Educational Administration: Theory and Practice
2024,30(1), 4657 – 4663
ISSN:2148-2403
https://kuey.net/

Research Article

Quality Performance Measurement Practices InIndian Manufacturing Companies

Pravez Alam[1], Neetu Ram[2]

[1]Assistant Professor, Deptt. Of Mathematics, V.S.K.C Govt. PG College Dakpathar, Dehradun, Uttarakhand, India, 248125
[2] Assistant Professor, Deptt. Of Mathematics, H.V.M. (PG) College Raisi, Haridwar, Uttarakhand, India 247671
[1]Corresponding author email address- alampro9@gmail.com

Citation: Pravez Alam, et al (2024), Quality Performance Measurement Practices In Indian Manufacturing Companies,*Educational Administration: Theory and Practice*, 30(1), *4657 - 4663*
Doi: 10.53555/kuey.v30i1.8327

ARTICLE INFO

ABSTRACT

This paper presents the findings from a survey on the methods used by Indian manufacturing enterprises to monitor quality performance. The study assesses quality performance measures in Indian manufacturing enterprises from both a financial and non-financial perspective. The study's two main conclusions are that company managers believe non-financial measurements are more effective than financial measures, and manufacturing enterprises use non-financial measures more frequently than financial measures. The methodology of the study is a postal questionnaire survey, conducted with the top 100 industrial enterprises in India.

Keywords- manufacturing enterprises, quality performance

Introduction

Performance measurement performs crucial functions in a business, including converting strategy into desired behaviors and outcomes, communicating these expectations, tracking progress, giving feedback, and inspiring staff members with performance-based incentives and penalties[4]. For a long time, managers had primarily used accounting-based measures, which are named as financial measures, to evaluate performance of organizations [18], [4] and [13]. Since using financial measures has some limitations that will be explained in the coming section, both scholars and practitioners were urged to develop non-financial measures. However, instead of choosing either one, financial and non-financial measures should be viewed as complementary to each other[4].
Kettering et al. [10] have studied that measuring and accounting for the costs of quality are essential steps in total quality management programs. The significance of combining financial and non-financial metrics to assess an organization's quality performance is emphasized by this study. The study offers an empirical assessment of how well Indian manufacturing firms use and perceive the efficacy of quality performance metrics. Because the study offers a set of quality performance metrics, practitioners will particularly benefit from the findings of this paper. The study also adds to the body of knowledge on quality performance measurement from the standpoint of emerging markets. Therefore, the study serves as an example of how the topic is applicable in both developed and underdeveloped nations.

Literature Review

The literature about performance measurement categorizes performance measurement tools as traditional which include financial measures and new approaches which include non-financial measures along with financial measures. In 20th century, traditional measures had been utilized heavily to measure the performance of organizations. However, due to insufficiency of financial measures in performance measurement, the need for non-financial measures has been voiced in recent years. Hence, non-financial performance measures emerged to fill in the gap caused by traditional performance measurement tools. However, instead of choosing either one, financial and nonfinancial measures should be viewed as complementary to each other [4]. Utilization of non-financial performance measures along with financial measures is named as balanced scorecard approach in performance measurement system.
Neely et al. [12] have presented Performance measurement, defined as the process of quantifying action, where measurement is the process of quantification and action leads to performance. The performance of

organizations is traditionally measured by methods based on accounting reports. However, in a changing business environment these measures are considered inadequate. Therefore, organizations have begun to use new performance measures (non-financial measures) other than traditional measures.

