



Performance Measurement Factors For Small Scale Indian Manufacturing Industries

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Abstract

The small scale industries are growing at a fast pace in India. An effective instrument for growth is Industrialization, contributing a lot in economic boom in the country. This study gives us a pathway which a company should follow to evaluate the factors which have positive impact on organizational performance indicators. The Output factors (Performance measures) are identified for financial and overall benefits of organisation. The results of the study will help manufactures in meeting the objectives for sustainable development.

Keywords: small scale industries, Performance measures, performance indicators, sustainable development

Introduction

India is a fast developing country. Manufacturing industries are facing tough competition not only at national but at international level too. The prime competitive aspects of focus are Conformance quality, performance quality, product reliability and on-time delivery, Now every business has to face different aspects like advanced operations, increase in product complexity, Quality, Reliability, Productivity, Risk, Flexibility and Safety. Some of the important elements of concern are financial performance and annual sales growth. There is need to improve technological process by using emerging tools, technologies & techniques. Now adays management is emphasising on market leadership, cost leadership & business supremacy. The main target is reducing production cycle, minimising scraps & wastages, minimising unit cost of operation, improving human potentials

Methodology

The study is entirely based on thorough field work study by using a well-developed questionnaire. Developing Questionnaire needs a thorough study of various literatures available along with the field survey. The purpose of questionnaire is to obtain information to improve its content and format so as to cover maximum factors. The methodology adopted by researchers have been carefully analysed. A questionnaire is designed based on the educational level and work experience of the responses. Only those variables were included in the questionnaire which had the greatest importance on performance measures The questionnaires were filled by the respondents having sound knowledge of their respective work. The structured Questionnaire consists of total 54 questions based on output factors. SPSS software package is used for the data analysis for the statistical method of factor analysis.

Performance Measures

Performance Measures are the output factors contributing towards production and its benefits. Shrivastava et al. (2014) carried out his research on Indian cement industries & has identified 6 Performance Measures consisting of 38 attributes for attaining Quality management goals. Lande et al. (2015) carried out her work for lean six sigma in Small and Medium enterprises and identified attributes for Performance Measures in her study for Indian industries. Minhaj et al. (2015) carried out his studies on Automobile industries and suggested various variables for Green Supply Chain Management in automobile industries. Gorantiwar et al. (2014) carried out his research in sponge iron industries and identified 34 attributes of prime consideration. Lokhande (2014) has carried out his studies on Indian industries and identified 7 performance measure factors including 65 variables for establishment of Remanufacturing Industry. Desai et al. (2012) conducted his studies on six sigma in context of Indian Industry. He identified 8 performance measures contributing to 54 variables. Shrivastava et al. (2006) also carried out their work in Indian industries and have identified 5 organizational performance measurements in their study. Shah et al. (2014) have done their pilot study in small and medium sized enterprises and identified 7 performance measures for development of an SME-focused model. Terziovski et al. (1999) characterized the organizational performance by 14 attributes.

The above works on performance measures suggested number of requirements identified for performance measurement. These are:

1	Decreased scrap
2	Decreased rework
3	Decreased reinspection / retest cost
4	Return on investment
5	Reliability
6	Durability
7	Availability
8	Growth in market share
9	Delay cost
10	Safety reputation of organization
11	Safety oriented programs
12	Continuous improvement in work
13	Timely delivery of materials
14	Recognition
15	Increase in sales
16	Profit
17	Better relations
18	Average production cost per unit
19	Average overtime hours per employee
20	Average time incurred per product
21	Average annual output per worker
22	Idle time as percentage of total time
23	Increased labour utilization efficiency rate
24	Increased labour utilization efficiency rate
25	Reduced variance in cycle times
26	Total downtime due to process problems
27	Production rate
28	Total productivity factor
29	Cost reduction
30	Price of the product in line with others
31	Safety results (no. of days with no safety violations)
32	Safety violations noted per week & corrected within allotted framework
33	Training time per investment per employee
34	Decreased injury / illness
35	Delivery lead time
36	Parts per volume accepted
37	Cost of product
38	Inspection and test equipment periodically inspected
39	Improved product quality at lower cost
40	Long term goal setting on the basis of current performance
41	Overall employee involvement in Quality improvement
42	Better Quality of work life
43	Overall information communication in the organization.
44	The organization listens to the ideas /opinions that employees contribute.
45	Reward and recognition given to employees for improvement suggestions
46	Balance between work and personal life.
47	The organization's policies for promotion and advancement are always fair.
48	Fair Compensation cost
49	Enhanced employee retention
50	Enhanced Customer retention
51	Customer Feedback and Suggestions implementation
52	Customer complaints dealt on priority
53	Customer communication system well established
54	Improved Customer Satisfaction

Data Analysis

The main motto of this research is to identify factors underlying performance improvement and establishing relationship between these factors. A questionnaire enables quantitative data to be collected in a standardized way so that the data are internally consistent and coherent for analysis.

