

**ARTIFICIAL INTELLIGENCE IN GREEN VALUE
CREATION OF SMES:
AN EMPIRICAL INVESTIGATION IN THE
NORTHERN PROVINCE OF SRI LANKA.**

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Abstract

Artificial Intelligence is a form of substitute to the cognitivist role of human which enables problem identification and resolution efficiently. Green entrepreneurship depths in scaling economic returns simultaneously upgrading environmental quality through eco-conscious practices. This study examines the role of AI in generating green entrepreneurial value addition among small medium sized enterprises in Northern province of Sri Lanka. This study adopts quantitative approach in nature where the data collection is done with 100 SMEs following a purposive sampling method. The implication of AI is investigated through operational efficiency, strategic advancement, organizational structure and ethical consideration towards the green value creation. Descriptive statistics, correlation and multiple regression analysis demonstrate the significant association among operational efficiency, strategic advancement, organizational structure towards sustainable outcomes. The findings of the study highly support AI adoption and application leading to resource optimization, inculcate eco-innovation and stimulate sustainable development from economic, social and environmental perspectives. This investigation pay value to the entrepreneurial theory through validating the multi-dimensional effectiveness of AI in postering green value in less developed setting like Sri Lanka. Moreover, affords the insight to entrepreneurs, managers and policy makers to articulate a standardized frame work on AI to a real term practice directing the symmetry of profit and planet of SMEs pathing global green value Altogether, the study highlights the digital transformative phase of AI in promoting green entrepreneurial value through eco-consciousness innovation, competitiveness and sustainable development.

Keywords: Artificial Intelligence, Digital Transformation, Green Entrepreneurship, Sustainability, value Creation

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1. Introduction

Artificial Intelligence is known as evidence of digital transformative phase in contemporary era affords set of technologies in advancing data management, identifying every pattern and helping with decision making process as predictive and prescriptive, replacing human intellectuality (Wamba et al.,2025). As an initial point, AI adoption was treated as the flexible mode for mass scale enterprises such as international and multinational businesses. this is possible due to the availability of large investment and skilled personalities along with the technological infrastructure in large scale enterprise setting (Abbasy & Quesada, 2017). In later part it was expanded to small and medium scale enterprises as well due the ability in bearing cost, manageable tech- infrastructure and diffusion of digitalization at global level. According to Fonseka (2022) AI technology and its exploration is highly appreciated for the green entrepreneurs having the interest in reaching both the economic and environmental goals. IA handles eco-efficiency, waste management, green supply chain management and the opportunity for sustainable socio-economic development (Desilva,2025). Thus, AI adoption acting as the mechanism where its multi-dimensional aspects are interceding organizational background and internal capabilities in delivering sustainable outcomes from social, economic, and environmental perspectives (Kumar,2019). In a less developed economic context setting, the adoption and application of AI specially in SMEs are subject to set of terms. Mostly the firms in the setting are functioned with considerable level of constraints of finance, knowledge, expertism network, and technological infrastructure (Fonseka & wickramasinghe,2022).

North province of Sri Lanka appears to be a region with quicker recovery from post war conflict. The local economy is shaped by small and medium scale business heavily in primary sector economic activities accounting for agriculture, farming and food processing where the environmental performance is high and associated with the long-term competitiveness and sectoral sustainability (Randika,2025). Despite the supremacy, the SMEs in the northern province face some challenges such as limited digital tech-infrastructure, insufficient force with technology expertism, dependency of informal network sceneries for business and operation. Therefore, the fraternization of AI is underutilized and fragmented towards acceleration of green entrepreneurship remains inconsequential (Kumar,2019). Understanding how AI adoption can support green entrepreneurial value creation in these sceneries is critical for both theory and practice (Kushani,2025). Existing literature largely reflects experiences from technologically advanced urban centers, where firms have access to constant digital infrastructure, skilled expertism, and vigorous financial systems (Central bank of Sri Lanka,2023). There are set of studies highlight that in the Northern Province of Sri Lanka; SMEs face several intertwined challenges:

- Operational Constraints: Thin profit margins, high energy and material costs, and sectoral limitations impede investment in technological solutions (Vaikundanathan,2025).

