iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** IX **Month of publication:** September 2018

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue IX, Sep 2018- Available at www.ijraset.com

Comparative Assessment of Factors affecting Productivity in Case Companies

Dr. Bhagwan Das Gidwani
Dept. of Mech. Engg., Rajasthan Technical University, Kota (Raj), India.

Abstract: ***Intensifying global competition is throwing challenges in the form of fluctuation in demand and necessity to provide wide variety of product to attract and hold the ever demanding customer. To be successful in such competitive world, companies are forced to adopt all ways and means to improve productivity. Companies are seeking ways to increase the value of their products and services by improving productivity from all systems. Customer satisfaction and marketing management are two such tools for productivity improvement. The implementation of these helps companies to improve productivity and remain profitable. The automotive sector manufacturing companies in India are the fourth largest manufacturer in Asia producing around 40% of the total production in organised sector and the balance 15% by the unorganized companies. This study reports findings based on case study carried out after an extensive survey of automotive sector manufacturing companies. Two companies have been selected for detailed case studies. Their experiences in the productivity improvement practices are analysed. Although the companies represented diversity in terms of sales volume and product range; they shared some commonalities including use of some of productivity improvement activities. Productivity improvement practices seem to be in line with corporate strategy, though the companies followed a traditional top down approach. The study concluded that customer satisfaction, marketing management, Job satisfaction and computer application are some of the tools, which play key role in improving productivity in case companies.***

Keywords: Productivity Improvement, Customer satisfaction, marketing management, case study.

I. INTRODUCTION

Global competition and sophisticated markets is forcing managers to adopt the strategies for cost cutting and remaining profitable. Competition from international companies is in terms of improved quality products with higher performance [1]. This scenario is applied to all types of industries including automotive sector manufacturing companies. Looking at situation, companies are bound to improve productivity and remain profitable.

Productivity is the key to success and growth in every industry. Some researchers note that productivity improvement is the only way to increase the standard of living [2].

The relevance of growth is less meaningful if it has not affected productivity and hence the standard of living. Essentially the focus is on productivity improvement to meet competition [3].

In the developing country like India, Automotive sector manufacturing companies play a significant role in economic development of country. The growth trend in automotive sector in India was for Two Wheelers- 32.31%, Commercial Vehicle -19.10% and Passenger Cars grew by - 19.10%. Hyundai remained the top exporter. Indian automobile Sector saw a growth of 13.11% in sales in Feb. 2016 compared to Feb. 2015.

The industry is manufacturing automobiles as per market demand. Automobile production trend in India is represented in Table 1 (source:SIAM), which indicate that approx. 2.33 crore vehicle were produced during last year. 2-wheelers industry in India has witnessed spectacular growth over the last 5 years. Literature indicates that considerable investment is there in research in automotive sector manufacturing companies.

This sector is assumed to be an indicator of the economic progress of the country. Hence this sector is taken up for present research. To fulfill their role in development of country, they need to reduce cost of product and improve productivity. The purpose of this research is to observe current productivity measurement practices being followed in case company, assessing productivity awareness status of the workforce of case company and then to study which factors affect productivity improvement in case company to most significant level. For the research survey questionnaire has been framed and administered in case company, responses are analyzed statistically to give suitable recommendations useful for these industries.

Table 1: Automobile Production Trends in India (source: SIAM)

Category	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Passenger Vehicles	23,57,411	29,82,772	31,46,069	32,31,058	30,87,973	32,20,172
Commercial Vehicles	5,67,556	7,60,735	9,29,136	8,32,649	6,99,035	6,97,083
Three Wheelers	6,19,194	7,99,553	8,79,289	8,39,748	8,30,108	9,49,021
Two Wheelers	1,05,12,903	1,33,49,349	1,54,27,532	1,57,44,156	1,68,83,049	1,84,99,970
Grand Total	**1,40,57,064**	**1,78,92,409**	**2,03,82,026**	**2,06,47,611**	**2,15,00,165**	**2,33,66,246**

The outline of the paper is as follows: Section 2 deals with the concept and literature on Productivity improvement. Research methodology for exploratory survey and case study is discussed in Section 3. Finally the paper concludes with findings of the case study and limitations of present work.

II. CONCEPT OF PRODUCTIVITY: LITERATURE REVIEW

Productivity is commonly used with performance in academia and industries. Infect these are usually considered to be interchangeable, with terms such as profitability, efficiency and effectiveness [4-9]. Productivity improvements in industries can be achieved by five different ways: (i) Output and input increases, but increase in input is proportionally less than output, (ii) Output increases while input stays the same, (iii) Output increases while input is reduced, (iv) Output stays the same while input decreases and (v) Output decreases while input decreases even more [10]. The measures, in which productivity can be discussed, are: *Partial productivity measures* and *Total productivity measures*. The most common partial productivity measure is labour productivity, e.g. output per working hour [11]. Other partial productivity measures are material, capital and energy productivity. The advantage of partial productivity measures is that they are simple to measure and understand. With partial productivity measurements it is also easy to focus on particular part of the company, and measure changes in productivity and their causes. It is however important to use relevant partial productivity measures [12].

