

Sustainable Entrepreneurship in the Digital Age

The Role of AI in Green Business Practices

Md Rajibul Islam

Master's Thesis

Thesis for a Novia UAS - MBA

Digital Business and Management

Vaasa (Finland), 2024

MASTER'S THESIS

Author: Md Rajibul Islam

Degree Programme and place of study: MBA at Novia UAS

Specialisation: Digital Business and Management

Supervisor(s): Eva Holmberg

Title: Sustainable Entrepreneurship in the Digital Age: The Role of AI in Green Business Practices

Date: 02.06.2024

Number of pages: 75

Appendices: 0

Abstract

This research explores the intersection of artificial intelligence (AI) and sustainable entrepreneurship, focusing on how AI can enhance green business practices and contribute to the achievement of Sustainable Development Goals (SDGs). The study begins by outlining the purpose, research questions, significance, and limitations of the research. It then delves into the theoretical foundations, discussing Artificial Intelligence, sustainable development, sustainable entrepreneurship, green business practices, Technology Acceptance Model and Triple Bottom Line theory. The role of digitalization in business and the integration of AI as a critical component of this transformation are examined.

A comprehensive literature review highlights the Technology Acceptance Model and the specific applications of AI in promoting sustainable entrepreneurship and green business practices. The study aims to provide insights into the extent to which AI can drive sustainable entrepreneurship by optimizing resource use, reducing environmental impact, and aiding in the achievement of SDGs. Methodologically, the research employs qualitative approaches, particularly thematic analysis of podcast interviews, to gather and analyze data on the adoption and impact of AI in sustainable business contexts.

The findings reveal that AI significantly contributes to sustainable entrepreneurship by optimizing resource use, reducing environmental impact, and facilitating the achievement of SDGs. Key areas of impact include AI adoption in business, its role in sustainable entrepreneurship, and its potential to drive sustainable development. The discussion addresses the current state of sustainable entrepreneurship, the impact of AI on promoting and implementing green business practices, and the challenges and opportunities for entrepreneurs in leveraging AI for sustainability. The study concludes with recommendations to enhance green business practices through AI and underscores the potential of AI to drive substantial progress in achieving global sustainability goals.

Language: English

Key Words: Artificial Intelligence, Sustainable Entrepreneurship, Green Business Practices, SDGs

EXAMENSARBETE

Författare: Md Rajibul Islam

Utbildning och ort: MBA at Novia UAS

Inriktning: Digital Business and Management

Handledare: Eva Holmberg

Titel: Hållbart entreprenörskap i den digitala tidsåldern: Rollen för AI i gröna affärspraktiker

Datum 02.06.2024

Sidantal 75

Bilagor 0

Abstrakt

Detta forskningsprojekt utforskar korsningen mellan artificiell intelligens (AI) och hållbart entreprenörskap, med fokus på hur AI kan förbättra gröna affärsmetoder och bidra till att uppnå de globala målen för hållbar utveckling (SDG). Studien börjar med att skissera syftet, forskningsfrågorna, betydelsen och begränsningarna av forskningen. Därefter fördjupas det i de teoretiska grunderna och diskuterar artificiell intelligens, hållbar utveckling, hållbart entreprenörskap, gröna affärsmetoder, Technology Acceptance Model och Triple Bottom Line-teorin. Digitaliseringens roll i affärsvärlden och integrationen av AI som en kritisk komponent i denna transformation undersöks.

En omfattande litteraturöversikt lyfter fram Technology Acceptance Model och de specifika tillämpningarna av AI för att främja hållbart entreprenörskap och gröna affärsmetoder. Studien syftar till att ge insikter i hur långt AI kan driva hållbart entreprenörskap genom att optimera resursanvändningen, minska miljöpåverkan och bidra till att uppnå SDG. Metodologiskt använder forskningen kvalitativa metoder, särskilt tematisk analys av podcast-intervjuer, för att samla in och analysera data om antagandet och påverkan av AI i hållbara affärssammanhang.

Resultaten visar att AI väsentligt bidrar till hållbart entreprenörskap genom att optimera resursanvändningen, minska miljöpåverkan och underlätta uppnåendet av SDG. Nyckelområden för påverkan inkluderar AI-antagande i affärer, dess roll i att främja hållbart entreprenörskap och dess potential att driva hållbar utveckling. Diskussionen behandlar den nuvarande situationen för hållbart entreprenörskap, AI:s påverkan på att främja och genomföra gröna affärsmetoder, samt utmaningarna och möjligheterna för entreprenörer att utnyttja AI för hållbarhet. Studien avslutas med rekommendationer för att förbättra gröna affärsmetoder genom AI och understryker AI:s potential att driva betydande framsteg i att uppnå globala hållbarhetsmål.

(Translated from English Abstract by ChatGPT 3.5)

Språk: Svenska

Nyckelord: Artificiell intelligens, Hållbart entreprenörskap, Gröna affärspraktiker, SDGs

OPINNÄYTETYÖ

Tekijä: Md Rajibul Islam

Koulutus ja paikkakunta: MBA at Novia UAS

Suuntautumisvaihtoehto: Digital Business and Management

Ohjaaja(t): Eva Holmberg

Nimike: Kestävä yrittäjyys digitaaliaikakaudella: tekoälyn rooli vihreissä liiketoimintakäytännöissä

Päivämäärä 02.06.2024

Sivumäärä 75

Liitteet 0

Tiivistelmä

Tämä tutkimus tarkastelee tekoälyn (AI) ja kestävän yrittäjyyden risteystä, keskittyen siihen, kuinka AI voi parantaa vihreitä liiketoimintakäytäntöjä ja edistää kestävän kehityksen tavoitteiden (SDG) saavuttamista. Tutkimus alkaa määrittelemällä tarkoituksen, tutkimuskysymykset, merkityksen ja rajoitukset. Seuraavaksi käsitellään teoreettisia perusteita, mukaan lukien tekoäly, kestävä kehitys, kestävä yrittäjyys, vihreät liiketoimintakäytännöt, teknologian hyväksymismalli (Technology Acceptance Model) ja kolmoisalinjan teoria (Triple Bottom Line). Digitaalisaation rooli liiketoiminnassa ja AI:n integrointi osaksi tätä muutosta tarkastellaan.

Laaja kirjallisuuskatsaus korostaa teknologian hyväksymismallia ja AI:n erityisiä sovelluksia kestävän yrittäjyyden ja vihreiden liiketoimintakäytäntöjen edistämiseksi. Tutkimuksen tavoitteena on tarjota oivalluksia siitä, kuinka pitkälle AI voi edistää kestävä yrittäjyyttä optimoimalla resurssien käyttöä, vähentämällä ympäristövaikutuksia ja auttamalla SDG-tavoitteiden saavuttamisessa. Metodologisesti tutkimus käyttää kvalitatiivisia lähestymistapoja, erityisesti teemallista analyysiä podcast-haastatteluista, kerätäkseen ja analysoidakseen tietoja AI:n käyttöönnotosta ja vaikutuksista kestävässä liiketoimintayhteyksissä.

Tulokset osoittavat, että AI vaikuttaa merkittävästi kestävä yrittäjyyteen optimoimalla resurssien käyttöä, vähentämällä ympäristövaikutuksia ja helpottamalla SDG-tavoitteiden saavuttamista. Keskeiset vaikutusalueet ovat AI:n käyttöönotto liiketoiminnassa, sen rooli kestävä yrittäjyyden edistämiseksi ja sen potentiaali edistää kestävä kehitystä. Keskustelussa käsitellään kestävä yrittäjyyden nykytilaa, AI:n vaikutusta vihreiden liiketoimintakäytäntöjen edistämiseen ja toteuttamiseen sekä yrittäjien haasteita ja mahdollisuuksia hyödyntää AI:ta kestävyden edistämiseksi. Tutkimus päättyy suositukseen vihreiden liiketoimintakäytäntöjen parantamiseksi AI:n avulla ja korostaa AI:n potentiaalia merkittävän edistyksen saavuttamisessa globaalien kestävä kehityksen tavoitteiden suhteen. (Translated from English Abstract by ChatGPT 3.5)

Kieli: Suomi

Avainsanat: Tekoäly, Kestävä yrittäjyys, Vihreät liiketoimintakäytännöt, SDGs

Table of Contents

List of Tables.....	I
List of Figures	I
1 Introduction	1
1.1 Aim and Purpose of Research	1
1.2 Research Questions.....	2
1.3 Limitations and Delimitations	3
1.4 Significance of the Study	5
1.5 Structure of the Thesis	6
2 Enhancing sustainable entrepreneurship through AI.....	7
2.1 Sustainable Development Goals.....	8
2.2 Sustainable Entrepreneurship	10
2.2.1 Green Business Practices.....	11
2.2.2 Triple Bottom Line Theory.....	12
2.3 Digitalisation of Business.....	14
2.4 AI as a Part of Digitalization.....	17
2.4.1 What is Artificial Intelligence?.....	17
2.4.2 AI and Sustainable Entrepreneurship.....	20
2.5 Technology Acceptance Model	22
2.6 AI in Green Business Practices.....	24
2.7 Summary of Literature Review	25
3 Methodological Approaches	27
3.1 Qualitative Research	27
3.2 Data Collection Methods.....	28
3.2.1 Selection of Podcast Interviews	28
3.2.2 Data Extraction	29
3.3 Data Analysis Techniques	29
3.3.1 Thematic Analysis.....	30
3.4 Validity and Reliability.....	32
4 Analysis and Results	33
4.1 Overview of Data.....	33
4.2 Findings	39
4.2.1 AI Adoption in Business.....	39
4.2.2 AI in Sustainable Entrepreneurship.....	45
4.2.3 AI for Sustainable Development.....	47

4.2.4	AI in Achieving the SDGs.....	51
4.2.5	Sustainable Entrepreneurship for Green Business Practices.....	54
4.2.6	Green Business Practices for Achieving SDGs	57
5	Discussion.....	60
5.1	Current State of Sustainable Entrepreneurship	60
5.2	Impact of AI on Promoting and Implementing Green Business Practices	64
5.3	Challenges and Opportunities for Entrepreneurs in Leveraging AI for Sustainability	66
5.4	Recommendations to Enhance Green Business Practices through AI.....	67
6	Conclusion	68
	Reference	70

List of Tables

Table 1: List of Sustainable Development Goals .	9
Table 2: Learning Philosophies.....	19
Table 3: List of videos in details	34

List of Figures

Figure 1: Thesis structure by chapter.....	7
Figure 2: Sustainability by Triple Bottom Line Theory	13
Figure 3: Technology Acceptance Model for AI Adoption	23
Figure 4: Diagram of Theoretical Framework for Data Analysis.....	26
Figure 5: Categorization of video by Sub-topics.....	37
Figure 6: Demography of total interviewees.....	38
Figure 7: Current state of Sustainable Entrepreneurship at a glance.	61
Figure 8: Impact of AI on promoting and implementing green business practices briefly.	64

1 Introduction

In recent years, the imperative for sustainable development has become increasingly prominent, with businesses worldwide recognizing the necessity of adopting environmentally friendly practices. Amidst this transition, the integration of artificial intelligence (AI) has emerged as a transformative force in enhancing green business strategies. AI technologies offer the potential to optimize resource utilization, reduce waste, and mitigate environmental impacts across various industries (Kiron et al., 2018). On the other hand, Sustainability strategies provide companies with a strong competitive advantage. Investing in sustainable development offers significant business benefits, high return on investment, and a competitive edge over traditional investments, making it a crucial competitive advantage (Willard, 2012). The integration of sustainability and digital imperatives is gaining momentum in both private and public sectors, but systematic and rigorous academic research is yet to be established (George et al., 2020).

1.1 Aim and Purpose of Research

In response to the transformative changes unfolding in the contemporary business landscape, this research aims to investigate the role of Artificial Intelligence (AI) in enhancing sustainable entrepreneurship, particularly within the context of promoting green business practices. As businesses increasingly navigate the challenges posed by environmental concerns and digitalization, the integration of AI emerges as a critical area of exploration. Drawing from a multidisciplinary perspective encompassing sustainable development, entrepreneurship, digitalization, and technology acceptance, the research seeks to elucidate the mechanisms through which AI can contribute to the triple bottom line objectives of economic prosperity, social equity, and environmental stewardship (Jankovic & Curovic, 2023; Martínez-Peláez et al., 2023).

Drawing from a multidisciplinary perspective encompassing sustainable development, entrepreneurship, and technology adoption, the aim of this study is threefold. Firstly, it aims to explore the current state of sustainable entrepreneurship in the digital era, shedding light on the challenges and opportunities faced by entrepreneurs in navigating the evolving business landscape. Secondly, it seeks to evaluate the impact of AI on

promoting and implementing green business practices, discerning the potential benefits and drawbacks of AI integration for sustainability. Finally, it endeavors to identify the challenges and opportunities encountered by entrepreneurs in leveraging AI for sustainability, providing actionable recommendations for businesses to enhance environmentally responsible practices through AI adoption (Jankovic & Curovic, 2023; Martínez-Peláez et al., 2023).

1.2 Research Questions

The research questions for the study encompass a multifaceted exploration aimed at understanding the interplay between sustainable entrepreneurship and Artificial Intelligence (AI) in fostering environmentally responsible business practices. These questions are designed to provide insights into the current state of sustainable entrepreneurship within the digital era, evaluate the impact of AI on promoting and implementing green business practices, identify challenges and opportunities for entrepreneurs in leveraging AI for sustainability, and offer practical recommendations for enhancing environmentally responsible practices through AI integration. Through a systematic inquiry approach, this study seeks to address the pressing need for empirical evidence and actionable insights to guide businesses in navigating the complexities of sustainability in an increasingly digitalized world (Jankovic & Curovic, 2023; Martínez-Peláez et al., 2023).