Although traditional measurement systems, which focus on financial outcomes, translate and report all activities into dollars and cents, however, in recent years it has become evident that looking at just financial measures masks many of the important performance activities that are taking place behind the scenes [15]. Those organizations that are aware of this fact are beginning to utilize non-financial measures along with financial measures from both manufacturing and service industries, such as hotels, banks, and healthcare [2], [14], [7], [8] and [6].Neely et al. [12] have also presented quality-based measures of performance focus succinctly on issues, such as the number of defects produced and the cost of quality. In this context, some cost accounting textbooks [5] and related articles [1], [10], [11], [3] and [16] cover the subject from the perspectives of financial and non-financial measures, which are suggested to be utilized together in order to evaluate quality performance of a business. The name of this approach is the balanced scorecard approach. The reason for that is the balanced scorecard approach considers both financial and non-financial aspects of the quality performance evaluation. Non-financial measures represent information and analyses that are not expressed in monetary equivalents [10]. For example, the number of reworked units, the number of material inspections, and the number of customer complaints represent non-financial measures.

Kapuge and Smith [9] have studied, although non-financial measures are increasingly important in decision making and performance evaluation, copying non-financial measures that others use may not work. Instead, the companies should link the measures to the factors, such as corporate strategy, value drivers, organizational objectives and the competitive environment. Albright and Roth [1] reported that importance of financial data although non-financial measures of quality such as the number of customer complaints and the number of defects are important quality measures. They say that quality costs are one type of financial data that cost management systems need to provide.

Kettering [10] have analyzed, small firms can achieve benefits, similar to those benefits which large firms achieve with their costly quality programs, by using non-financial measures to identify and monitor quality. The principle of this simple approach is not to waste time and effort to report the data in monetary equivalents, but to simply report the non-financial data and look for trends in the measures.

The findings of researchers about financial and non-financial measures of quality indicate that firms report financial measures of quality less frequently than physical measures of quality [3]. Most business managers prefer the use of non-financial quality performancemeasures while they comprehend and support for the COQ and other financial measures with relative limitation[11], andCompanies implementing total quality management (TQM) provide more frequent physical and financial quality measures than non-TQM companies [9].

Methodology

A postal questionnaire survey was conducted with the top 100 Indian manufacturing companies. The list of these top 100 companies was obtained from Bureau of Indian Standards (BIS) Report. The questionnaire was adopted from the studies conducted by Tansey et al. [17], and Lin and Johnson [11]. The original copy of the questionnaire was prepared in English and to be sent out to the companies. The responses were statistically analyzed using SPSS software and the Microsoft Excel spreadsheet program. The responding firms are geographically dispersed throughout India. Hence, the results of the study are representative of the general practices and perceptions of quality performance measures across the country.

The main emphasizeof this study is to explore the utilization frequency and perceived effectiveness of quality performance measures (i.e. financial and non-financial) amongst manufacturing companies. For further analysis, the following eight research questions were prepared:

Q1. Do companies utilize financial and non-financial quality performance measures in the same frequency?

Q2. Do managers perceive financial and non-financial quality performance measures as effective in the same degree?

Q3. Do listed and non-listed companies utilize financial quality performance measures in the same frequency?

Q4. Do listed and non-listed companies utilize non-financial quality performance measures as effective in the same degree?

Q5. Do International Organization for Standardization (ISO-refers to 9000:2015) certified and non-ISO certified companies utilize financial quality performance measures in the same frequency?

Q6. Do ISO certified and non-ISO certified companies utilize non-financial quality performance measures as effective in the same degree?

Q7. Do COQ system adopting and non-COQ system adopting companies utilize financial quality performance measures in the same frequency?

Q8. Do COQ system adopting and non-COQ system adopting companies utilize non-financial quality performance measures as effective in the same degree?

The response rate of the research is 100 percent. When these 100 responses are reviewed, most of the survey-takers are accounting/finance professionals (25 persons) and quality professionals (47 persons). Other respondents (22 persons) come from various professional groups such as plant managers, chief executive

officers, production managers, and engineers. The remaining six respondents are from unknown job specifications. The classification of responding firms according to ISO certification ownership is as follows: 83 firms have ISO certification, 14 firms do not have ISO certification, and 03 firms did not respond to the question. The classification of responding firms according to COQ system implementation is as follows: 46 firms implementing, 48 firms not implementing, and 6 firms did not respond to the question. The classification of responding firms according to being listed or non-listed is as follows: 30 firms listed, and 70 firms are non-listed.

