shape in North America.

IMPORTANCE OF NONFINANCIAL MEASURES

The questionnaire asked the respondents to rate how important financial and nonfinancial performance measures are to them for the purposes of short- and long-term decision making. The respondents rated separately for short- and long-term decision making using the following 5-point Likert scale:

- 1 = only nonfinancial measures are important
- 2 = nonfinancial measures are more important than financial measures
- 3 = nonfinancial and financial measures are equally important
- 4 = financial measures are more important than nonfinancial measures
- 5 = only financial measures are important

Exhibit 5 presents a breakdown of plants based on their Likert scale scores and the number of nonfinancial measures reported to plant senior management.

On average, the plants rated both financial and nonfinancial performance measures as equally important for both short-term and long-term decision making (average Likert scale scores 3.36 and 3.11, respectively). Fifteen of the 28 plants (53.6 percent) rated both financial and nonfinancial measures as equally important for short- or long-term decision making (see Exhibit 5). This finding is consistent with the accepted wisdom regarding the importance of both financial and nonfinancial measures (e.g., the balanced scorecard) (Kaplan and Norton, 1992).

With respect to short-term decision making, only 2 plants (7.1 percent) rated nonfinancial measures as more important than financial measures, whereas 10 plants (35.7 percent) rated financial measures as more important than nonfinancial measures. This finding is a little surprising because, in the short term, improvements in the nonfinancial dimensions can probably be achieved more easily than improvements in financial results, although the financial numbers can be manipulated more easily.

A possible explanation for the relatively higher emphasis on financial measures is that most plants use annual budgets (which are typically expressed in financial terms) as their operating plans, and managers' rewards usually depend on their performance against the budget. As another reason, the vice president of operations of one firm commented as follows about the importance attached to financial measures in the short term:

Well, my opinion is if you don't make your financial measures, all of the nonfinancial measures aren't going to get you through

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Exhibit 5. Relative Importance of Financial Versus Nonfinancial Measures

Score (Short Term) ¹	Number of Firms	Mean Number of Measures Reported	Range of Measures Reported
1	0 (0%)	—	—
2	2 (7.1%)	13.0	10–17
3	15 (53.6%)	9.2	3–20
4	10 (35.7%)	11.6	5–24
5	1 (3.6%)	6.0	—
Total	28 (100%)	10.3	3–24
Avg. Score 3.36			
Score (Long Term) ¹	Number of Firms	Mean Number of Measures Reported	Range of Measures Reported
1	0 (0%)	—	—
2	5 (17.9%)	5.8	3–10
3	15 (53.6%)	12.7	7–24
4	8 (28.6%)	8.3	5–16
5	0 (0%)	—	—
Total	28 (100%)	10.3	3–24
Avg. Score 3.11			

¹ 1 = only nonfinancial measures are important
 2 = nonfinancial measures are more important than financial measures
 3 = nonfinancial and financial measures are equally important
 4 = financial measures are more important than nonfinancial measures
 5 = only financial measures are important

it. You have to make your finances to stay in business. Not that I disregard nonfinancial measures . . . just as you said, we have a lot of them out there. We have more nonfinancial measures in the plant than . . . financial measures and that's because I believe that the nonfinancials . . . have a direct bearing on the financials. So if you have the nonfinancial measures and you

Exhibit 6. Number of Hierarchical Levels and the Reporting of Nonfinancial Measures

Number of Hierarchical Levels	Number of Firms	Mean Number of Measures Reported	Range of Measures Reported
3	2	15.0	14–16
4	10	8.4	3–24
5	13	11.3	3–20
6	2	8.5	6–11
7	1	10.0	—
Total	28	10.3	3–24

All of the plants have to generate a positive financial return, at least in the long term. More important, management's rewards are usually tied to achieving financial results.

have people focused on them, they are easier to focus, they are easier to work, they are easier to get measured on. And yet, you have to have the financials . . . to make sure you haven't gone overboard. You can go overboard on nonfinancial measures and go overboard on meeting them and all of a sudden you get yourself in real trouble. You say, "look at all these 82 measures, I made 99 percent of them," but the one you missed is the financial one and you are in deep trouble. That's why I rate it higher.

With respect to long-term decision making, five plants (17.9 percent) rated nonfinancial measures as more important than financial measures, whereas eight plants (28.6 percent) rated financial measures as more important than nonfinancial measures. It is not surprising that more plants consider financial measures more important than nonfinancial measures because all of the plants have to generate a positive financial return, at least in the long term. More important, management's rewards are usually tied to achieving financial results.

As the number of hierarchical levels increases, managers are more likely to be fed information through formal channels rather than through informal communication.

HIERARCHICAL LEVELS AND REPORTING

We also asked the survey respondents to indicate the number of hierarchical levels existing in their firms. With respect to this dimension, the number of measures reported increases substantially for firms with five hierarchical levels versus those with four levels (see Exhibit 6). On the one hand, this result appears to be counterintuitive, in that firms having a greater number of hierarchical levels will likely filter information and report only a handful of key indicators to senior management. On the other hand, one may interpret this finding as suggesting that nonfinancial measures are increasingly considered important by senior managers irrespective of the number of reporting levels. Also, as the number of hierarchical levels increases, managers are more

likely to be fed information through formal channels rather than through informal communication. However, no generalizations can be made due to the small sample size.