- Environmental Pressures: Growing regulatory requirements and increasing consumer demand for eco-friendly products compel SMEs to adopt sustainable practices (Fonseka,2022).
- Technological Barriers: Uneven digital infrastructure and low levels of digital literacy hinder the implementation of advanced AI tools (Kushani,2025).
- Financial Limitations: Restricted access to formal financing mechanisms limits SMEs' ability to adopt and maintain AI systems (Tutur,2025).
- Sectoral and Social Factors: Reliance on informal networks and community trust shapes operational dynamics and social legitimacy (Jayathilake,2024).

AI applications lead to demand forecasting, energy-use optimization, and automated customer engagement have demonstrated measurable value in large enterprises, it is unclear whether SMEs with resource limitations can achieve similar outcomes (Jayathilake,2024). Equally important is understanding whether AI can facilitate triple bottom line value creation encompassing economic growth, environmental sustainability, and social inclusion in these contexts (Randika,2025).

Research Problem statement

Nonetheless AI is highly recognized for efficiency driven sustainability, SMEs in Sri Lankan context are adopting and applying the AI technologies in one or more forms but the adoption of AI technology in the SMEs operated in North region is not significant and the desired sustainable outcome is underrated (Desilva,2025). Despite the presence of AI technologies in the region, the systematic adoption and application is still at under figured and scaling sustainable objectives in practice scenario remains inconsequential. This results in less quantity of context- specific studies and literature in the emerging field of green entrepreneurship. Similarly, there are less empirical investigation was carried out in the field of green entrepreneurship from digitalization and technology-based sustainability point of view.

Research Objectives

The overarching goal of this study is to investigate the role of AI in fostering green entrepreneurial value creation through four AI-driven dimensions among SMEs in the Northern Province of Sri Lanka. The specific objectives are:

- To testify the impact of Artificial Intelligence driven operational efficiency on green value creation in SMEs.
- To examine the association of Artificial Intelligence based strategic advancement on generating green value among SMEs.

- To identify the influence of Artificial Intelligence driven organizational structure in reaching green value addition of SMEs.
- To assess the relationship among Artificial Intelligence based ethical concerns towards green value of SMEs.

Research Questions

In line with the problem statement and objectives, this study addresses the following research questions:

- Does Artificial Intelligence driven operational efficiency impact on green value creation in SMEs?
- Does Artificial Intelligence driven strategic advancement influence on generating green value among SMEs?
- Does Artificial Intelligence based organizational structure in reaching green value addition of SMEs?
- Does Artificial Intelligence based ethical concerns impact on green value of SMEs.

Hence this study explores the adoption and application of AI in terms of the effectiveness in SMEs operated in a less developed economic framework in addressing the association of multi dimension of AI applied in the enterprises towards green value creation.

2. Literature review

This section reviews literature on AI, green entrepreneurship, and value creation in SMEs, with emphasis on developing economies and peripheral regions. Following PRISMA guidelines, a systematic literature review analyzed 96 articles (2015–2025) from Scopus, Web of Science, and Google Scholar. This synthesis identifies theoretical, empirical, and contextual gaps, particularly in resource-constrained contexts such as Sri Lanka's Northern Province, providing a foundation for the present study.

Adoption and application of AI in SMEs

Recent studies exhibit the connection of AI adoption and application towards dynamic capability in limited among SMEs (Eshan, Muhammd& Laura, 2022). Ample of studies have addressed that the adoption and application of AI in the mass scale is frequent in action rather comparing with SMEs (Rendika,2025). These

investigations concern on large scale enterprises in tech equipped context leading a notable gap in inferring the difficulties in resource accumulation, allocation and utilization in developing economies on functionalizing AI with the purpose of constructing the standardized frame work which is actionable and practical to context of SMEs (Amarasinghe & Wickramasinghe, 2020). This will be resulted in detecting the theoretical as well as pragmatic validation in testifying AI adoption and the green value execution in SMEs.

According to Furman & Seamans (2018), application of AI is considered as purposive technology aided with transformative capabilities transversely sectors and industries. AI offers proportional advantage to SMEs over the rivals in many aspects in which improved operational efficiency, active customer assignation, systematic green supply chains and data driven decision making are the valid values in AI towards SMEs and their entrepreneurs (Randika,2025). The apprehensions of propositional advantages are demonstrated in terms of green value creation through following perspectives.