The research questions for the study are as follows:

- I. Examine the current state of sustainable entrepreneurship in the digital era.

This question aims to investigate the existing landscape of sustainable entrepreneurship within the context of digitalization. It seeks to understand the challenges, trends, and opportunities faced by entrepreneurs in integrating sustainable practices into their businesses amidst rapid technological advancements.

- II. Evaluate the impact of AI on promoting and implementing green business practices.

This question focuses on assessing the influence of Artificial Intelligence (AI) on the adoption and implementation of green business practices. It aims to explore how AI

technologies contribute to enhancing sustainability efforts in businesses, including their effectiveness, efficiency, and potential barriers to adoption.

- III. Identify challenges and opportunities for entrepreneurs in leveraging AI for sustainability.

This question aims to identify the key challenges and opportunities encountered by entrepreneurs when integrating AI technologies into their sustainability initiatives. It seeks to uncover the factors that facilitate or hinder the successful utilization of AI for promoting environmental sustainability in entrepreneurial ventures.

- IV. Provide recommendations for businesses to enhance environmentally responsible practices through AI.

This question aims to offer practical recommendations for businesses to optimize their use of AI in fostering environmentally responsible practices. It seeks to provide actionable insights and strategies based on the findings of the study to enable businesses to leverage AI effectively in their sustainability initiatives.

1.3 Limitations and Delimitations

In the research, limitations and delimitations serve to define the scope and boundaries of a study, acknowledging what the study cannot accomplish and what factors might affect its validity or generalizability. As this research is conducted within a short time and followed qualitative data analysis, there are significant limitations and delimitations of this research.

The research confronts several limitations that could impact the depth and breadth of its findings. Relying exclusively on podcast interviews from platforms like YouTube introduces the risk of sampling bias towards individuals with specific viewpoints or platform activity levels, while the exclusive use of TEDx Talks may overlook valuable perspectives from other reputable channels such as GreenBiz and the World Economic Forum. Additionally, despite efforts to ensure transcription accuracy, variability in interview lengths and the unstructured nature of discussions may pose challenges in data retrieval and analysis. Thematic analysis, while valuable, remains inherently subjective, potentially leading to divergent interpretations among researchers and impacting the reliability of conclusions. Moreover, resource constraints limit access to a comprehensive dataset, as reliance on

publicly available podcast interviews may neglect insights from other sources like specialized journals or primary interviews, potentially hampering the generalizability of findings. While the research aims for a global perspective, focusing on one specific location, like Finland, could yield more intensive and in-depth results. However, the selection of interviewees based on theme introduces the risk of bias and data manipulation. Thus, while the research covers a wide range of global scenarios, a more localized approach could provide deeper insights into specific contexts, albeit with potential limitations regarding bias in participant selection.

The research strategically delimits its scope in several ways to focus on specific parameters. Firstly, it confines its analysis to podcast interviews available on platforms like TEDx Talks on YouTube, intentionally excluding other potential data sources such as academic papers, reports, primary interviews, or alternative video channels. While this ensures a concentrated focus on a specific type of content, it may overlook valuable insights from diverse sources. Secondly, while the selection of podcast episodes showcases presenters from diverse nationalities and professional backgrounds, the research does not limit itself to geographic boundaries, allowing for a broad understanding of specific themes. However, despite the inclusion of experts, entrepreneurs, researchers, students, and thought leaders as interviewees, the perspectives of other stakeholders such as consumers, policymakers, or community members might be underrepresented. Additionally, the research spans from recent to 11-year-old videos, adhering to the TEDx policy of limiting video durations to 18 minutes. While these delimitations aid in focusing on the topic, they also introduce the possibility of data bias.

Addressing these limitations and delimitations requires careful consideration throughout the research process, including transparency in reporting methodologies, acknowledging biases, and interpreting findings within the context of the limitations. Additionally, researchers may seek to mitigate these limitations by triangulating data sources, engaging in member checking, and maintaining reflexivity throughout the research journey.

1.4 Significance of the Study

This research makes a significant contribution to the academic field by shedding light on the interplay between artificial intelligence (AI) and sustainable entrepreneurship, enriching the ongoing scholarly dialogue. The findings extend beyond theoretical realms, offering practical implications for entrepreneurs seeking to harness AI to foster sustainable practices. This guidance aims to empower businesses to integrate ecological and economic sustainability effectively. Furthermore, the study aspires to provide valuable insights for environmental policymakers and advocates, presenting a potential blueprint for leveraging AI to achieve tangible benefits in the realm of environmental sustainability. Overall, this research bridges the academic and practical realms, fostering knowledge dissemination and facilitating positive impact in both sectors.

The business landscape is undergoing transformative changes in the digital age, where sustainable entrepreneurship plays a pivotal role in addressing environmental concerns. In the contemporary business landscape, the convergence of sustainable entrepreneurship and artificial intelligence (AI) in the digital era has emerged as a critical area of exploration. As businesses increasingly digitize their operations, there is a pressing need to understand how the integration of AI can contribute to fostering green business practices (Jankovic & Curovic, 2023; Martínez-Peláez et al., 2023). As businesses increasingly embrace digital technologies, understanding how AI can facilitate and enhance sustainable entrepreneurship becomes crucial for fostering environmentally responsible business practices. In recent years, sustainable entrepreneurship has gained traction as a strategic imperative for businesses, driven by an increasing global awareness of environmental issues. The digital era has introduced unprecedented opportunities and challenges, necessitating innovative solutions to align economic growth with ecological responsibility. Despite growing interest in both sustainable entrepreneurship and AI, there is a discernible research gap in understanding how these domains intersect, particularly in the context of green business practices. This study seeks to bridge this gap by providing insights into the ways AI can be harnessed for sustainable entrepreneurship, thereby contributing to a more comprehensive understanding of the dynamics at play. (Yang et al., 2023; Ratten, 2023).

1.5 Structure of the Thesis

For presenting in an organized way, the thesis is organized into several chapters, each serving a distinct purpose in unravelling the complex interplay between sustainable entrepreneurship, green business practices and artificial intelligence.

The chapters that follow are structured to provide a cohesive narrative, starting with an Introductory chapter 1 which includes purpose of research, research questions, significance of the study, and lastly limitations and delimitations.

Chapter 2 lays the groundwork by delving into the concept of sustainable entrepreneurship, elucidating its significance within the framework of the SDGs, and examining key theories and models underpinning green business practices.

Chapter 3 outlines the methodological approaches employed in this study, delineating the qualitative research methods, data collection techniques, and data analysis procedures utilized to derive meaningful insights.

In Chapter 4, the analysis and findings derived from the research process are presented. Through a meticulous examination of data, this section explores the adoption of AI in business contexts, its role in sustainable entrepreneurship, and its contribution towards achieving the SDGs.

Chapter 5 delves into a comprehensive discussion of the findings, offering insights into the current state of sustainable entrepreneurship, the impact of AI on promoting green business practices, and the challenges and opportunities that entrepreneurs encounter in leveraging AI for sustainability. Moreover, this chapter puts forth recommendations to enhance green business practices through AI-driven interventions.

Finally, Chapter 6 encapsulates the conclusions drawn from the research, summarizing the key insights gleaned and outlining potential avenues for future research. The thesis concludes with a comprehensive reference list at the end, providing a repository of scholarly works and resources referenced throughout the study.

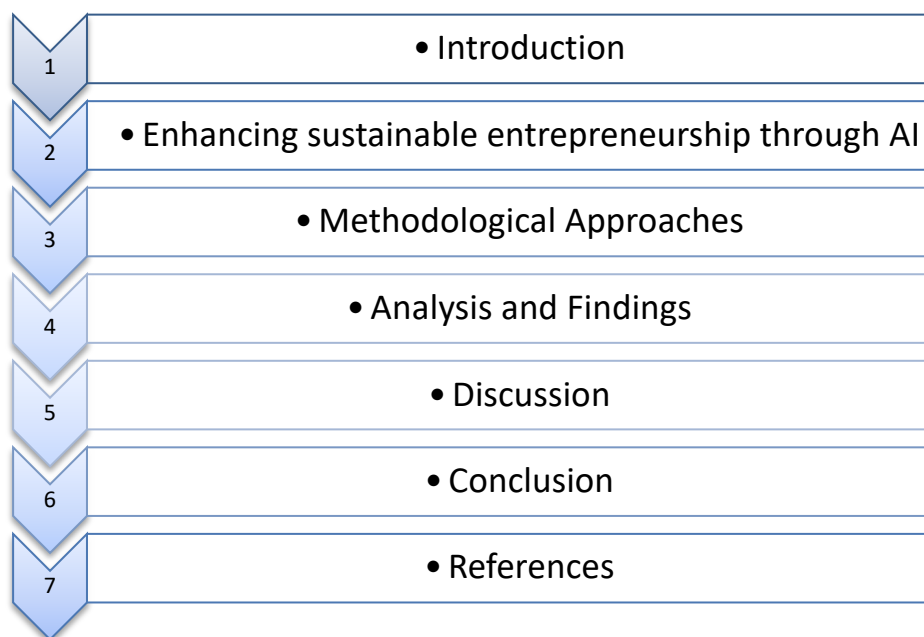


Figure 1: Thesis structure by chapter.

Figure 1 outlines the thesis structure based on chapter titles and summarizes the progression in chronological steps. Each element of the structure includes multiple subpoints for detailed explanations. This figure aids in maintaining the coherence and flow of the thesis writing.

2 Enhancing sustainable entrepreneurship through AI

This chapter explores the pivotal role AI plays in driving sustainable business practices. With the pressing need to align business operations with Sustainable Development Goals (SDGs) by the United Nations, AI emerges as a transformative tool that can help entrepreneurs innovate and optimize for environmental, social, and economic benefits. By delving into concepts such as green business practices, the triple bottom line theory, and the digitalization of business, this chapter underscores the synergistic potential of AI in fostering sustainable entrepreneurship. From defining AI and its applications to examining models like the Technology Acceptance Model, the discussion extends to practical implementations of AI in enhancing green business practices. This comprehensive review sets the stage for understanding how AI not only supports but also accelerates the transition towards more sustainable entrepreneurial ventures.

2.1 Sustainable Development Goals

The 17 Sustainable Development Goals of the United Nations aim to eradicate extreme poverty, reduce inequalities, restore the environment, ensure justice, improve well-being, and establish global partnerships for sustainable development by 2030 (United Nations, 2023). Since 2015, academia and industry have been actively working to achieve the Sustainable Development Goals through research, practice, and community engagement.

Sustainable Development Goals (SDGs) represent a global commitment to addressing pressing challenges facing humanity, including poverty, inequality, and environmental degradation. These goals range from eradicating poverty and hunger to promoting gender equality, clean water and sanitation, affordable and clean energy, and climate action, among others. By setting these goals, the international community aims to guide collective action towards a more equitable, prosperous, and environmentally sustainable future.

One of the key strengths of the SDGs lies in their universality and inclusivity, recognizing that sustainable development is a shared responsibility that applies to all countries, regardless of their level of development (United Nations, 2015). Unlike their predecessor, the Millennium Development Goals (MDGs), which primarily targeted developing countries, the SDGs emphasize the interconnectedness of global challenges and the need for coordinated action by all nations. This approach acknowledges that issues such as climate change, biodiversity loss, and economic inequality cannot be effectively addressed in isolation but require collaborative efforts at local, national, and international levels (Chou, 2021).

However, achieving the SDGs by 2030 remains a formidable challenge, requiring significant political will, resources, and innovative solutions. Despite progress in some areas, many targets are off track, and the COVID-19 pandemic has further exacerbated existing inequalities and setbacks (United Nations, 2020). To accelerate progress, renewed efforts are needed to mobilize financing, strengthen governance mechanisms, promote technology transfer, and enhance international cooperation. Additionally, fostering partnerships among governments, businesses, civil society, and academia is essential to harnessing collective expertise and resources towards achieving the SDGs (United Nations, 2019). Ultimately, the success of the SDGs hinges on sustained commitment and action by

all stakeholders to build a more just, resilient, and sustainable world for current and future generations (Chou, 2021).

Table 1: List of Sustainable Development Goals.

