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Sustainable Production Practices and Firms' Financial Performance: An Empirical Analysis

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Abstract: *A shift towards a more sustainable and cleaner industrial production pattern is important given India's net zero commitments and shrinking carbon footprint. Global warming and climate change are the two main issues that industrial enterprises around the world are currently dealing with. The primary need has been to lessen these companies' harmful environmental effects. Since the manufacturing sector is the most polluted, it is necessary for them to create innovative products through the process known as "sustainable production practices," which involves integrating eco-friendly design, environmental management systems, and sustainable production technologies into their operations. It is necessary to determine whether or not the adoption of sustainable production techniques impacts the companies' financial performance. Further research in this field is necessary, as the concept continues to present difficulties in the economy. The study aims to investigate how manufacturing companies in Odisha's Khurda district perform financially in relation to sustainable production methods. The study is descriptive in nature. A purposeful sample of thirty manufacturing enterprises from the Mancheswar Industrial Estate in the Khurda region of Odisha, supervised by BMC, was chosen. A well-structured questionnaire about the impact of sustainable production techniques on the financial performance of manufacturing enterprises was used to gather primary data for the study. Before processing the completed surveys, the answers were initially checked for consistency. The data was analyzed using SPSS software after a consistency check. The results were displayed using descriptive statistics, such as mean and percentages, frequency counts, and standard deviations, after the analysis. ANOVA, linear regression, and multiple correlation tests were used to evaluate the hypothesis. This analysis will help decision-makers in the manufacturing units and the government to make quick, economical, and environmentally responsible decisions.*

Key Words: *Sustainable production practices, financial performance, manufacturing firms, environmental management.*

1. INTRODUCTION:

Environmental concerns that manufacturing firms face in today's industry include climate change, global warming, difficulties with their production processes, waste generation and resource utilization, biodiversity effect, etc. Manufacturing companies are found all over the world. As the public's awareness of the environmental problems brought on by economic activity has grown, minimizing these companies' negative environmental effects has been their top priority. Manufacturing businesses must create innovative products and processes by incorporating eco-design, global environmental management systems, and sustainable production technologies into their manufacturing operations in order to meet these environmental requirements. These practises are known as "sustainable production practises." In addition to lessening environmental risks, this will enhance the company's reputation and competitiveness in a market where environmental concerns are paramount. Conversely, a company's financial performance serves as a subjective gauge of how well it can employ resources from its primary business and turn a profit. A company's performance not only indicates its current situation and the level of industry competition, but it can also act as a guide for decisions about future development and investment. While the main objective of sustainable production practices is to lessen their impact on the environment, there are additional benefits as well, such as increased competitiveness because of reduced expenses, market expansion along with the development of fresh products. While capital expenditures for voluntary environmental

improvements negatively impact the company's earnings in the short term, they appear to positively correlate with long-term financial performance. This study's goal is to investigate how manufacturing firms in Odisha's Khurda district perform financially as a result of using sustainable production methods.

2. LITERATURE REVIEW:

Digalwar, Tagalpallewar et.al (2016) conducted a study on "Sustainable production manufacturing performance measures: an empirical investigation from Indian manufacturing industries". A survey questionnaire with 128 variables was created on the basis of a literature review. Each variable was rated by respondents on a five-point interval scale. For reliability and validity check, the final variables were derived from the gathered data using factor analysis. There were 400 questionnaires created, however only 108 legitimate answers came from the Indian manufacturing sectors. In conclusion, 66 variables were examined across a total of 12 performance metrics of sustainable production manufacturing.

Saxena and Srivastava (2022) carried out research on "Industry Application of Sustainable production Manufacturing: A Critical Review**".** The article examined how sustainable production manufacturing has been used in different sectors of the economy. A review report based on secondary data was presented. The report offered insights into the state of sustainable production manufacturing in different industries, with a focus on industrial applications. Even though a lot of research has been done on the effects of different manufacturing industries and how to reduce their carbon footprints, it can be said that sustainable production initiatives must be implemented at every stage, from product design to manufacturing to application. Through various government initiatives, stringent laws, and policies to support the Sustainable production Manufacturing projects, awareness of sustainable production issues should also be increased among manufacturers and customers.

