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ARTIFICIAL INTELLIGENCE ADOPTION FOR SUSTAINABLE BUSINESS PERFORMANCE

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ABSTRACT

The adoption of Artificial Intelligence (AI) in business operations has gained significant attention due to its potential to enhance Sustainable Business Performance (SBP) by improving efficiency, resource utilization, and decision-making. As businesses face increasing environmental challenges and regulatory demands, AI-driven solutions enable organizations to integrate sustainable practices while maintaining competitiveness. This study examines the impact of AI adoption on SBP, exploring its role in optimizing sustainable operations and fostering long-term business growth. Empirical data were collected from 132 Small and Medium Enterprises (SMEs) in Nagercoil town under simple random sampling technique. The data were analysed using SPSS software package version 27. The findings revealed that AI significantly enhances sustainability by enabling businesses to adopt eco-friendly practices and minimize environmental impact. It provides valuable insights for policymakers to develop innovative solutions that align with long-term sustainability and corporate responsibility goals.

Keywords: Artificial Intelligence, Small and Medium Enterprises, Sustainable Business Performance.

1. INTRODUCTION

Artificial Intelligence (AI) transforming business operations by enhancing efficiency, innovation, competitiveness and sustainability. As businesses face increasing pressure to adopt sustainable practices, AI provides valuable solutions to improve performance while minimizing environmental and social impacts. Sustainable business performance is achieved when organizations maintain long-term profitability by integrating environmental, social and governance (ESG) considerations into their strategies. AI technologies, such as machine learning, predictive analytics and automation, empower businesses to make data-driven

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decisions that align with sustainability goals. From energy-efficient operations to smart supply chains, AI helps companies to balance profitability with corporate responsibility. AI adoption in sustainable business practices enables companies to optimize resource utilization, reduce waste and develop eco-friendly solutions. This paper explores how AI adoption contributes to sustainable business performance. By integrating AI-driven sustainability initiatives, businesses not only reduce their carbon footprint but also gain a competitive advantage in an increasingly eco-conscious marketplace.

2. STATEMENT OF THE PROBLEM

In today's rapidly evolving business landscape, organizations face increasing pressure to achieve sustainable growth. Traditional business models often struggle to balance profitability with sustainability due to inefficiencies in resource management, supply chain operations and decision-making processes. Artificial Intelligence (AI) provides advanced tools and technologies, that have demonstrated their potential in enhancing resource efficiency and optimizing supply chain operations. However, there is a lack of empirical research on their real-world application across different industries, particularly in developing economies. This study aims to fill this gap by examining the role of AI in achieving sustainable business performance by answering the following research question,

RQ1: Does AI adoption contribute towards sustainable business performance?

3. REVIEW OF LITERATURE

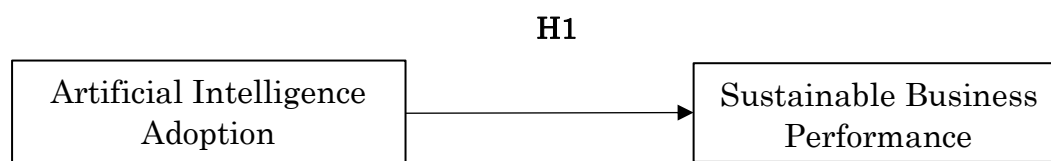
AI adoption significantly enhances corporate sustainability performance by improving economic, environmental and social benefits found in the study conducted among 451 employees (Li & Jin, 2024). With regard to HRM (Human Resource Management) practices, a positive relationship was found between AI adoption and employee sustainable performance, highlighting AI's potential to enhance productivity and job satisfaction (Chin et al., 2024). Badghish and Soomro (2024) conducted a study among 220 SMEs and found that AI adoption significantly influences SMEs' operational and economic performance, contributing to sustainable business performance. Factors such as relative advantage, compatibility and government support are crucial for successful AI integration, particularly in the context of SMEs. AI is a strategic business tool to improve operational effectiveness and environmental responsibility discovered in the survey among 288 business organizations (Khan et al., 2024). AI adoption positively influences green investment and environmental performance in SMEs,

as indicated by the study among 266 individuals (Jahan et al., 2024). Jankovic and Curovic (2023) conducted a study among 240 enterprises and concluded in their study that AI-driven personalization and omnichannel interactions enhance user engagement, satisfaction and loyalty, contributing to sustainable business growth. Based on these empirical evidences, the following hypothesis was formulated.