Number	Goal	Description	Number of Target/Indicator
1	No Poverty	Ending poverty in all its forms everywhere	7 targets and 13 indicators
2	Zero Hunger	Ending hunger, achieving food security and improved nutrition, and promoting sustainable agriculture	8 targets and 14 indicators
3	Good Health and Well-Being	Ensuring healthy lives and promoting well-being for all at all ages	13 targets and 28 indicators
4	Quality Education	Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all	10 targets and 12 indicators
5	Gender Equality	Achieving gender equality and empowering all women and girls	9 targets and 14 indicators
6	Clean Water and Sanitation	Ensuring availability and sustainable management of water and sanitation for all	8 targets and 11 indicators
7	Affordable and Clean Energy	Ensuring access to affordable, reliable, sustainable and modern energy for all	5 targets and 6 indicators
8	Decent Work and Economic Growth	Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	12 targets and 16 indicators
9	Industry, Innovation, and Infrastructure	Building resilient infrastructure, promoting inclusive and sustainable industrialization, and fostering innovation	8 targets and 12 indicators
10	Reduced Inequalities	Reducing inequality within and among countries	10 targets and 14 indicators
11	Sustainable Cities and Communities	Making cities and human settlements inclusive, safe, resilient, and sustainable	10 targets and 14 indicators
12	Responsible Consumption and Production	Ensuring sustainable consumption and production patterns	11 targets and 13 indicators
13	Climate Action	Taking urgent action to combat climate change and its impacts	5 targets and 8 indicators
14	Life below Water	Conserving and sustainably using the oceans, seas, and marine resources for sustainable development	10 targets and 10 indicators
15	Life on Land	Protecting, restoring, and promoting sustainable use of terrestrial ecosystems, sustainably managing forests, combatting desertification, and halting and reversing land degradation, and halting biodiversity loss	12 targets and 14 indicators
16	Peace, Justice, and Strong Institutions	Promoting peaceful and inclusive societies for sustainable development, providing access to justice for all, and building effective, accountable and inclusive institutions at all levels	12 targets and 24 indicators
17	Partnerships for the Goals	Strengthening the means of implementation and revitalizing the global partnership for sustainable development	19 targets and 24 indicators

(Chou, 2021).

Table 1 displays the 17 goals including the number of targets and indicators along with details. Adopted by the United Nations in 2015, the SDGs provide a comprehensive framework for sustainable development, consisting of 17 interlinked goals and 169 targets to be achieved by 2030 (United Nations, 2015).

2.2 Sustainable Entrepreneurship

Sustainable entrepreneurship is a distinct concept that combines sustainable business strategies with entrepreneurial principles to enhance both social and business value simultaneously. It involves implementing innovative sustainability solutions for widespread adoption, benefiting society at large. This approach entails businesses continually striving to foster economic growth while enhancing societal well-being and environmental conditions (World Business Council for Sustainable Development, 2012). It is important to note that entrepreneurship, in this context, extends beyond simply establishing new ventures and encompasses creating impactful initiatives within existing businesses (Weidinger et al., 2013).

Defining Sustainable Entrepreneurship (SE) remains challenging due to its complexity and the inclusion of various domains like environmental, social, and ecological entrepreneurship. SE is defined as business conducted without destroying necessary foundations and considering the future impact of the business. This complexity can lead to a conceptual labyrinth, making it essential to find a simple definition for this complex topic (Bickley et al., 2024). Sustainable entrepreneurship encompasses a business strategy that restores resources, including environmental and human resources, and generates value and prosperity for all stakeholders through ethical and equitable acts. This strategy places greater emphasis on long-term environmental and social results in comparison to short-term economic objectives, so ensuring that long-term environmental and social repercussions hold the same significance as short-term economic objectives. (Gutterman, 2018, p. 39–40).

The urgent need is to shift our economy, society, and culture towards systems and actions that promote ecological sustainability, necessitating radical transformations in decision-making and resource use. The shift towards sustainability through entrepreneurship has gained significant attention in recent years, with 78.6% of papers published between 2015 and 2019 (Bickley et al., 2024).

2.2.1 Green Business Practices

Over the past decade, there has been a noticeable surge in publications discussing green business practices, yet a lack of robust foundational material persists, often relying heavily on case studies without a clear reference framework. Corporate environmentalism, characterized by actions taken by organizations to diminish their environmental footprint throughout their life cycle, is distinguished from the broader concept of sustainability as outlined in the Brundtland Report 1987. While sustainability aims to meet present needs without compromising the ability of future generations to meet their own, corporate environmentalism serves more as a societal vision guiding academic research and management practices rather than a readily testable model (Orsato, 2009). Henriques and Sadosky (1996, 1999) propose that "environmentally responsive firms" are those that have formalized plans to address environmental concerns, suggesting that a firm's commitment to the environment is demonstrated through actions aimed at improving environmental performance (Worthington, 2013).

Sustainable entrepreneurship, characterized by the integration of environmental and social considerations into business operations, has gained significant traction in recent years as the global community grapples with pressing environmental challenges. Green business practices are central to this approach, encompassing a range of strategies aimed at reducing environmental impact while fostering long-term profitability and societal well-being. One prominent example of such practices is the implementation of renewable energy solutions within business operations. By switching to renewable energy sources like solar and wind power, businesses can mitigate their reliance on fossil fuels, thereby reducing greenhouse gas emissions and contributing to climate change mitigation (Hockerts & Wüstenhagen, 2010).

Furthermore, adopting sustainable supply chain management practices is another critical component of green business strategies. This involves optimizing procurement processes to prioritize suppliers with strong environmental and social performance records, as well as implementing measures to minimize waste and resource consumption throughout the supply chain. By engaging in sustainable supply chain management, businesses can enhance operational efficiency, reduce costs, and minimize their ecological footprint (Carter & Rogers, 2008).

Moreover, the adoption of eco-friendly product design and packaging represents another key avenue for green business practices. By designing products with recycled materials, minimizing packaging waste, and prioritizing biodegradable materials, companies can reduce the environmental impact of their products throughout their lifecycle, from production to disposal (Mont, Heijungs, & Tukker, 2017).

Green business practices are integral to the pursuit of sustainable entrepreneurship, enabling businesses to simultaneously achieve economic success and environmental stewardship. By embracing renewable energy, implementing sustainable supply chain management, and prioritizing eco-friendly product design, businesses can play a crucial role in advancing environmental sustainability while remaining competitive in a rapidly evolving marketplace (Mont, Heijungs, & Tukker, 2017; Carter & Rogers, 2008).

2.2.2 Triple Bottom Line Theory

According to Andrew Savitz (2006), the concept of the Triple Bottom Line (TBL) encompasses the measurement of an organization's impact on the world, considering its profitability, shareholder values, and its social, human, and environmental capital. This concept, often referred to as the 3P notion or People, Profit, and Planet framework, emphasizes the integration of environmental and social concerns into business practices. It aims to treat the impact of business actions on the environment and society with the same level of importance as financial performance, thereby ensuring accountability and clear evaluation of performance in these areas (Žak, 2015). Bob Willard (2012), in his book "The New Sustainability Advantage: Seven Business Case Benefits of a Triple Bottom Line", presents an updated business case emphasizing seven distinct advantages aligned with current evidence on how sustainability contributes to profitability.

For many organizations, grasping the Triple Bottom Line (TBL) concept proves challenging, as it suggests that a firm's responsibilities extend far beyond mere economic considerations. While traditional business focuses on profitability and compliance with regulations, the TBL introduces social and environmental dimensions to performance evaluation. Environmental performance evaluates resource usage and waste generation, including energy, land, water, and emissions. Social performance, on the other hand, assesses the impact of a firm and its suppliers on local communities. Measuring

performance against these criteria presents a complex undertaking, requiring careful evaluation across multiple dimensions. Overall, the triple bottom line is a concept used to measure and report a company's performance in business, social, and environmental aspects. It encompasses the values, problems, and processes a company must consider minimizing harmful effects and generate economic, social, and environmental values. In its broadest sense, it encompasses the entire set of business, social, and environmental aspects. (Žak, 2015).



Figure 2: Sustainability by Triple Bottom Line Theory (Žak, 2015).

The diagram (Figure 2) depicts sustainability as a circular relationship between three aspects: social, economic, and environmental. Social aspects, like education and community, influence the quality of life which in turn affects the environment and the economy. Economic aspects, like profit and economic growth, affect the environment through resource use and pollution prevention. Environmental aspects, like natural resource stewardship, influence the social and economic aspects by providing resources and impacting the quality of life. Essentially, all three aspects influence each other in a cycle that should be balanced for sustainability.

2.3 Digitalisation of Business

The creation of a completely digital work process means digitalization which follows three distinct steps – a. automation of a single process or operation, b. automation of related processes and joined together, and c. automation of multiple systems along with information flows that support business processes. Automation of processes or operations is the way of accumulating different technologies such as cloud computing, sensors, big data, 3D printing etc. which initiate to create radically new opportunities, products, services, and business models (Savić, 2019 cites via Matzler et al., 2016; Yasin, Hossain, Moiz Hali, & Iqbal, 2022). Digitalization by using digital information is able to lower costs, optimize business outputs and customer experiences, and even create new revenue opportunities (Savić, 2019).

In the current era of globalization and digitalization, companies are leveraging various technologies to enhance their performance and expand their business scope. Scholars like Yasin et al. (2022) and Rachinger et al. (2019) highlight the multifaceted benefits of digitalization, including optimized resource utilization, cost reduction, increased productivity, and improved supply chain efficiency. Moreover, digitalization positively impacts the value proposition and value capture aspects, leading to enhanced revenue streams (Rachinger et al., 2019). While digitalization is widely regarded as a competitive advantage, researchers such as Guo and Xu (2021) caution that its impact on financial performance in the manufacturing sector of China may not be as substantial. They argue that while digital transformation can offer competitive advantages, its effects on operating performance are more enduring than on financial performance, suggesting a nuanced understanding of its implications (Guo & Xu, 2021; Rachinger et al., 2019).

Furthermore, Jain et al. (2014) emphasizes the significant benefits of digitalization, particularly in the maintenance service industry, where digital monitoring processes enable real-time observation of work progress and data analysis, resulting in improved efficiency and customer satisfaction. This systematic approach to data collection and analysis facilitates informed decision-making by providing insights into asset performance and resource utilization (Raj Karki et al., 2022). Additionally, digitalization enhances communication processes through various tools and applications, thereby empowering managers to make efficient decisions (Liu et al., 2020). However, the successful

implementation of digitalized processes requires both managerial capability and technological expertise (Holopainen et al., 2022). Thus, while digital technologies offer the potential to enhance organizational performance, their effective utilization necessitates a comprehensive understanding of their implications and capabilities.

In the contemporary landscape of business operations, digital technology has emerged as a cornerstone for organizational success, reshaping traditional practices and fostering innovation. The integration of digital technology in business processes transcends mere automation; it revolutionizes fundamental aspects of operations, management, and customer engagement. Digital technology has become synonymous with operational efficiency in modern businesses. By streamlining processes and reducing manual intervention, digital tools enhance productivity and minimize errors (McAfee & Brynjolfsson, 2017). For instance, the implementation of Enterprise Resource Planning (ERP) systems centralizes data management, enabling real-time insights into various facets of operations such as inventory, sales, and finances (Wu et al., 2020). Moreover, the adoption of cloud computing facilitates scalability and flexibility, allowing organizations to adjust resources according to demand fluctuations without significant infrastructure investments (Gartner, 2020).

Digital technology has revolutionized contemporary business operations, fundamentally altering traditional paradigms of value creation, capture, and delivery. At the core of this transformation are the concepts of the business model and the operating model (Iansiti & Lakhani, 2020). While the business model outlines strategies for generating and capturing value, encompassing differentiation and monetization strategies, the operating model focuses on the practical execution necessary for effective goods and services delivery. These models collaborate to drive a company's strategic intent and practical execution, shaping its value proposition in the marketplace (Iansiti & Lakhani, 2020).

The value of a company is influenced by two fundamental concepts: its business model and its operating model. The business model outlines how the company plans to generate and capture value, including strategies for differentiation and monetization of goods or services. On the other hand, the operating model encompasses the systems, processes, and capabilities necessary for delivering these goods and services to customers. While the business model represents the company's strategic approach and potential value, the

operating model embodies the practical execution of these strategies, reflecting the daily activities of the company's people and resources. Ultimately, while the business model indicates the potential value a company could deliver, the operating model serves as the actual driver of company value and its primary constraint. (Iansiti & Lakhani, 2020).

Critical to the business model is value creation, which entails understanding customer needs and offering tailored solutions, while value capture ensures profitability through various revenue streams (Iansiti & Lakhani, 2020). Operating models play a vital role in translating strategic intent into practical execution, leveraging digital technology, particularly AI-driven automation, to streamline processes and enhance agility (Iansiti & Lakhani, 2020). Moreover, digital transformation extends beyond strategic objectives to drive environmental and social impact, aligning business goals with broader societal and environmental objectives (Martínez-Peláez et al., 2023). Embracing digital transformation is imperative for companies to remain competitive and achieve sustainable growth in an interconnected world.

Furthermore, digital technology empowers businesses with agility, a crucial attribute in navigating dynamic market landscapes. Through data analytics and predictive modeling, organizations gain actionable insights into consumer behavior and market trends, facilitating informed decision-making (Davenport & Harris, 2017). For example, predictive analytics enable retailers to anticipate customer preferences and optimize inventory management, thereby reducing stockouts and enhancing customer satisfaction (Verhoef et al., 2017). Additionally, agile methodologies such as DevOps enable rapid software development and deployment, fostering responsiveness to evolving customer needs and competitive pressures (Fitzgerald & Stol, 2020).

The pervasive influence of digital technology on contemporary business operations cannot be overstated. From enhancing efficiency through automation and centralized data management to fostering agility through predictive analytics and agile methodologies, digital technology underpins organizational success in the digital age. Embracing digital transformation is no longer a choice but a necessity for businesses striving to remain competitive and resilient in an increasingly digitalized marketplace. (Fitzgerald & Stol, 2020; Verhoef et al., 2017; Davenport & Harris, 2017).