Bellgran and Bruch (2015) carried out research on "Environmental Management in Manufacturing Industries". Based on secondary data, the study was entirely theoretical. Three broad areas were highlighted in the study: reducing the environmental impact in production phase, improving the environment during the operations phase, and corporate environmental management. Combined design and operations approach is one way to produce resource- and energy-efficient products. It was determined that resource management within a manufacturing company was crucial.

Kalyar, Shoukat et.al (2019) formulated research on the topic of "Enhancing firms' environmental performance and financial performance through green production supply chain management practices and institutional pressures". The purpose of the study was to focus on different GSCM practices affecting the financial performance of businesses, both directly and indirectly, through environmental performance. The impact of institutional forces on the relationship between financial performance, environmental performance, and GSCM practices was also examined. Convenience sample method was used. 238 textile businesses of Punjab were selected. Data analysis was performed using Hayes' process macro. The results showed that GSCM procedures significantly affected businesses performance financially. Institutional demands also greatly reduced the GSCM practises.

Kour, Kaur et.al (2020) conducted analysis on "Impact of Sustainable production Practices on the Financial Performance: A Study of Indian Automobile Companies". A sample of 285 supply managers received an organized questionnaire. PLS-SEM was used to analyze the data. Results showed that eco design, technology integration, integrated environmental management, and sustainable production marketing were the main factors that significantly affected automotive industry's financial performance. The financial performance of vehicle firms was found to be unaffected by pollution prevention or customer orientation.

Rehman, Seth et.al (2016) tried to explore the "Impact of sustainable production manufacturing practices on organisational performance in Indian context: An empirical study". The data gathering for the study used the survey method. The data was analysed using methods like factor analysis, correlation, regression, etc. For the purpose of gathering information, a diagnostic research survey instrument was created. Analysis revealed that the majority of the variables linked with organisational performance and had an impact on outcomes. According to the findings, the performance parameters had a stronger influence on organisational performance.

Sen, Roy et.al (2015) pursued a study on "Exploring role of environmental proactivity in financial performance of manufacturing enterprises: a structural modelling approach". The study examined relevant concerns in relation to manufacturing businesses in India and the UK. Manufacturing companies were given access to survey data that had been verified by invited specialists. The structural model for examining the link between environmental proactivity and financial performance was also built using the data. The findings showed a favourable association between environmental proactivity and financial performance of manufacturing enterprise.

3. RESEARCH GAP :

Numerous research concentrated on immediate effects. However, there are few studies that follow the financial success of industrial companies across years or decades. Often, industry-specific analysis is missing from research. There are several areas of the manufacturing industry and each has its own potential and challenges when it comes to using sustainable production practises. Various studies have found associations between sustainable production A very small number of studies have covered every facet of sustainable production methods. To address the gap and to gain a deeper understanding of how sustainable production practices impact the financial performance of manufacturing firms, the following objective is developed.

4. OBJECTIVE OF THE STUDY :

The primary objective of the study is to examine the impact of sustainable production practices on financial performance of manufacturing firms in Khurda district of Odisha.

To fulfill the primary objective, following sub-objectives are designed –

1. To study the awareness level of sustainable production practices among the selected firms.
2. To analyze the relationship between various sustainable production practices and financial performance of the firms.
3. To explore the impact of various sustainable production practices on financial performance of the firms.