The disadvantage of partial productivity measures is that they only focus on one productivity measure. Total productivity measurements accounts for the overall company productivity.

Techniques for Productivity improvement are categorized as technology based, task based, material based, management based, product based and investment based categories [13].

The manufacturing system productivity improvement methods are categorized into operation research based, system analysis based, continuous improvement based and performance metrics based. Productivity improvement methods are also categorized as: logistics, quality, production engineering and others [14].

Some of industrial productivity improvement techniques used in these categories are Six sigma, Total productive maintenance, Just in time, lean manufacturing, Business process reengineering, Balanced scorecard, Work study, Supply chain management, Five S, Kaizen, Total productivity management [15-18].

Figure 1 represents Transformation process and productivity model given by Tangen [10]. According to him in the industries almost all transformation processes are fed with many inputs (e.g. labour, capital, material and energy) and produce more than one output (e.g. product A, product B, etc.). This complicates the calculation of productivity [19].

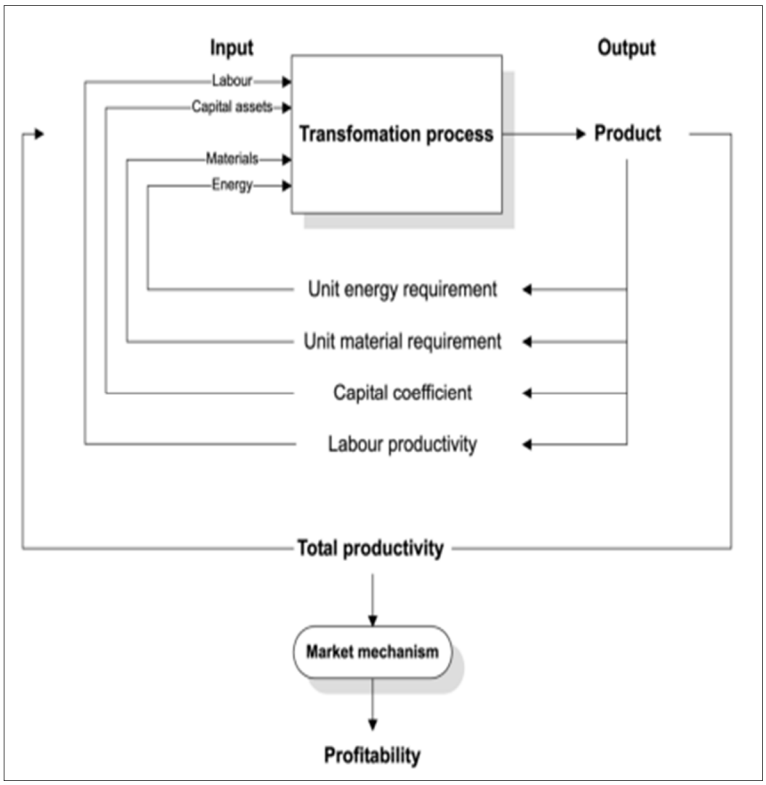


Fig. 1: Transformation process and productivity model[10]

Available literature in the field of productivity improvement underlines it's importance in survival of the industry. Still there are many industries which are obstinate to use productivity improvement techniques. Main reason behind it is lack of strategic planning and misconception of the benefits. Traditional mindset is also a reason which keeps them away from investing much in productivity improvement techniques. There are many other reasons which attracted our interest towards this study in Automotive sector Manufacturing Industry, these are:

A. The high number of units in this sector,
B. Absence of clear strategic expectation and
C. Non-holistic thinking of managers about Productivity related issues.

In the light of above mentioned facts, it can be said that there are plenty chances of carrying out a research in this field.

III. CASE STUDY

A. Purpose of the study

In this section case study is presented from an automobile sector manufacturing industry. Case-based research represents the intersection of theory, structure and events [20]. The purpose of the case study here is to evaluate, enhance and to adjust the findings of literature. It intend to aid in development of concept thus enhancing its exploratory and prescriptive characteristics. Based on the exploratory survey, three cases of automotive sector manufacturing companies are presented. Of these, three companies, one (ABC) is a leading bearing manufacturer and second (GEH) is a polymer product manufacturing industry. All three companies belong to the category of automotive sector manufacturing companies. We have adopted case study method for our research, after exploratory survey, since survey research may have some errors in it [21]. In case studies one attribute is to be discussed with more than one manager for collection of data, therefore non-response bias is reduced to minimum. Various researchers used case study for their research [22-26]. The objective of case study is to gain in-depth understanding of productivity improvement practices in automotive sector manufacturing companies. The specific issues involved in the case study are enumerated in below Table 2. Methodology of the case study is explained in Table 3.