Results and Discussion

The respondents were asked about the utilization frequency and perceived effectiveness of 11 financial and non-financial quality performance measures. Lin and Johnson [11] and Tansey et al. [17] used these 11 measures in their studies in the People's Republic of China previously. Five of these measures are financial, six are non-financial. The listing of these 11 measures is below:

1. Financial measures-
- ✓ Itemized quality cost reporting
- ✓ Analysis of quality cost components
- ✓ Quality cost budgeting and variance analysis
- ✓ Comparison of quality costs to industrial standards
- ✓ Multi-period trend analysis of quality costs.

2. Non-financial measures-
- ✓ Percentage of product reworks
- ✓ Rate of material spoilage
- ✓ Rate of defects in production output
- ✓ Percentage of returned goods to total sales
- ✓ On-time delivery of goods or services to customers
- ✓ Total number of customer complaints.

The quality performance measures listed above are investigated according to two aspects in this study:

1. **Utilization frequency**
2. **Perceived effectiveness.**

To investigate the utilization frequency of eleven measures, the survey questions were evaluated with the alternative answers expressed in a Likert scale of 1-5, in which "1" denotes "never use", "2" represents "once a year", "3" indicates "every 6 months", "4" means "every 3 months", and "5" denotes "at least once a month". Table I lists the mean scores and ranking order of the eleven measures of quality performance that is based on utilization frequency of the responding firms. As a measure of reliability, the high Cronbach α (0.86) shows that eleven items are internally correlated. Based on the mean scores of those eleven items, the top 100 manufacturing companies most frequently utilize the total number of customer complaints (mean = 4.2) measurement, on-time delivery of goods or services to customers (mean = 4.1), next by the rate of defects in production output (mean = 4.1), rate of material spoilage (mean = 4.0), percentage of returned goods to total sales (mean = 3.9), itemized quality cost reporting (mean = 3.9), multi-period trend analysis of quality costs (mean = 3.7), analysis of quality cost components (mean = 3.3), percentage of product rework (mean =2.8), quality cost budgeting and variance analysis(mean = 2.7), and comparison of quality costs to industrial standards (mean = 2.3).

To investigate the effectiveness of measures, the survey questions were evaluated with alternative answers expressed in a Likert scale of 1-5, in which "1" denotes "not effective", "2" represents "slightly effective", "3" indicates "effective", "4" means "quite effective", and "5" denotes "extremely effective".

Table II lists the mean scores and ranking order of the 11 measures of quality performance based on effectiveness perceived by the respondents. As a measure of reliability, the high Cronbach α (0.9) shows that eleven items are internally correlated. The mean scores in the study indicate that the top 100 manufacturing companies perceive non-financial measures more effective than financial measures. What is mostinteresting is that the last four items in the utilization frequency ranking are also the last four items in the effectiveness ranking.

In order to investigate whether or not financial (average of five financial measures) and non-financial (average of six non-financial measures) quality performance measures have significant differences in terms of utilization frequency and perceived effectiveness, paired-samples t-test was conducted. The results indicated that the top 100 manufacturing companies utilize financial quality performance measures significantly,significant at 0.01 level, less frequently than non-financial quality performance measures, and also the same companies perceive financial quality performance measures significantly, significant at 0.01 level, less effective than non-financial quality performance measures (see Table III). Subgroup analysis- The first subgroup analysis was conducted to determine preference over quality performance measures dealing with perceived effectiveness. Based on the study findings, business managers perceive non-financial measures more effective than financial measures. For further investigation of the preference over quality performance measures by subgroups based on job

specifications, one-way ANOVA test was conducted (see Table IV). The findings are that there are no significant differences over seven items; however, there are significant differences among subgroups over the following four items. The significant differences among subgroups, which were analyzed with ANOVA Duncan statistical testing, are as follows:

(1) Quality professionals perceive "analysis of quality cost components, significant at 0.05 level, is more effective compared to others";

(2) Quality professionals perceive "quality cost budgeting and variance analysis, significant at 0.05 level, is more effective compared to others";