Participative culture becomes backbone of the organisational climate. The respondents were requested to indicate their level of agreement on Likert scale with five response categories such as Not Important, Slightly Important, Medium Important, Very Important and Most Important. Likert scale is easy to construct and administer and easy for respondent to understand.

Normality

A lot of statistical tests are based on the assumption that the data is normally distributed

Normality for output variables

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
OUTPUT VARIABLES	54	100.0%	0	0.0%	54	100.0%

Descriptives

		Statistic	Std. Error
OUTPUT VARIABLES	Mean	4.0404	.03178
	95% Confidence Interval for Lower Bound	3.9765	
	Mean Upper Bound	4.1044	
	5% Trimmed Mean	4.0407	
	Median	4.0000	
	Variance	.047	
	Std. Deviation	.21788	
	Minimum	3.63	
	Maximum	4.41	
	Range	.78	
	Interquartile Range	.38	
	Skewness	.008	.347
	Kurtosis	-1.184	.681

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
OUTPUT VARIABLES	.120	62	.088	.952	62	.052

a. Lilliefors Significance Correction

Factor Analysis

Factor analysis attempts to represent the common factors that are hypothetical variables which explain why a number of variables are correlated with each other. It is because they have one or more factors in common. Varimax rotation searches for a set of factor loadings such that each factor has some loadings close to zero and some loadings close to -1 to +1. It indicates a clear association between the variables and the factor; or close to zero indicates a clear lack of association.

Confirmatory Factor Analysis (CFA) technique is used in this research. Confirmatory Analysis is a factor analysis (CFA) used to study how well a hypothesized factor model fits a new sample. Here Varimax rotation i.e. an algorithm which minimizes the number of variables that have high loadings on the orthogonal factors is used to improve interpretability. Confirmatory Factor Analysis and Varimax rotation yielded 06 output factors for Indian small scale manufacturing industries under study.

Interpretation and Naming of output factors

Factor No.	PM Identified	Attributes
Factor 1	Quality Performance	Improved quality of relationships, Identification of Defective materials, segregated from acceptable material, Inspection and test equipment periodically inspected, Timely delivery of materials, Improvement in adoption of innovative technology ,capacity utilization of industries, Decrease in delivery lead time, Reliability of products, Increase in reputation of organization, improved product quality at lower cost. Long term goal setting on the basis of current performance, employee involvement in Quality improvement
Factor 2	Productivity Performance	Reduced variance in cycle times, Reduced idle time as a percent of total time, Increased labour efficiency rate, Decrease in down time due to process problems, Increase in production rate, Increase in total productivity factor, Optimum human resource utilization, High productivity of machines
		profitability, cost savings ,competitiveness, Decrease in average production cost per unit, Increase in sales, Increase in Return on investment, Growth in market share, Results in

Factor 3	Financial Performance	Decreased scrap & Rework, Decreased re-inspection , retest cost, Decreased delay cost
Factor 4	Safety Performance	Increase in safety reputation of organization, Safety oriented programs , reduction in risk behavior, Better safety results, Safety violations corrected Decreased injuries, Better Quality of work life, Improved working conditions
Factor 5	Employee Satisfaction	Communication of information, Recognition of employees contribution, Reward and recognition given to employees, balance between work and personal life, Fair promotion and advancement policies, Fair Compensation ,Enhanced employee retention
Factor 6	Customer Satisfaction	Customer Feedback acceptance, Customer complaints dealt on priority, well established Customer communication system, Improved Customer Satisfaction, Price of the product in line with others, Enhanced Customer retention

Bartlett’s test of sphericity

Bartlett’s test of sphericity assesses the overall significance of the correlation matrix. If the value of test statistic for sphericity is larger and the associated significance is small, it can be concluded that the attributes are correlated. For the collected data, the Bartlett’s test of sphericity value is high which indicates that the factor analysis can be applied on the collected data.

Results of KMO and Bartlett’s test of Output Factors

Sr. No.	Output Factors	KMO	Bartlett’s test of sphericity		
			Approx. Chi-square	df	Sig.
1.	Quality Performance	0.683	329.888	6	0.000
2.	Productivity Performance	0.619	112.552	6	0.000
3.	Financial Performance	0.653	92.631	10	0.000
4.	Safety Performance	0.634	96.286	6	0.000
5.	Employee Satisfaction	0.693	253.800	10	0.000
6.	Customer Satisfaction	0.644	141.681	6	0.000

Hence based on above mentioned statistical analysis, it can be concluded that all the PMs are suitable for factor analysis.

Result

In this research, an attempt has been made to analyze output factors of manufacturing industries. An extensive survey is being done to identify factors and their effects on manufacturing techniques. The reliability estimate and validity results of the research instrument (Questionnaire) show that, the instrument can be used as a standard for collecting data related with manufacturing industries. Further confirmatory factor analysis revealed six performance improvement factors. These are 1. Quality Performance 2. Productivity Performance 3. Financial Performance 4. Safety Performance 5. Employee Satisfaction 6. Customer Satisfaction.

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