Table 2: Specific issues involved in case study

Issues	Source of information
Manufacturing mission/vision	From published reports.
Organization Structure	From meetings involving managers
Competitive strength	Discussion with respondents.
Productivity awareness status	Through case survey and discussions with Respondents
Existing productivity measurement practices	
Productivity improvement strategies	

Table 3: Case study Methodology

Steps	Comments
Definition of research question	What are the issues in productivity improvement in automotive sector manufacturing companies.
Objectives	The case methodology shall seek answers to specific questions for the case industry - What is productivity awareness status of workforce - Which productivity measurement Technique are implemented - What are Productivity Improvement Practices - What are Factors affecting Productivity.
Selecting cases	Two companies were selected among automotive sector manufacturing companies.
Crafting research instrument	Structured questionnaire was used to capture major issues in the field of productivity improvement. Interviews and observation followed this survey.
Entering the field	Companies were contacted and multiple respondents were surveyed and interviewed to obtain better understanding of issues.
Analyzing the data	Various issues and methodology for productivity improvement strategies were analysed in SPSS and studied.
Enfolding literature	Comparison with other cases to sharpen generalizability.
Reaching closer	Based on learning from survey and cases, recommendations are formulated.

All the case companies were visited two-three times, once for general tour on operations and other visits to discuss productivity related issues in the company. In addition, several telephonic communications were also made. The data collection involved structured survey followed by unstructured interviews and observations with managers and engineers in the case companies. The managers provided contextual information about the company and its productivity improvement strategy. The companies for case study were selected on the basis of their consent for detailed study and geographical location.

B. Case Study 1 (Company ABC)

ABC Company is a one of the oldest automotive component (bearing) manufacturing company. It belongs to a big industrial group and operates in a multi-plant environment (two plants) in northern part of country. It was established in year 1946 and is now manufacturing approx 24 Lac bearings per month in 500 sizes ranging from 0.6 cm diameter to 140 cm diameter and can manufacture upto 200cm diameter. The company operates with 3500 employees with an export of 35% of annual sales. Presently company is the third largest manufacture of bearings for vehicles in the world and has 15% exports of total sales. Organization structure of case company ABC is indicated in Figure 2. Vision of the company is "*Be recognized by customers as their best supplier*". And Mission is:

a) To be identified as a global automotive component supplier.
b) Passionate pursuit of customer satisfaction through quality, cost and responsiveness.
c) Increase stakeholders value through revenue growth and superior returns.
d) Create an environment where every employee can contribute.

i) *Previous Approach:* Company did not have any specific quality and marketing policy till the 1980s, as it was an era of limited supply, the government's industrial policy was restrictive and regulative. The company's production was very less than demand. Company enjoyed a monopoly status in earlier years. After relaxation in industrial policy many new companies have

entered in this sector with foreign collaboration. In the 1990s the company has grown explosively and its production volume increased tremendously.

ii) *Present Approach:* Owing to increased competition the company created a marketing department (in 1990s) that focused on increasing annual sales. The company decided to modernize plants and increase productivity. It invested in Productivity improvement strategies and framed a Productivity and marketing policy.

Reliability statistics of the data obtained in the case survey done with eleven executives (managers and engineers) of the case company indicated a cronbach's alpha value of 0.890 for all items taken together and 0.883 for standardized items.