(3) Quality professionals perceive "rate of material spoilage, significant at 0.05 level, perceive more effective compared to both accountants and others"

(4) Quality professionals & accountants perceive "total number of customer complaints, significant at 0.05 level,is more effective compared to others"

In addition to subgroup analysis conducted based on job specifications of the respondents, some subgroup analyses were conducted according to the following firm characteristics:

- ✓ Being listed or not
- ✓ Having ISO certification or not
- ✓ Implementing COQ system or not

According to the results of the independent-samples t-test, the listed companies significantly utilize non-financial quality performance measures more frequently than non-listed companies (see Table V).

The analysis indicates that the listed companies significantly utilize the following three non-financial measures more frequently than non-listed companies:

- ✓ Percentage of returned goods to total sales,significant at 0.05 level
- ✓ On-time delivery of goods or services to customers, significant at 0.05 level
- ✓ Total number of customer complaints, significant at 0.05 level

According to the results of independent-samples t-test, ISO (International Organization for Standardization) certified companies significantly utilize financial quality performance measures more frequently than non-ISO certified companies (see Table VI).

The analysis indicates that, according to the ISO certification ownership, there are not much significant differences among firms. There are significant differences only over two financial measures:

- ✓ Itemized quality cost reporting, significant at 0.05 level,
- ✓ Quality cost budgeting and variance analysis, significant at 0.10 level.

The results of independent-samples t-test showed that COQ system adopters significantly utilize both financial and non-financial quality performance measures more frequently than Non-COQ system adopters (see Table VII).

Conclusion

Present study evaluates the extent whether the top 100 industrial enterprises in India utilize and perceive financial and non-financial quality performance measures as effective. The findings indicated that the top 100 industrial enterprises significantly utilize financial quality performance measures less frequently than non-financial quality performance measures (this result is consistent with Carr et al. [3]'s study findings). This situation can be explained by another finding of this study that the top 100 industrial enterprises perceive financial measures significantly less effective than non-financial measures. Other possible reasons for this could be (Horngren et al., [5]):

- ✓ Non-financial measures of quality are easier to quantify and understand
- ✓ Non-financial measures provide immediate short-run feedback on quality improvements efforts.

Overall, the findings in relation to job functions showed that quality professionals perceive quality performance measures more effective than accountants, and accountants perceive them more effective than others. It is more appropriate that quality professionals should explain the significance of utilizing quality performance measures to the other members of the organizations bydue to the fact that this is their expertise.

According to the subgroup analysis, some significant differences were found on the basis of characteristics of firms as being listed or not, having ISO certification or not, and implementing COQ system or not. The results of subgroup analysis indicated that:

- ✓ The listed companies significantly utilize especially non-financial quality performance measures more frequently than non-listed companies
- ✓ ISO certified companies significantly utilize financial quality performance measures more frequently than non-ISO certified companies; and .
- ✓ COQ system adopters significantly utilize both financial and non-financial quality performance measures more frequently than non-COQ system adopters.

The study has some managerial implications as well. Today, almost every organization engages in quality initiatives, which aim at increasing quality of processes and products. Without performance evaluation, managers can not know how much they are successful in achieving the targets. In addition, managers need to evaluate performance in order to take corrective actions immediately. Therefore the proposed financial and non-financial measures in the study are very useful tools for measuring quality performance, and are recommendable to be utilized in a balanced way. If organizations do not have experienced personnel to utilize those measures, managers need to prepare required conditions for necessary training.