HYPOTHESES

Hypothesis 1

H0: There is no significant relationship between sustainable production practices and firms' financial performance

H1: There is a significant relationship between sustainable production practices and firms' financial performance

Hypothesis 2

H0: There is no significant impact of sustainable production practices on firms' financial performance

H1: There is a significant impact of sustainable production practices on firms' financial performance

5. RESEARCH METHODOLOGY :

The study is based on descriptive research design. From descriptive, it is conclusive in nature. Thirty manufacturing firms in Mancheswar Industrial Estate, registered under BMC, Khurda, Odisha were selected as sample. Purposive sampling technique was used for data collection. Data was gathered with the help of a well-designed questionnaire. Majority of the questions were closed-ended and scored on a five-point Likert scale. The responses were coded and entered into the statistical analysis program, SPSS for analysis. There were five sections of entire questionnaire. The company's basic information was included in the first section, followed by the awareness level of companies. Third section included questions on sustainable production practices; the fourth section consisted questions to ascertain the degree of adoption of sustainable production methods, and the final section of the survey was created to ascertain the company's financial performance. Production managers, maintenance managers, quality assurance managers etc. those in charge of the organization's environmental management initiatives filled out the questionnaires. A total of thirty manufacturing companies were surveyed.

DATA ANALYSIS TECHNIQUES

Before processing responses, the completed questionnaires were edited for consistency followed by analysis. The data was presented using descriptive statistics, such as means, frequency counts, percentages, and standard deviations, following appropriate analysis. The relationship between the independent and dependent variables was sought for, what is technically referred as the hypothesis. Pearson's product moment correlation analysis was employed for examining the relationship between variables. Linear regression analysis was used to establish causal relationship between dependent and independent variables. ANOVA was used to test the significance of the model. R^2 was used in the research to measure the extent of goodness of fit of the regression model.

DATA ANALYSIS, PRESENTATION AND INTERPRETATION

This section presents the study findings. It also gives detailed explanation of the effects of the findings in relation to various set objectives.

Questionnaire Return Rate

Thirty questionnaires in all were sent to different manufacturing companies in Mancheswar Industrial Estate, registered under Bhubaneswar Municipal Corporation (BMC) of Khurda district, Odisha and the rate is shown in table no.1 below -

Table no. 1 Return Rate

Sector	Sample	Responses
Metals and Allied	12	12
Textiles and Apparels	03	03
Energy, Electrical and Electronics	03	03
Plastic and Rubber	09	09
Food and Beverages	03	03
Total	**30**	**30**

***Source**: Author's Estimation*

Table no. 1 highlights the return rate of questionnaire. It is found that the return rate is 100% with Metals and Allied dominating at 12. The results are in line with Mugenda and Mugenda's (2003) decisive conclusion that a study can be judged to be good in the social sciences when a return rate is more than 50%.

Background Information of the Respondents

The basic characteristics of the various manufacturing firms were established and the results are indicated below:

i. Period of Operation

Table no. 2 highlights the length of firm's operation. As indicated in the table, more than half of the firms (60%) have been in operation for more than twenty years, followed by firms that have been operating for ten to fifteen years (20%). Hence, it can be expected that these firms are well aware of the most recent developments in sustainable productions practices.

Table no. 2 Length of Firm's Operation

Period (Years)	Frequency	Percentage
Below Five	0	0
Five to Ten	0	0
Ten to Fifteen	09	30
Fifteen to Twenty	03	10
Above Twenty	18	60
Total	**30**	**100**

***Source:** Author's Estimation*

ii. Environmental Management Awareness

Awareness level on environmental management in relation to environmental protection of various firms was examined with the help of a few questions and the results are shown in table no.3 below.

Table no. 3 Awareness on environmental management

Question	Percentage (Yes)	Percentage (No)
Is your company registered with any environmental management body?	60	40
Do you have an environmental protection policy in your firm?	80	20
Does your firm have environmental management department?	40	60
Is the firm ISO Certified?	60	40
Is the company BIS Certified?	0	100

***Source:** Author's Estimation*

From table no.3, it is observed that 80% of the manufacturing firms have their own environmental protection policy but as far as registration is considered, it was found that 60% of the firms were registered with environmental management body. 40% of the firms have their own environmental management department and 60% of the firms were certified by ISO.

iii. Sustainable production Practice Awareness

A list of questions was asked in relation to the awareness level on sustainable production practices and the responses are presented in table no. 4 below:

Table no.4 Awareness on Sustainable production Practices

Question	Percentage (Yes)	Percentage (No)
Are you aware of "sustainable production of industries" initiatives?	100	00

Have you heard about sustainable production practice strategies?	100	00
Is the concept of sustainable production practice discussed in your internal meetings?	80	20
Have you ever been trained on sustainable production practice strategies?	70	30

Source: *Author's Estimation*

Table no. 4 indicates that all of the respondents are well aware of sustainable production of industries initiatives and sustainable production practice strategies. It was also seen that 80% of the firms held their internal meetings that discussed sustainable production operations and about 70% of the firms have had their members being trained on sustainable production operation strategies.

iv. Level of implementation of sustainable production practices

The level of implementation of sustainable production practices is determined in five stages. They are "procurement and use of raw materials", "manufacturing", "distribution, sales and marketing", "product use" and "end of life of product". The implementation level is measured with five-point Likert scale and the responses are presented in table no. 5 to table no. 9 below.

Table no. 5 Procurement and Use of Raw Materials

	Mean	Standard Deviation
Use of Non – hazardous materials	4.50	0.509
Non-exhaustible materials	2.90	1.242
Recycled Materials	4.30	1.442
Recyclable Materials	4.60	0.932
Regular evaluation of alternative raw materials that have a lower environmental impact	4.10	1.155
Active collaboration with suppliers to source raw materials that align with sustainable practices	4.20	0.610
Clear guidelines and policies to ensure use of environmentally safe raw materials in manufacturing	4.30	0.915

Source: *Author's Estimation*

From Table no 5., it is inferred that use of recyclable materials is the most implemented practice as indicated by a mean score of 4.60 and standard deviation of 0.932. This is followed by use of non – hazardous materials with a mean score of 4.50. However, the mean score of non-exhaustible materials is 2.90, which implies that the use of non-exhaustible raw materials is not adopted among most of the firms.

Table no. 6 Manufacturing

	Mean	Standard Deviation
Prioritizing the use of renewable energy sources and energy-efficient technologies to reduce carbon emissions and environmental impact	3.90	0.712
Low generation of waste	4.20	0.610
Manufacturing facilities are equipped with advanced pollution control technologies and practices to minimize air, water, soil pollution etc.	4.30	0.651
Selection of suppliers based on their ability to meet manufacturing requirements and deliver high-quality environment-friendly components	4.10	0.548
Investment in research and development to develop innovative eco-friendly manufacturing techniques	3.30	1.119
Continuous evaluation and improvement of environmental performance of manufacturing operations through regular monitoring, measurement and goal setting	4.00	0.643
Reducing and replacing the use of hazardous substances with safer and environmentally friendly alternatives in manufacturing processes	4.20	0.407

Source: *Author's Estimation*

Table no. 6 depicts that the most prevalent adopted sustainable production practice to manufacture is "advanced pollution control technique" with a mean score of 4.30 and standard deviation of 0.651, followed by "Low generation of waste" with a mean value of 4.20, and "reduction and replacement of hazardous substances with sustainable production alternatives" with the same mean value of 4.20. The mean score of "investment in research and development for

developing innovative and eco-friendly manufacturing techniques" is the lowest at 3.30, which means that most of the firms are planning to invest on research and development in the future.

Table no. 7 Distribution, Sales and Marketing

	Mean	Standard Deviation
Environment friendly transport mode (e-vehicle, hybrid vehicle) to reduce carbon emission in distribution operation.	2.20	0.407
Emphasis on environmental benefits and sustainability features of products to attract environmental conscious customers	4.00	0.455
Collaboration with suppliers and partners that follow eco-friendly practices in the distribution and marketing of products	3.40	0.675
Take-back initiatives for defective/returned products to reduce waste and promote effective reverse logistics	4.80	0.407
Environment friendly packaging solutions (biodegradable materials or packaging made from recycled content)	4.30	0.651
Eco-friendly materials such as recycled paper or digital formats used for the purpose of sales and marketing (brochures, catalogs, etc.)	4.00	1.017
Proper education and training to sales and marketing team about the importance of sustainability and environmental benefits of products	4.00	0.643
Constant monitoring and goal setting for continuous improvement of sustainability efforts of products	3.90	0.845