2.4 AI as a Part of Digitalization

Artificial Intelligence (AI) is a technology that simulates human intelligence through algorithms and computer systems. It includes machine learning, natural language processing, and robotics, enabling machines to perform tasks like problem-solving and decision-making. AI drives innovation by improving efficiency and automating complex processes. Its integration into digital platforms fosters new business models and services, contributing to digital transformation and promoting sustainable entrepreneurship, economic growth, and global challenges through intelligent, data-driven solutions. (Iansiti & Lakhani, 2020; Bickley et al., 2021; Willington, 2020; Minoli & Occhiogrosso, 2024)

2.4.1 What is Artificial Intelligence?

The advancement of AI has already reached a point where it significantly drives the rapid growth of companies like Facebook and Tencent, despite not being highly sophisticated. Achieving transformative changes through AI does not require it to replicate human behaviour or reasoning perfectly, a concept known as strong AI. Instead, what is necessary is a computer system capable of performing tasks traditionally done by humans, termed weak AI. This imperfect form of AI is already capable of reshaping businesses by undertaking tasks such as content prioritization on social networks, customer behaviour analysis, pricing optimization, and even artistic endeavours like painting in the style of Rembrandt. Thus, even with its limitations, weak AI has the potential to fundamentally transform the nature of firms and their operations. (Iansiti & Lakhani, 2020).

John McCarthy is widely regarded as a key figure in Computer Science and Artificial Intelligence (AI). He earned the title of "father of Artificial Intelligence" for his significant contributions to the field. In the 1950s, McCarthy introduced the term "Artificial Intelligence," defining it as the discipline concerned with creating intelligent machines through science and engineering (McCarthy, 2007, p. 2; Willington, 2020). Artificial intelligence is the study of how digital computers and algorithms solve complex problems that require human intelligence to adapt to changing circumstances. This is crucial for organizations, as they often struggle with significant systematic changes. The definition, scope, and focus of AI research and innovation have evolved over time (Bickley et al., 2021). Russell and Norvig (2010) identified four main approaches to AI: thinking humanely,

thinking rationally, acting humanely, and acting rationally. AI and IT are expected to boost productivity, reduce costs, and prevent hazardous situations. These advancements aid in organizational intelligence, aiding in information provision and interpretation. Information helps in understanding policy changes, monitoring company dynamics, and preparing for the future. Top management relies on external environmental information for effective survival. (Bickley et al., 2021).

One method of categorizing AI involves dividing it into narrow AI and general AI, with general AI also referred to as artificial general intelligence (AGI) (Minoli & Occhiogrosso, 2024). **Narrow AI** aims to automate human-performed tasks to increase productivity and endurance. Implemented as software that automates analytical tasks, narrow AI comprises the majority of AI applications. Its objective is to accomplish duties one at a time. On the other hand, **General AI** aims to teach machines to understand and assess various parameters, issues, and processes in an ecosystem. It uses dynamic learning instead of prescriptive training, enabling decisions based on experience and pragmatics. Researchers aim to achieve AGI through advanced DL mechanisms, and various tests assess an AGI system's intelligence (Minoli & Occhiogrosso, 2024). Advanced AI fields include cognitive computing systems and natural language processing (NLP)/natural language understanding (NLU), which work together under the rubric of generative AI. Cognitive computing systems aim to understand and emulate human behavior while providing an intuitive interface. NLP systems enable machines to understand written language or voice commands and support natural language generation, enabling them to communicate in "spoken conversation." Related fields include automatic speech recognition (ASR), which transforms audio data associated with speech into a token or textual representation, and Text-to-Speech (TTS), which transforms textual data into audio data resembling quality human speech. AI is also widely used in automated content generation systems in various industries. (Minoli & Occhiogrosso, 2024).

Machine learning (ML) involves sophisticated algorithms that analyze data, draw insights from it, and use those insights to make informed decisions. Its objective is to gain knowledge from experience by deriving actionable conclusions and decisions from past data, with ML techniques increasingly applied across various domains such as IoT, healthcare, and video analytics. ML encompasses tasks like classification (sorting items into categories) and regression (identifying correlations between features and outcomes). **Deep**

learning (DL), a subset of ML, mimics human learning using neural networks (NNs), which operate akin to neurons in the human brain, allowing for complex computational tasks. (Minoli & Occhiogrosso, 2024).

Table 2: Learning Philosophies

Term	Definitions/Explanations/Concepts
Machine Learning (ML)	This describes AI applications that learn and develop through experience, rather than relying solely on programmed instructions for every possible scenario. Machine learning programs access data to improve their performance, with machine learning models (MLMs) using algorithms to generate predictions or inferences based on input data. These systems dynamically learn and adapt to generate insights from datasets.
Deep learning (DL)	Deep learning (DL), also known as deep neural learning or representation learning, is a subset of machine learning (ML) that operates similarly but employs artificial neural networks (ANNs). DL algorithms include various methods such as neural networks, support vector machines (SVM), decision trees, and more, enabling complex pattern recognition and analysis tasks.

(Minoli & Occhiogrosso, 2024).

Minoli and Occhiogrosso (2024) provide a concise summary of the learning philosophies inherent in Machine Learning (ML) and Deep Learning (DL) in Table 2 of their work. This table elucidates the fundamental concepts associated with ML and DL, offering definitions and explanations of key terms such as Artificial Narrow Intelligence (ANI), support vector machines (SVM), and decision trees. By presenting these concepts in a structured format, the table serves as a valuable reference for understanding the essence of ML and DL, as well as their respective applications and methodologies. Additionally, the table aids in clarifying the distinctions between ML and DL, thereby facilitating comprehension of these critical components of artificial intelligence research and practice.

Artificial Narrow Intelligence (ANI), also known as weak AI or applied artificial intelligence (AAI), is specialized in performing specific tasks within defined areas like facial and voice recognition or driving (Kaplan & Haenlein, 2019; Paschen, Pitt, & Kietzmann, 2020, p.153). While it enhances human life, it carries risks such as disrupting electric grids or causing accidents if malfunctioning (Tai, 2020). Artificial General Intelligence (AGI) surpasses ANI by being capable of reasoning and autonomously solving problems not pre-programmed. It can learn and understand any intelligent task, possibly exceeding human performance (Kaplan & Haenlein, 2019; Tai, 2020). Artificial Superintelligence (ASI), the highest form of AI, is depicted in science fiction as surpassing human knowledge and abilities, instantly solving complex problems across multiple domains. However, ASI remains theoretical and speculative for now (Kaplan & Haenlein, 2019; Paschen et al., 2020).

This research focus on the role of AI applications in various businesses. Some areas where AI being used to the following: network operations monitoring, network management, predictive maintenance, network security and fraud mitigation, customer service, virtual assistants, chatbots, Intelligent Customer Relationship Management systems, and intelligent automation based on AI-supported Robotic Process Automation (Minoli & Occhiogrosso, 2024).

2.4.2 AI and Sustainable Entrepreneurship

AI contributes significantly to environmental sustainability within the realm of sustainable entrepreneurship by offering innovative solutions to mitigate environmental degradation and promote eco-friendly practices. For instance, AI-powered algorithms facilitate the optimization of resource utilization, energy efficiency, and waste management, thereby reducing carbon emissions and ecological footprint (Gupta & George, 2020). By leveraging AI-driven insights, entrepreneurs can develop sustainable products, services, and business models that align with environmental conservation goals (Gandomi & Haider, 2020). Additionally, AI technologies enable the monitoring and analysis of environmental data, empowering entrepreneurs to make informed decisions that minimize environmental impact throughout the value chain.

In terms of business efficiency, AI enhances the operational effectiveness and competitiveness of sustainable ventures by streamlining processes, improving decision-

making, and optimizing resource allocation. Automation of routine tasks, predictive analytics, and intelligent algorithms enable entrepreneurs to enhance productivity, reduce costs, and improve overall performance (Bapna et al., 2021). AI-driven insights facilitate real-time monitoring of supply chains, customer behavior, and market dynamics, enabling agile and data-driven decision-making processes (Liu et al., 2019). Consequently, sustainable entrepreneurs can allocate resources more efficiently, enhance scalability, and adapt to evolving market conditions, thereby fostering long-term viability and growth.

Bican and Brem (2020) underscore the critical role of digitalization, particularly AI, in advancing the United Nations Sustainable Development Goals (SDGs) by transforming sustainable entrepreneurship. They elucidate how AI can optimize resource utilization, enhance energy efficiency, and foster innovation within sustainable ventures, thereby driving inclusive growth, promoting social equity, and contributing to the UN SDGs. This review lays the groundwork for a comprehensive understanding of how AI applications strategically align with sustainable entrepreneurship, offering valuable insights for researchers, policymakers, and businesses navigating the evolving landscape of digitalization and sustainability. Fuerst et al. (2023) further emphasize the potent combination of digital technologies and sustainability, heralding a new era of transformative potential, particularly within sustainable entrepreneurship. They highlight how digital technologies, including AI, create fresh possibilities for entrepreneurs focused on economic, social, and environmental sustainability, enabling social inclusion, poverty reduction, and improved resource management. Additionally, Iansiti and Lakhani (2020) highlight the transformative power of AI in reshaping business operations, even with so-called "weak AI" systems, which can revolutionize tasks traditionally performed by humans and drive substantial impacts on growth and efficiency, as evidenced by the success of companies like Facebook and Tencent.

Moreover, AI plays a crucial role in promoting social responsibility within sustainable entrepreneurship endeavors by facilitating inclusive innovation, personalized customer experiences, and community engagement. By analyzing vast datasets and understanding diverse stakeholder needs, entrepreneurs can develop solutions that address social challenges while creating shared value (Mishra & Sinha, 2021). AI-powered platforms enable personalized services, accessibility, and inclusivity, thereby enhancing customer satisfaction and social impact (Cohen & Winn, 2007). Furthermore, AI technologies

empower entrepreneurs to engage with communities, stakeholders, and employees in meaningful ways, fostering transparency, trust, and social cohesion.

Finally, the relations and roles of AI in sustainable entrepreneurship are multifaceted and dynamic, encompassing environmental sustainability, business efficiency, and social responsibility. By harnessing the power of AI technologies, entrepreneurs can innovate, operate sustainably, and create value for stakeholders while addressing pressing global challenges. However, realizing the full potential of AI in sustainable entrepreneurship requires careful consideration of ethical, social, and environmental implications, as well as proactive measures to mitigate risks and maximize benefits. (Mishra & Sinha, 2021; Cohen & Winn, 2007; Fuerest et al., 2023)

2.5 Technology Acceptance Model

The Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action (TRA), designed to explain individuals' acceptance or refusal of new technology. TAM posits that people's intention to engage with technology is influenced by their perception of its usefulness (PU) and ease of use (PEOU). While PU reflects the belief that a technology enhances job performance, PEOU refers to the perception of minimal effort required for its use. TAM is widely utilized in information system research to understand behavioral intentions. It incorporates external variables such as system design, user attributes, task characteristics, and organizational structures, which may impact PU and PEOU. Furthermore, TAM suggests that the intention to adopt technology influences its actual utilization, which, in turn, affects the intention to continue using it. Factors like PU and PEOU play crucial roles in both initial adoption and continuance intention, with users' experiences potentially influencing the decisions over time. (Putro & Takahashi, 2024).

The Technology Acceptance Model (TAM) suggests that a computer system's acceptance depends on two factors: perceived usefulness and perceived ease of use. It emphasizes that the product's creator may believe it's useful and user-friendly, but it won't be accepted by potential users unless they share these beliefs. This model emphasizes the importance of user perceptions in determining acceptance (Thompson, 2019). TAM posits that technology acceptance is a tripartite procedure in which cognitive responses (perceived usefulness and ease of use) are provoked by external factors (system design features),

which subsequently generate an effective response (attitude toward technology usage/intention) that exerts an influence on usage behavior (Davis, 1985).

TAM provides insights into the factors influencing the acceptance and utilization of technology, offering a nuanced understanding of the decision-making processes surrounding AI implementation in the context of sustainable entrepreneurship. By amalgamating these theories, the framework aims to holistically explore the multifaceted dimensions of AI's impact on green business practices, providing a comprehensive and insightful guide for future research endeavours in this evolving field.

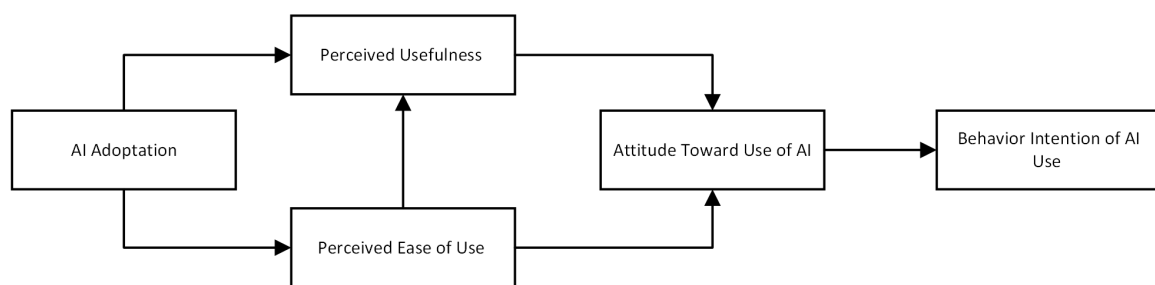


Figure 3: Technology Acceptance Model for AI Adoption

Figure 3 illustrates the process and outcomes of AI adaptation, along with the relationship between perceived knowledge and behavioral intention regarding AI use in professional contexts. This depiction is grounded in the Technology Acceptance Model (TAM) theory, ensuring that the depicted outcomes align with established theoretical frameworks. Furthermore, the figure elucidates the interdependence between perceived usefulness and ease of use, highlighting the mutual influence these factors exert on each other within the context of AI adoption and utilization. By visually representing these relationships, Figure 3 provides valuable insights into the dynamics of AI acceptance and integration in professional settings, serving as a foundational reference for further analysis and discussion.