- Operational efficiency: enabling enterprises to fostering demand orientation, methodical prophecy, energy management, responsible resource consumption (Jayathilake,2024).
- Active customer assignation: encourages enterprises to client- firm orientation, organized recommendation system, emotional analysis to improve customer retention (Mahagamage & Perera ,2025).
- Data driven decision: enterprises are able to exploit data driven insights, data management, strategic information system as to minimize the risks in the competitive markets (Quadri,2024).

In common, most of the studies conducted in Asian region indicate the general encountered restraints from financial, knowledge and technological foundation in many cases as not utilizing the AI (Acemoglu & Restrepo,2018). Limited access to capital restricts investment in advanced AI systems are denoted as financial constraints. Skill Shortages along with lack of data science expertise hinders the effective implementation of AI tools are expressed in terms of skill shortage. Infrastructure Limitations is demonstrated as weak digital foundation in developing regions constrains AI scalability and reliability (Amarasinghe & Wickramasinghe ,2020).

Application of AI and Green entrepreneurial value creation

Green entrepreneurship emphasizes the simultaneous pursuit of economic, environmental, and social objectives of business operations in line with context of SMEs, green entrepreneurship has gained prominence as a pathway toward sustainable competitiveness, particularly in resource-intensive sectors such as agriculture, fisheries, food processing, and ecotourism in specific to context to SMEs (Al-mulla,2022). when AI technology is applied in the enterprises, pathing the sustainable green values through three mediators in the system. The core concern of

green value creation is expressed in terms of economic, environmental and social values of an active enterprise (Acemoglu & Restrepo,2018). In developing countries, small and medium-sized enterprises (SMEs) increasingly adopt green practices to comply with evolving regulatory frameworks, encounter mounting consumer demand for sustainable products, and enhance long-term competitiveness (Bjola,2020).

Economic Value is performed through Productivity enhancement, cost reduction, revenue growth, and improved market competitiveness (Belli.et al.,2020). Environmental Value is gained through eco-efficiency, emissions reduction, waste minimization, and circular economy adoption (Jayathilake,2024). Social Value is added through enhanced employment quality, supplier inclusion, community legitimacy, and social cohesion (Kushani,2025).

In order to generate a green value, the enterprise supposed to focus on energy, production and distribution based on environmental sustainability. AI-powered energy management systems reduce electricity consumption and associated emissions are expressed in terms of energy efficiency. (Serban & Lytra ,2020)). sustainable production is generated through Machine learning model, minimize material waste and improve operational efficiency in manufacturing (Ibrahim,2022)). AI-driven analytics enable product design aligned with sustainability and customer eco-consciousness are in line with sustainable marketing and distribution targeting market alignment. Despite these promising applications, literature remains skewed toward large enterprises in developed economies (Rendika,2025).

Application of AI in less developed regions

There set of studies demonstrate the effectiveness of AI adoption in promoting green entrepreneurship is highly context-dependent, necessitating careful consideration of local economic, infrastructural, and social conditions specially in less developed nations (Rasool &Ravindra,2019).

- Bangladesh: AI has been heavily applied in energy efficient system such as solar and waste management techniques in the field of SMEs. the enterprises are facing the tech-based investment constraints (Furman & Seamans ,2018).
- India: AI-driven logistics optimization improves productivity, yet uneven infrastructure restricts scalability (Vaikundanathan,2025).
- Indonesia: SMEs leveraging AI for green innovations report enhanced environmental performance and competitive advantage, but regulatory uncertainty and limited financing restrict widespread adoption (Schwake,2025).
- China: AI can significantly lower operating costs and increase revenue for Chinese SMEs by improving operational efficiency and creating new revenue streams. (Belli.et al.2020).
- Sri Lanka: SMEs experience skill shortages, digital infrastructure gaps, and financing constraints, limiting AI's transformative potential (Kushani,2025).

Related theories in the study

The study underpins with grounded theories triple bottom line (TBL) dynamic capabilities (DC) in association with the expected outcome. Dynamic Capabilities Theory posits that firms achieve sustainable competitiveness in volatile environments by sensing opportunities and threats, seizing them through strategic investments, and transforming organizational processes and structures to adapt to change (Barney, 1991). Specially in value creation process of sustainability and green entrepreneurship can be driven through multi-dimensional factors. the study uses the three bottom line value creation grounded through economy, social and environment (Elkington, 1997).



Figure 01: Theoretical framework

Development of hypothesis

Drawing on prior literature and the context of SMEs in Sri Lanka's Northern Province, this study formulates four hypotheses on how Artificial Intelligence (AI) adoption supports green business value creation described below in table 1.

Table 01: Hypothesis of the study

Sequence	Hypotheses
H1	AI driven operational efficiency influence on green value creation of SMEs
H2	AI driven strategic advancement influence on green value creation of SMEs
H3	AI driven organizational structure influence on green value creation of SMEs
H4	AI driven ethical concerns influence on green value creation of SMEs

The denoted hypotheses have been formulated based on the review literature and the empirical evidence in terms of AI and green entrepreneurial value creation in the relevant context.

Synthesis and Identification of Research Gaps

A critical analysis of the current literature and empirical evidence reveals gaps in contextual, theoretical, and empirical understanding, as outlined in table 2.

Table 02: Thematic Literature gap

Theme	Current insight	Thematic gap
Dynamic capabilities	Applied to large scale enterprises often like MNCs	Limited evidence adopting AI to SMEs
AI adoption	Operational and marketing gains identified	Narrow focus on sustainability or green ventures
Green entrepreneurship	Multi-dimensional value recognized	Poor link with AI enabled transformation
Regional context	Studies available in Asian countries	Few empirical evidences in Northern province in Sri Lanka

(Source: Summarized by author)

A critical synthesis of prior literature reveals three significant gaps:

- Contextual Gap: Most studies focus on developed countries or large firms, neglecting SMEs in resource-constrained regions such as Northern Sri Lanka.
- Theoretical Gap: Limited integration of Dynamic Capabilities Theory to explain how SMEs leverage AI for sustainability.
- Empirical Gap: Sparse evidence on how AI adoption simultaneously generates economic, environmental, and social value in SMEs pursuing green objectives.

The literature confirms AI's potential to transform SME operations but highlights persistent gaps in understanding its role in enabling green entrepreneurial value creation. Addressing these gaps will provide both theoretical insights and practical guidance for SMEs in peripheral regions.

3. Methodology

The study has followed quantitative approach to examine the implication of application of AI towards green entrepreneurial value generation among the SMEs in Sri Lanka. Being north province is the study location, application of AI has been testified through its dimensions such as operational efficiency, strategic advancement, organizational structure and ethical consideration in line with green entrepreneurial outcome of SMEs. table 03 exhibits the methodology used in this study.

Table 03: Methodology framework

Methodological components	Application in the study
Research Paradigm	Positivist
Research Design	Explanatory
Research Approach	Qualitative
Research Method	Survey method
Sampling Technique	Purposive Sampling
Sample size	100 SMEs
Data Collection Methods	Questionnaire survey
Data Analysis	Smart PLS
Ethical Considerations	Informed Consent and Confidentiality ensured

Population and Sampling

The study targets SMEs in the Northern Province of Sri Lanka, encompassing sectors such as agriculture, fisheries, food processing, manufacturing, and retail, selected for their economic relevance and green practices. Using purposive sampling, 100 SME were chosen as the unit of analysis due to their direct role in technology adoption and sustainable business decision-making.

Data Collection Instrument

The study surveyed 100 registered SMEs from the Mullaitivu, Mannar, Jaffna, Kilinochchi, and Vavuniya DS divisions, each operating for at least one year. Data were collected through self-administered questionnaires distributed in person to maximize response rates and minimize misinterpretation. Respondents were briefed on the study objectives, assured of confidentiality, and provided informed consent.

The instrument comprised 20 items measuring four dimensions of AI adoption—operational efficiency, strategic advancement, organizational structure, and ethical considerations—on a five-point Likert scale. Questionnaire items were adapted from validated scales in prior studies on AI, digital transformation, and green entrepreneurship (Fonseka, 2022) ensuring both reliability and contextual relevance to the SME landscape of the Northern Province.

Variables and Measurement

The study has been structured with dependent and independent variables in following manner.

Independent Variables of this study are:

- AI driven operational Efficiency (AIOE) – measured through automation, resource optimization, cost reduction, and data-driven decision-making.
- AI driven strategic Advancement (AISA) – operationalized using strategic product development, business model innovation, and agile practices.
- AI driven organizational Structure (AIOS) – assessed via structural adaptability, process integration, and AI readiness.
- AI driven ethical Considerations (AIEC) – captured through alignment with social, environmental, and ethical standards in AI use.

Dependent Variable of the study is:

- Green value creation (GVC) – operationalized through economic, environmental and social outcome as to as maintaining long-term viability. Indicators included profitability, eco-performance, and social contribution to the local community.

All variables were measured using multi-item scales derived from established literature, ensuring validity and reliability in capturing constructs relevant to AI-driven green entrepreneurship.

Data Analysis

Data were analyzed using Smart PLS-4 following a multi-step procedure:

- Descriptive Statistics – summarized demographic information, firm characteristics, and AI adoption patterns.
- Reliability and Validity Testing – assessed internal consistency using Cronbach's alpha, composite reliability, and confirmatory factor analysis.
- Correlation Analysis – examined the strength and direction of relationships between AI dimensions and enterprise sustainability.

- Multiple Regression Analysis – tested the impact of AI dimensions on economic, environmental, and social value creation while controlling for firm size and sector (significance set at $p < 0.05$).
- Moderation Analysis – explored the influence of contextual factors, including digital infrastructure, human capital, access to finance, and informal networks, on AI–value creation relationships.

This framework enabled rigorous testing of hypothesized relationships, identifying which AI dimensions most strongly influence sustainable value creation in SMEs.

Conceptual Framework

The framework outlines the linkage between artificial intelligence (AI) adoption and business value creation in SMEs. AI adoption is conceptualized across four dimensions: operational efficiency, strategic advancement, organizational structure and ethical concerns. developed conceptual frame work is exhibited in figure 02.

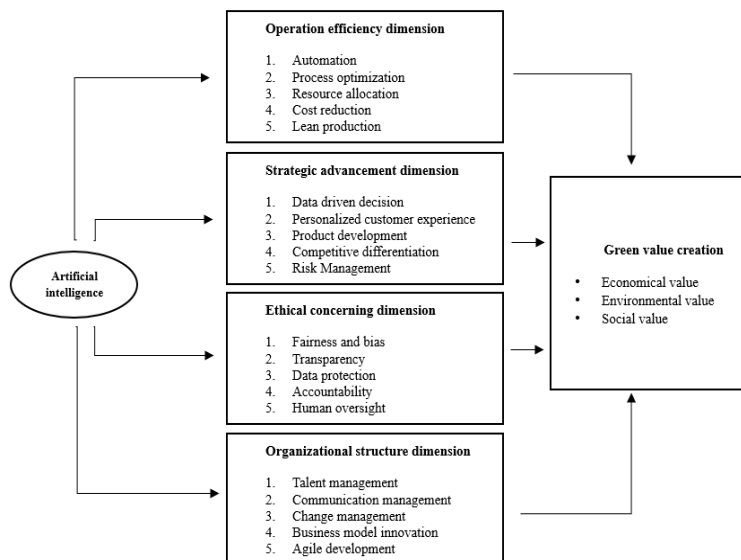


Figure 2: Conceptual framework
(Source: Developed by author)

4. Results and Discussion

Descriptive Statistics

Data from 100 SMEs showed that 62% of respondents were male and 38% female, with most aged 31–45 years. Nearly half (45%) had 5–10 years of business experience, while 55% had over 10 years in sustainable practices. Sectors included agriculture (30%), manufacturing (35%), and services (35%). Mean scores indicated strong perceptions of operational efficiency ($M = 4.28$, $SD = 0.52$), moderate to high engagement in strategic advancement ($M = 4.15$, $SD = 0.61$) and organizational structure ($M = 4.12$, $SD = 0.59$), but relatively lower perceptions of ethical considerations ($M = 3.78$, $SD = 0.65$). Enterprise sustainability scored highly ($M = 4.20$, $SD = 0.57$), reflecting positive economic, social, and environmental outcomes.

Reliability Analysis

Cronbach's alpha values confirmed strong internal consistency across constructs: operational efficiency (0.86), strategic advancement (0.83), organizational structure (0.81), ethical considerations (0.79), and enterprise sustainability (0.87).

Table 4: Summary of reliability and validity statistics

Factors	V(S)	1	2	3	4	AVE	CR	SIG
Operation efficiency	1.Automation	0.810						0.03**
	2.Process optimization	0.800						
	3.Resource allocation	0.811						
	4.Cost reduction	0.822						
	5.Lean production	0.820				0.812	0.782	
Strategic Advancement	6.Data driven decision		0.900					0.02**
	7.Personalized customer experience		0.892					
	8.Product development		0.894					
	9.Competitive differentiation		0.901					
	10.Risk management		0.891			0.895	0.861	
Ethical consideration	11.Fairness and bias			0.872				0.06
	12.Transparency			0.820				
	13.Data privacy			0.810				
	14.Accountability			0.842				
	15.Human oversight			0.822		0.833	0.798	

Organizational structure	16.Talent management				0.906			0.01**
	17.Communication management				0.910			
	18.Change management				0.900			
	19.Business innovation				0.922			
	20.Agile development				0.902	0.908	0.898	

Correlation Analysis

Pearson's correlations showed in figure 03, significant positive relationships between enterprise sustainability and operational efficiency ($r = 0.62$, $p < 0.01$), strategic advancement ($r = 0.58$, $p < 0.01$), and organizational structure ($r = 0.54$, $p < 0.01$). Ethical considerations, however, showed a weak negative correlation ($r = -0.21$, $p < 0.05$).

Table 5: Summary of Pearson correlation matrix

Variables	1	2	3	4	5
AISA	0.56**	1			
AIOS	0.52**	0.48**	1		
AIEC	-0.14	-0.12	-0.18	1	
GVC	0.62**	0.58**	0.54**	-0.21*	1

Note: * $p < 0.05$; ** $p < 0.01$

Multiple Regression Analysis

The regression model was significant ($F(4,95) = 28.64$, $p < 0.001$; $R^2 = 0.63$). Results indicated that operational efficiency ($\beta = 0.34$, $p < 0.001$), strategic advancement ($\beta = 0.29$, $p < 0.001$), and organizational structure ($\beta = 0.27$, $p < 0.001$) were strong predictors of enterprise sustainability. Ethical considerations had a negative effect ($\beta = -0.15$, $p = 0.038$).

Table 6: Multiple Regression Analysis of AI Dimensions on Enterprise Sustainability

Independent variable	B (standardized)	T-value	P-value
AIOE	0.34	4.92	<0.001
AISA	0.29	4.11	<0.001
AIOS	0.27	3.85	<0.001
AIEC	-0.15	-2.10	0.038

Model Summary: $F(4, 95) = 28.64$, $p < 0.001$, $R^2 = 0.63$

Findings confirm that AI adoption enhances sustainable green value creation in SMEs by AI driven dimension in improving efficiency, enabling strategic innovation, and supporting adaptive organizational structures. However, the negative effect of ethical considerations suggests pressure between operational gains and ethical compliance, pointing to the need for balanced frameworks that integrate responsibility with performance. Overall, AI adoption significantly strengthens green value creation in SMEs, particularly through operational, strategic, and structural dimensions.

Being the strongest prognosticator AI driven operational efficiency dimension encourages green value addition of enterprises (Al-ruquiba,2018). There is an anticipated outcome generated using through automation, resource optimization, cost reduction and lean production among the SMEs used in the study. accordance with this study UiPath and RPA-AI tools are used for automation related activities. IBM Watson supply chain is being applied by 57% of the SMEs in the region for process optimization aided with AI. Utilizing the resources via exploring larger production with minimum input in a systematical way is expected by every SMEs (Ibrahim,2022). The finding of the study is parallel to the former studies that emphasize the effective streamline function, appropriate waste management system and optimizing the resources leading to retain the sustainability in economy and environment at greater satisfactory level (Quadri & Omar,2025). 61% of the SMEs are already using SAP-IBP in performing cost leadership activities in dispatch the production. AI integration with the enterprises often leading the automation process not only to internal function also to the cost switching sense on consumers as well. Thus, probably leads to long term competitiveness and sustainability of the enterprises in the market. The digital technology transformation enhances the material less process in manufacturing which uplifts the eco-manufacturing, eco-consciousness and improved living standard in the society (Heshton & Richard,2025). Moreover, the resource coordination is streamline consistent with the in-frame demand of the enterprises resulting in less resource piling rather uneven distribution of the resources. SMEs in the mercantile industry of 52% are using Coupa and Seebo apps in conceding the factors of production to the value adding output stage. SMEs are beneficial in applying AI driven efficiency directly with the resource-view theory as articulated earlier. Finally, the enterprises operating at a small and medium scale are able to exploit process optimization similar to the suggestions of the concurrent studies taken place in the industry (Mahagamage &

Perera,2025). In deed the concept of green supply chain management is closer replication function to process optimization targeting the anticipated functions as prescribed by the entrepreneurial context rather process amplification on irrational functions of an entity.

AI driven strategic advancement and green value creation are positively associated as per the findings of the study in which data driven decisions are often yield through AI aided tools in Nigerian context (Wamba.et al.,2025). the findings of this study highlight the higher usage of Einstein analytics and Microsoft power BI with above 50% in food proceeding SMEs in the North region. Data management system provisions new entrants and the ongoing enterprises making rationale decision equipped with data driven policy. Application of data driven decision making process strengthening the SMEs with timely and effective decision towards economic, social and environmental perspective. ‘Know Your Customer’ being the mantra in present business scenario, recognizing the needs and wants asper the satisfactory level of the target and consumer base with the enterprise is highly examined by the entrepreneurs and the managers as to progress them in to the next level (Prihatin,2024). Applying AI driven strategic dimension such as Einsin and adobe cloud help the entities to go-ahead with personalized customer expectation for their products in the market. rather the in-person checkout validating a business entity to smear coherent decisions as to accomplish the customer personalization resulting the competitive advantage for them. Offering the products to the market is highly constant when the entity cascades on market orientation than the product orientation (Schwake,2025). It means, distribution of the goods and services as per the obligation of the market and leading the long-lasting phase, support enterprises for premium prices and reputation in the market. According to Heshton & Richard (2025) product development function is highly rendered through the AI driven strategic advancement of SMEs in application often in middle income earning contexts. Usage of Product board and Jira are in crowning in use among SMEs. Specially the apparel industry is frequently exploited with ongoing- product development phase since the industry is conditional on dynamic changes, taste and desire of consumers. Comparable like the massive scale of manufacturing sectors, even SMEs are gaining the advantage of developing the product and dominating the market with customer attraction, aesthetic aspect and cost coverage resulting in hitting stage of profit and market share in. The findings of this study highlight the importance of products differentiation among SMEs. Commonly, product differentiation cascades in generic theories on signifying the product among the rivals (Ndubulsi & onyinye,2025). The entrepreneurs in this study confessed that adoption and application of AI driven Strategic advancement dimension are able to exploit product innovation. Disparate the human driven innovation process, AI brands it as eco-innovation directing to safeguard environment, enterprise and the customer values in the front line. Inestimable product innovation affiliated to eco -innovation derives the firms to design multiple product blueprints at a single time through Uipath and zapiar AI tools. Since the innovation is unique and cost -feasible-friendly SMEs are able to gain the competitive advantage again in the market with cist benefits. Finally, AI driven tools are supporting the enterprises to mitigate risk

and compete in the market. level of risk and uncertainty is reduced to some extent and evident from the food processing SMEs investigated in the Asian economic context (Bruuij,2018). The AI driven tools like Logic gate risk cloud and IBM open pages are frequently advantageous due to user-friendliness and cost-captivation among entrepreneurs.

Talent management is widely practices through AI driven organizational structure equaling to employee life cycle management. Most of the SMEs are in the process of applying Skillup and Viser AI apparatuses, the job description and workforce analytics are practiced. New green skill of the workforce can be highly engendered, leading to internal mobility towards green and sustainable practices in-frame of the SMEs. Addition to this people analytics phase is done effectively, where the enterprises can forestall talent gap among the work force leading to green initiatives to take place (Jayathilake,2024). This will result in sustainable exertions of the internal capabilities accomplishment of green strategies. Secondly communication management through AI is signified among SMEs. The studies come across in the north western countries slack AI and tanka AI tools are facilitating the context aware prompts directing to constructive dialogues and green initiatives to be seen in action. Consequently, stakeholders' green assignation is certified forming through execution of sustainable green values of the firms. The context of south Asian regions is using AI as the mediation technology on team communication and long-long-term memory. This repeatedly supports the firms to interrelate with global supply chain partners reaching the sustainable communication. Change management is also emphasized through AI driven organizational structure dimension among SMEs (Bjola,2020). The AI based tools like Issoria and Pandatron can often encourage green value initiation at the venture level. SMEs are adopting the sustainable business models as the empirical evidence of process change resulting in road map for sustainable values in economic, social and environmental (Quadri &Omar,2024). AI driven tools often act as coaching -change functions encouraging SMEs to come up with change behavioral practices such as green consciousness and ecological mind set resulting in internal green adoption (Furman & Seamans,2018). Addition to this, business model valuation correspondingly done through AI based technologies such as Canvas AI and IBM Watson studios. SMEs are encouraging to apply novelty in the model which replicate new green business model for the entity to operate and resulting in circular economic practices and integrity of sustainability among society and firms. when agile development is considered Spira and Miro AI are affiliated. Since these tools are regularly used in project management helps SMEs to attest and go with green product trails such as 'testing cases. Product development is prolonged in each stage of entrepreneurial function and speedup blocklog leading agile sprints as a result green objectives of SMEs can be formulated as to produce novelty green design and competitive advantage. Finally, AI driven tools used in the phase of agile development encounters visual collaboration and related analysis as to imply hybrid on eco-innovation resulting in AI insights to green goal setting and feed back to the system. This is the similar type of implication seen in the study of Tatur (2025) accomplished in westernized regions.