Source: *Author's Estimation*

As per table no. 7, the most adopted sustainable distribution, sales and marketing practice is "taking-back initiative for defective/returned products for waste reduction and promotion of effective reverse logistics" with a mean score of 4.8 and standard deviation 0.407, followed by "environment friendly packaging solutions" with mean score of 4.30. However, the implementation of "environment friendly transport mode" is the lowest with mean value of 2.20, is a matter of concerned.

Table no. 8 Product Use

	Mean	Standard Deviation
Emphasizing energy-efficient features in product design to reduce energy consumption during the usage phase	3.30	1.579
Smart and innovative features optimize resource consumption and reduce environmental impact during use	2.50	0.938
Providing clear instructions and user manuals emphasizing eco-friendly product use, maintenance and disposal practices to customers	4.60	0.498
Actively promotes and assists product repair and refurbishment programs to extend the lifespan of products thereby reducing waste.	4.50	1.225
Actively seeking feedback and suggestions to improve the eco-friendliness and usability of products	4.70	0.466

Source: *Author's Estimation*

From table no.8, it is observed that, "taking customer feedback and suggestions to improve the usability of the product" was mostly adopted by firms with a mean score of 4.70 and standard deviation 0.466, followed by "Providing clear instructions and user manuals emphasizing eco-friendly product use, maintenance and disposal practices to customers" with a mean of 4.60. However, "designing the product emphasizing on energy efficient, smart and innovative features" is lacking among the sample firms under study.

Table no. 9 End of Life of Product

	Mean	Standard Deviation
Utilizing the reusable products	4.20	1.424
Low environmental impact of product disposal and waste generation	4.50	0.509
Efficient disassembly of different materials for recycling and reuse purposes	3.80	1.095

Providing customers' access to eco-friendly product disposal and recycling options to ensure responsible end-of-life management	4.30	0.915
Active engagement in research and development to explore new technologies and approaches for sustainable end-of-life management of products	3.20	0.997

Source: *Author's Estimation*

Table no. 9 indicates that "Low environmental impact of product disposal and waste generation" was the most adopted practice for end of life with a mean score of 4.50 and standard deviation 0.509, followed by "Providing customers' access to eco-friendly product disposal and recycling options to ensure responsible end-of-life management" with mean score of 4.30, "Utilizing the reusable products" with a mean score of 4.20 and "efficient disassembly of different materials for recycling and reuse purposes" with a mean score of 3.80. These findings suggest that the majority of sample manufacturing companies are concerned about the environment and want to cut costs by reusing the products and recycling the materials.

Table no. 10 Financial Performance

Regarding the improvement of financial performance through the adoption of sustainable production practices, respondents were asked to rate their agreement with the following statements. Table 10 below displays the outcomes:

	Mean	**Standard Deviation**
The design for use of environment friendly raw materials in the products result in cost savings and operational efficiencies, contributing to improved financial performance.	3.70	0.794
The use of eco-friendly packages such as paper packages and their reusability has led to attract new customers and increment in sales.	3.80	1.095
The innovative and eco-friendly practices of the company attract customer loyalty leading to improved financial performance.	3.80	0.887
Investment in sustainable production practice initiatives have a positive long-term impact on our company's financial performance.	4	0.643
The positive perception of company's sustainable production practice practices by customers contributes to increased sales, market growth and financial success	3.70	0.651
Sustainable production practice methods improve the brand image, resulting in consumer loyalty and sales growth.	3.80	0.761

Source: *Author's Estimation*

From table no. 10, it is clearly understood that most of the firms agree that investment in sustainable production practice initiatives has a positive long-term impact on their company's financial performance, (Mean score 4 with a standard deviation of 0.643). Further, it is understood that the sustainable production practices have resulted in cost savings and operational efficiencies, creation of new customers, improvement of brand loyalty and sales growth.