2.6 AI in Green Business Practices

AI encompasses a spectrum of applications that can revolutionize sustainability efforts within businesses. One notable application lies in predictive analytics, where AI algorithms analyze vast datasets to forecast environmental trends, enabling proactive decision-making (Feng et al., 2020). For instance, AI-driven models can predict energy consumption patterns, allowing companies to optimize energy usage and minimize carbon emissions. Additionally, AI-powered optimization algorithms are instrumental in streamlining supply chain operations, facilitating the efficient allocation of resources and reduction of waste (Schwartz et al., 2019). Moreover, AI-enabled monitoring systems enhance environmental compliance by continuously monitoring emissions and identifying deviations from regulatory standards in real-time (Shin et al., 2021).

The integration of AI into green business practices offers multifaceted benefits. Firstly, AI-driven insights enable companies to identify inefficiencies and implement targeted interventions for resource conservation, thereby reducing operational costs (Schwartz et al., 2019). Secondly, AI facilitates the development of smart infrastructure capable of autonomously adapting to environmental changes, thereby enhancing resilience and sustainability (Feng et al., 2020). Furthermore, by optimizing processes and minimizing waste, AI contributes to the overall competitiveness and profitability of green businesses (Kiron et al., 2018). Ultimately, the strategic deployment of AI fosters innovation and drives the transition towards a more sustainable economy.

Explainable AI provides transparency in AI decision making, perception, learning, and behaviours, but its potential to refine human perception, decision making, reasoning, and observed behaviours remains unclear, as per Kerstholt et al., 2019. It is uncertain whether this is used to further build and refine theories of human perception, decision making, reasoning, and observed behaviours (Bickley et al., 2021). This research critically analyses case studies and research findings on how AI is utilized to enhance green business practices. The era of AI is marked by companies leading a significant shift in industrializing processes related to data collection, analysis, and decision-making, fundamentally reinventing the core operations of modern firms (Iansiti & Lakhani, 2020).

Despite its transformative potential, the widespread adoption of AI in green business practices is not without challenges. One significant concern pertains to data privacy and

security, as AI systems rely heavily on sensitive data for analysis (Shin et al., 2021). Ensuring the ethical collection, storage, and usage of data is paramount to maintain stakeholder trust and compliance with regulatory frameworks. Moreover, the accessibility and affordability of AI technologies pose barriers to entry for small and medium-sized enterprises (SMEs), limiting their capacity to leverage AI for sustainability (Kiron et al., 2018). Addressing these challenges necessitates collaborative efforts between policymakers, businesses, and technology developers to promote equitable access and ethical AI deployment.

The integration of AI represents a paradigm shift in advancing green business practices, offering unprecedented opportunities to enhance sustainability across industries. By harnessing the predictive capabilities of AI, businesses can optimize resource utilization, reduce waste, and mitigate environmental impacts. However, realizing the full potential of AI in sustainability requires addressing challenges related to data privacy, accessibility, and ethical considerations. Through concerted efforts and innovative solutions, AI stands poised to drive the transition towards a more environmentally conscious and resilient global economy. (Kiron et al., 2018; Shin et al., 2021; Iansiti & Lakhani, 2020)

2.7 Summary of Literature Review

By integrating the TBL framework and TAM, this theoretical framework aims to provide a holistic understanding of the interplay between sustainable entrepreneurship, technology adoption, and environmental management, particularly in the context of AI adoption. The TBL lens enables the evaluation of business practices across economic, social, and environmental dimensions, while TAM offers insights into the determinants of AI adoption among entrepreneurs. By synthesizing these theories, the framework seeks to elucidate how AI can facilitate the adoption of green business practices, contributing to both theoretical advancements and practical applications in sustainable entrepreneurship.

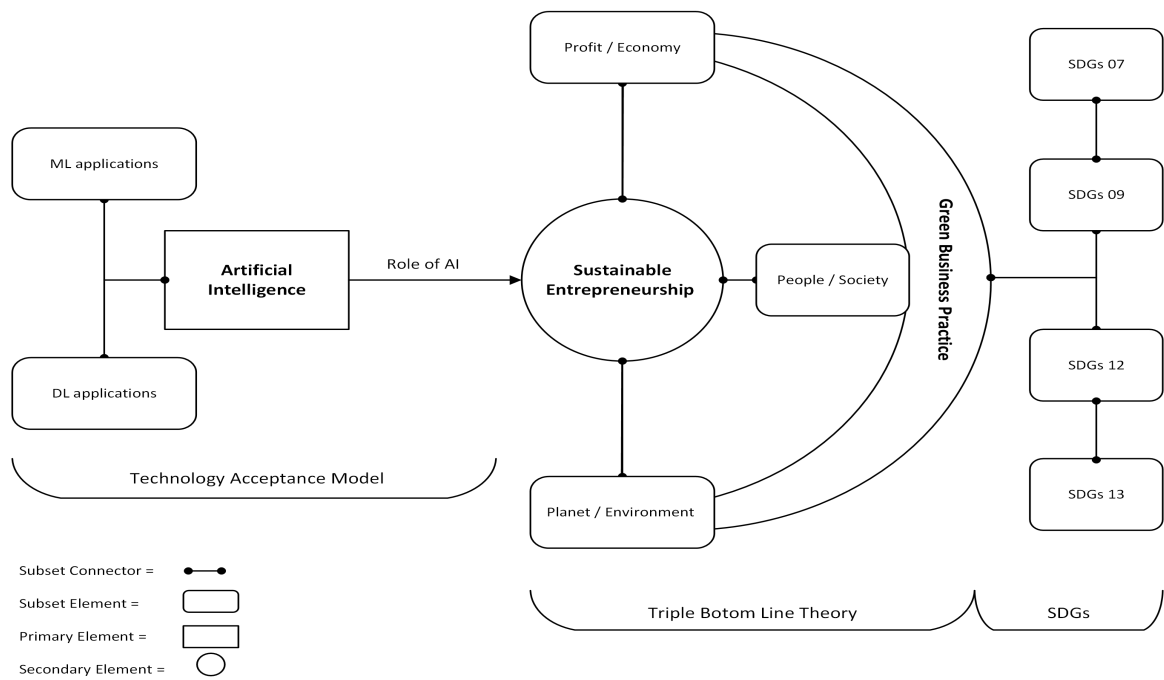


Figure 4: Diagram of Theoretical Framework for Data Analysis

Figure 4 presents the theoretical framework for data analysis, encompassing the conceptual framework of AI within the context of the Technology Acceptance Model (TAM) and its role in promoting sustainability. This framework integrates the principles of sustainable entrepreneurship as explained by the Triple Bottom Line (TBL) theory, which emphasizes the balance of profit, people, and planet. Additionally, the figure delineates green business practices, aligning them with specific Sustainable Development Goals (SDGs), particularly SDGs 07, 09, 12, and 13 (United Nations, 2015). These elements collectively underscore the interplay between sustainable entrepreneurship, green business practices, and the SDGs within the TBL theory. The directional arrows in the figure illustrate the effective relationship between AI and sustainable entrepreneurship, highlighting how AI can drive green business practices along with SDGs.

This research seeks to develop a robust theoretical framework that synthesizes key theories in sustainable entrepreneurship, technology adoption, and environmental management, with a focus on assessing AI's role in promoting green business practices. At its core, the Triple Bottom Line theory serves as the foundational lens for understanding sustainable business practices, emphasizing the integration of economic, social, and environmental considerations. Building upon this, the proposed framework incorporates the Technology Acceptance Model (TAM), first proposed by Fred Davis in 1985, to delve into the intricacies of AI adoption by entrepreneurs (Putro & Takahashi, 2024).

3 Methodological Approaches

This research adopts a qualitative approach to delve into the subjective experiences, perspectives, and attitudes of stakeholders involved in sustainable entrepreneurship and AI technology (Creswell & Poth, 2018). The methodology involves analyzing podcast interviews available on platforms such as YouTube, focusing on discussions related to AI and sustainable entrepreneurship.

Frank Lloyd Wright emphasized that design should fit both its use and environment, requiring continuous assessment and adjustments to ensure the study achieves desired outcomes (Flick, 2022). In the second part of the thesis, the research questions posed initially are addressed by analyzing interviews with different professionals and experts. This analysis provides practical insights into the applications and effects of artificial intelligence in sustainable business practices, particularly focusing on its role in green business initiatives. Additionally, this section incorporates a study of thematic analysis regarding AI, sustainable business, green business, and related topics, to gauge opinions on the role of AI in these fields (Flick, 2022).

The research employs various methodological approaches to investigate its objectives. These approaches guide the systematic collection and analysis of data, ensuring a robust and rigorous research methodology. By employing diverse methods, the study aims to enhance the validity and reliability of its findings, contributing to a comprehensive understanding of the chosen research topic.

3.1 Qualitative Research

Qualitative research aims to describe real-life phenomena and study them comprehensively, relying on existing values that shape our understanding. Traditional objectivity is not possible in qualitative research, as the researcher and knowledge gained are dependent on each other. It focuses on finding or revealing facts rather than verifying existing ones (Kovalainen, 2012). Qualitative research is part of the interpretivist paradigm, which focuses on understanding and unmasking the meaning individuals assign to their actions in a social setting. Qualitative research serves as an invaluable tool for understanding complex processes or issues, allowing researchers to delve deeply into the

nuances of a problem before devising solutions or theories (Horvat, 2015). This approach is particularly pertinent in emerging fields such as Sustainable Entrepreneurship in the Digital Age, where the integration of artificial intelligence (AI) into green business practices introduces novel challenges and opportunities. By employing methods such as thematic analysis, researcher can delve into the nuances of this emerging field, uncovering insights into motivations, barriers, and potential strategies for leveraging AI in sustainable ventures. Through this process, researcher can gain a deep understanding of the origins and intricacies of the problem, laying the groundwork for informed decision-making and innovative solutions (Creswell & Poth, 2018). Therefore, qualitative research method has been chosen for this research.

3.2 Data Collection Methods

As the field of AI technology continues to experience rapid growth, accessing specialists in the sustainable business sector can be challenging. Therefore, this research utilizes various interviews or episodes available only on TEDx Talks, a YouTube channel, though there are many renowned other channels such as GreenBiz, World Economic Forum, and MIT Sloan School of Management. TEDx Talks has enough episodes on AI, sustainable entrepreneurship, and green business practices that helps to maintain consistency and transparent. The selection criteria prioritize interviews featuring experts, entrepreneurs, researchers, students and thought leaders discussing the intersection of AI and environmental sustainability (Smith, 2018).

3.2.1 Selection of Podcast Interviews

Podcast episodes are chosen based on their alignment with the research themes of AI, sustainable entrepreneurship, and green business practices. Criteria for selection includes the reputation of the channel, the expertise of the interviewee, and the depth of discussion on relevant topics. Episodes from reputable channels known for hosting informative discussions on sustainability issues is preferred. These may include TEDx talks, GreenBiz podcasts, World Economic Forum discussions, and content from the MIT Sloan School of Management. The focus is on interviews that provide insights into the practical applications of AI in fostering sustainability and environmentally conscious business practices. Podcast interviews from only TEDx Talks are taken from youtube.

TEDx Talks (considered as TEDx) are independently organized events licensed by TED, a non-profit organization dedicated to spreading ideas in the form of short, featuring diverse speakers and topics to spark conversation and inspire innovation. The "x" signifies these events are community-driven, promoting inclusivity and tailoring to local interests. Talks cover various fields like science, technology, and culture, delivered in engaging 18-minute presentations. Filmed and shared online for free, TEDx Talks reach a global audience, fostering discussions and connections. These events serve as platforms for transformative experiences, showcasing impactful ideas that shape our world. Whether attending in person or online, TEDx offers a glimpse into diverse perspectives and ground-breaking concepts. (TED Conferences, n.d.).

3.2.2 Data Extraction

Transcripts of the selected podcast interviews are obtained for detailed analysis. Relevant sections of the interviews discussing AI applications, sustainable entrepreneurship, and green business practices is extracted for closer examination. The extraction process involves identifying segments and searching key words that address key research questions and themes related to the role of AI in driving sustainability initiatives within the business sector. These transcripts serve as the primary data source for conducting thematic analysis.

3.3 Data Analysis Techniques

The first method of analysis is done by following the method of qualitative content analysis which is an inductive approach that involves analysing qualitative data to identify themes, categories, or concepts that emerge from the data (Lindgren et al., 2020; Miles & Huberman, 1994; Thomas, 2006). This was done by examining the discussions taken place on episodes of a podcast namely TEDx Talks in YouTube which is one of the podcasts produced by an international community named TEDx. The discussions in these podcast episodes revolve around many subjects related to the application, adoption, and expectation of AI in green business and sustainable entrepreneurship.

Transcripts of selected YouTube podcast episodes serve as the primary source of qualitative data for analysis. These transcripts are obtained through transcription services or manual transcription, ensuring accuracy and completeness of the textual data. Each

transcript is carefully reviewed to identify relevant discussions pertaining to the application, adoption, and expectations of AI in green business and sustainable entrepreneurship. The transcripts serve as the foundational material for subsequent analysis techniques.