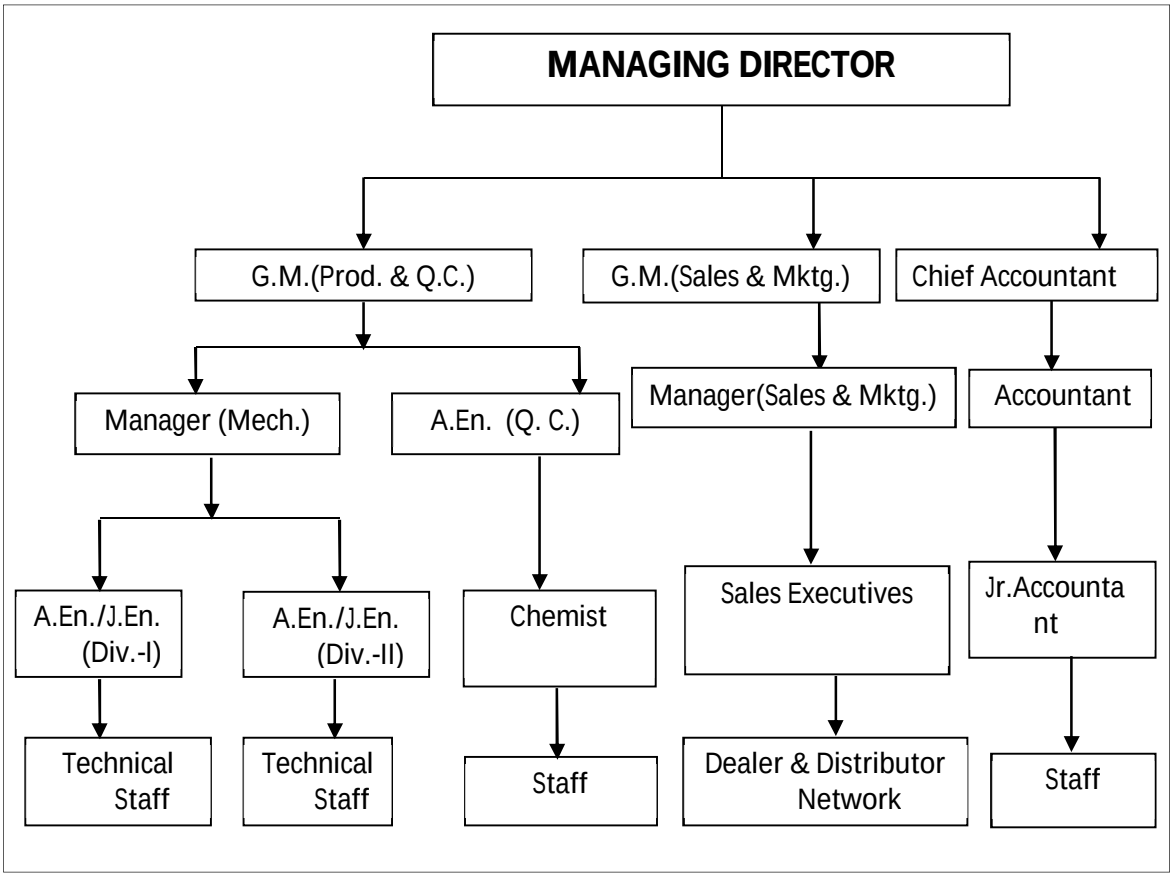


Fig. 2: Organization Structure of ABC Company (Plant-I)

1) *Productivity Awareness Status of Workforce (ABC):* Workforce including Top Manager, Middle Manager, Lower Manager, Operators and Supporting Staff were observed for assessment of productivity awareness. The case study survey, discussion and interview indicates that Top manager is comparatively much more aware for productivity improvement in the industry than to other workforces with a mean value of 4.36, as shown in Figure 3. Top manager's awareness causes the enhancement of productivity by motivating and training other employees working in the industry. Supporting staff and operators, as normally observed, are concern only about production and production based financial incentives. Hence, these must be trained and told about the benefits and outcomes of productivity improvement.

2) *Productivity Measurement Technique Implementation in Industries:* The productivity measurement techniques includes the value of output with respect to value of man hours, capital, material input, miscellaneous inputs, total input, customer satisfaction, etc. Evaluation was done on the basis of survey and discussion during case study; responses indicated that productivity measurement technique implementation is highest in terms of Customer Satisfaction. The analysis indicated (as shown in Figure 4) that Customer Satisfaction, both internal and external, is given comparatively much more importance among productivity measurement techniques. Company recognizes that there is a direct link between customer satisfaction and productivity.

Fig 3: Productivity Awareness of Workforce for Company ABC

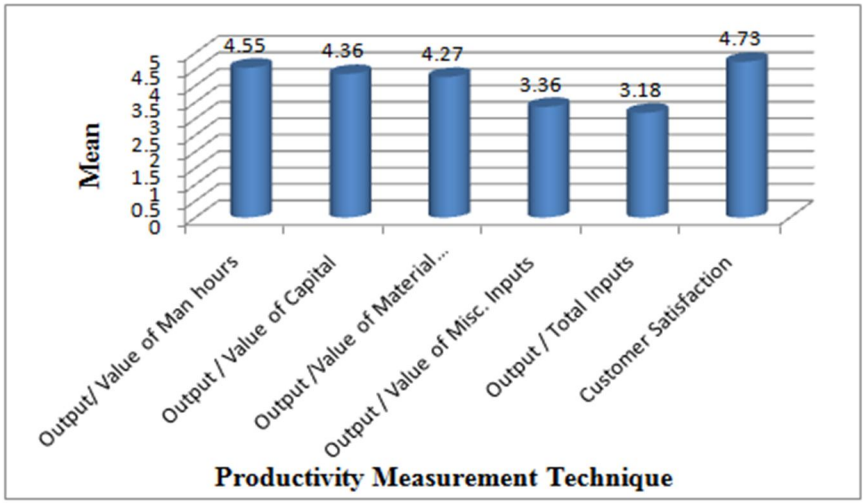


Fig. 4: Productivity Measurement Techniques for Company ABC

3) *Productivity Improvement Practices (ABC):* The productivity improvement practices include education level, skills, absentees, lead time, internal transport, employee satisfaction, etc. It is clear from Figure 5 that employee satisfaction is taken as most important parameter for the productivity improvement practices than other practices. In the interviews with respondents it was observed that for improving productivity industries are trying to satisfy their employees by the way of better work environment, financial incentives, etc. Some companies also understand the fact that it really is in the company's best interest to conduct regular employee satisfaction surveys, specifically to increase productivity and uncover issues not readily apparent.