Hypothesis Testing

Hypothesis 1- *H1: There is a significant correlation between sustainable production practices and firms' financial performance*

Table no. 11 Pearson's Correlation

Correlations

		SustainableProcurement	SustainableManufacturing	SustainableDistribution	SustainableProductUse	SustainableEndofLife	SustainableFinancialPerformance
SustainableProcurement	Pearson Correlation	1	.879**	.682**	.328	.628**	.481**
	Sig. (2-tailed)		.000	.000	.076	.000	.007
	N	30	30	30	30	30	30
SustainableManufacturing	Pearson Correlation	.879**	1	.681**	.337	.609**	.466**
	Sig. (2-tailed)	.000		.000	.069	.000	.010
	N	30	30	30	30	30	30
SustainableDistribution	Pearson Correlation	.682**	.681**	1	.672**	.848**	.324
	Sig. (2-tailed)	.000	.000		.000	.000	.080
	N	30	30	30	30	30	30
SustainableProductUse	Pearson Correlation	.328	.337	.672**	1	.769**	.147
	Sig. (2-tailed)	.076	.069	.000		.000	.438
	N	30	30	30	30	30	30
SustainableEndofLife	Pearson Correlation	.628**	.609**	.848**	.769**	1	.319
	Sig. (2-tailed)	.000	.000	.000	.000		.086
	N	30	30	30	30	30	30
SustainableFinancialPerformance	Pearson Correlation	.481**	.466**	.324	.147	.319	1
	Sig. (2-tailed)	.007	.010	.080	.438	.086	
	N	30	30	30	30	30	30

**. Correlation is significant at the 0.01 level (2-tailed).

***Source**: Author's Estimation*

From table no. 11, it is observed that, the Pearson co-efficient of correlation between sustainable procurement practices and firms' financial performance is 0.481, which indicates that a moderate degree of positive correlation exists between them. Hence, both the factors move in the same direction. As the p value is 0.007, the null hypothesis is rejected at 1% level of significance. Thus, it can be concluded that correlation between sustainable procurement practices and firms' financial performance is statistically significant. Similarly, the Pearson co-efficient of correlation between sustainable manufacturing and financial performance is 0.466, which indicates that a low degree of positive correlation exists between them. Since, a positive correlation exists, both the factors move in the same direction and as the p value is 0.010, the null hypothesis is rejected at 1% level of significance. It also implies that there is a significant relationship between sustainable manufacturing practices and the firms' financial performance. However, at 10% level of significance, both sustainable distribution practices ($r=0.324$, $p<0.10$) and sustainable end of life practices ($r=0.319$, $p<0.10$) are found to have a very low degree of positive correlation with financial performance and are also significant. The significance value of sustainable product use being 0.438 (>0.05), is treated as statistically insignificant and concluded that no statistical correlation could be established between sustainable product use practices and the firms' financial performance. Thus, on the basis of the Pearson's correlation analysis, the alternative hypothesis of significant correlation between sustainable production practices and firms' financial performance is accepted.

Table no. 12: Multi- collinearity Analysis

Model	Collinearity Statistics	
	Tolerance	VIF
Green Procurement	0.203	4.926
Green Manufacturing	0.213	4.685
Green Distribution	0.227	4.405
Green Product Use	0.354	2.822
Green End of Life	0.191	5.249

a. Dependent Variable: Financial Performance

***Source:** Author's Estimation*

After checking correlation, multi-collinearity analysis is performed between the predictors to check their inter-relatedness with each other (Table no. 12). To check the multi-collinearity, 'Tolerance' and 'Variance Inflation Factor' (VIF) are analysed for each predictors using SPSS. As the Tolerance value is greater than 0.1 and VIF is less than 5 in case of all the predictors, it can be concluded that there is no multi-collinearity between the independent variables under study.