References-

1. Albright, T.L. and Roth, H.P. (1992), "The measurement of quality costs: an alternative paradigm", Accounting Horizons, Vol. 6 No. 2, pp. 15-27.
2. Ballou, B., Heitger, D.L. and Tabor, R. (2003), "Non-financial performance measures in the healthcare industry", Management Accounting Quarterly, Vol. 5 No. 1, pp. 11-16.
3. Carr, S., Mak, Y.T. and Needham, J.E. (1997), "Differences in strategy, quality management practices and performance reporting systems between ISO accredited and non-ISO accredited companies", Management Accounting Research, Vol. 8, pp. 383-403.
4. Chow, C.W. and van der Stede, W.A. (2006), "The use and usefulness of non-financial performance measures", Management Accounting Quarterly, Vol. 7 No. 3, pp. 1-8.
5. Horngren, C.T., Datar, S.M. and Foster, G. (2006), Cost Accounting, 12th ed., Pearson Prentice-Hall, Englewood Cliffs, NJ.
6. Hussain, M., Gunasekaran, A. and Islam, M.M. (2002), "Implications of non-financial performance measures in Finnish banks", Managerial Auditing Journal, Vol. 17 No. 8, pp. 452-63.
7. Ittner, C.D. and Larcker, D.F. (1998), "Innovations in performance measurement: trends and research implications", Journal of Management Accounting Research, Vol. 10, pp. 205-38.
8. Ittner, C.D. and Larcker, D.F. (2003), "Coming up short on non-financial performance measurement", Harvard Business Review, Vol. 81 No. 11, pp. 88-95.
9. Kapuge, A.M. and Smith, M. (2007), "Management practices and performance reporting in the Sri Lankan apparel sector", Managerial Auditing Journal, Vol. 22 No. 3, pp. 303-18.
10. Kettering, R.C. (2001), "Accounting for quality with non-financial measures: a simple no-cost program for the small company", Management Accounting Quarterly, Vol. 2 No. 3, pp. 14-19.
11. Lin, Z.J. and Johnson, S. (2004), "An exploratory study on accounting for quality management in China", Journal of Business Research, Vol. 57, pp. 620-32.
12. Neely, A., Gregory, M. and Platts, K. (1995), "Performance measurement system design: a literature review and research agenda", International Journal of Operations & Production Management, Vol. 15 No. 4, pp. 80-116.
13. Paulson Gjerde, K.A. and Hughes, S.B. (2007), "Tracking performance: when less is more", Management Accounting Quarterly, Vol. 9 No. 1, pp. 1-12.
14. Phillips, P.A. (1999), "Hotel performance and competitive advantage: a contingency approach", International Journal of Contemporary Hospitality Management, Vol. 11 No. 7, pp. 359-65.
15. Shepherd, N.A. (2002), "Integrating cost of quality into performance improvement plans. How to align and integrate with a balanced scorecard", Quality Congress: ASQ's Annual Quality Congress Proceedings, pp. 337-42.
16. Sjoblom, L.M. (1998), "Financial information and quality management: is there a role for accountants?", Accounting Horizons, Vol. 12 No. 4, pp. 363-73.
17. Tansey, R., Carroll, R.F. and Lin, Z.J. (2001), "On measuring cost of quality dimensions: an exploratory study in the People's Republic of China", International Business Review, Vol. 10, pp. 175-95.
18. Yeniyurt, S. (2003), "A literature review and integrative performance measurement framework for multinational companies", Marketing Intelligence & Planning, Vol. 21 No. 3, pp. 134-42.

Financial Measures/Non Financial Measure	N	Mean	SD	Ranking
FM1: Itemized quality cost reporting	74	3.9	1.43	4
FM2. Analysis of quality cost components	70	3.3	1.56	6
FM3. Quality cost budgeting and variance analysis	72	2.7	1.57	8
FM4. Comparison of quality costs to industrial standards	74	2.3	1.54	10
FM5. Multi-period trend analysis of quality costs	70	3.7	1.68	11
NonFM1: Percentage of product rework	75	2.8	1.62	6
NonFM2: Rate of material spoilage	78	4.0	1.54	5
NonFM3: Rate of defects in production output	75	4.1	1.41	3
NonFM4: Percentage of returned goods to total sales	76	3.9	1.61	5
NonFM5:On-time delivery of goods/services to customers	74	4.1	1.45	2
NonFM6: Total number of customer complaints	76	4.2	1.20	1
Here: FM- Financial Measures, NonFM- Non Financial Measure				