Thematic analysis, as outlined by Lindgren et al. (2020), Miles and Huberman (1994), and Thomas (2006), is employed as the primary method of qualitative analysis. This inductive approach involves systematically identifying themes, categories, or concepts that emerge organically from the qualitative data. Through iterative reading and coding of the transcripts, themes related to AI's role in green business practices and sustainable entrepreneurship are identified and categorized. This process enables the researchers to gain a deeper understanding of the key issues, challenges, and opportunities surrounding the intersection of AI and sustainability.

In addition to analyzing the content of the podcast episodes, **observational techniques** are utilized to supplement the thematic analysis. Researchers pay close attention to non-verbal cues, tone of voice, and other contextual factors present in the podcast discussions. Observations may include identifying patterns in speakers' behavior, detecting underlying emotions or attitudes, and noting any instances of agreement or disagreement among participants. These observations enrich the qualitative analysis by providing additional insights into the dynamics of the conversations and the nuances of the topics discussed. Observation about the qualitative nature of people's actions allowed the researchers to understand and reframe the problem (Hovert, 2015).

3.3.1 Thematic Analysis

Thematic analysis is employed to systematically analyze the extracted data and identify key themes and concepts (Braun & Clarke, 2006). This method allows for the exploration of nuanced relationships between AI technology and sustainable entrepreneurship, enabling the identification of emerging trends and issues.

The purpose of thematic analysis is to gain more information about a limited target, often more holistically. Qualitative research starts by describing real-life realities and selecting discretionary samples. Researchers often engage with the subjects and make well-founded interpretations (Moilanen et al., 2022). Thematic analysis stands as a cornerstone method

within qualitative research, offering a systematic approach to analyzing textual data and identifying patterns of meaning. Among its various approaches, the inductive method holds a distinct position, emphasizing the bottom-up exploration of data without preconceived categories or theoretical frameworks (Braun & Clarke, 2006). This methodological stance aligns with the constructivist epistemology, which posits that knowledge is actively constructed by individuals in interaction with their social and cultural contexts (Charmaz, 2006). By adopting an inductive approach, researchers acknowledge the dynamic and context-dependent nature of meaning-making processes, allowing for a nuanced exploration of phenomena from the ground up.

The process of conducting thematic analysis through the inductive method typically involves several interrelated steps, beginning with familiarization with the data and concluding with the interpretation and presentation of findings (Braun & Clarke, 2006). Initially, researchers immerse themselves in the data through repeated readings, noting patterns, phrases, and ideas that stand out. This phase of open coding allows for the identification of initial themes, which are subsequently refined and organized into a coherent thematic framework through processes of axial coding and thematic mapping (Nowell et al., 2017). Throughout these iterative stages, researchers engage in constant comparison, examining similarities and differences within and across themes, while also considering the broader socio-cultural context that shapes participants' experiences.

Despite its inherent strengths, the inductive method of thematic analysis is not without its challenges and considerations. One notable challenge pertains to the subjective nature of interpretation, as researchers must navigate their own biases and assumptions throughout the analytic process (Braun & Clarke, 2006). Additionally, the iterative and time-intensive nature of thematic analysis may pose practical constraints for researchers, particularly in terms of data management and analysis (Nowell et al., 2017). Moreover, ensuring the trustworthiness and rigor of findings remains a perennial concern, necessitating transparency in reporting and reflexivity in researcher positioning (Braun & Clarke, 2013).

Thematic analysis through the inductive method offers a robust yet flexible approach to exploring patterns of meaning within qualitative data. Grounded in the principles of openness, reflexivity, and methodological rigor, the inductive approach enables researchers to uncover rich insights into the complexities of human experiences and

phenomena. By embracing the iterative process of data immersion, coding, and theme development, researchers can generate nuanced understandings that resonate across diverse research domains. Continued dialogue and collaboration among qualitative researchers are essential for refining methodological practices, addressing emerging challenges, and advancing theoretical frameworks within the realm of thematic analysis. (Braun & Clarke, 2006; Nowell et al., 2017; Moilanen et al., 2022).

3.4 Validity and Reliability

Ensuring the validity and reliability of qualitative research is critical to establishing the credibility and trustworthiness of the study's findings. Validity in qualitative research refers to the accuracy and truthfulness of the data and the extent to which the findings accurately represent the phenomena being studied (Creswell & Poth, 2018). In this study, validity is enhanced through triangulation (Flick, 2022), involving multiple sources of data, such as different podcast episodes from TEDx Talks, to provide a comprehensive view of AI's role in sustainable entrepreneurship. As member checking is hard to do due to using open-source data, the direct speech of presenters is quoted as a supplementary of validation during data analysis (Birt et al., 2016; Lincoln & Guba, 1985). Moreover, the transcription is prepared with the time span for ensuring more transparency. This iterative process helps in refining the themes and categories derived during thematic analysis, bolstering the study's internal validity. Additionally, providing detailed descriptions of the research context, participants, and data collection methods helps to establish a clear and transparent audit trail, allowing others to assess the study's validity (Birt et al., 2016; Lincoln & Guba, 1985).

Reliability in qualitative research pertains to the consistency and dependability of the research process and findings. To achieve reliability, this study employs a detailed documentation process such as maintaining an excel file of 25 transcripts along with time span including details of presenter and video link, ensuring that data collection and analysis procedures are systematically transparent and replicable (Gibbs, 2007; Creswell & Poth, 2018). The use of a coding framework during thematic analysis helps maintain consistency in how data are interpreted and categorized (Braun & Clarke, 2006). Furthermore, conducting intercoder reliability check with the help of research supervisor, where supervisor independently code and cross check the same data, helps to enhance the

consistency and reliability of the coding process (Miles, Huberman, & Saldaña, 2014). Moreover, the link of videos, transcripts, and other information are open and shared to all that can be used for reliability check based on data analysis process.

Ensuring both validity and reliability in this research involves continuous reflection and adherence to rigorous methodological standards. Peer debriefing involves discussing the research process and findings with colleagues or mentors who provide critical feedback and alternative perspectives, helping to identify any potential biases or assumptions that may influence the research (Lincoln & Guba, 1985). Reflexivity requires the researcher to continually reflect on their own role, potential biases, and the impact of their interactions with the research data and participants (Finlay, 2002; Berger, 2015). This self-awareness, combined with transparent reporting of methods and findings, contributes to the credibility and trustworthiness of the study (Nowell et al., 2017). By integrating these strategies, the research provides a robust and reliable understanding of how AI technology intersects with sustainable entrepreneurship, offering valuable insights grounded in the authentic experiences and perspectives of stakeholders.

4 Analysis and Results

This chapter presents a comprehensive examination of the data collected and the insights derived from it, focusing on the research aim and questions. This chapter begins with an overview of the data, providing a foundation for the subsequent analysis. The findings section is divided into several key areas complying the theoretical framework. Through detailed exploration and data-driven insights, this chapter aims to elucidate the intricate relationships between AI, sustainability, and entrepreneurship, providing valuable findings for researchers, practitioners, and policymakers.

4.1 Overview of Data

Qualitative data was gathered from the YouTube channel "TEDx Talks," which encompasses a broad spectrum of topics, igniting thought-provoking discussions and nurturing connections. These talks showcase a diverse range of speakers who share ideas, anecdotes, and insights through engaging, concise presentations lasting 18 minutes or less. To identify

relevant videos, specific keywords related to the research topic were utilized for searching within the TEDx channel.

The list of **search keywords** included: Sustainable Entrepreneurship, Green Business, AI in Green Business Practice, AI in Sustainable Development, AI in Business, AI and Sustainable Development Goals, AI Adaptation in Business, AI Opportunities and Challenges.

Following the keyword search, videos pertinent to the research topic were carefully selected. Details of each collected video, including presenter information, duration, and the video link (see Table 3), were compiled into a list. Subsequently, the videos were randomly coded using the format TEDx00 and categorized by sub-topics such as AI Adoption, Role of AI, Sustainable Entrepreneurship, and Green Business Practices (see Figure 5) based on theoretical framework.

Table 3: List of videos in details

Code	Video Title	Interviewee	Duration	Link
TEDx01	Artificial Intelligence and the Future of Business	Hans-Christian Boos Founder of Arago in Germany in 1995	15,44	https://www.youtube.com/watch?v=5NlmdoHzmrw
TEDx02	How AI is changing Business: A look at the limitless potential of AI	Anirudh Kala expert in Machine Learning techniques, Artificial Intelligence, creating predictive models	11,25	https://www.youtube.com/watch?v=vqXjw5jxHnE
TEDx03	AI Superpowers for Sustainability	Michael Berns Director for AI & FinTech at PwC	15,51	https://www.youtube.com/watch?v=mVYAbVQ3dJY&t=160s
TEDx04	AI in small businesses	Yuktav Srinivas currently a senior at KC High international school semi-competitive single-scul rower	12,51	https://www.youtube.com/watch?v=qnQBr0KSLSA&t=123s
TEDx05	The Adaptive Age: AI's New Frontier	Chad Lane With over 20 years of hands-on experience	16,30	https://www.youtube.com/watch?v=OwiZKb3oW3o
TEDx06	How to Solve the UN's Sustainable Development Goals in 5 minutes	Léonard Bousioux PhD from MIT and the University of Washington	5,47	https://www.youtube.com/watch?v=i0vCXMFxIOk

TEDx07	Building AI with Climate Conscience: Prioritizing People and Planet	Longtong Dafyak engineer and researcher	8,02	https://www.youtube.com/watch?v=fID9ScMQG7Q
TEDx08	Sustainable Business	Frank Wijen Expert in sustainable business practices	16,48	https://www.youtube.com/watch?v=Y5fR_KAVRMo&t=25s
TEDx09	The Future Of Sustainability And Entrepreneurship	Bernard Eng a sustainability entrepreneur	11,03	https://www.youtube.com/watch?v=YfZ2r3KQrEU
TEDx10	Sustainable business: It's not just about the why	Jeremy Moon Leading outdoor clothing producer and exporter in New Zealand	16,39	https://www.youtube.com/watch?v=azM4n0zf4jw
TEDx11	Sustainability through Entrepreneurship	Nichatorn (Belle) Tangkuptanon Student and an entrepreneur at heart	7,46	https://www.youtube.com/watch?v=J3uJlgbLtyA&t=85s
TEDx12	The Gateway to Sustainable Entrepreneurship	Rhea Mazumdar Singhal Indian entrepreneur	11,30	https://www.youtube.com/watch?v=Jxde5YswYfA
TEDx13	Sustainable is Profitable	Björn Söderberg started a recycling company in Nepal	10,15	https://www.youtube.com/watch?v=NnVG2sotxrY
TEDx14	Developing Sustainable Entrepreneurship	Rhea Mazumdar Singhal an Indian entrepreneur	10,15	https://www.youtube.com/watch?v=NnVG2sotxrY
TEDx15	Sustainability and Innovation: Uncovering the Problem	Jessica Vieira an Indian entrepreneur	10,15	https://www.youtube.com/watch?v=NnVG2sotxrY
TEDx16	Green Business: The Path to Zero Carbon Capitalism	Nyleve Henry CEO of a Fashion/Tech startup	13,28	https://www.youtube.com/watch?v=FM6DXMWuNQ8
TEDx17	The New Green Business Model for Sustainable Finance	Peter C. Fusaro a best selling author, keynote speaker and thought leader	19,23	https://www.youtube.com/watch?v=GoVXV8q8hQ4
TEDx18	Defining Sustainability: Absolutely	Anjila Hjalsted environmental engineer and anthropologist	11,30	https://www.youtube.com/watch?v=B-dCmbViDEQ
TEDx19	How Data & AI Can Help Our Sustainable Future	Dr. Georgios Leontidis Interim Director for Data and AI at the University of Aberdeen in Scotland, UK	12,14	https://www.youtube.com/watch?v=CBwUphHn1Ew&t=155s

TEDx20	How AI can contribute to a sustainable future and help achieve SDGs	Sahil Pareek working towards achieving SDGs through AI	10,04	https://www.youtube.com/watch?v=H2-o7dM05gU
TEDx21	How modern technology can make our society more sustainable	David Lais founder of a German NGO for Sustainable Consumption (Organisation fuer nachhaltigen Konsum - OfnK).	7,42	https://www.youtube.com/watch?v=IQs9EohZNto
TEDx22	Opportunities and Challenges of Artificial Intelligence	Dung Ngô Ngọc Eighth-grade student from Western International School System (WASS)	7,59	https://www.youtube.com/watch?v=VpMwBSqU-ag
TEDx23	How Artificial Intelligence creates opportunity for all	Jamila Gordon CEO and Founder of Lumachain, a technology platform	5,55	https://www.youtube.com/watch?v=PwEo7gOweP8
TEDx24	Generative AI is just the Beginning AI Agents are what Comes next	Daoud Abdel Hadi Machine Learning Engineer at EastNets	13,15	https://www.youtube.com/watch?v=z7-fPFtgRE4
TEDx25	Artificial Intelligence and the Environment	Scott Switzer senior Electrical Engineering student at the University of British Columbia	8,02	https://www.youtube.com/watch?v=9LvHI9lI9No

From Table 3, the total episode number is 25 and the total length of episode videos is 285,33 minutes (4 hours 45 minutes). During the interview section, automated transcription software is employed to transcribe the spoken contents, capturing the timestamp for each word. These transcriptions were then organized into a database within an Excel file for further analysis. Basically, the video is categorised during search by using key words. After that, the interviews intensely observed and linked to the elements of theme.