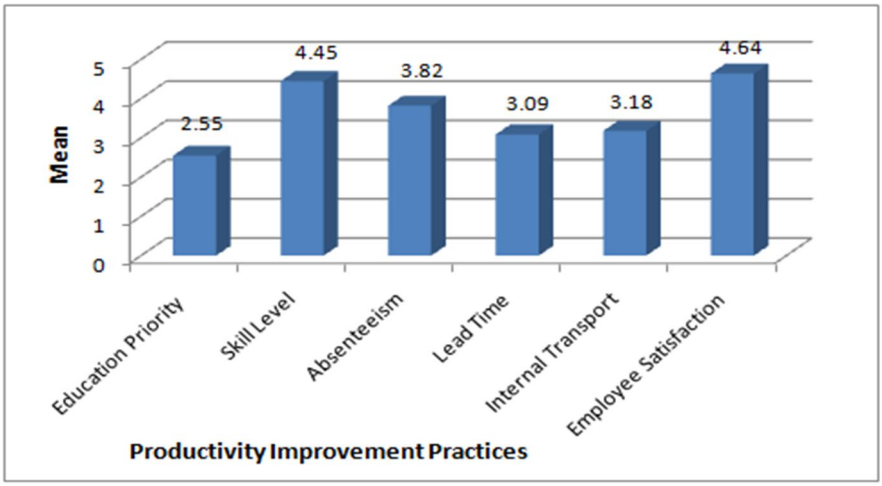


Fig. 5: Productivity Improvement Practices for Company ABC

4) *Factors Affecting Productivity (ABC):* In the study twenty main factors that affect productivity like: Computer application, Computer Aided Process Planning, Computer Aided Design, Computer Aided Manufacturing, Quality management, etc. were included and respondents reported that Marketing Management play a vital role among factors that affect productivity of industry, as also indicated in Figure 6 arranged in ascending order of mean value of different parameters. In the interviews, company indicated that the marketing teams who directly deal or provide the services to the customers are more important. The role played by them is very crucial from business point of view. It can be said the Marketing team is the most important resource for the company.

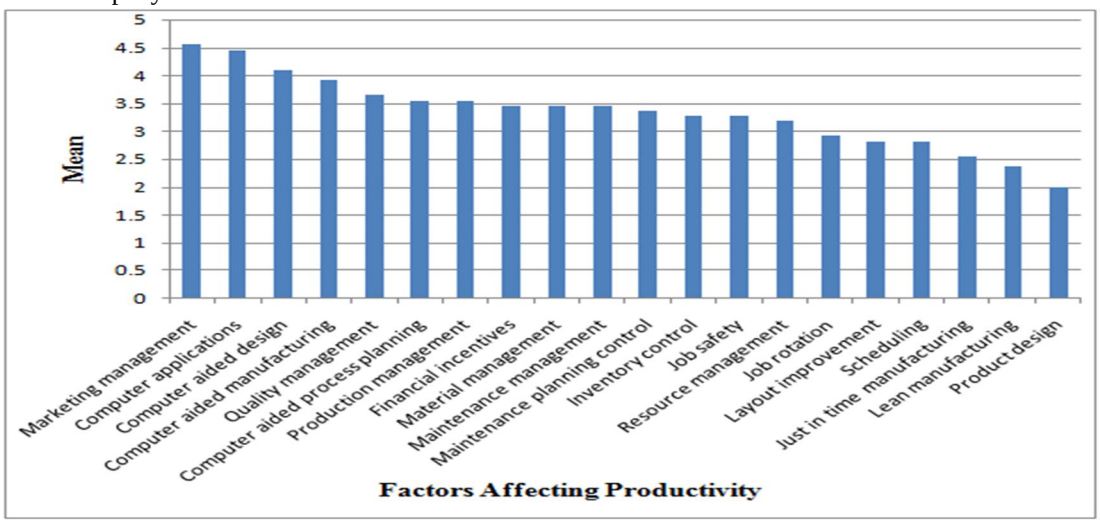


Fig. 6: Factors Affecting Productivity for Company ABC

C. Case Study 3 (Company GEH)

Company GEH is a leading manufacturer of polymer products used in automobiles, situated in northern India. Its products are used in cars, jeeps, buses, trucks, etc. The product range covers dashboards, ECM boxes, door panels, steering column covers, Horn cap, Front and rear Bumper etc. The company was established in 2006 and started production in 2008. Annual turnover is about 20 crore. It supplies components to leading automobile companies. Ten officials of the company were administered the survey questionnaire for the case study. Reliability statistics of the data obtained of the case company indicated a cronbach's alpha value of 0.769 for all items taken together and 0.750 for standardized items.

1) *Productivity Awareness Status of Workforce (GEH):* While querying the respondents about awareness about the productivity awareness of their workforce, they were asked about their views and perceptions about the extent of awareness about productivity among workforce. In the case company GEH respondents had a view that Top Manager and to some extent middle managers are having good awareness for productivity improvement Supporting staff and operators are comparatively less aware about productivity improvement and need to be trained for the same. The outcomes of case survey about the aspect are indicated in Figure 7.