DISCUSSION

The customer is king in today's business environment, and satisfying customer needs is the number-one priority for most firms. Long-term profitability results from being competitive, and quality, delivery time, flexibility (or responsiveness), dependability, and service are important sources of competitive advantage (Johnson, 1990). It is therefore not surprising that over 90 percent and 70 percent of the sample firms report at least one measure pertaining to quality and delivery, respectively.

Measures pertaining to these two dimensions are considered good internal proxies for customer satisfaction. However, it is interesting to note that few firms actually report on customer satisfaction (approximately 21 percent of the sample firms). In today's business environment, listening to the voice of the customer is important to understanding their needs and satisfying them. That 22 of the 28 firms in the sample do not report customer satisfaction measures to plant senior management seems to suggest that many U.S. firms are still not directly reporting the voice of the customer to plant management.

Customer responsiveness (in terms of time) is another key competitive factor, and a key internal indicator of responsiveness is cycle time or turnaround time. Only 43 percent of the sample firms report one or more measures pertaining to manufacturing cycle time (see Exhibit 3b). A possible reason why the other firms do not measure cycle time could be the difficulty of accurately measuring cycle time because of the existence of complex production processes. Another possible reason is that processes may not be synchronized and carried out sequentially, thereby making it difficult to measure cycle time. However, it seems reasonable that even a relatively crude measure of cycle time would be valuable in recognizing the possible existence of non-value-added activities in the processes.

It is reasonable to assume that firms in this sample use at least some elements of TQM to achieve the goals of continuous improvement. (One of the researchers conducted in-depth field studies in 8 of the 28 sample firms and observed that all these firms were using at least some elements of TQM, such as quality training, teams, and statistical process control. Moreover, the survey results indicate that quality is the most important dimension of reporting, thereby suggesting that firms pay attention to quality.)

TQM emphasizes building quality into the product rather than inspecting it in. Building quality into a product requires the involvement of design/engineering, purchasing, human resources, and other dimensions within a firm. Design engineers are required to develop designs that meet or even exceed customer expectations, and process engineers are required to develop reliable processes. However, only 11 percent of the firms report any measures pertaining to design/

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engineering to plant senior managers. This lack of attention to design/engineering by plant management appears to reflect the existence of the “inspect quality after you build” mentality rather than the “build quality into the product” attitude.

Building long-term supplier relationships to maintain vendor quality is another important feature of TQM. Firms employ certain criteria to select reliable suppliers and certify them based on these criteria. Such firms are likely to maintain supplier statistics with respect to quality, delivery, price, service, and so on. The survey, however, indicates that only 25 percent of the sample firms report any supplier measures to plant senior management, which reflects a lack of attention, at the plant level, toward evaluating suppliers and developing relationships with this important constituent in the value chain.

Moreover, developing employee skills is also important in trying to adapt to new management and manufacturing practices, and the importance of training cannot be disregarded. Attention to training by plant senior managers is important in building a competent and skilled work force that, in turn, will be able to produce quality goods on time. As the plant manager of an auto parts manufacturer observed, the most important person is the individual “drilling the holes”; everyone else is burden (Lindsay and Kalagnanam, 1993, p. 80). Only 32 percent of the sample firms report any measures pertaining to human resources. (In fact, only 2 of 28 firms report any measure pertaining to training!)

As a final comment, although the extent of reporting to plant management about dimensions other than quality, delivery, and manufacturing is low, it seems likely that subordinate managers in many of the sample firms receive detailed information about the dimensions of their individual responsibilities, and they then convey the highlights to senior plant managers through informal communication.

CONCLUSIONS

The use of nonfinancial measures has increased in manufacturing firms since the mid-1980s. Nonfinancial measures are very important to middle- and lower-level managers because they provide timely information that enables those managers to take corrective actions in a timely manner. They provide information about key competitive factors that are important to senior managers.

The findings in this study suggest that, on average, about 10 nonfinancial performance measures pertaining to about 5 dimensions of importance are reported to plant senior managers. Quality and delivery are the most important dimensions of reporting, while maintenance and design/engineering are the least important dimensions. In terms of the balanced scorecard, there is a heavy focus on reporting measures pertaining to the internal business process perspective; limited emphasis is placed on measures pertaining to the customer and the learning and growth perspectives.

Future research should address how managers translate this information into action to achieve the long-term sales and profitability goals of the corporation. A key question is: “Do firms whose senior

Attention to training by plant senior managers is important in building a competent and skilled work force that, in turn, will be able to produce quality goods on time.

Nonfinancial measures are very important to middle- and lower-level managers because they provide timely information that enables those managers to take corrective actions in a timely manner.

managers receive more nonfinancial information than their counterparts in other firms exhibit higher growth in long-term sales and profits?" The answer will likely provide an assessment of the usefulness of nonfinancial information. ♦

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