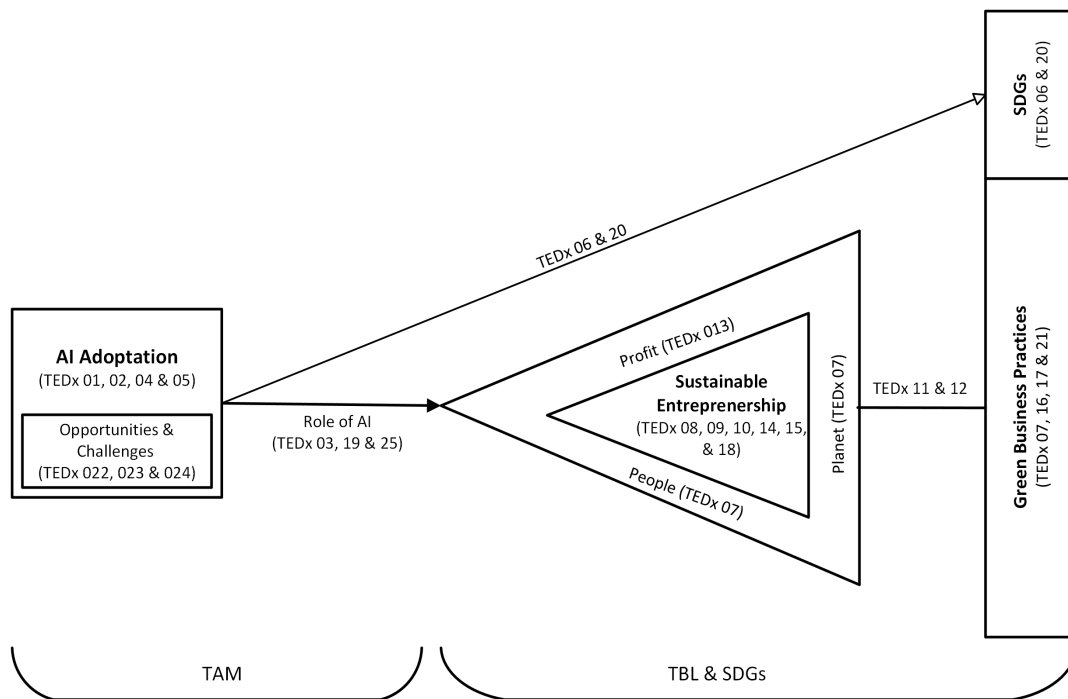


Figure 5: Categorization of video by Sub-topics.

The diagram (Figure 5) depicts the interrelation among Artificial Intelligence (AI) Adoption, Sustainable Entrepreneurship, Green Business Practices, and the pursuit of Sustainable Development Goals (SDGs). A total of 25 TEDx Talks videos are organized within each thematic segment to elucidate their respective connections. Specifically, TEDx Talks 01, 02, 04, and 05 address the theme of AI Adoption in business, while TEDx Talks 022, 023, and 024 delve into the Opportunities and Challenges of AI in the business landscape. Sustainable Entrepreneurship is explored through TEDx Talks 08, 09, 10, 14, 15, and 18, emphasizing the pillars of Profit (TEDx 013), People (TEDx 07), and Planet (TEDx 07). The synergy between AI Adoption and Sustainable Entrepreneurship is substantiated by TEDx Talks 03 and 19. Green Business Practices, emerging from Sustainable Entrepreneurship, are elaborated in TEDx Talks 07, 16, 17, 21, and 25, aligning with SDGs as elucidated in TEDx Talk 06. TEDx 11 & 12 explains about sustainable entrepreneurship and green business. Finally, two videos (TEDx 06 & 20) are about how AI contributes to achieve the SDGs. TEDx Talks 11, 12, and 20 further explore the intersection between sustainable entrepreneurship, green business, and AI contributions to SDGs, respectively.

Overall, the diagram suggests that Sustainable Entrepreneurship and AI Adoption are two sides of a triangle that contribute to achieving the SDGs. The use of AI and sustainable

business practices creates opportunities and challenges, with considerations for the role of AI, profit, people, and the planet.

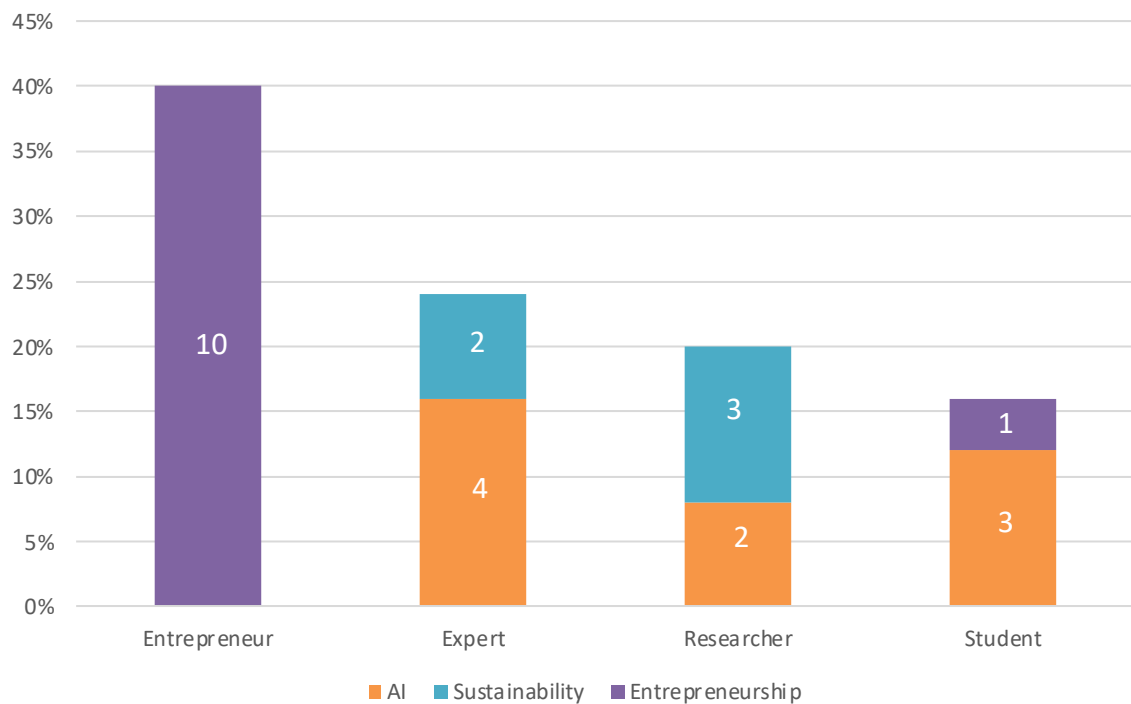


Figure 6: Demography of total interviewees.

The demographic profile of interviewees (Figure 6) reflects a diverse representation across Artificial Intelligence (AI), Sustainability, and Entrepreneurship. Entrepreneurs constitute the largest proportion at 40% (10 in number) of total 25 interviewees, indicating a significant focus on entrepreneurial perspectives. Within Experts, Experts in AI contribute 16% of the total sample, while experts in Sustainability account for 8%. Moreover, Researchers constitute 20% of the interviewees, with 8% specializing in AI and 12% in Sustainability. Notably, Students contribute 16% to the overall sample, primarily engaged in AI (12%) and Entrepreneurship (4%). This distribution suggests a balanced representation of stakeholders across the three domains, with particular attention to entrepreneurial insights. The inclusion of Experts, Researchers, and Students enriches the discourse by offering varied perspectives, contributing to a comprehensive understanding of the intersection between AI, Sustainability, and Entrepreneurship. This demographic composition underscores a multifaceted exploration of perspectives, with a substantial emphasis on entrepreneurial viewpoints across all three domains.

4.2 Findings

A comprehensive exploration of the research findings offers a glimpse into the intricate relationship between technology, entrepreneurship, and sustainability in the digital age. By exploring the experiences and perspectives of entrepreneurs, industry experts, researchers and students, the findings provide valuable insights into the transformative potential of AI in driving sustainable practices, while also highlighting the need for careful consideration of economic, social, and environmental implications. The findings encapsulate the essence of these discussions, offering a comprehensive understanding of the themes which is presented in Figure 5. This analytical approach not only unravels emergent patterns and trends but also underscores the relevance and applicability of TEDx Talks as a valuable resource.

4.2.1 AI Adoption in Business

The integration of Artificial Intelligence (AI) into business operations has become increasingly prevalent, driven by advancements in technology and changing market dynamics. This section explores the adoption of AI in business, drawing insights from TEDx talks and the Technology Acceptance Model (TAM) theory. By examining the intersection of theoretical frameworks and real-world applications, researcher aims to provide a comprehensive understanding of the factors influencing AI adoption and its implications for sustainable entrepreneurship. The Technology Acceptance Model, rooted in the Theory of Reasoned Action, posits that individuals' acceptance of new technology is influenced by their perceived usefulness (PU) and perceived ease of use (PEOU). When applied to AI in the context of sustainable entrepreneurship, TAM underscores the importance of user perceptions in driving adoption and utilization. As entrepreneurs seek to integrate AI into their green business models, understanding and addressing users' perceptions of AI's utility and usability become critical factors for success.

A. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) in AI Adoption

Artificial Intelligence (AI) adoption in business is a multifaceted process influenced by various factors, including perceived usefulness (PU) and perceived ease of use (PEOU), as proposed by the Technology Acceptance Model (TAM). TAM posits that users' intention to adopt a new technology is influenced by their perceptions of its usefulness and ease of use.

In the context of AI adoption in business, PU refers to the belief that AI technology enhances job performance and facilitate business objectives. Meanwhile, PEOU reflects the perception of minimal effort required for learning and using AI systems.

Synthesizing insights from TEDx talks, particularly TEDx01 and TEDx02, it becomes evident that AI's adoption hinges on its perceived benefits and usability. Speakers emphasize the transformative potential of AI in improving business flexibility, decision-making, and customer interactions. Perceived usefulness (PU) is evident in the discussions about the practical benefits of adopting new technologies. For example, the speaker of TEDx01 highlights how AI introduces flexibility into business solutions, allowing for more adaptive and efficient processes. This flexibility enables businesses to respond to changing circumstances and innovate in ways that were previously not possible. Additionally, Anirudh Kala emphasizes how established companies with deep knowledge and resources may be hesitant to adopt new technologies due to perceived risks and the need to maintain stability. However, the potential benefits of embracing AI, such as increased efficiency and competitiveness, underscore the importance of PU in driving technology adoption.

For instance, a customer calls for a support to a call centre but the customer does not get the solution instantly. On the other hand, though the call centre has recorded the conversation, it takes too long time to resolve the problem because of a long que for analysing and solving it. If the call centre applies basic error principles and hi-tech solutions like AI technology, it can solve the issue within 10 to 15 minutes instead of taking 15-20 days (TEDx02). In that case, the staff of call centre may use AI technology for improving the performance as well as reducing the efforts for supporting the customer within a short time, and the company can retain the customer for long time because of satisfactory supports.

Anirudh Kala, co-founder of a company called soluble Corp which majorly work with AI and machine learning based products, says,

..... if you are not satisfied the call center company is going to do the analysis of a call in 20 days at least 20 days and you'll get a call so we figured out that you are not very happy we want to provide you something but by the time you've already moved on to that product on a new product, imagine how do you get that got that call maybe in 10 minutes or 15 minutes of your very first conversation. the company right so call center can become effective if they apply something some

very basic error principles some very basically hi technologies on their conversations. (TEDx02).

The speakers emphasize that AI introduces flexibility into solutions, making them more adaptable to changing circumstances. This flexibility can influence the perception of ease of use, as users may find it easier to interact with systems that can adjust to different situations without requiring significant effort on their part. On the other hand, the speaker, Chad Lane who is experienced in AI for more than 20 years, highlights the use of AI in the workplace is framed around personalized interactions, such as using chat GPT Stella, which allows users to ask questions and receive personalized responses. The companies were leveraging AI internally for their software offerings, but now they are seeing it more being used by employees. Adaptive AI in the workplace is like a super smart helper that watches how people do their jobs and learns how to help them do them even better. AI has become increasingly important in the workplace, with companies like Chat GPT and Barden leveraging AI to improve employee productivity and learning experiences. (TEDx05).

B. External Variables and Organizational Structures

The Technology Acceptance Model incorporates external variables such as system design, user attributes, task characteristics, and organizational structures, which may impact PU and PEOU. Hans-Christian Boos, a founder of Arago in Germany, expresses that to survive in the new world, companies need to have a strong brand, innovate, and offer services. People like person-to-person interaction, so businesses must adapt their business models to survive. AI is important because it allows business to compete and thrive in a rapidly changing market. AI and business go hand in hand, as they require money and people to achieve success. As the economy evolves, businesses must adapt their strategies to stay competitive and thrive in the new economic landscape. By understanding the challenges and opportunities presented by AI, businesses can adapt and thrive in the ever-changing technology landscape. By introducing AI into companies, companies can achieve 80% efficiency and thrive in the new world. By focusing on creating new business models and using data to analyze them, humans can return to their strengths and contribute to the economy. (TEDx01).

The role of open-source technologies in driving AI innovation and democratizing access to AI tools for small businesses (TEDx04). Moreover, it emphasizes the importance of

organizational structures that foster collaboration and experimentation, essential for harnessing AI's potential in sustainable entrepreneurship (TEDx04). The ethical considerations and organizational readiness required for responsible AI adoption, including the establishment of ethics committees and comprehensive risk assessments (TEDx05).