Table I. Ranking of the quality performance measures based on utilization frequency (Cronbach α = 0.86)

Financial Measures/Non Financial Measure	N	Mean	SD	Ranking
FM1: Itemized quality cost reporting	71	3.4	1.0	7

FM2. Analysis of quality cost components	65	3.1	1.14	7
FM3. Quality cost budgeting and variance analysis	60	2.9	1.14	6
FM4. Comparison of quality costs to industrial standards	60	2.7	1.20	10
FM5. Multi-period trend analysis of quality costs	61	3.1	1.17	9
NonFM1: Percentage of product rework	71	3.2	1.13	6
NonFM2: Rate of material spoilage	72	3.5	.99	4
NonFM3: Rate of defects in production output	70	3.5	1.07	3
NonFM4: Percentage of returned goods to total sales	70	3.0	1.20	3
NonFM5:On-time delivery of goods/services to customers	68	3.7	1.01	2
NonFM6: Total number of customer complaints	65	4.1	.91	1
Here: FM- Financial Measures, NonFM- Non Financial Measure				

Table II. Ranking of the quality performance measures based on perceived effectiveness (Cronbach α = 0.90)

Based on utilization frequency	N	Mean	SD	Standard error mean	t-test
Financial Measures	70	3.1	1.21	.17	-6.10
Non Financial Measure	70	4.2	1.18	.15	
Based on effectiveness frequency	N	Mean	SD	Standard error mean	t-test
Financial Measures	60	3.3	1.10	.13	-5.63
Non Financial Measure	60	3.5	.92	.12	

Table III. Paired-samples t-test (Significant at 0.01 levels) for financial and non-financial quality performance measures

Financial Measures/Non Financial Measure	Quality professionals		Accountants		Others		ANOVA -test
	Mean	Rank	Mean	Rank	Mean	Rank	
FM1: Itemized quality cost reporting	3.6	6	3.7	4	3.5	4	.61
FM2. Analysis of quality cost components	3.7	7	3.2	8	2.9	7	3.05
FM3. Quality cost budgeting and variance analysis	3.3	8	3.2	11	2.5	10	3.10
FM4. Comparison of quality costs to industrial standards	3.1	9	3.4	10	2.6	9	.67
FM5. Multi-period trend analysis of quality costs	3.4	10	3.0	9	2.8	9	1.20
NonFM1: Percentage of product rework	3.9	5	3.4	7	3.2	6	2.37
NonFM2: Rate of material spoilage	4.1	3	3.5	5	3.4	4	3.28
NonFM3: Rate of defects in production output	3.8	2	3.5	5	3.5	3	2.29
NonFM4: Percentage of returned goods to total sales	3.8	4	3.6	3	3.3	5	1.55
NonFM5:On-time delivery of goods/services to customers	3.7	5	3.9	3	3.6	2	.99
NonFM6: Total number of customer complaints	4.1	1	4.1	1	3.4	3	4.23

Table IV. One-way ANOVA analysis for Perceived effectiveness of quality performance measures by subgroups

Quality performance measures	Listed company		Non-Listed company		t-test
	N	Mean	N	Mean	
Financial Measures	24	3.1	60	3.0	-.55
Non Financial Measure	26	3.8	61	3.9	-2.49

Table V. Results of the independent-samples t-test for listed and non-listed companies

Quality performance measures	ISO certified company	Non-ISO certified company	t-test

	N	Mean	N	Mean	
Financial Measures	70	3.5	15	3.1	-2.57
Non Financial Measure	75	3.9	13	3.7	-1.28

Table VI. Results of the independent-samples t-test for ISO certified and non-ISO certified companies

Quality performance measures	COQ system adopters		Non-COQ system adopters		t-test
	N	Mean	N	Mean	
Financial Measures	48	3.5	35	2.9	-6.23
Non Financial Measure	48	4.0	40	3.8	-2.03

Table VII. Results of the independent-samples t-test for COQ system adopters and non- COQ system adopters