Integrating Productivity & Safety in Indian Manufacturing Industries For Improved Performances

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Abstract
Manufacturing industries contributes directly to GDP of any country. Thus these industries need to be analysed critically. Every business's motto is sustainability, profit and success. Most producers consider Productivity the most important aspect of manufacturing but now a days safety specialists and academicians claims occupational safety as most important factor for business. Hence the study deals with integrating Productivity & Safety in Indian manufacturing industries for improved performances.

Keywords*: Manufacturing industries, Productivity , occupational safety, improved performances*

1. Introduction

The term productivity is economically defined as ratio between output & input (Mohanty,1998). It is basically a measure of effectiveness & efficiency of organization in generating output with resources available. Output can be measured in terms of increased sales, production value etc. whereas input comprises of the resources used to produce output like labour, capital etc. It is more goods of better Quality at lower costs. It is the elimination of waste in all forms: time, money, materials, equipments, energy, space , physical and mental effort (Mohanty, 1988).Various performance measures are used to describe productivity like machine utilisation, schedule performance, cost variance, profitability, sales per employee etc .Helms (1996) stated that productivity tells how well a producer is. According to him growth in workers abilities, capital investment, number of quality items produced, process inventions, innovations are the contributing factors to improve productivity.

Safety describes the ability of system to function without harm or damage to property or environment (OHS, 1970) . Safety also refers to the preventive measures taken by people to prevent accidents, harm, danger, damage & loss For number of people working in an industry safety should be everybody's interest. Safety management is an important part of overall management system. It includes sum of activities focused on technical, human & organisational aspects. Lack of concentration may cause disaster, death of employees and a lot of production loss too. Health and wellbeing of employees should be the concern of top management, because occupational diseases and poor health of employees may itself result in a big accident (Jain, 2010).

Hence it was felt appropriate to investigate a relationship by studying Quality, Productivity and Safety relationship in a manufacturing setup. The theme of the work is based on finding Productivity and Safety interrelationship for Manufacturing Industries. The critical examination of the literature review identifies a gap in the critical success factors for performance improvements considering Productivity and Safety in Indian manufacturing industry.

2. Scope of work

The primary interest in this study is the Productivity & Safety improvement. These linkages satisfy the question that overall performance is improved through Productivity improvement & Safety improvement combinely in overall perspective of manufacturing organisation. The methodology used for establishing facts use a questionnaire for survey, also interviews at personal level are conducted. The study helped in:

1) Identification of possible input factors and output factors for Productivity & Safety interrelationship in Indian manufacturing industries.
2) Extracting input factors and output factors of Productivity & Safety from field data.
3) Evaluating the factors which have positive impact on organizational performance indicators.
4) Establishing relation between these factors for Productivity & Safety interrelationship.

3. Linking Productivity & Safety

With the development Occupational Safety & Health has become prime concern. The rapid growth of industries has raised concern on safety at workplace. It is important for management to understand that safety & health programming

are profitable ways to work effectively & achieve corporate goals. With this concern only management in industry can do business profitably. Most producers regard Productivity as one of the most important aspects of manufacturing but many safety specialists and academicians commits occupational safety as best for business.
Accident results in loss of profit as cost of accident includes both direct & indirect costs contributing to the total cost of accidents. More attention to safety increases productivity as it reduces direct & indirect costs & therefore increases profit (Jain, 2017).The research work carried out by Salminen et al. (1995), suggested that improving machines & equipments, providing more spacious work sites & initiating better housekeeping will increase both productivity & safety .Krause (1994) reported that a positive change in safety affects the entire organization, from productivity & quality to morale & culture.The studies carried out by Evans et al. (2005) in Wood manufacturing industry stated that a useful factor in understanding employee safety related incidents is productivity climate. Also, fostering a climate for safety should reduce safety related events & injuries reduce the associated costs.
Maudgalya et al. (2008) in their studies stated that productivity improvements have potential to increase safety. They worked on 18 case studies of industries and concluded that improvement in industrial safety performance results in improvement in plant operations & maintenance which in turn increases productivity. Shalini (2009) pointed out that increase in investment of safety areas and the declination of occupational accidents results in improvement of productivity.