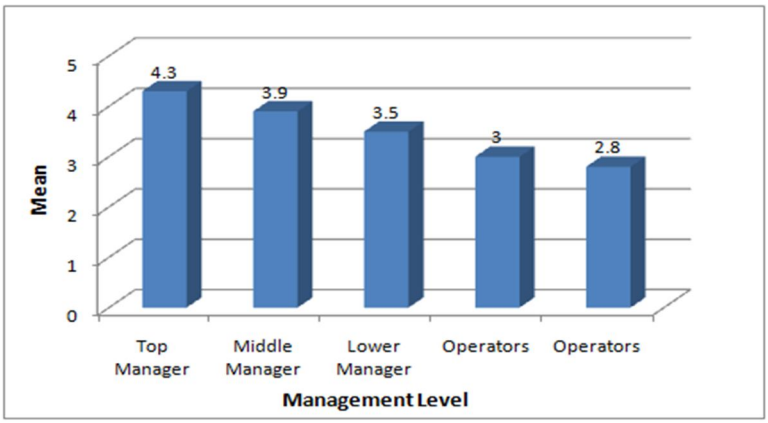


Fig. 7: Productivity Awareness Status for Company GEH

2) *Productivity Measurement Technique Implementation (GEH):* Evaluation was done on the basis of the responses indicated by respondents for productivity measurement technique implementation in their industry. Management indicated that Customer Satisfaction, both internal and external, is comparatively much more important, as indicated in Table 4. In fact many problems related to productivity improvement can be attributed to lack of customer satisfaction aspect.

Table 4: Productivity Measurement Technique in Company GEH

Measurement Technique	Mean
Value of output/ Value of Man hours	4.30
Output/Value of Capital	4.40
Output/ Value of Material input	4.20
Output/ Value of Misc. Inputs	3.50
Output/ Total Inputs	3.80
Customer Satisfaction	4.80

3) *Productivity Improvement Practices (GEH):* In the case survey and interviews with respondents it was observed that for improving productivity industries are trying to satisfy their employees by the way of better work environment, financial incentives, etc. Same thing is revealed in Table 5. A positive relationship between employee and management is always beneficial, and the full success of a company can only be measured when the loyalty of its employees is included. Satisfied employees play a key role in the company and they promote and support the company's mission, strategy and brand.

Table 5: Productivity Improvement Practices in Company GEH

	Mean	Std. Deviation	No of Respondents
Education Priority	2.30	.483	10
Skill Level	4.30	.675	10
Absenteeism	3.50	.707	10
Lead Time	2.90	.568	10
Internal Transport	2.60	.516	10
Employee Satisfaction	4.70	.483	10

4) ***Factors Affecting Productivity (GEH):*** It is evident from the Figure 8, arranged in descending order of the mean values for the factors affecting productivity improvement, that 'Computer applications' and 'Job Safety' play a vital role among other factors. In the interviews, companies indicated that the more work are done using computers in the industry, Finally the Productivity, profitability and goodwill of the organization go high.

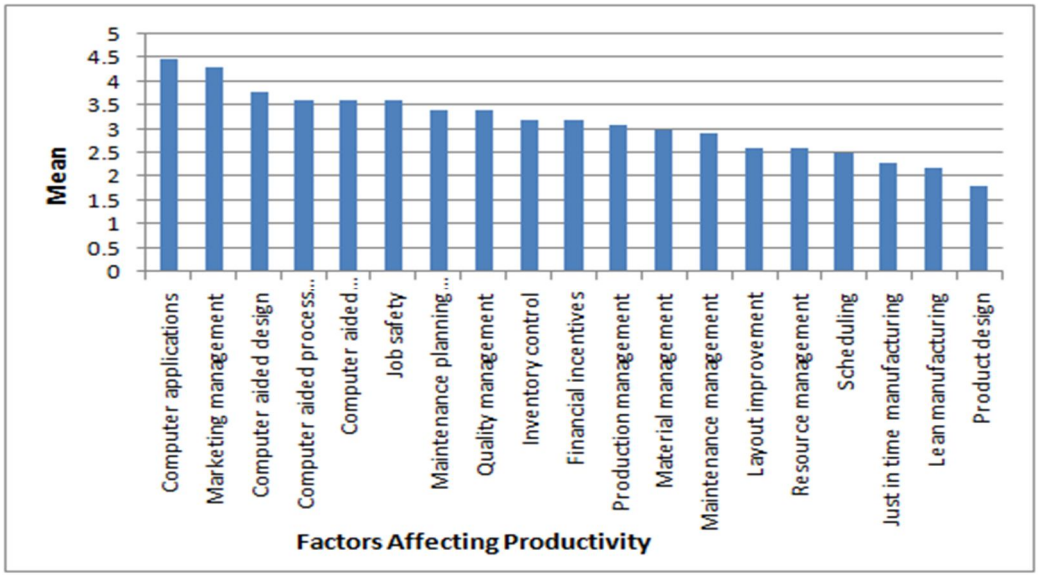


Fig. 8: Factors affecting Productivity for Company GEH

IV. CONCLUDING REMARKS

In our study we have tried to evaluate automotive sector manufacturing industries in various productivity improvement related issues based on the following frameworks:

A. Productivity awareness status of workforce;
B. Productivity measurement technique used by the industry;
C. Existing productivity improvement techniques in industry;
D. Factors affecting Productivity in the industry;

In this paper, case studies have been presented for Productivity related issues in automotive sector manufacturing industries. Table 6 summarizes analysis of case studies taken for detailed study based on their consent and geographical location. The case study responses have indicated that top managers are having good understanding about the productivity related issues, companies takes customer satisfaction as its perspective towards productivity measurement, employee satisfaction is also on priority for the management. Slight difference in the opinion of the officials of the companies taking part in detailed case studies, about the main factors that affect productivity in the industries is observed. Among various factors, companies have indicated that marketing management and Computer Application are taken on priority depending on the type of product being manufactured in the company. From the statistics presented in above sections, it can also be observed that these three factors are on almost on top priorities in the industries.

