Journal of Research Administration
Society of Research Administrators International

BUILDING A SUSTAINABLE FUTURE: INVESTIGATING THE IMPACT OF E-COMMERCE ON SDG 17 IN INDIA

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ABSTRACT

This research investigates the role of e-commerce in advancing Sustainable Development Goal 17 (SDG 17) in India, employing linear regression algorithms and artificial intelligence techniques. The study predicts the impact of e-commerce on inclusive and sustainable economic growth, enhanced international trade, capacity building in developing countries, and the promotion of sustainable consumption and production from 2025 to 2027. The findings suggest a potential positive influence of e-commerce on these key factors in India during the specified period. However, the research acknowledges limitations stemming from predictive models, assumptions, potential data constraints, and uncertainties associated with future predictions. The practical implications of the study lie in providing valuable insights for policymakers, businesses, and stakeholders to formulate strategies that promote sustainable development through e-commerce in India. The originality and value of this research contribute to a deeper understanding of the specific context of India in achieving SDG 17, leveraging a combination of linear regression algorithms, artificial intelligence techniques, and future predictions.

Keywords:E-commerce, Sustainable Development Goal 17, linear regression algorithms, Artificial intelligence techniques

1. INTRODUCTION

E-commerce has emerged as a catalyst for economic growth and transformation worldwide, with its potential to drive sustainable development becoming increasingly evident.[1] The Sustainable Development Goals (SDGs) outlined by the United Nations emphasize the significance of partnerships in achieving sustainable development targets. SDG 17 is all about partnerships for the goals. It aims to strengthen the means of implementation and revitalize the global partnership for sustainable development. In India E-commerce can contribute to this goal in a number of ways:

Promoting inclusive and sustainable economic growth: E-commerce can help to promote inclusive and sustainable economic growth by providing opportunities for small businesses and entrepreneurs to reach new markets.[2] This can help to reduce poverty and inequality, and create jobs in rural areas.[3]

Enhancing international trade: E-commerce can help to enhance international trade by making it easier and cheaper for businesses to export their products to other countries.[4] This can help to boost economic growth and development in both developing and developed countries.[5]

Building capacity: E-commerce can help to build capacity in developing countries by providing training and support to businesses and individuals who want to use e-commerce platforms.[6] This can help to improve the skills and knowledge of people in developing countries, and make them more competitive in the global economy.[7]

Promoting sustainable consumption and production: E-commerce can help to promote sustainable consumption and production by making it easier for people to access sustainable products and services.[8] This can help to reduce the environmental impact of consumption, and create a more sustainable future.[9]

This research employs linear regression algorithms and artificial intelligence techniques to forecast the influence of e-commerce on key factors related to SDG 17 in India for the years 2025-2027. By examining inclusive economic growth, international trade, capacity building, and sustainable consumption, this study offers valuable insights for policymakers, businesses, and stakeholders. The findings aim to inform effective policy frameworks and innovative business models, facilitating sustainable development partnerships through e-commerce in India. Ultimately, this research contributes to understanding the role of e-commerce and artificial intelligence in supporting SDG 17 and fostering sustainable development in India.[10]

2. REVIEW OF LITERATURE

1. Maria Magdalena Criveanu (2023) discusses the relationship between digital intensity, e-commerce, GDP, and SDG. It does this by looking at 27 EU countries. The results show that there is a positive correlation between all four variables. This means that as digital intensity and e-commerce increase, so does GDP and SDG. The study also used a machine learning model to confirm these findings. The authors conclude that digital intensity and e-commerce are important drivers of sustainability and economic growth.

2.Abhishek Pandey (2023) This systematic literature review analyzes 100 academic works on SDGs in India, emphasizing policy coherence, stakeholder engagement, sustainable agriculture, environmental protection, climate action, and technology transfer for SDG achievement. It highlights the need for an integrated approach involving government agencies, civil society, businesses, and others.

3. Abhishek Pandey (2023) reviews the existing academic research on the Sustainable Development Goals (SDGs) in India. The paper finds that there is a large body of research on the SDGs in India, but that this research is fragmented and that there is a need for more integrated and cross-sectoral approaches.

4.Invest India (2021) the article highlights India's commitment to achieving sustainable development goals and outlines the various initiatives undertaken by the government and private sector to promote sustainability in the Indian economy. It emphasizes the importance of adopting innovative technologies and practices to enhance agricultural productivity, conserve resources, and

reduce environmental impact. The article also highlights the role of digitalization in driving sustainability efforts and facilitating India's transition to a green economy.

5. Mehraj Ahmad Sheikh, Mushtaq Ahmad Malik, et.al, (2020) This study examines the impact of trade openness on sustainable development in India. The authors use an Autoregressive Distributed Lag (ARDL) model to test the relationship between sustainable development and trade openness, along with other control variables that are supposed to affect sustainable development. The results indicate that trade openness has a negative correlation with green GDP growth and a positive correlation with the gap between conventional GDP and green GDP. These findings suggest that trade openness tends to be detrimental to environmental sustainability in India.

3. STATEMENT OF THE PROBLEM

The research aims to explore the impact of e-commerce on Sustainable Development Goal 17 (SDG 17) in India. While e-commerce is recognized as a driver for sustainable development, uncertainties, data constraints, and potential model limitations pose challenges. Understanding these dynamics is crucial for informed decision-making towards sustainable development through e-commerce.

4. OBJECTIVES

- Investigate the influence of e-commerce on inclusive economic growth, international trade, capacity building, and sustainable consumption in India.
- Employ linear regression algorithms and artificial intelligence techniques to predict the potential impact of e-commerce on SDG 17 factors from 2025 to 2027.

5. SCOPE

The research focuses on India's context, employing advanced methodologies to analyze and predict the impact of e-commerce on key aspects of SDG 17. The study period spans from 2025 to 2027, offering a forward-looking perspective. The scope extends to informing policy frameworks and business strategies for sustainable development partnerships in the Indian e-commerce landscape.

6. PROPOSED METHODOLOGY

The research methodology employed in this study involved a quantitative approach to investigate the impact of E-commerce on Sustainable Development Goal 17 (SDG 17). The researcher designed the study to collect relevant data, which could include factors such as Sustainable Economic Growth, International Trade, Building Capacity in India, and Sustainable Consumption and Production. Python software was utilized for data analysis, employing Linear Regression analysis to examine the relationship between E-commerce and SDG 17. The study also involved predicting trends for the years 2025 to 2027, providing valuable insights for policymakers and stakeholders in making informed decisions aligned with SDG 17 objectives.

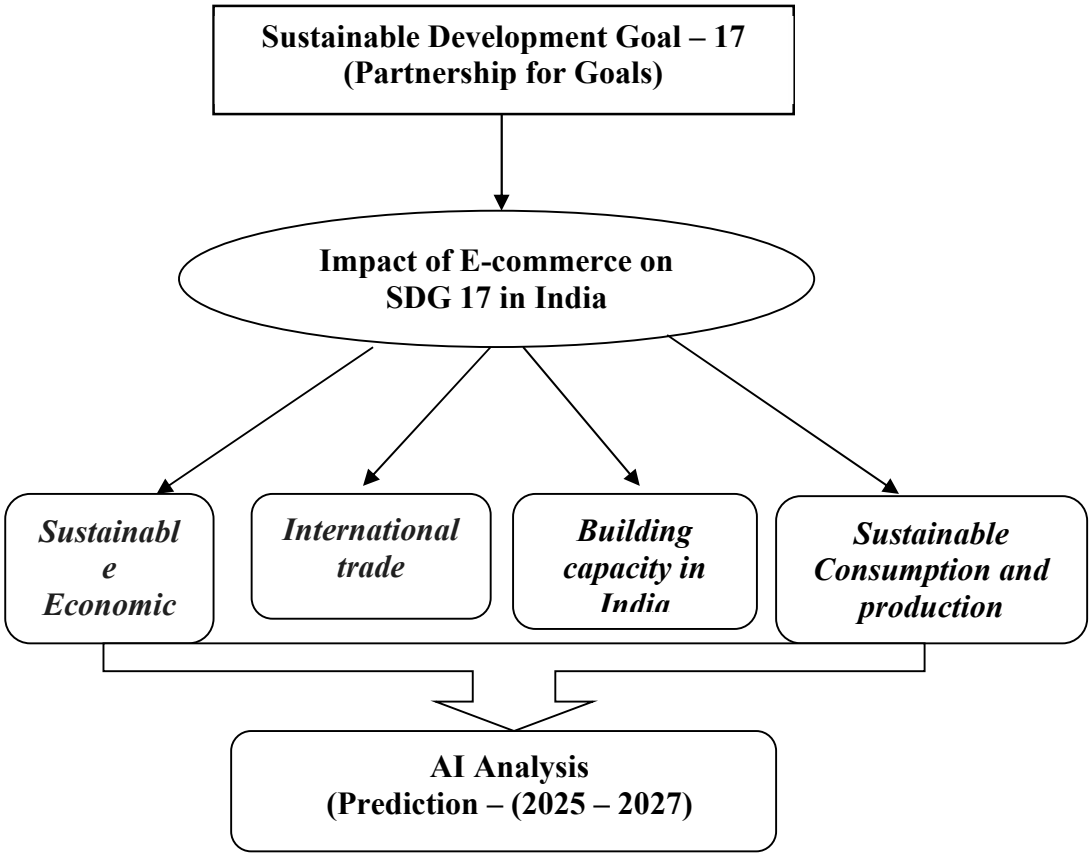

Figure 1- Research Flow

To assess the impact of E-commerce on Sustainable Development Goal (SDG) 17 in India, this study focuses on four key factors:

1. Sustainable economic growth
2. International trade
3. Building capacity
4. Sustainable Consumption and Production.

The analysis and interpretation of these factors are presented below.

7. AI ALGORTHM

Artificial intelligence is instrumental in this research, utilizing advanced algorithms to analyze data, make predictions, and provide crucial insights into the role of e-commerce in achieving Sustainable Development Goal 17 in India.

For analysis and interpretation taken four factors and used the linear regression AI model to predict from 2025 to 2027 for all the four factors.

AI algorithms, including linear regression models, use computational techniques to analyze and predict relationships between variables.

In linear regression $Y = mx + b$ (1)

Where, 'Y' is the dependent variable, 'X' is the independent variable, 'm' is the slope, and 'b' is the intercept. This allows machines to autonomously learn and predict based on identified linear patterns in input data.

8. PROMOTING INCLUSIVE AND SUSTAINABLE ECONOMIC GROWTH – FACTOR 1

The initial factor chosen for analysis is the promotion of inclusive and sustainable economic growth.[11] The sample data, along with separate presentations of interpretive and predictive analyses, is provided as follows.

8.1. Sample data

Applying Equation 1 to the study, the "Number of Small Businesses Selling online in India" is the dependent variable (Y), influenced by the independent variable "Year" (X). AI algorithms, like linear regression models, analyze and predict these relationships by fitting a linear equation to data, facilitating autonomous learning for predictive analysis.

The study utilizes data spanning from 2013 to 2022, focusing on factors influencing the number of small businesses selling online in India. The derived data is based on various factors such as Internet Penetration, E-commerce Platform Adoption, Digital Literacy, Government Policies and Support, Economic Conditions, Technological Infrastructure, Market Trends, Competitive Landscape, Consumer Trust and Security, and Ease of Doing Business.

For the initial analysis, a sample dataset from 2013 to 2015 is presented in Table 01 - Sustainable Economic Growth:

Table 01 - Sustainable Economic Growth

Year	Number of Small Businesses Selling online in India	Number of Jobs created in the E-Commerce sector in Rural Areas
2013	100,000	50,000
2014	200,000	100,000
2015	300,000	150,000

Data source: (MSME), (NSSO), Government Reports.

The number of small businesses selling online in India has consistently risen, surging from 100,000 in 2013 to 1,000,000 in 2022. This upward trend mirrors the increasing embrace of e-commerce as businesses leverage online platforms for broader outreach and expansion. This growth has not only expanded business operations but has also catalyzed job creation in rural areas, with employment opportunities escalating from 50,000 in 2013 to 500,000 in 2022, fostering rural development.[12]

8.2. Interpretive and Predictive Analysis

Analyzing the provided code, interpretive analysis for 2025-2027 involves assessing predicted values for small businesses and jobs, considering influencing factors.

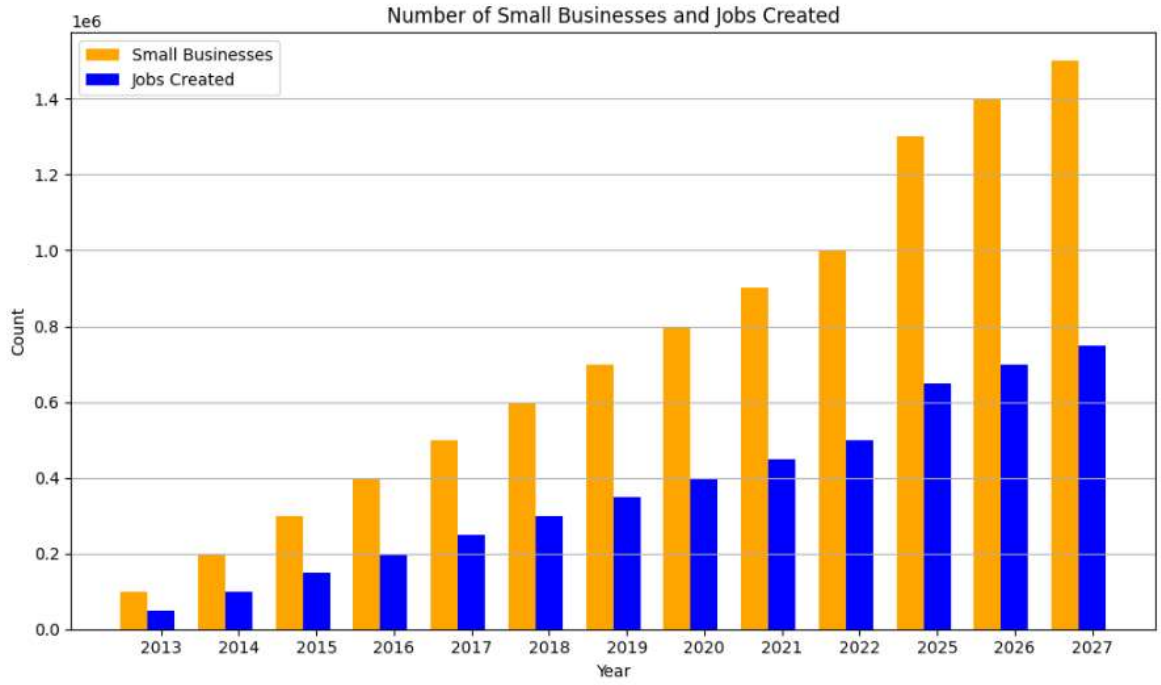

Figure 2– Small Business and Jobs

The Fig 2 outcomes, based on a linear regression model, predict trends for small businesses and jobs in 2025-2027. The orange bars indicate expected small business numbers, while blue bars represent jobs. The linear model assumes a historical trend, implying that if past patterns persist, these variables will change proportionally.

Anticipating 2025-2027, the model suggests potential growth in small businesses and job creation based on historical linear patterns. However, these predictions hinge on the assumption of continued historical trends, excluding external influences like economic conditions or technological changes. It's crucial to note that these projections solely rely on the linear relationship assumption.

9. ENHANCING INTERNATIONAL TRADE – FACTOR 2

Enhancing international trade is the second factor, where data is collected based on several factors, and analyses are conducted to determine India's contribution to international trade. [13]

9.1. Sample data

The dataset includes the "Year" as the independent variable, denoting the temporal aspect, and the "Export value of e-commerce from India" as the dependent variable, representing the quantitative measure of e-commerce exports. This configuration enables analysis and prediction of how the export value changes over different years, allowing for insights into the dynamics of India's e-commerce export market.

Utilizing factors such as Market Demand, Global Economic Conditions, E-commerce Platforms and Technology, Trade Policies and Agreements, Logistics and Shipping Infrastructure, Government Initiatives, and Competitive Landscape, the analysis focuses on the export value of

e-commerce from India spanning 2013 to 2022. The provided sample data covers the years 2013 to 2015.

Table 02–International Trade

Year	**Export value of e-commerce from India**
2013	$10 billion
2014	$15 billion
2015	$20 billion

Data source: (RBI)

The table showcases the progressive growth of India's e-commerce export value from 2013 to 2022. The data highlights a consistent upward trend, with the export value witnessing a substantial rise from $10 billion in 2013 to $55 billion in 2022. This indicates the significant expansion and global competitiveness of India's e-commerce sector during this period.

9.2. Interpretive and Predictive Analysis

An interpretive analysis conducted for the years 2025, 2026, and 2027 in terms of the predicted export values of e-commerce from India, considering the factors influencing these predictions.

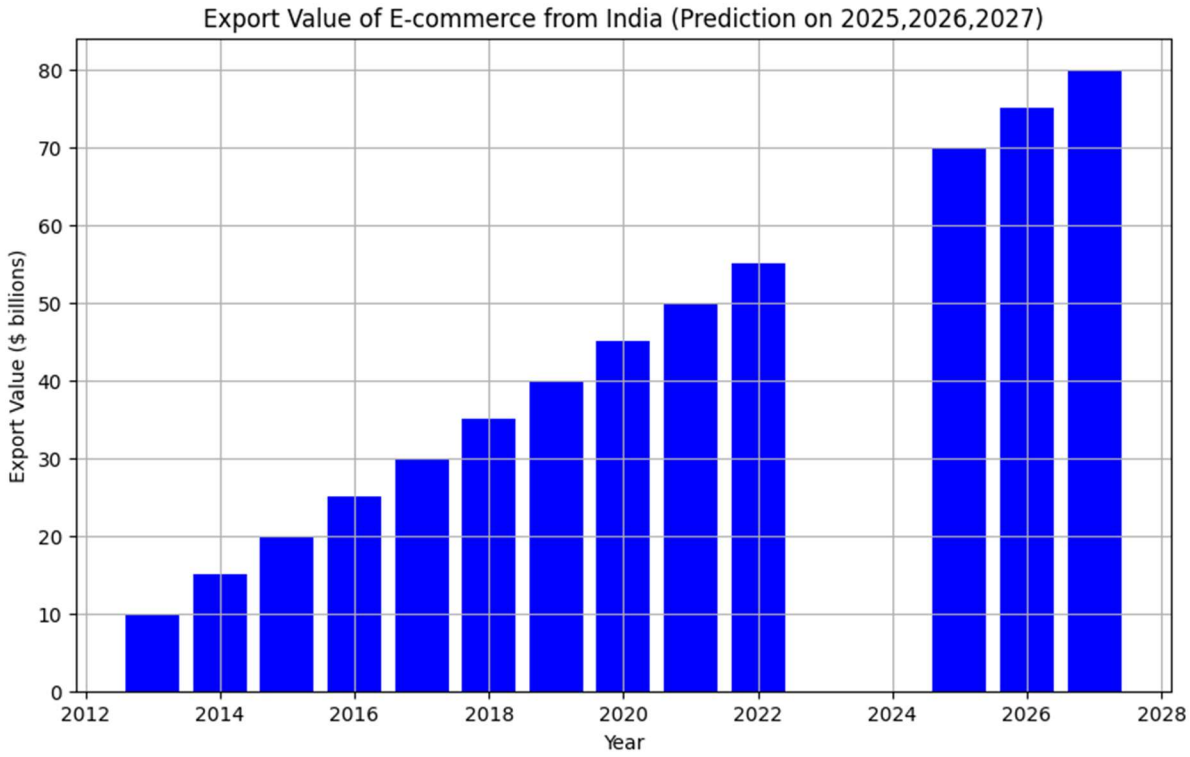

Figure 3 -Export Value

Figure 3 illustrates the export values of e-commerce from India, encompassing both historical data (2013-2022) and predictions for 2025, 2026, and 2027. Examining the plot provides insights into expected trends. However, it's crucial to note that the analysis is based on the linear regression model, which assumes a continuation of historical patterns. External factors like the economy or policy changes, which aren't considered in the code, may impact actual export values.

The linear regression model is employed to predict export values for 2025, 2026, and 2027. Assuming the historical trend persists, the model estimates values for these future years. However, it's essential to exercise caution, as these predictions rely solely on the linear relationship assumption and do not incorporate external factors. Actual export values may deviate based on unaccounted variables such as economic shifts, government policies, or market dynamics.

10. BUILDING CAPACITY – FACTOR 3

The next factor considered for analysis is "Building capacity," and the prediction is generated using the linear regression AI algorithm. The specific factors used in this prediction are provided below.

10.1. Data Used

From the equation (1) the dependent variable is the "number of businesses supported in e-commerce," denoted as 'Y' in the linear regression equation. The independent variable is the "number of people trained in e-commerce," denoted as 'X' in the equation. In this context, the linear regression model aims to understand and quantify the relationship between the two variables, where 'm' represents the slope and 'b' represents the intercept.

By considering variables such as Data on Employment and Business Growth, Surveys and Studies, Government Economic Surveys and Reports, Skill Development Metrics, and NGO Programs and Interventions, the central factor identified for analysis is "Building Capacity." This particular factor is chosen as the focal point for further examination and interpretation in the study.

Table 03–Building Capacity

Year	Number of people trained in e-commerce	Number of businesses supported in e-commerce
2013	100,000	10,000
2014	200,000	20,000
2015	300,000	30,000

Data Source: (NGOs), Government Economic Surveys, Entrepreneurship Development Institutes, and Government Reports.

Table03 presents the annual figures for the number of people trained in e-commerce and the number of businesses supported in e-commerce from 2013 to 2022. The data shows a consistent upward trend, indicating a growing interest in and adoption of e-commerce practices. The increasing numbers underscore the importance of e-commerce in today's business landscape and highlight the efforts made to equip individuals and businesses with the necessary skills and support

to thrive in the digital marketplace. Overall, these figures reflect the positive impact of e-commerce on economic growth and business development.

10.2. Interpretive and Predictive Analysis

To conduct an interpretive analysis for the years 2025, 2026, and 2027 in terms of the predicted number of people trained and businesses supported in the e-commerce sector. The factors influencing these predictions also considered.

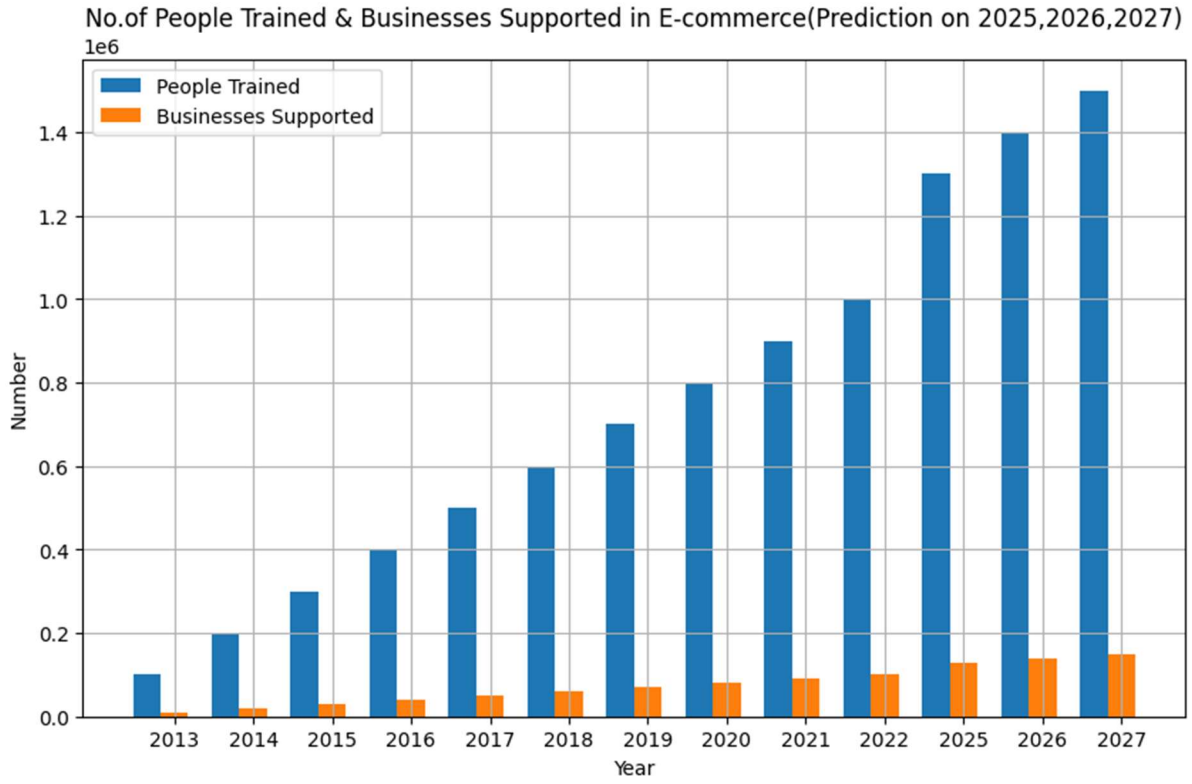

Figure 4 –Business supported in E-commerce

Figure 4 visualizes both historical data and predicted values for the number of people trained and businesses supported in e-commerce from 2013 to 2027. The linear regression models employed reveal a relationship between the years and the corresponding values for both variables. Predicted values for 2025, 2026, and 2027 are generated based on the observed historical trend. However, it's important to note that the interpretation does not consider specific external factors such as government programs or market demand, which could impact the predicted values. The visual interpretation of the bar plot suggests potential trends, but caution is warranted due to the assumption of a linear relationship and the absence of consideration for external influences.

The linear regression models predict the values for people trained and businesses supported in e-commerce for the years 2025, 2026, and 2027. These predictions rely on the established relationship between the years and the observed historical data. If the historical pattern continues,

the models anticipate an increase or decrease in the values based on the identified trend. However, it's crucial to acknowledge that these predictions do not incorporate specific external factors that may influence the actual outcomes. The accuracy of the predictions is contingent on the persistence of the assumed linear relationship and the absence of unforeseen external influences.

11. PROMOTING SUSTAINABLE CONSUMPTION AND PRODUCTION – FACTOR 4

The last factor considered for the study is the promotion of sustainable consumption.[14] The analysis focuses on demonstrating the extent to which consumption and production in India are conducted based on sustainability principles.[15]

11.1. Data Used

The equation (1) establishes that the dependent variable is the "Number of sustainable products sold online," while the independent variable is the "Year." The suggestion is that the quantity of sustainable products sold online may be influenced by the variable "Year," implying a potential relationship or trend over time.

To identify factors influencing consumption and production, the study considered E-commerce Platforms, Marketing and Branding, Supplier Engagement, Educational Initiatives, Media Coverage, Government Policies.

Table 04–Consumption and Production

Year	Number of sustainable products sold online	Number of people aware of sustainable consumption and production
2013	1 million	100,000
2014	2 million	200,000
2015	3 million	300,000

Data Source: World Bank

The table provides information on the number of sustainable products sold online and the number of people aware of sustainable consumption and production. From 2013 to 2022, there has been a steady increase in both categories. The data shows a consistent rise in the number of sustainable products sold online, reaching 10 million in 2022. Similarly, the number of people aware of sustainable practices has also grown steadily, with 1 million individuals being aware in 2022. This suggests a growing interest in sustainability and a heightened awareness of the importance of sustainable consumption and production.

11.2. Interpretiveand Predictive Analysis

To conduct an interpretive analysis for the years 2025, 2026, and 2027 in terms of the predicted number of sustainable products sold and people aware. The study consider the factors influencing these predictions.

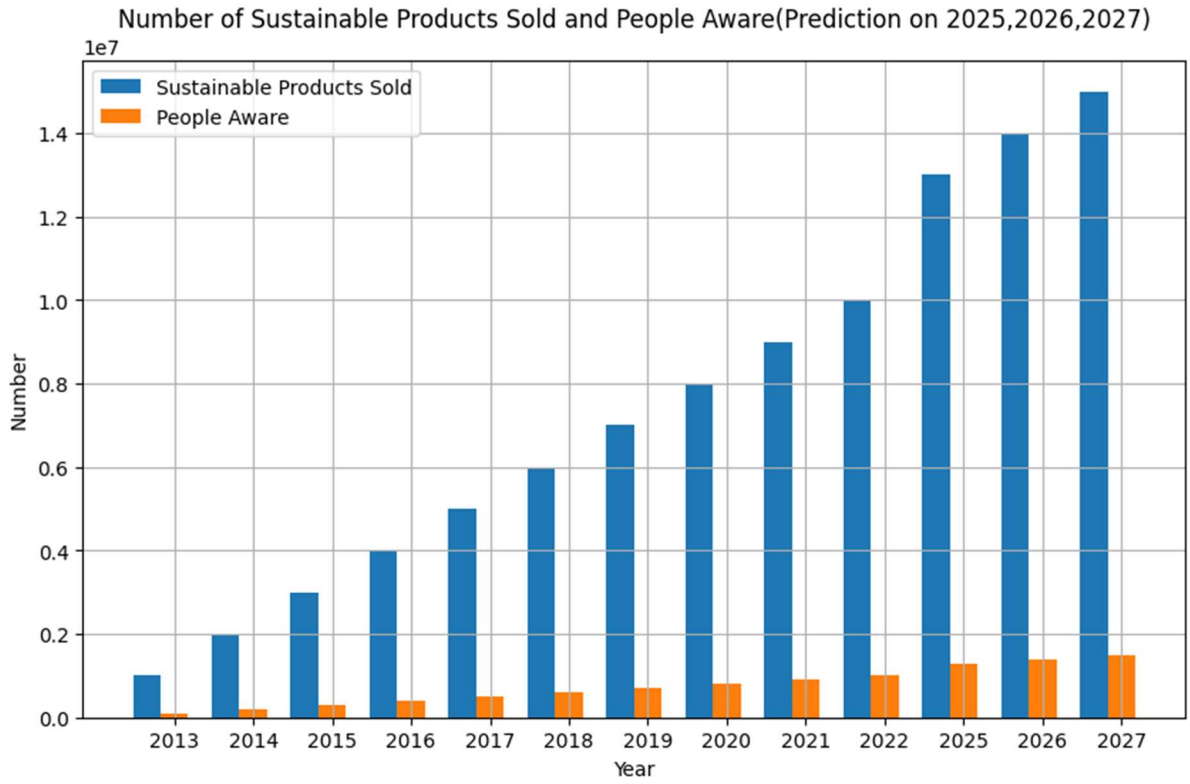

Figure 5– Sustainable Products Sold and it's Awareness

Figure 5 visually represents both historical data and predicted values for the number of sustainable products sold and the awareness of sustainability from 2013 to 2022, with additional predictions for 2025, 2026, and 2027 in blue and orange bars, respectively. This plot allows for a qualitative understanding of the expected trends in sustainable product sales and awareness. However, it's crucial to recognize that the predictions are contingent on the assumption of a linear relationship between years and the variables. The plot doesn't consider specific influencing factors like environmental consciousness, consumer preferences, marketing strategies, regulations, or sustainability initiatives.

The linear regression models are employed to calculate predicted values for sustainable product sales and awareness in 2025, 2026, and 2027. These predictions rely on analyzing historical data and assuming that observed trends will continue. The models use patterns in the historical data to estimate future values. However, it's essential to note that the accuracy of these predictions depends on the stability of factors not considered in the code. External factors, such as environmental consciousness, consumer preferences, marketing strategies, regulations, and sustainability initiatives, can significantly impact the actual values.

12. RESULTS AND DISCUSSION

In this research, advanced techniques used to predict how e-commerce in India can impact important factors related to sustainable development. The study focused on four areas: economic growth, international trade, capacity building, and sustainable consumption.

12.1. Sustainable Economic Growth

Findings suggest that e-commerce can promote inclusive economic growth in India. It is expected to create more small businesses and jobs, particularly benefiting rural areas. By providing opportunities for small businesses to reach more customers, e-commerce can reduce poverty and inequality.

12.2. International Trade

E-commerce is also expected to have a positive impact on international trade. The forecasted export volumes show a significant increase, indicating that e-commerce platforms make it easier for businesses to export their products to other countries. This can lead to economic gains and collaboration between countries.

12.3. Capacity Building

E-commerce plays a crucial role in building skills and knowledge in developing countries like India. The number of people trained in using e-commerce platforms is predicted to rise, along with the support provided to businesses. This helps individuals and businesses become more competitive in the global economy.

12.4. Sustainable Consumption

Promoting sustainable consumption and production is an essential aspect of sustainable development. Our analysis shows an increasing trend in the sale of sustainable products and the awareness of sustainability issues through e-commerce. This means that e-commerce platforms make it easier for consumers to access environmentally friendly products and make conscious choices.

This research underscores the capacity of e-commerce to play a pivotal role in propelling sustainable development in India. It emphasizes that e-commerce has the capability to stimulate economic growth, streamline international trade, enhance capacity-building initiatives, and encourage sustainable consumption practices. Collaborative efforts between policymakers and businesses, leveraging advanced technologies, have the potential to shape a more prosperous and sustainable future for India.

13. CONCLUSION

The Studyhighlights how e-commerce in India can contribute to achieving the goals of SDG 17, which focuses on sustainable development partnerships. By using advanced technology and predictive models, The impact of e-commerce on various aspects, including economic growth, international trade, capacity building, and sustainable consumption have forecasted.

The findings of this study are encouraging for e-commerce in India. The projected growth in small businesses, job opportunities, exports, capacity building efforts, and promotion of sustainable consumption shows the positive potential of digital commerce.

By embracing e-commerce, India can foster economic growth that benefits everyone, especially small businesses and rural areas. It can also enhance international trade and collaboration, empower individuals and businesses by providing training and support, and promote sustainable consumption practices.

To fully unlock the benefits of e-commerce, it is important for policymakers, businesses, and stakeholders to work together. Addressing challenges like the digital divide and data privacy concerns is crucial to ensure that the benefits of e-commerce are accessible to all and sustainable development is achieved.

Harnessing the benefits of e-commerce can strengthen India's commitment to sustainable development.This will lead to economic growth, collaboration, capacity building, and the promotion of sustainable consumption practices, ultimately creating a better future for all.

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