H1: AI adoption positively related to Sustainable Business Performance.

Conceptual model for this article is presented in figure 1.

Figure 1. Conceptual model



4. METHODOLOGY

This study based on both primary and secondary data. The research has focused on SMEs in Nagercoil town. Primary data was collected using questionnaire under the survey method. Secondary data were obtained from research articles and websites.

SMEs details were gathered from District Industries Centre in Kanyakumari district. Under simple random sampling techniques, the data were collected from 132 SMEs. If the population lies between 190 and 200, the minimum required sample is 132 (Krejcie & Morgan, 1970). The researcher felt satisfied with the sample size.

5. DATA ANALYSIS

Data analysis was done with SPSS package. Data were organized and tabulated for analysis. Percentage analysis was used to measure the demographics. Reliability analysis was used to check the validity of the indicators. Linear regression analysis was employed to test the hypothesized relationship. Correlation analysis also done to measure the interrelation between the variables.

5.1 Demographic Profile of the Respondents

Demographic profile of the respondents was grouped into different categories namely; Gender, Age, Education Qualification, Firm and Annual Income. Demographic profile of the respondents was captured in table 1.

Table 1
Demographic Profile of the respondents

| Category | Profile | Total number | Percentage |
|-------------------------|----------------------|--------------|------------|
| Gender | Male | 84 | 64 |
| | Female | 48 | 36 |
| | Total | 132 | 100 |
| Age | 17-22 | 13 | 10 |
| | 23-28 | 74 | 56 |
| | 29-34 | 21 | 16 |
| | Above 35 | 24 | 18 |
| | Total | 132 | 100 |
| Education Qualification | Schooling | 9 | 7 |
| | Undergraduate | 64 | 48 |
| | Postgraduate | 25 | 19 |
| | Professional courses | 34 | 26 |
| | Total | 132 | 100 |
| Firm | Micro | 83 | 63 |
| | Small | 37 | 28 |
| | Medium | 12 | 9 |
| | Total | 132 | 100 |
| Annual income | Below 5,00,000 | 19 | 14 |
| | 5,00,000-10,00,000 | 89 | 68 |
| | Above 10,00,000 | 24 | 18 |
| | Total | 132 | 100 |

Source: Primary Data

The sample consists of 84 males (64%) and 48 females (36%), showing a higher representation of male respondents. Regarding age, the majority of 74 (56%) fall within the 23-28 years category, followed by 21 (16%) aged 29-34 years, 24 (18%) above 35 years, and 13

(10%) between 17-22 years, indicating that the sample primarily consists of young adults. For educational qualifications, 64 (48%) hold an undergraduate degree, 25 (19%) are postgraduates. Additionally, 34 (26%) have completed professional courses, and 9 (7%) have only schooling, reflecting a highly educated sample. Regarding firm size, the majority 83 (63%) run micro-enterprises, 37 (28%) manage small businesses and 12 (9%) operate medium-sized firms, highlighting a dominance of micro and small enterprises in the sample. In terms of annual income, 89 (68%) earn between Rs. 5,00,000 and Rs. 10,00,000, followed by 24 (18%) earning above Rs. 10,00,000, and 19 (14%) earning below Rs. 5,00,000, indicating that the majority fall within the mid-income range.

5.2 Measures

The questionnaire used in this study consists of 18 items adapted from previous studies. All constructs were measured on a Likert-type five-point scale. The detail Survey instrument was provided in Appendix I.

AI adoption was measured with three items adapted from Badghish and Soomro (2024) and the sample item read as, “My firm is willing to adopt AI to improve firm performance”, and “My firm adopts new technologies”. The reliability coefficient Cronbach’s alpha for Entrepreneurial Intention was 0.87.

Sustainable Business Performance was measured with fifteen indicators adapted from Khan and Quaddus (2015), the sample item read as “Providing Employment opportunities”, and “Concerned about hygienic factors”. The reliability coefficient Cronbach’s alpha for SBP was 0.92.

As suggested by Hair et al. (2019), the reliability coefficients of all the indicators were more than 0.70 and less than 0.90. This provides evidence for the reliability and validity. The reliability of the study variables is presented in Table 2.