Table 6: Comparative Analysis of Case Companies

Company / Attribute	ABC	GEH
Sales Turnover	200 Crores	20 Crores
No. of Employees	3500	300
Domestic Market Share	45%	18%
Exports As % of Total Sales	35%	Nil
Productivity Awareness status of Workforce	Top Management	Top Management
Productivity Measurement Technique Implementation	Customer Satisfaction	Customer Satisfaction
Productivity Improvement Practices	Employee Satisfaction	Employee Satisfaction
Factors Affecting Productivity	Marketing Management	Computer Applications

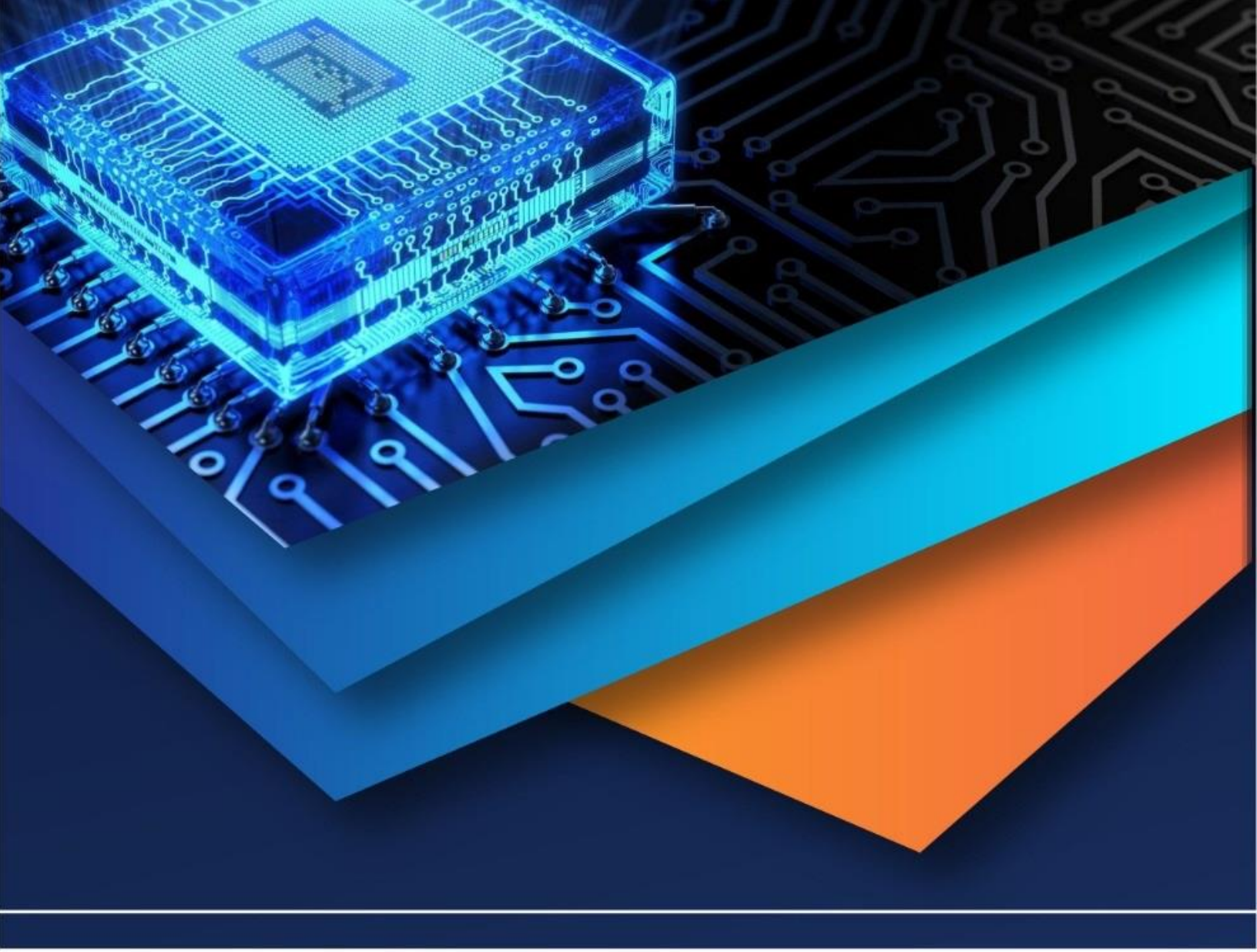
In the aspect of factors affecting productivity case companies are having difference in opinion depending on their management working and product requirements. Case company ABC and DEF emphasizes on marketing management, as it involved in wide variety of product manufacturing. According to the views of officers and managers, their company needs to have strong marketing policy to maintain their position in the market. Case company GEH officials were of the opinion that since their company is producing polymer and plastic parts for automobiles, so computer application is on the priority for this company. Along with computer application company persons were also having good knowledge of computer aided design (CAD) and graphics. Computer application and CAD helped them to understand and create good design of big plastic and polymer parts.

V. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

In this study an attempt is made to assess automotive sector manufacturing companies in India. However this study has some limitations, which future researchers could consider. Researcher has chosen the case company based on the consent of the company for detailed research study and their geographic location. Other companies from process sector, machinery sector and service sector could not be included in the study. Researchers may consider these sectors in future.

REFERENCES

[1] Dangayach, G. and Deshmukh, S. (2003), "Evidence of manufacturing strategies in Indian industry: A survey", International Journal of Production Economics, 83:279–298.
[2] Krugman, P. (1990) The Age of Diminished Expectations, MIT Press, Massachusetts.
[3] William J. Stevenson, "Operations Management", 11th Edition, 2012, Mc Graw Hill, pp.57-58
[4] Sink, D.S. and Tuttle, T.C. (1989), "Planning and Measurement in your Organisation of the Future", Industrial Engineering and Management Press, Norcross, GA, pp. 170-84.
[5] Chew, W. (1988), "No-nonsense guide to measuring productivity", Harvard Business Review, Vol. 66 No. 1, pp. 110-18.
[6] Sumanth, D. (1994), Productivity Engineering and Management, McGraw-Hill, New York, NY.
[7] Koss, E. and Lewis, D.A. (1993), "Productivity or efficiency – measuring what we really want", National Productivity Review, Vol. 12 No. 2, pp. 273-95.
[8] Gidwani, B. D., and Dangayach, G. S. (2017). "Productivity measurement and improvement-an overview." International Journal of Productivity and Quality Management. 20(3): 316-343.
[9] Jackson, M. and Petersson, P. (1999), "Productivity – an overall measure of competitiveness", 2nd Workshop on Intelligent Manufacturing Systems, Leuven, 22-24 September, pp. 573-81.
[10] Stefan Tangen, 2002, "Understanding the concept of Productivity", 7th Asia Pacific Industrial Engineering and Management Systems Conference, Taipei, pp. 1-4.
[11] Tangen, Stefan (2003), "A theoretical foundation of frequently used performance measures", The Royal Institute of Technology, Stockholm, Sweden.
[12] Stefan Tangen, 2005, "Demystifying productivity and Performance", International Journal of Productivity and Performance Management, Vol. 54 No. 1, pp. 34-46.
[13] Gidwani, B. D., (2017). "Modeling and Analysis of Productivity Issues in Automotive sector manufacturing companies: Survey" International Journal of Production Engineering. Vol. 3(2), pp 20-33.
[14] S. Anil Kumar and N. Suresh, Production and Operations Management: Second Edition, New Age International, New Delhi, 2008.
[15] Kjell B. Zandin: Industrial Engineering Handbook: Fifth Edition, McGraw-Hill, 2004.
[16] Miskir Teklemariam, 2004, "Productivity Improvement in Ethiopian Garment Industry through Efficient Maintenance Management", Master's Thesis, Addis Ababa University, Addis Ababa.
[17] Young Kyu Son, Chan S. Park, "Economic Measure of Productivity, Quality and Flexibility in Advanced Manufacturing Systems", Journal of Manufacturing Systems, 2008, Vol. 6(3), pp. 193-207.
[18] A. Bennett, J. Hui, M.S. Silve, "A Framework for Productivity Analysis at the Organizational Level: Method and an Applied Case", Engineering Costs and Production Economics, 12 (1987), pp. 401-411.
[19] Kurosawa, K. (1991), "Productivity Measurement and Management at the Company Level: the Japanese Experience", Advances in Industrial Engineering, Vol. 14:, Elsevier Science, Amsterdam.
[20] Grunberg, T., 2004, "Performance improvement: towards a method for finding and prioritizing potential performance improvement areas in manufacturing operations", International Journal of Productivity and Performance Management, Vol. 53, No. 1, pp.52–71.
[21] Malhotra, M.K., Grovar, V., 1998, "An assessment of survey research in POM: from constructs to theory", Journal of Operation Management, Vol. 16, pp. 407-425.
[22] Shrivastava, P., 1995, "Environmental technologies and competitive advantage", Strategic Management Journal, Vol. 16, pp. 183-200.
[23] Cheng, T.C.E., and Musaphir, H., 1996, "Theory and practice of manufacturing strategy", International Journal of Production Research, Vol. 34, pp. 1243-1259.
[24] Menda, R. and Dilts, D., 1997, "The manufacturing strategy formulation process: linking multifunctional viewpoints", Journal of Operations Management, Vol. 14, pp. 315-331
[25] Dangayach, G. S. & Deshmukh, S. G., (2001), "Practice of manufacturing strategy: Evidence from select Indian automobile companies", International Journal of Production Research, Vol. 39(11), pp. 2353-93.
[26] Eisenhardt, K.M., (1989), "Building theories from case study research", The Academy of Management Review, vol. 14(4), pp.532-550.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY