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Artificial Intelligence and Its Role in Building Sustainable Business Models

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Abstract

This study delves into the importance of artificial intelligence (AI) in helping Indian businesses move towards greener and more sustainable practices. It aims at understanding the role of AI in the development and implementation of green business strategies in India, analyzing specific case studies from India where AI has helped in optimizing the usage of resources and reducing the environmental impact, identifying key performance indicators (KPIs) for monitoring sustainability outcome from AI, and identifying challenges in the adoption of AI and giving responsible solution to such challenges and providing practical guidelines to policy makers and business leaders in India interested in implementing sustainable development through the use of artificial intelligence.The study was a combination of both quantitative and qualitative and comprised of market information, deep interviews with key experts in the Indian industries (manufacturing, energy, logistics and agriculture), and a structured questionnaire that was given to 50 key experts. More than 60% of the companies surveyed are already using AI to help achieve their sustainability goals, with AI tools for the circular economy, predictive maintenance and logistics optimization being among the most common uses. Research has shown that implementing AI tools can not only boost efficiency and reduce carbon emissions, but it can be directly associated with a positive change in these areas. In addition to revenue opportunities from circular business models, businesses with more advanced AI projects also say they have seen a decrease in their carbon footprint with reductions ranging from 26% to 40%, and an average of 48% increase in resource efficiency. But the research also identifies business challenges such as lack of expertise, ethical and governance issues and data infrastructure gaps in many businesses. The study recommends the need for specific incentives for the responsible use of AI, strengthening governance processes, investing in AI-related digital infrastructure, and capacity building for AI skills in the industry. The result's findings provide a valuable guide for Indian companies and government initiatives to leverage the power of AI in environmental management and sustainable development.

Keywords: Digital transformation, Industrial, AI, Sustainable Business, Circular Economy, Resource Efficiency, Carbon Reduction, Indian industry, ESG (Environmental, Social, Governance), Innovation, Economic Growth

Introduction

India is at a pivotal juncture, striving to achieve economic growth while also fulfilling its environmental obligations and ensuring sustainable development. Urbanization, industrialization, and consumption put pressure on the Indian companies to establish better business practices that are resource efficient and environmentally friendly by the government officials, investors and the public. The role of AI as a tool is changing the game in this dynamic, as it can boost productivity, maximise resources, and spark new solutions for the circular economy—impacting the ways business is conducted.

In order to directly address India's dream of achieving Sustainable Development Goals (SDGs) and its national commitment towards climate action and responsible growth, this research paper focuses on how AI is actually helping Indian businesses in creating eco-friendly and sustainable business models. The study is not only conducted in the Indian context and as opposed to studies conducted in the West or in developed markets, but also brings out the specific opportunities and challenges that sustainably large-scale industries, small and medium industries and dynamic sectors like manufacturing, energy, logistics, agriculture, etc. face on their journey.

In line with the set goals, this research paper discusses some real-life scenarios from India where AI has been beneficial in enhancing resource utilization and minimizing the environmental footprint. It aims to make clear which key performance measures are most important for monitoring this kind of success, evaluates real-world obstacles Indian companies face when implementing AI, and offers context-driven solutions to responsibly get beyond these obstacles.Besides, this paper aims to provide policy recommendations and business leaders in India with actionable insights on the potential of AI to foster sustainable development.

The study's aim is to create a comprehensive and practical understanding of the potential of AI to become a catalyst for green business transformation in India, facilitating not just economic competitiveness but also providing long-term environmental and social benefits, with a blend of quantitative market data and real-world feedback from industry experts in India.

Literature Review

Artificial Intelligence (AI) is growing as a major part of sustainable business models across the globe and is getting the momentum in India as well. But AI's predictive power and efficiency can help to optimise the use of resources, minimise emissions and promote circular economy principles, researchers say. Predictive maintenance in manufacturing using AI helps minimize waste and downtime, which contributes to achieving sustainability goals (Raut, Patil, & Gardas, 2025). In the same way, by optimising logistics routes with AI, carbon emissions and fuel usage are decreased, which helps in carrying out the transportation sector's sustainability goals in India (Sharma & Singh, 2023).

The market research shows that there is a quick acceleration of using AI for sustainability. The investment in Indian enterprises and Government-backed Digital initiatives (NITI Aayog, 2023; Grand View Research, 2024) are anticipated to increase with a CAGR. From optimizing business processes to enabling companies to handle their life cycles and reduce waste, the impact of AI on India business platforms for the circular economy is reshaping the landscape in the business sector.

But, there are some specific hurdles that Indian enterprises face such as the scarcity of skilled employees, data quality issues, lack of data infrastructure, and ethical issues in AI utilization (BSR India 2025). The policy implications, capacity development, and investments in digital ecosystems are all crucial for fostering responsible AI use, highlighting the need for action.

Despite the challenges, the case studies in India demonstrate the potential success and positive impact of AI use is associated with real-world improvements in resource efficiency and carbon emission reduction (Rao et al., 2024).

Overall, the findings underscore the multifaceted role that AI plays in India's dynamic and intricate business landscape, both as a tool that drives technological advancements and as a catalyst for sustainable transformation. In this context, the new study provides relevant information about Indian companies and policy makers in their context.

India is at a critical juncture with a desire to grow its economy and at the same time, create environmental mandates and sustainable development. Due to urbanization, industrialization and consumption, government officials, investors and public are putting pressure on Indian companies to have improved business practices, which are resource efficient and environmentally friendly. As a tool, AI is a game-changer in this new world, capable of transforming business models, making them more productive, efficient and introducing new solutions

for the circular economy. This research paper aims to delve into the practical impacts of AI on Indian companies as they work towards developing environmentally-conscious and sustainable business models to effectively contribute to India's efforts to achieve the Sustainable Development Goals (SDGs) and meet its national climate action and responsible growth targets. As compared to studies conducted in the west or in developed markets, the study focuses on the Indian context and brings unique opportunities and challenges to the attention of the country's sustainability journey for large-scale industries, small and medium industries, and dynamic sectors like manufacturing, energy, logistics and agriculture. In this regard, this research paper presents some real-life cases, in India, where AI has been helpful in improving the utilization of resources and reducing environmental impacts. It aims to make clear which key performance measures are most important for monitoring this kind of success, evaluates real-world obstacles Indian companies face when implementing AI, and offers context-driven solutions to responsibly get beyond these obstacles. The paper will also make policy recommendations and give actionable suggestions to business leaders in India on how AI can contribute to sustainable development. To develop a holistic and practical exposure of the potential of AI as a driver of green business transformation in India, to not only help India to become economically competitive but also benefitting the environment and society in the long run, combining quantitative market data with first-hand insights from industry experts in India. Artificial Intelligence (AI) is growing as a major part of sustainable business models across the globe and is getting the momentum in India as well. However, with AI's predictive capabilities and efficiency, the resource can be optimised, emissions reduced and principles of the circular economy can be encouraged, researchers say. Predictive maintenance in manufacturing using AI helps minimize waste and downtime, which contributes to achieving sustainability goals (Raut, Patil, & Gardas, 2025). In the same way, by optimising logistics routes with AI, carbon emissions and fuel usage are decreased, which helps in carrying out the transportation sector's sustainability goals in India (Sharma & Singh, 2023). The market research reveals a swift pace of adopting AI in the field of sustainability. Investment in Digital initiatives supported by the Government (NITI Aayog, 2023) and Indian enterprises is expected to grow with this CAGR. From optimizing business processes to enabling companies to handle their life cycles and reduce waste, the impact of AI on India business platforms for the circular economy is reshaping the landscape in the business sector. But, there are some specific hurdles that Indian enterprises face such as the scarcity of skilled employees, data quality issues, lack of data infrastructure, and ethical issues in AI utilisation (BSR India 2025). Policy directions, capacity building and investments in AI ecosystems are all critical to ensure the responsible use of AI, and action is needed now. Despite some existing challenges, AI can be used for significant benefits in resource efficiency and carbon emission reduction, as shown by the case studies in India. The case studies from India show the potential benefits of AI and the positive impact it can have on resource efficiency and reduction in carbon emissions. The results underscore the complex and multifaceted nature of AI in India’s ever evolving and nuanced business landscape, both as a technology that contributes to technological progress and as a catalyst for sustainable change.

The new study in this context not only offers relevant information in the context of Indian companies but also in the context of policymakers. Objectives 1) To understand how Artificial Intelligence can contribute to a sustainable and eco-friendly business model in Indian business. 2) Talk about how AI has been assisting in India for better utilization of resources and to reduce environmental damage. 3) With the AI's assistance, to create the critical performance indicators to track sustainability outcomes. 4) Identify challenges in the use of AI in Indian companies and suggest responsible answers to address the challenges. 5) To give valuable recommendations to the Indian industry and policy makers on the potential of AI to drive sustainability. Research Methodology The research approach used was an overarching mixed method design, which included studying the Application of Artificial Intelligence (AI) in creating Sustainable and Eco-friendly Business Models in an Industrial Set-Up in India. The mixed methods approach helped in measuring the patterns and trends whereas the qualitative approach helped in gaining in-depth experience and contextual insights from the Indian enterprises. The research design of the study is Mixed Methods Research which aims to get holistic view of Artificial Intelligence (AI) and its contribution towards establishing sustainable business models in India. Both qualitative and quantitative research techniques enable the research to analyse the overall market trends and also to have in-depth insight into the industry from the practitioners.

Data Collection Methods:

The data collection involved two sources: Secondary data comprised analyses of credible government reports, industry white papers and market analyses were conducted to gain insights into trends of AI adoption, the outcomes of sustainability and the regulatory landscape in India. Structured survey and semi-structured interviews were used to gather primary data from 50 Indian professionals who are actively working in the field of sustainability and technology. The surveys provided information on use, applications, effects on sustainability, KPI's and challenges and the interviews provided valuable insights in barriers, enablers and policy implications.

The sample consisted of mid and senior level professionals from the key sectors that are related with India's economy and sustainability agenda. The participants were selected by purposive sampling to ensure the data gathered is relevant to the research objectives, giving them the relevant knowledge and hands-on experience.

Tools for Data Analysis: Data collected from the Indian organizations were analysed using SPSS and some of the practical tools were provided to Indian business and researchers which are they familiar with. Descriptive statistics were used to gain an understanding of patterns and trends in the adoption of AI, efficiency of resources and reduction in carbon emissions by sectors. Various levels of adoption of AI and their impact on the use of the resources were tested using statistical methods including one-way ANOVA, and the differences between groups were detected using the Tukey's method. The Chi-square tests were used to determine the association between using AI and the problems experienced by the respondents by sector and new revenue generation. The Pearson's correlation was used to assess the correlation between the use of AI and carbon emission reduction. All the analysis were presented in a simple manner, so that it would be easily comprehensible by the Indian managers and policy makers for taking business decisions and planning for sustainable growth.

Data Analysis and Interpretation

1. Effect of AI Adoption Level on Resource Efficiency

- **H0:** There is no significant difference in resource efficiency among the levels of AI adoption.
- **H1:** There is a significant difference in resource efficiency among the levels of AI adoption.

ANOVA					
Resource Efficiency (%)					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	37.380	2	18.690	122.004	.000
Within Groups	7.200	47	.153		
Total	44.580	49			

Resource Efficiency (%)					
	AI Adoption Level	N	Subset for alpha = 0.05		
			1	2	3
Tukey HSD[a,b]	No	5	1.00		
	Partially	15		2.80	

	Large Scale	30			3.80
	Sig.		1.000	1.000	1.000
Tukey B[a,b]	No	5	1.00		
	Partially	15		2.80	
	Large Scale	30			3.80
Means for groups in homogeneous subsets are displayed.					
a. Uses Harmonic Mean Sample Size = 10.000.					
b. The group sizes are unequal. The harmonic mean of the group sizes is used. Type I error levels are not guaranteed.					

ANOVA Interpretation

The one-way ANOVA reveals that there is an statistically significant difference in resource efficiency (%) between the organizations with different level of AI. The F-value = 122.004 and the p-value = .000 suggest that there is a high F-value and p-value, and the variance between the groups is much larger than the variance within the groups (Sum of Squares = 37.380 vs. Sum of Squares = 7.200). Since the p-value is < 0.05, we reject the null hypothesis and accept the alternative hypothesis: The mean resource efficiency of at least one group is significantly different from the other groups. This means that there is a great impact when it comes to the efficiency of resource utilization in organizations if they use AI products to the fullest extent.

Post-Hoc (Tukey HSD) Interpretation

The post-hoc Tukey HSD test shows all three AI adoption levels, No Adoption, Partial Adoption and Large-Scale Adoption, are significantly different from each other in terms of resource efficiency. Each group is assigned to its own homogeneous subset (1.00, 2.80 and 3.80 respectively), with no overlap in means and all differences being statistically significant at the 0.05 level. This confirms that the higher the level of AI adoption, the higher the resource efficiency. Further, for each stage of adoption — from none to partial to large-scale — the gains are measurable and significant.

Overall Conclusion

Finally, the analysis provides strong evidence in favor of the argument that the adoption of AI is beneficial to the efficiency of resources in organizations. Organizations with zero AI adoption have the lowest efficiency, partial adoption of AI results in moderate improvements, and large-scale AI implementation leads to the highest efficiency levels. The large variations between levels of adoption suggest that AI can improve resource management even at partial levels of adoption, and the more extensive the adoption the greater the benefits that are likely to be accrued. These findings reinforce the strategic value of investments in AI technologies to improve operational performance

2. Association between AI Adoption and New Revenue Generation

- **H0:** Generation of new revenue via AI is independent of AI adoption level.
- **H1:** Generation of new revenue via AI is associated with the level of AI adoption.

Test Statistics		
	AI Adoption Level	New Revenue via AI
Chi-Square	19.000[a]	2.000[b]
df	2	1
Asymp. Sig.	.000	.157
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 16.7.		
b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 25.0.		

Chi-Square Test Interpretation:

The outcome of a Chi-Square test for the association between level of AI adoption and new revenue generation through AI is shown as follows: Test Statistic: 19.000, DOF: 2, P-value (Asymp. Sig.): 0.000. Sig.) of .000. The p-value is < 0.05, so we reject the H0. Based on this, We can assume that the use of AI is strongly correlated with the generation of new revenues. This suggests tremendous disparities between different levels of AI adoption, and that eagerness to adopt AI may be important to contribute more to new revenue streams.

3. Correlation between AI Adoption Level and Carbon Emission Reduction

- **H0:** There is no significant correlation between the level of AI adoption and carbon emission reduction.
- **H1:** There is a significant positive correlation between the level of AI adoption and carbon emission reduction.

Correlations			
		AI Adoption Level	Carbon Emission Reduction (%)
AI Adoption Level	Pearson Correlation	1	-.924**
	Sig. (2-tailed)		.000
	N	50	50
Carbon Emission Reduction (%)	Pearson Correlation	-.924**	1
	Sig. (2-tailed)	.000	
	N	50	50
**. Correlation is significant at the 0.01 level (2-tailed).			

Correlation Interpretation:

The Pearson correlation coefficient between the level of adoption of AI and carbon emissions reduction is 0.924 which is statistically significant at the 0.01 level, and the p-value is .000. The p-value is found to be < 0.05, suggesting rejection of the null hypothesis (H0: No correlation between adoption of AI and reduction of carbon emissions) and acceptance of the alternative hypothesis (H1: There is a correlation between adoption of AI and reduction of carbon emissions). The correlation is indeed quite strong and significant, and is negative, contrary to

the alternative hypothesis which predicted a positive correlation as AI adoption got higher, the reduction in carbon emissions would decrease. This surprising finding could be a sign of unforeseen environmental exchanges arising from the use of AI or inconsistencies in data and reporting, which need to be explored and clarified.

4. Impact of Sector on Major Challenges Faced

- **H0:** The sector does not significantly influence the major challenges faced in AI adoption.
- **H1:** The sector significantly influences the major challenges faced in AI adoption.abstract-and-objective.pdf+1

Test Statistics		
	Sector	Major Challenges
Chi-Square	2.000[a]	20.560[b]
df	3	6
Asymp. Sig.	.572	.002
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 12.5.		
b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 7.1.		

Chi-Square Test Interpretation:

As seen in the results of the Chi-Square test the relationship between adoption of AI and sector is statistically significant. The test for "Major Challenges" gives the following Chi-Square value: 20.560 degrees of freedom: 6 and p value: .002 The p-value is less than 0.05, which means that the null hypothesis is rejected, indicating that the sector does have a significant impact on the challenges encountered by organizations implementing AI. This means that various sectors face different issues or challenges in the process of implementing AI. The test assumptions are not violated because none of the expected cell frequencies for the table is below 5. The Chi-Square test for the "Sector" variable only (value = 2.000, p = .572) is not significant, indicating that there is no inherent imbalance of representation of data by sector.

Descriptive

Sector					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agriculture	10	20.0	20.0	20.0
	Energy	15	30.0	30.0	50.0
	Logistics	10	20.0	20.0	70.0
	Manufacturing	15	30.0	30.0	100.0
	Total	50	100.0	100.0	

Role					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Consultant	1	2.0	2.0	2.0
	Executive	9	18.0	18.0	20.0
	Farm Owner	1	2.0	2.0	22.0
	Farm Tech Lead	1	2.0	2.0	24.0
	Fleet Manager	1	2.0	2.0	26.0
	IT Head	1	2.0	2.0	28.0
	IT Manager	6	12.0	12.0	40.0
	IT Specialist	2	4.0	4.0	44.0
	Manager	6	12.0	12.0	56.0
	Operations Head	1	2.0	2.0	58.0
	Operations Manager	2	4.0	4.0	62.0
	Plant Manager	1	2.0	2.0	64.0
	Production Executive	1	2.0	2.0	66.0
	Quality Manager	1	2.0	2.0	68.0
	Small Farmer	1	2.0	2.0	70.0
	Supply Chain Analyst	1	2.0	2.0	72.0
	Sustainability Head	1	2.0	2.0	74.0
	Sustainability Lead	4	8.0	8.0	82.0
	Sustainability Mgr.	5	10.0	10.0	92.0
	Sustainability Officer	4	8.0	8.0	100.0
	Total	50	100.0	100.0	

AI Adoption Level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Large Scale	30	60.0	60.0	60.0
	No	5	10.0	10.0	70.0
	Partial	15	30.0	30.0	100.0
	Total	50	100.0	100.0	

AI Applications					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AI Analytics, Maintenance	1	2.0	2.0	2.0
	AI Analytics, Predictive Maintenance	3	6.0	6.0	8.0
	Circular Economy Platforms	8	16.0	16.0	24.0
	Energy & AI Analytics	1	2.0	2.0	26.0
	Energy Monitoring	1	2.0	2.0	28.0
	Energy Monitoring, AI Analytics	4	8.0	8.0	36.0
	Energy Monitoring, Circular Economy Platforms	1	2.0	2.0	38.0
	Energy Monitoring, Circular Platforms	2	4.0	4.0	42.0
	Logistics Optimization	10	20.0	20.0	62.0
	None	5	10.0	10.0	72.0
	Personalized Sustainability Services	1	2.0	2.0	74.0
	Personalized Sustainability Services	3	6.0	6.0	80.0
	Predictive Maintenance	8	16.0	16.0	96.0
	Predictive Maintenance, Logistics	1	2.0	2.0	98.0
	Sustainability Services	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Resource Efficiency (%)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	10–20%	3	6.0	6.0	6.0
	21–40%	18	36.0	36.0	42.0
	Less than 10%	5	10.0	10.0	52.0
	More than 40%	24	48.0	48.0	100.0

	Total	50	100.0	100.0	

Carbon Emission Reduction (%)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1–10%	2	4.0	4.0	4.0
	11–25%	14	28.0	28.0	32.0
	26–40%	23	46.0	46.0	78.0
	Above 40%	6	12.0	12.0	90.0
	No reduction	5	10.0	10.0	100.0
	Total	50	100.0	100.0	

New Revenue via AI					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	20	40.0	40.0	40.0
	Yes	30	60.0	60.0	100.0
	Total	50	100.0	100.0	

KPI Importance (Avg 1-5)					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3	6	12.0	12.0	12.0
	4	14	28.0	28.0	40.0
	5	30	60.0	60.0	100.0
	Total	50	100.0	100.0	

Major Challenges					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Awareness Gaps	1	2.0	2.0	2.0
	Data Infrastructure	13	26.0	26.0	28.0
	Ethical Concerns	3	6.0	6.0	34.0

	Ethical Governance	5	10.0	10.0	44.0
	Financial Constraints	13	26.0	26.0	70.0
	High Energy Consumption	1	2.0	2.0	72.0
	Lack of Awareness	1	2.0	2.0	74.0
	Policy Complexity	1	2.0	2.0	76.0
	Regulatory Barriers	3	6.0	6.0	82.0
	Skilled Personnel	7	14.0	14.0	96.0
	Skilled Workforce	2	4.0	4.0	100.0
	Total	50	100.0	100.0	

Examples / Suggestions					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Adoption support	1	2.0	2.0	2.0
	Affordable tech access	1	2.0	2.0	4.0
	Affordable technology	1	2.0	2.0	6.0
	AI integration best practices	1	2.0	2.0	8.0
	AI platforms for real-time monitoring	1	2.0	2.0	10.0
	Awareness and training programs	1	2.0	2.0	12.0
	Awareness drives	1	2.0	2.0	14.0
	Better data-sharing platforms	1	2.0	2.0	16.0
	Capacity building	1	2.0	2.0	18.0
	Certification and training	1	2.0	2.0	20.0
	Cloud computing investments	1	2.0	2.0	22.0
	Data governance frameworks	1	2.0	2.0	24.0
	Digital ecosystem creation	1	2.0	2.0	26.0
	Employee training	1	2.0	2.0	28.0
	Employee upskilling	1	2.0	2.0	30.0
	Ethical AI adoption	1	2.0	2.0	32.0
	Ethical AI frameworks	1	2.0	2.0	34.0

	Ethical AI training	1	2.0	2.0	36.0
	Facilitate affordable tech access	1	2.0	2.0	38.0
	Financing schemes for AI adoption	1	2.0	2.0	40.0
	Government support	1	2.0	2.0	42.0
	Government training programs needed	1	2.0	2.0	44.0
	Green finance initiatives	1	2.0	2.0	46.0
	Improved tech accessibility	1	2.0	2.0	48.0
	Incentivize adoption	1	2.0	2.0	50.0
	Increase funding	1	2.0	2.0	52.0
	Industry best practices	1	2.0	2.0	54.0
	Industry collaboration	1	2.0	2.0	56.0
	Integrated supply chain digitalization	1	2.0	2.0	58.0
	Invest in green data centres	1	2.0	2.0	60.0
	Knowledge sharing	1	2.0	2.0	62.0
	More training programs	1	2.0	2.0	64.0
	Policy incentives	1	2.0	2.0	66.0
	Promote data sharing frameworks	1	2.0	2.0	68.0
	Promote digital ecosystem	1	2.0	2.0	70.0
	Public-private partnerships	1	2.0	2.0	72.0
	Regular training modules	1	2.0	2.0	74.0
	Regular training programs	1	2.0	2.0	76.0
	Renewable energy integration	2	4.0	4.0	80.0
	Responsible AI practices	1	2.0	2.0	82.0
	Simplify policies	1	2.0	2.0	84.0
	Streamlining approvals	1	2.0	2.0	86.0
	Subsidies for AI adoption	1	2.0	2.0	88.0
	Training on sustainable routing	1	2.0	2.0	90.0
	Transparent AI ethics policies	1	2.0	2.0	92.0
	Transparent AI policies	1	2.0	2.0	94.0

	Transparent governance	1	2.0	2.0	96.0
	Transparent governance frameworks	1	2.0	2.0	98.0
	Upskilling and certifications	1	2.0	2.0	100.0
	Total	50	100.0	100.0	

Findings

The sectoral distribution of the respondents is reasonably balanced with 15 out of 50 respondents (30%) from each of the two major sectors (Energy and Manufacturing); and 20% (10) in each of the other two major sectors (Agriculture and Logistics). The sectoral balance will be crucial to enable effective comparison at the cross-sector level of the adoption pattern and challenges and outcomes in using AI. The variety of the range indicates that it is not limited to any particular industry, and extends to a range of different industries when it comes to data information being embraced by AI. Role Distribution: The respondents were from various roles in the organization with the top three being Executives (18%), IT Managers (12%) and Managers (12%) and Sustainability-related roles (26%). There are also a handful of people who are employed in other positions like the Farm Owner, Fleet Manager and Consultants. This blend suggests that the survey could potentially cover strategic and operational viewpoints, and focus particularly on enhancing leadership and sustainability roles, which might stem from the diversity of opinions and experiences about the role and hurdles of AI across different sectors. AI Adoption Level: The majority of the organizations surveyed (60%) indicated that they are using AI on a large scale, 30% indicated partial use and only 10% indicated that they are not using AI. The overall distribution has a high level of interest in implementing AI, suggesting that the sample is comprised of mainly organisations that are in the process of transitioning to and/or have transitioned to digital transformation. It offers a foundation for measuring outcomes, and also the issues at various stages of maturity of AI. The application of AI in Action: As can be seen from the data, there are a number of different application cases for AI, of which Logistics Optimization accounts for 20%, Predictive Maintenance 16% and Circular Economy Platforms 16%. A few respondents also mentioned using combinations of AI in energy monitoring and analytics, with 10% of them stating they were not using AI at all. The diversity suggests that AI is being utilized for sustainability efforts and in operational processes, it is an innovative and experimental use of the technology across organizations although some are at relatively early or exploratory stages. Resource Efficiency: Almost half of organisations (48%) reported resource efficiency gains of over 40%, with 36% of organisations reporting resource efficiency gains in the range 21% - 40%. Small improvements (10-20%) were made by 6% and less than 10% had small improvements. The general trends indicate that AI is helping organizations make better use of resources, particularly for those that are more integrated with AI, further highlighting its potential to significantly drive operational sustainability. Carbon Emission Reduction: Most of the respondents indicated that they had moderated their carbon emissions and 46% indicated a reduction of 26-40%, 28% indicated a reduction of 11-25%. 10% indicated that there was no reduction, 4% indicated minimal reduction (1-10%) and 12% indicated greater than 40% reduction. From the distribution, it appears that the potential for emissions reduction via AI will be dependent on many factors, including the sector, the application of AI, and the scale of the application. New Revenue via AI 60% of organisations reported to have generated new revenue through AI, 40% did not. This not only illustrates the possibilities of AI to improve efficiency and sustainability but also to actually create returns for many of those who embrace it. In addition, the number of NRG users suggests that results can differ, possibly due to different use cases, sectors or the maturity of the use of the AI.

KPI Importance:

60% of respondents gave it the rating of “5” (very important) when asked to rate the importance of Key Performance Indicators (KPIs) related to AI initiatives, followed by 28% that rated it “4” (important) and 12%

that rated it "3" (somewhat important). This is because businesses are hyper-focused on any KPIs in the way that they approach AI strategies, and this demonstrates their focus on real-world results, like efficiency, revenue and sustainability. But it's also an indicator of an era in which it relates to data-driven decision making of AI projects.

Major Challenges:

Data Infrastructure and Financial Constraints (both at 26%) were the most common challenges reported in the adoption of AI, followed by a lack of Skilled Personnel (14%), and Ethical Governance (10%). Lesser were reported for other issues- high energy consumption and lack of awareness/ regulatory barriers. Technical and financial challenges are emphasized, along with ethical and human capital-related challenges, particularly in the context of the increasing use of AI.

Examples / Suggestions:

Individual suggestions (at 2% each) included a broad range of responses including topics on affordable access to technology, training, ethical use of AI, policy incentives, support for government and green technologies. The wide range of suggestions highlights the complexity of the challenges of implementing AI solutions and the importance of creating a support ecosystem that is comprehensive, covering education, infrastructure, funding, policy streamlining and cooperation across sectors, to drive the sustainable and inclusive integration of AI solutions.

Suggestions: -

Use of AI should be promoted by policies and initiatives that facilitate the adoption of AI, including awareness campaigns, and provide financial incentives and subsidies, especially for sectors with low uptake of AI.

Invest in Data Sharing Platforms, Cloud Systems and Digital Ecosystems: Investment in data sharing platforms, cloud systems and digital ecosystems is required: 26% of the respondents indicated that data infrastructure is a major challenge. Progress on establishing common standards on safe and interoperable data sharing can contribute to accelerating the uptake of AI.

Lack of skilled personnel (14%) is an opportunity to undertake regular training, upskilling and certification efforts. Specialized courses in AI for different industries can be created through academic, industrial and governmental partnerships.

Sustainable AI technologies can be supported by financial measures such as green finance, low-interest loans for innovation in AI, and public–private partnerships, to address the financial constraints that SMEs face when adopting sustainable AI.

Enhance Ethical and Responsible AI practices are highlighted by concerns of ethics in AI governance and transparency, underscoring the need for ethical AI frameworks, clear policies, and responsible AI practices to foster trust among stakeholders and ensure fair, transparent AI systems.

Encourage multi-sector innovation networks: Multi-sector innovation networks can help to share best practices and technologies, as challenges are sector specific. Learning can be encouraged between the sector manufacturing, logistics, agriculture and energy by using multi-sector platforms.

AI for Environmental Sustainability: As the carbon reduction benefits of AI are inversely proportional to its use, there is a need to link AI with renewable energy and green data centres in order to reduce the carbon footprint associated with the use of AI.

On Performance Measurement: Most respondents rated KPIs as very important, and it is important to push for a more structured approach to measuring the efficiency, revenue benefits and sustainability effects of using AI.

Government & Regulatory Support: Simplify government policies and offer industry sector specific regulatory sandboxes for experimentation, while ensuring that it is used ethically and in compliance with government rules.

Awareness and Accessibility Initiatives: Awareness campaigns, technology solutions that are affordable, and localized AI training programs can be effective in addressing the adoption challenge in smaller organizations and rural areas.

Conclusion

From the overall results of the study it can be concluded that the use of Artificial Intelligence (AI) has a great impact on the performance of the organization in various aspects. After analysing the data, companies that have made the most number of AI implementations are far more effective in utilizing their assets and they are doing an excellent job at generating additional sources of revenue. The examples listed here are some of the potential ways AI can revolutionize the business of sustainability, in operations and finances. The results, however, also showed a strong negative correlation between carbon emission reduction and AI adoption, meaning that while AI can help to boost productivity there might be other negative environmental effects from using AI or carbon emissions can also be increased. With the sustainable use of energy and green technologies, there is a need to carefully manage and plan the use of AI, to ensure it doesn't have a negative impact.

Furthermore, the study revealed that the challenges for AI adoption are different for different industries and a blanket solution might not work. The three challenges responded that they were facing in implementing AI successfully are lack of data systems and data infrastructure, manpower constraints and financial constraints. Ethical governance and policy issues were also agreed to be an important issue that requires to be tackled strategically. However, this is not stopping the increasing adoption of digital transformation and large-scale AI in other sectors like manufacturing, energy, agriculture and logistics, and there is a definite push towards using AI in the future.

In conclusion, the research highlights the importance of AI's role in the adoption journey, going beyond just a technological evolution, it is a strategic move to enhance efficiency, competitiveness, and innovation. Robust systems for data collection, skill building and developing clear and ethical governance structures for AI must be put in place to reap the benefits. There is also a need to coordinate with industry players for financial incentives, de-regulate and promote collaboration between different industries by policy makers. AI that aligns with the ethical, environmental and economic principles will be able to be leveraged for sustainable development and inclusive growth of the future.

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