Ethical considerations are parts of AI driven dimension where common in governance – commercial operations. Fairness and bias are associated through Arthur AI and IBM Watson open scale adopted by SMEs (Ministry of technology, Sri Lanka, 2024). As per the findings of the study, it shows the negative association among ethical concerns and green value creation. The elements of ethical concerns such as fairness, transparency, data protection, accountability and human oversight are insignificant in connotation towards green value creation. The studies encountered that, model monitoring platforms helps with real time monitor in which fairness, biasness and model drift discriminate inattentions of the functions. Findings of the study does not evident fully sense the affiliation among ethical concerns and green value creation of SMEs. Addition to this Truyo-AI and one trust-AI are commonly applied by SMEs, but the sense of transparency and data protection is suspicious specify to the developing region. some studies highly confess the similar implication resulted in the investigation (Rasool & Ravindra, 2019). 50% of the SMEs are using the similar AI tools such as Magai-AI, Holistic-AI and Colibra-AI for their multiple usages, hence majority of the SMEs contradict the accomplishment of ethical validation towards the green value generation in their operation. Further the investigation reveals that AI application stimulates the green value generation at a significant level via AI based operational efficiency, strategic advancement, organizational structure in general. The interpretation of the relationship and the association among the variables are used for robust empirical based discussion of the study.

5. Conclusion

This study provides theoretical and practical insights to the field of green entrepreneurship. The empirical evidence from Northern province Sri Lanka expresses the current nature of the AI adoption and application in the field of SMEs. Thus, the findings would validate the implication to the entrepreneurs, policymakers, and industry stakeholders highlighting the potential in digital transformation in promoting green value generation throughout economic, social and environmental outcomes. This study delivers the integrity aiming the theories through validating the multi-dimensional phase of AI adoption and practice including operational, strategic, organizational and ethical concerns at aggregate level towards green value in the socio-economic context. The study explores the compound effect of digital transformation and green value creation to Sri Lanka and other nations with the similar frame work setting, by expressing the standardized form of AI adoption ad practice possible to accomplish in resource -constrained contexts. The findings also exhibit the confrontation among the ethical concern phase of AI and practical sense of green value generation, assuming the high requirement of standardized frame work which does the justice for responsible AI application and economic, social, and environmental performance. Overall systematic adoption and application of the AI driven technologies used in SMEs are beneficial for economic context like Sri Lanka and need to contribute further to utilize the fruitfulness of the technology transformative sense of the era. Policy makers and regulators should align further on green strategies and systematic green goal formation as to gain sustainable

development as one of the Macro economic objectives by 2030. Green regulations and sustainable laws should facilitate the sustainable finance, tech-based infrastructure, filling the green skill gap and appropriate consultation. SMEs operated in Northern province in Sri Lanka can explore AI application to improve operational efficiency, strategic planning and management and eco- innovation. Effective amalgamation needs in applying organizational structure through green workflow, collaboration and knowledge exchange affiliated through appropriate green strategic frame work for SMEs. The study area is limited to its geographical boundary of Northern province of Sri Lanka, which causes constraints in generalizing the findings to whole context. The sample size has been chosen may not fit enough to represent the diversity of SMEs in the sectors also cross-sectional view imply single point of data collection limiting the insights to long term impact of AI application on green value creation. Future studies can address the limitation indicated in this study by exploring the desired outcome of AI driven technology and green value creation in multi regions and in different contexts.

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