Table 2
Reliability of the Study Variables

| Variables | Cronbach’s Alpha |
|---|------------------|
| AI adoption (Badghish & Soomro, 2024) | 0.82 |
| Sustainable Business Performance (Khan & Quaddus, 2015) | 0.89 |

Source: Computed Data

5.3 Correlation

Correlation is a statistical measure that indicates the strength and direction of the relationship between two variables. To test the correlation between the variables, the researcher used Pearson Correlation analysis in SPSS software. The values should range between -1 and +1. The correlation between dependent and independent variable shown in Table 3.

Table 3
Correlation (Mean, Standard deviations)

| Variable | Mean | SD | 1 | 2 |
|----------------------------------|------|------|---------|---|
| AI adoption | 2.64 | 0.75 | 1 | |
| Sustainable Business Performance | 2.63 | 0.94 | 0.420** | 1 |

Source: Collated.

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

Table 3 presents the correlation between AI adoption and Sustainable Business Performance (SBP) along with their mean values and standard deviations. The results show a positive correlation ($r = 0.420$, $p < 0.01$) between AI adoption and SBP, indicating that businesses with higher AI adoption tend to exhibit better sustainable performance. The significance level ($p < 0.01$) suggests that this relationship is statistically significant.

5.4. Testing hypothesis H1

To test the proposed hypothesis, the researcher run linear regression. The results are presented in Table 4.

Table 4
AI adoption with Sustainable Business Performance

| Variables | Model 1 | | | Model 2 | | |
|-------------------------|---|----------|----------|---|----------|----------|
| | Dependent variable Sustainable Business Performance | | | Dependent variable Sustainable Business Performance | | |
| Control variables | β values | t values | p values | β values | t values | p values |
| Gender | -0.068 | -1.573 | 0.116 | 0.023 | 0.575 | 0.565 |
| Age | -0.095 | -2.163 | 0.031 | -0.064 | -1.599 | 0.110 |
| Education Qualification | 0.073 | 1.619 | 0.106 | 0.064 | 1.576 | 0.116 |

| | | | | | | |
|-------------------------|---------|--------|-------|-----------|--------|-------|
| Industry | 0.035 | 0.788 | 0.431 | 0.096 | 2.341 | 0.020 |
| Annual Income | -0.103 | -2.272 | 0.023 | -0.091 | -2.191 | 0.029 |
| Main variables | | | | | | |
| AI adoption (H1) | | | | 0.424*** | 10.525 | 0.000 |
| R ² | 0.038 | | | 0.201 | | |
| Adjusted R ² | 0.030 | | | 0.192 | | |
| ΔR^2 | | | | 0.163 | | |
| F | 4.342** | | | 22.809*** | | |
| ΔF | | | | 110.766 | | |
| df1 | 5 | | | 6 | | |
| df2 | 126 | | | 125 | | |

Source: Computed Data

The regression analysis examines the influence of AI adoption on Sustainable Business Performance by comparing two models. Model 1 includes only control variables and Model 2, introduces AI adoption as the primary independent variable. In Model 1, both age ($\beta = -0.095$, $p < 0.05$) and annual income ($\beta = -0.103$, $p < 0.05$) showed a statistically significant effect. When AI adoption is incorporated in Model 2, it becomes a highly significant positive factor ($\beta = 0.424$, $t = 10.525$, $p < 0.001$) and indicating that businesses utilizing AI could experience a substantial improvements in their performance. These results emphasize the critical role of AI adoption in driving Sustainable Business Performance.

6. DISCUSSION AND CONCLUSION

The pivotal aim of this research is to uncover the impact of AI adoption on Sustainable Business Performance. The data were collected from 132 SMEs in Nagercoil town. After checking reliability and validity, the proposed hypothesis was tested. The findings indicated that AI adoption significantly influence the Sustainable Business Performance of SMEs. This results consistent with previous literatures (Badghish & Soomro, 2024; Chin et al., 2024; Jahan et al., 2024; Jankovic & Curovic, 2023; Khan et al., 2024; Li & Jin, 2024).

This study concludes that Artificial Intelligence (AI) adoption significantly enhances sustainable business performance by optimizing resource utilization, improving operational efficiency and aligning sustainability initiatives with long-term goals. AI-driven innovations

enable businesses to foster green practices, boost competitiveness and comply with global sustainability standards. The findings also provide valuable insights for policymakers to develop supportive frameworks that encourage AI-powered sustainability efforts. Overall, this study underscores the critical role of AI in shaping a more sustainable and resilient business landscape.

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