4. Construct Validity

Factor analysis is used to identify the items collected from various resources to be included in measuring instrument. Appropriateness of the data is also measured by examining the minimum no. of observations required. Construct validity is assessment of instrument. The factor matrices showed that they are uni-factorial with Eigen values greater than the accepted criterion. The component matrix, Eigen value and percentage of variance for all input and output values are shown below-

Component matrix and total variance explained for Input Factor

Sr. No.	Name of loaded items	Values of item loaded	Eigen values	Percentage of Variance
		Component 1		
Input Factor 1	clarity of vision, mission, Strategic direction for productivity & safety	.741	2.351	58.787
	ability to take responsibility for improvement in Productivity & Safety	.805	.648	16.201
	budgetary allocation for Productivity & safety improvement	.758	.533	13.321
	commitment for providing good work environment.	.761	.468	11.691
Input Factor 2	Employee Growth & Development	.554	1.989	39.776
	Proper Planning, Implementation and Procurement Policy	.552	.917	18.337
	Performance Incentives to Employees as per their accountability for success or failure	.780	.809	16.183
	Staff Training and Awareness Programs for Performance & safety from time to time	.589	.722	14.442
	Motivation to the employees for implementing innovative ideas	.650	.563	11.262
Input Factor 3	Teamwork	.346	1.965	49.135
	Work environment	.842	.943	23.565
	Customer's feedback	.855	.743	18.571
	Promoting better house keeping, spacious work-sites , safe work habits & use of personal rotectors	.637	.349	8.729
Input Factor 4	Favourable Govt, Safety Policies,	.647	2.430	48.603
	Rules & Implementation of osha regulations	.816	.939	18.774
	Systematic design & management of process through system standards, such as Quality systems (ISO 9000) , Environment System (ISO 14000) , Occupational Health & Safety System (ISO 18000)	.854	.721	14.429
	Fair Compensation cost to employees	.681	.589	11.772

Sr. No.	Name of loaded items	Values of item loaded	Eigen values	Percentage of Variance
		Component 1		
	Well Defined rules, regulations & operating procedures	.389	.321	6.422
Input Factor 5	Intensified Safety inspections	.689	1.998	39.969
	Proper Accident Investigations & Reporting	.862	.958	19.162
	Using proper machines , tools, equipments and protectors	.650	.879	17.582
	Tighter Adherence to work tables	.471	.790	15.803
	Use of statistical process control charts	.369	.374	7.485

Extraction Method: Principal Component Analysis.

Component matrix and Total Variance explained for Output Factor

Sr. No.	Name of loaded items	Values of item loaded	Eigen values	Percentage of Variance
		Component 1		
Output Factor 1	adoption of innovative technology and utilization of industries	.904	2.219	55.483
	Decrease in delivery lead time	.821	.994	24.861
	improved product at lower cost	.124	.498	12.459
	Identification & segregation of Defective materials	.844	.288	7.196
Output Factor 2	Increase in total productivity factor	.751	.999	24.984
	Optimum human resource utilization	.693	.730	18.246
	Reduced idle time	.179	.533	13.321
Output Factor 3	Increase in Return on investment	.512	1.745	34.900
	Growth in market share	.497	.934	18.684
	Decreased scrap & Rework	.713	.872	17.435
	Decreased delay cost	.725	.850	16.993
	higher profitability	.449	.599	11.988
Output Factor 4	Increase in safety reputation	.435	1.719	42.969
	Better safety results	.689	.971	24.267
	Safety violations corrections	.760	.686	17.143
	Decreased injuries	.690	.625	15.621
Output Factor 5	Overall, information in the organization is communicated well.	.835	2.131	42.613
	Reward and recognition given to employees for suggestions regarding improvement	.851	.994	19.890
	The organization implements employees ideas	.201	.962	19.234
	work and personal life balanced	.787	.535	10.694
	Fair Compensation cost	.225	.378	7.569

Extraction Method: Principal Component Analysis.

5. Conclusion

A thorough work has been done to establish the relationship between various performance measures like Quality, Reliability, Productivity, Flexibility, Safety, Risk , Organizational climate, Operating performance & Ergonomics in various industries like oil industries, roofing industries, construction industries etc. The items of factors underlying mainly productivity & safety are identified .the linkages have been developed for improvrd performances. The factors which correlate these parameters in concern with the Indian manufacturing industries are identified. Hence it can be

concluded that it is extremely difficult to attain company objectives of increased productivity & profit without giving proper consideration to safety.

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