

IMPACT OF GREEN MANUFACTURING AND INNOVATION ON ORGANIZATION PRODUCTIVITY IN MANUFACTURING COMPANIES

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ABSTRACT-- Today's global awareness about environmental risks and extreme desires to attain global competition were forcing manufacturing systems to transform from traditional system into a new paradigm. In current global scenario, the manufacturing sector needs to protect environment and also increase the organisation productivity in innovative technique. So the corporate is progressively adapting green manufacturing. Green manufacturing is a term used to describe manufacturing practices that do not harm the environment during any part of the manufacturing process. This paper explores the influence of green manufacturing and innovation on organization productivity. Data were collected through questionnaire from manufacturing companies, result were analysed through correlation and regression analysis. The findings revealed that there is positive relationship among green manufacturing and innovation on organisation productivity. Finally, suggests some policy measures to enhance green manufacturing and innovation which leads to greater eco-friendly organization productivity.

Keywords--Green manufacturing, **innovation**, organisation productivity, green products, environmental sustainability, eco-friendly, etc.

I. INTRODUCTION

In this global environment, business is changing with multiple resources to establish them as the exceptional in persistent period. No individuals can achieve this aggressive era independently, they need the supports of natural resources, technology and human resources. The sustainability of natural resources and population are major current corporate challenges. The ISO has also proposed that the new quality management system for products and even for environment management system. Environment is crucial one with and change in climate at any point leads to the imbalance of the earth. Hence, there is a need of new manufacturing process i.e. green manufacturing. It is a term used to describe manufacturing practices that do not harm the environment during any part of the manufacturing process. It emphasizes the manufacturing processes that do not pollute the environment or harm consumers, employees, or other members of community. Green manufacturing stresses on reducing parts, rationalizing materials and reducing components, to help make products more efficient to build.

The upgrading of manufacturing industry to green manufacturing needs to be based on innovation, in order to achieve the green transformation of traditional manufacturing and the green development of new manufacturing.

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Thus, corporate needs innovation in manufacturing system, innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management and it is the key to realize green manufacturing. Through implementing green manufacturing practices, firms cooperate with upstream suppliers to obtain green materials and improve their operational efficiency, and to design green products, thereby yielding financial benefits. Green product innovation contributes considerable benefits to economic performance and organization productivity. Organisational productivity is the capacity of an organisation to produce desired results with a minimum expenditure of energy, time, money, personnel and materiel

Green manufacturing highlights the road map of the industries for achieving performance and improvement through innovative manufacturing techniques and its impact on organizational productivity. In today's corporate strategy there are many factors which influence organisation productivity. For manufacturing firms, environmental impact score and green policies and performance score were found to have an impact on organizational performance; while, green reputation plays a more important role in impacting the organizational performance of service firms. Green manufacturing is a trend of manufacturing industry in the future, and is of great significance to resource protection and environmental protection. There is rapid transformation from traditional to green manufacturing system and also there is need for organisation to improve their productivity in global scenario.

II. REVIEW OF LITERATURE

Haleem, et al. (2012) has exposed that green manufacturing influences ecological and sustainability-related measures and, therefore, should encompass much more than air, water and land pollution; energy usage efficiency; waste generation and recycling.

Thomas Ngniatedema, et al. (2014) investigated the influence of green operations on organizational performance. Based on metrics for environmental impact and green reputation, manufacturing companies scored lower on the environmental impact metric and higher on the green reputation metric than companies in services industries. The overall impact of green operations was found to be different between the manufacturing and service firms studied.

Rehman, et al. (2016) revealed that green manufacturing addresses process redundancy, ergonomics and cost implications due to faulty methods of producing goods. Faster and cheaper are no longer the only two criteria in manufacturing a product or evaluating an existing process line. Several factors such as materials used in manufacture, generation of waste, effluents and their treatment, life of the product and finally, treatment of the product after its useful life are all important considerations. These changes encourage the participants from all over the globe to use India for making and not just marketing their products. These changes are creating a whirlpool in the markets, infrastructure industry and for the business world. These changes are encouraging researchers and practitioners to try new techno-managerial solutions like green manufacturing both as standalone and in hybrid manner to understand the relationships with respect to critical success factors and performance measures.

Chen Lai, et al. (2006) define innovation “as hardware or software innovation that is related to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management”.