Hypothesis 2- *H1: There is a significant impact of sustainable production practices on firms' financial performance*
After establishing statistical correlation between the variables, they were put to regression test to determine the impact of independent variables on firms' financial performance.

TABLE NO. 13: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.677	2	1.839	4.244	.025[b]
	Residual	11.698	27	.433		
	Total	15.375	29			

a. Dependent Variable: FinancialPerformance

b. Predictors: (Constant), GreenManufacturing, GreenProcurement

Source: Author's Estimation

TABLE NO. 14: MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.489[a]	.239	.183	.658	.239	4.244	2	27	.025

a. Predictors: (Constant), GreenManufacturing, GreenProcurement

Source: Author's Estimation

The dependent variable (Financial Performance) was regressed on predicting variables of Green Manufacturing and Green Procurement. From table no.13, ANOVA, the independent variables significantly predict Financial Performance, $F(2, 27) = 4.244$, $p<0.05$, which indicates that the overall model of the study is significant. As per model summary in table no. 14, $R^2 = 0.239$, which depicts that the model explains 23.9% of the variance in Financial Performance.

TABLE NO. 15: RESULT OF PREDICTOR VARIABLES' IMPACT ON FIRMS' FINANCIAL PERFORMANCE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.718	.914		1.878	.071
	GreenProcurement	.258	.290	.314	.891	.381
	GreenManufacturing	.226	.421	.189	.537	.596

a. Dependent Variable: FinancialPerformance

***Source*:** Author's Estimation

Additionally, coefficients were further assessed to ascertain the influence of each of the factors on the criterion variable (Financial Performance). From table no. 15, the results revealed that both the predictors (Green Procurement and Green Manufacturing) do not have any significant impact on Financial Performance (being p-value > 0.05). Hence, null hypothesis gets accepted, i.e., there is no significant impact of green sustainable practices on Financial Performance.

6. CONCLUSION:

As per the study findings, it is concluded that majority of the manufacturing firms taken under study are well established and are operating for more than twenty years. Around 80% of the sample taken under study have their own environmental protection policy but only 60% of the firms are registered under environmental management body. Further, only 40% of the firms have their separate environmental management department. It is also seen that all of the firms are well aware of the concept of 'sustainable production practices.' As far as relationship between the variables is considered, sustainable procurement and sustainable manufacturing practices are positively correlated with the companies'

financial performance and are statistically significant at 5% level of significance. However, sustainable end of life and sustainable distribution practices are positively correlated with financial performance of the firms and are statistically significant at 10% level of significance. Regression analysis further established that both the variables i.e., sustainable procurement and sustainable manufacturing practices when taken together, have a favorable effect on the companies' financial performance with 18.3% of goodness of fit. But individually, neither sustainable procurement nor sustainable manufacturing impacts financial performance of the manufacturing firms. Therefore, it can be summarized that the financial performance of manufacturing firms would be improved by implementing sustainable procurement practices (Use of non-hazardous , Non-exhaustible, Recycled, Recyclable materials, etc.) along with sustainable manufacturing practices (Prioritizing the use of renewable energy sources and energy-efficient technologies, Selecting suppliers based on their ability to deliver high-quality environment-friendly components, Reducing and replacing the use of hazardous substances with safer and environmental friendly alternatives etc.).

7. RECOMMENDATIONS:

The findings of the study are required to be considered in the light of several limitations which would be helpful for more meaningful research in the future. The present study is limited to only 30 manufacturing firms from the Mancheswar Industrial Estate supervised by BMC in Khurda district of Odisha. Thus, future studies may be carried out with a wider sample size covering a large geographical area. Further, the data has been collected from the manufacturing firms only. Hence, future studies could include firms from other sectors to have a more precise analysis of the sustainable production practices. Finally, only 18.3% of the variation in the firms' financial performance is clarified by the two predictor variables in the study. Therefore, more predicting variables can be included in analyzing the sustainable production practices more precisely.

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