Kemp and Pearson (2007) stating that the innovation object may be a product, process, service or method and that an innovation should satisfy a user’s need or solve a problem and therefore be competitive on the market. Concerning the environmental aspect all cited definitions agree that the innovation should have a reduced negative impact.

Chengdu, et al. (2017) stated that green manufacturing is a trend of manufacturing industry in the future, and is of great significance to resource protection and environmental protection. The researcher have studied the green manufacturing innovation system, and then decomposes the green manufacturing innovation dimensions, and constructs the green manufacturing innovation dimension space. Finally, from the view of resource protection and environmental protection, it explores the path of green manufacturing innovation.

Pujari, et al. (2006) explored that there are various benefits can be derived from product environmental improvement, including increased sales, enhanced market performance and competitiveness, and improved corporate image.

Hwang, et al. (2010) analysed that effective environmentally friendly practices are clearly critical in moving a firm and its products toward performance improvement. Close cooperation and mutual communication between firms and suppliers facilitate a clean production process and improved economic performance, and thus have become a trend in the manufacturing industry.

Alhadid, et al. (2014) suggested that through implementing green manufacturing practices, firms cooperate with upstream suppliers to obtain green materials and improve their operational efficiency, and to design green concept products, thereby yielding financial benefits. Green product innovation contributes considerable benefits to economic performance and organization productivity

Ying-Chin Ho (2016) examined the influence of green manufacturing on organizational performance improvement. The findings indicate that green manufacturing has a significant impact on firm performance. The researcher has investigated how contingency factors, circumstance uncertainty, operation management philosophy, and total quality environmental management influence the relationship between green manufacturing practices and firm performance. Several crucial relationships are derived from the results.

III. OBJECTIVES OF THE STUDY

1. To study the relationship between green manufacturing and organization productivity in manufacturing companies.
2. To study the impact of innovation on organization productivity in manufacturing companies.
3. To examine the relationship between green manufacturing and innovation practices in manufacturing companies

IV. HYPOTHESES

H₀₁: There is no significant relationship between green manufacturing and organization productivity.

H₀₂: There is no significant relationship between innovation and organization productivity

H₀₃: There is no significant relationship between green manufacturing and innovation.

V. METHODOLOGY

The objective of the study is to examine the relationship between green manufacturing, innovation and organization productivity in manufacturing companies in Chennai. Data obtained from questionnaires were analysed using the SPSS. The population of this study consists of fifty employees from three manufacturing companies. The researcher has chosen convenience sampling technique, since it is easiest technique to reach the population.

VI. RESULTS AND DISCUSSION

The purpose of this study is to determine the impact of green manufacturing and innovation on organization productivity in manufacturing companies. Results emerging from analysis show that there are significant influences of green manufacturing and innovation on productivity.

Table 1: Effect of Green Manufacturing on Organisation Productivity

Independent Variable	B	Std. Error	T	p	R ²	Significance
Constant	.187	-.115	1.360	.17	.03	F=1.849
Green manufacturing	0.104	0.23	2.94	.000		P =0.018

Simple linear regression was performed to find the significant relationship between green manufacturing and organization productivity. From the above table, it is found that the p-value is 0.000 and t-value is 1.360. Since the p-value is less than 0.05, it shows that there is a significant relationship between green manufacturing and organisation productivity, so the null hypothesis is rejected and alternate hypothesis is accepted. From the adjusted R² it is inferred that the green manufacturing have influenced 3 per cent on organisation productivity. There should be cooperation among employees and society to effectively implement green manufacturing to enhance organization productivity. The result is coincident with the result of Hwang, Wen, and Chen (2010). Close cooperation and mutual communication between firms and suppliers facilitate a clean production process and improved economic performance, and thus have become a trend in the manufacturing industry. There are factors which influences organisation productivity in green manufacturing and it consistent with the result of Ying-Chin Ho (2016). The moderating effects of CU and TQEM demonstrate that in some cases with certain green manufacturing practices, the inclusion or exclusion of circumstance uncertainty and total quality environmental management might reduce or improve performance.

Table 2: Effect of Innovation on Organisation Productivity

Independent Variable	B	Std. Error	T	p	R ²	Significance
Constant	3.598	4.140	.161	.041	.249	F=9.623
Innovation	0.514	0.104	6.086	.000		P =0.000

From Table 2, it is found that the P-value is 0.000 and t-value is 6.086, since the P-value is less than 0.05. It shows that there is a significant relationship between innovation and organisation productivity. Hence, hypothesis 2 is accepted. From adjusted R² it is clear that the organisation productivity have influenced 24.9 per cent on innovation. Organisation productivity =3.598 + (0.514) innovation. To have one unit increase in organisation productivity, the innovation has to increase by 0.514 while other factors remain constant. The equation explain organisation productivity have positive impact on innovation. The result is coincident with the study of Alhadid and As'ad (2014). Green product innovation contributes considerable benefits to economic performance and organization productivity.

Table 3: Relationship between Green Manufacturing and Innovation

Green manufacturing		
Innovation	Pearson correlation	.482**
	Sig.(2-tailed)	.000
	N	50

Pearson correlation was conducted to find out the relationship between quality circle and communication. Table 3 shows the R value 0.482 and P value 0.000, which implies that there is a significant positive relationship between green manufacturing and innovation. Hence, the results confirm the hypothesis 3 and R² value 0.28 implies that 28% of the variation in green manufacturing of the sample can be attributed to innovation, remaining 72% can be explained by other variables. Green manufacturing is a trend of manufacturing industry in the future, and is of great significance to resource protection and environmental protection. It explores the path of green manufacturing innovation.

VII. CONCLUSION

The finding from regression analysis implies that there is positive relationship among green manufacturing, innovation and organization productivity. The study reveals that organisation productivity is influenced by other factors such as circumstance uncertainty and total quality environmental management. Corporate have to implement innovative strategy to make manufacturing industries as environment friendly. Innovation that is related to green products or processes, including the innovation in technologies that are involved in energy-saving, pollution-prevention, waste recycling, green product designs, or corporate environmental management. Green manufacturing can lead to minimum raw material charges, manufacturing efficiency benefits, reduced

conservation and industrial safety expenses, and enhanced corporate image. The relationship between green practices and performance outcomes has been subject to numerous studies but the results are not conclusive.

REFERENCES

1. Alhadid, A. Y., & As'ad, H. A. R. (2014). The impact of green innovation on organizational performance, environmental management behaviour as a moderate variable: An analytical study on Nuqul Group in Jordan. *International Journal of Business and Management*, 9, 51-58.
2. Bai, C., & Sarkis, J. (2010). Green supplier development: Analytical evaluation using rough set theory. *Journal of Cleaner Production*, 18, 1200-1210.
3. Chen, Y. S., Lai, S.B., & Wen, C.T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, 67 (4), 331-339.
4. Gemser, G., & Leenders, M. A. A. M. (2001). How integrating industrial design in the product development process impacts on company performance. *Journal of Product Innovation Management*, 18, 28–38.
5. Gil, M. J. Á., Jiménez, J. B., & Lorente, J. J. C. (2001). An analysis of environmental management, organizational context and performance of Spanish hotels. *Omega*, 29, 457-471.
6. Hwang, Y. D., Wen, Y. F., & Chen, M. C. (2010). A study on the relationship between the PDSA cycle of green purchasing and the performance of the SCOR model. *Total Quality Management & Business Excellence*, 21, 1261–1278.
7. Lakshminpathaiah, M.G., & Natarajan, C. (2019). Buying behaviour of customers towards green products in Tumkur district. *Online International Interdisciplinary Research Journal*, 9 (1), 13-20.
8. MI Suhong Li (2014). Green operations and organizational performance Thomas Ngniatedema Kettering University, Flint, Bryant University, Smithfield, RI. *International Journal of Business and Social Science*, 5 (3).
9. Natarajan, C., & Kavitha, M. (2016). Implementation of green supply chain management in steel industries at Salem district, Tamil Nadu, *SMR BIZAD Research Review*, 2 (1), 281-283.
10. Natarajan, C., & Shenbagam, K. (2016). Problems and prospects of green entrepreneurs in Salem district: An empirical assessment. *Shanlax International Journal of Management*, 3, 168-171.
11. Pujari, D. (2006). Eco-innovation and new product development: Understanding the influences on market performance. *Technovation*, 26, 76–85.
12. Pujari, D., Wright, G., & Peattie, K. (2003). Green and competitive. *Journal of Business Research*, 56, 657-671.
13. Ramarajan, R., & Natarajan, C. (2020). Implementation of green supply chain management in small and medium enterprises in Cuddalore district: An empirical study. *Studies in Indian Place Names*, 40 (13), 1584-1591.