C. Intention to Adopt and Actual Utilization

TAM suggests that users' intention to adopt technology influences its actual utilization, which, in turn, affects the intention to continue using it. This cyclical process underscores the importance of positive user experiences and organizational support in sustaining AI adoption efforts. The rapid growth of AI technology is fast because it is not something that needs to be purchased anymore but can be used by employees. This is particularly beneficial for those who are already using AI in their jobs (TEDx05). The intention of adoption of AI is growing day by day. Small entrepreneurs can use AI from the scratch to final products. For instance, a fashion company can make logo of its, product and graphic design, website, and so on. Many companies are also utilizing this strategy in their businesses as well (TEDx04 & TEDx24).

In Yuktav Srinivas states in his TEDx Talks,

.....so hiring a professional editor is tedious time consuming and expensive but with the help of an AI accelerated editor and an AI accelerated editing workflow. we were able to promote our product in a day regardless of the limitations. (TEDx04).

Incorporating AI into a company can lead to 80% efficiency and competitiveness. However, there are concerns about data protection and the need to steal information from everyone. To truly benefit from AI, companies must introduce it step by step, automating processes that generate more data than they need. This approach ensures that everything is done faster than the one started with, allowing companies to focus on their new business model and how to use data to analyze it (TEDx01).

Anirudh Kala has admitted in his speech that:

.... if you want to introduce AI into a company and if you really say like I want these 80% efficiency because I need to compete, I want you to thrive in this new world. (TEDx01).

TEDx insights reinforce this notion by emphasizing the iterative nature of AI adoption and the need for ongoing user engagement and support. The presenter of TEDx02, for instance,

emphasizes the iterative nature of AI projects, where persistence and innovation are essential for overcoming challenges and achieving success. Additionally, TEDx05 underscores the importance of user-centric design and continuous improvement in enhancing AI's acceptance and utilization in the workplace.

Anirudh Kala declares,

..... there are currently eight companies in the world that can produce a digital assistant. The world has eight customers to the rest of the industry. So if you want to survive in that kind of a world, if you just want to survive as a company, you need to do three things you need to have a strong brand, so people asked for you, you need to do innovation, so you do things that others don't do, and you probably also need to offer services because in the end people like to have a person-to-person interaction(TEDx01)

On the other hand, Chad Lane states that AI new companies are coming up everyday (TEDx05). That means that many companies also accepting the AI technology for scalling up their business growth.

Finally, the Technology Acceptance Model (TAM) provides a valuable framework for understanding the complexities of AI adoption in business, encompassing factors such as perceived usefulness, ease of use, and organizational dynamics. Synthesizing insights from TEDx talks further enriches our understanding by highlighting the transformative potential of AI in sustainable entrepreneurship and the importance of user-centric approaches and organizational readiness for successful adoption. By integrating TAM principles with real-world insights, businesses can develop more nuanced AI adoption strategies that promote innovation, efficiency, and ethical practices in the evolving landscape of sustainable entrepreneurship. (TEDx01, TEDx02, TEDx04, TEDx05).

D. Opportunities and Challenges

Opportunities of using AI include reducing human error, improving the interaction between medical staff and patients, being available 24/7, and helping in repetitive jobs like cashiering or taking information without knowledge. AI can understand big data, making it easier to understand and make smarter assistance. However, AI still needs to understand human emotions and make smarter robots. (TEDx22).

AI can be used in a productive way. AI can work processing millions and millions of data for 24/7 relentlessly (TEDx01). AI can work as programmer, analyst, assistant, and agent

(TEDx24). The speaker, Chad Lane who is experienced in AI for more than 20 years, highlights the rapid growth of AI technology, with new companies emerging every day that are better than the previous ones, adding new functionalities, and capitalizing on open AI and similar companies. The velocity and momentum of this wave seems to be going up, and to be the great (TEDx05). The velocity of the wave is too fast as well.

According to Chad Lane,

..... Everything is changed but it was nine months ago where everything kind of lit up and AI got on everyone's radar even though we've been doing it for 2025 year, we have been working in the field but it really lit up what happened nine months ago is a great question I mean AI has been around since the government has been leveraging it behind the scenes for many years. (TEDx05).

Jamila Gordon, CEO and Founder of Lumachain, believes that artificial intelligence (AI) can help break down barriers to people who would otherwise be left behind. Language education and location are no longer the barriers they once were. The ability to read, write, or speak the local language is no longer an obstacle for many employees in the food industry (TEDx23). Moreover, Language models, such as chat GPT, can be used to plan and execute actions based on user requests. These agents are a feedback loop of planning and executing actions using language models. Examples of agents include Microsoft's co-pilot, Shopify's sidekick, AI Hyper Write, and Chat GPT itself (TEDx24).

There are also challenges to AI, such as bias, manpower, and data privacy and security. Bias is a problem as AI is emerging and not widely owned, leading to a lack of manpower and the need for trained and interns to code and develop AI machines. Manpower is another issue, as AI machines require significant budgets to fund trainees and interns. Data generated from millions of users worldwide could be used for malicious purposes, such as cyber-attacks, blackmail, and extortion (TEDx22). However, there are some cons to AI, such as high costs, unemployment, lack of creativity, and high pricing. AI is not easily fatigued and requires an engine machine, making it a cost-effective solution for many industries. It also lacks experience and can lead to unemployment among humans. Additionally, AI lacks creativity, as humans are creative. (TEDx22). Moreover, AI is not perfect. It can make mistakes, make up facts, struggle with basic maths, and multitasking (TEDx24).

According to Dung Ngô Ngọc,

... they can lead to unemployment among us humans humankind because they stop replacing us they have no experience improvement with experience unlike us who improve over time like perfecting the technique. They lack in creativity because we as humans are very creative. what are some opportunities of using AI Opportunities of using AI number one they can reduce in human error because we as human we're born with error. (TEDx22).

In the enterprise level, data privacy will be in danger if protective measure is not taken properly. AI tools like Chat GPT require careful and responsible use, as they can learn from and learn from human input. It is crucial for companies to have an ethical ethics committee and conduct thorough product analysis before implementing AI tools in their operations (TEDx05). Chad Lane also states about the challenge of AI as following:

... you're implementing a chat bot or some other AI productivity tool that's going to help you function or summarize your emails. You need to test that before; you just release it out in the wild and potentially leak information or make something that you shouldn't have said so that kind of leads to the other thing that you talk about which is data privacy. (TEDx05).

The impact of AI on jobs is also debated, with debates often focusing on whether AI will replace or create jobs. While some lower-key jobs may become obsolete, other jobs may be created, such as explaining AI. Additionally, AI can help maintain and create models, benefiting other industries (TEDx03).

Finally, AI has both opportunities and challenges, but it is essential to recognize and address these issues to ensure its continued growth and success (TEDx22). AI is transforming businesses by improving customer experience, streamlining processes, and streamlining processes. By implementing AI-based solutions, businesses can focus on helping their customers achieve their goals and improve their overall business operations (TEDx05).

4.2.2 AI in Sustainable Entrepreneurship

Sustainability is the ability to meet our own needs without compromising the future generation's well-being. Entrepreneurship is the answer to pressing problems, as entrepreneurs see solutions and opportunities in the same way as the world sees failures and problems (TEDx13). Sustainable entrepreneurship is about profit, people, and planet. How AI helps to ensure profit, helps to society, and environment is the main concern. Michael Berns, Director for AI & FinTech at PwC, says in his presentation that defining AI is

challenging, but it can be understood that it will fundamentally change the way the world does business (TEDx03).

According to Kaifu Lee, PwC estimates that AI deployment will add 15.7 billion dollars to global GDP by 2030. AI has fascinated the author for a long time, as it could be used to speed up work in sustainability and do something good for the planet. Artificial Intelligence (AI) has been a topic of debate for some time, with some believing that it could replace humans and make life on Earth more difficult. However, the author invites readers to explore the details and misconceptions surrounding AI, as well as its potential impact on sustainability. (TEDx03).

Michael Berns, Director for AI & FinTech at PwC articulates,

.... many people believe that humans would be replaced by robots that they would take over our jobs make our life on this planet more difficult and reduce the chances for survival of mankind. (TEDx03).

Yuktav Srinivas is a student who has unlocked the potential of AI tools in building his small business. He uses AI tools like ChatGPT, logomaster.ai, durable.co, and others for running his fashion business. Even after making a design, he asks Bing AI for searching which company can print his design for him in Chennai (TEDx04). That's how, he has grown up his business.

AI also helps to make decision based on diverse data sets. The speaker mentions that AI systems can be conceptualized and developed similarly to how humans learn and expand upon their knowledge base. First, AI systems need to observe the environment using cameras, sensors, and scanners to collect good-quality data. Second, they need a mechanism to share information and data across multiple systems, such as the internet and cloud. Third, AI-based decision support systems need to learn to make decisions and solve complex tasks. (TEDx19).

The intersection of Artificial Intelligence (AI) and sustainable entrepreneurship holds immense promise for driving positive change and fostering environmental stewardship. The author suggests that sustainability entrepreneurship is the perfect middle path that strikes a balance between saving the world and doing business. Sustainable entrepreneurship involves solving environmental problems by turning them into business opportunities. To start a sustainable business, one doesn't need a higher education or

environmental background. All they need is a passionate interest in solving the environmental problem. (TEDx09).

To start a sustainable entrepreneurship, one doesn't need a higher education or environmental background. All they need is a passionate interest in solving environmental problems. Companies like Company B, which focus on affordable food and beverage products, have a bottom-up approach to management decisions, focusing on profit maximization. By incorporating sustainability into their operations, companies can save operational expenses and generate higher profits. (TEDx09).

Sustainability is not only profitable in business but also beneficial for personal health and well-being. By appealing to people's self-side of their personalities and promoting sustainable behaviors, we can make a positive impact on the world and contribute to a more sustainable future. (TEDx11).

Nichatorn Tangkuptanon affirms,

.... so sustainability is not profitable only in business but it is also beneficial to your own health and well-being. (TEDx11).

The TEDx talks further elucidate the transformative potential of AI in sustainable entrepreneurship. From enabling personalized customer interactions to streamlining business processes, AI emerges as a powerful tool for driving efficiency, innovation, and market competitiveness. For instance, AI-powered analytics can help businesses identify opportunities for resource optimization, waste reduction, and environmental impact mitigation, aligning with the principles of sustainable entrepreneurship. (TEDx07).

4.2.3 AI for Sustainable Development

The journey to sustainability in the past 200 years has been marked by the development of technology that transformed societies and improved the quality of our lives. However, this progress has also caused significant harm to the planet. As we move towards more advanced technologies, it is crucial to consider the lessons learned from these pivotal shifts in modern history (TEDx07). Sustainability is a growing topic in today's world, encompassing various terms such as corporate responsibility, shared value creation, inclusive capitalism, social enterprise, and more. Sustainable development, coined in 1987 by the United Nations Commission, aims to meet the needs of the present without

compromising future generations' ability to meet their own needs. It is about social inclusion, ensuring equal access to job opportunities and reducing poverty for marginalized actors (TEDx08).

The term "sustainability" can be used to mean various aspects, but it is crucial to define it accurately and quantifiably to ensure its effectiveness in meeting the needs of both present and future generations (TEDx18). Absolute sustainability is a concept that can be defined as something that can sustain itself into the future. This concept has become more important since becoming a parent. The Bruntland definition, which was introduced in 1987, is still relevant today, but it is not accurate or quantifiable (TEDx18).

Anjila Hjalsted, Danish environmental engineer and anthropologist declares,

.... this is known as the Bruntland definition when you guys think this is from 1987. this definition is literally older than me so it still isn't working because we don't know we can't agree on what sustainability looks like. (TEDx18).

The closest accepted definition of sustainability is one that focuses on meeting the needs of the present without compromising future generations' ability to meet their needs. However, this definition is vague and outdated, as it doesn't accurately or quantifiably define sustainability. The term "sustainability" can be divided into two groups: focus and numbers. Focus refers to addressing sustainability in one aspect, such as organic cotton, which reduces pesticide use and toxic pollutants but requires more water and land usage. Numbers refer to claiming something is more sustainable than another, such as an oatmeal cappuccino emitting three times its allowed amount of carbon. (TEDx18).

The author believes that artificial intelligence (AI) can help break down barriers to people who would otherwise be left behind. AI can notice unsafe behaviors, provide social distancing, and deliver individualized training in their preferred language. This makes a huge difference to organizations and its people. (TEDx23).

Although AI may have a detrimental effect on sustainability, it can also help achieve other goals such as clean water, food, job security, and income. By understanding the interconnectedness of these goals, AI can play a crucial role in promoting sustainability and reducing the carbon footprint. (TEDx03).

Michael Berns proclaims,

..... when you look closely, you will find out that only free namely 13 to 15 of those goals are related directly to the environment, so the climate action, the life underwater and the life on land but when you take others into account, you realize that all of these goals are interlinked in. For example, looking at a person having enough clean water, enough food on the table, enough job security, enough income, only that kind of person can really care and make enough effort to protect the environment and in that way we next look at what impact AI might have on those goals, so on the first instance AI might have a detrimental effect to sustainability into the carbon footprint. (TEDx03).

Sustainable development requires not only meeting the present needs but also ensuring the abilities of future generations to do the same. This includes environmental stability and financial sustainability, particularly in the agricultural sector. For instance, strawberry production can be considered as an example of a sector that aims to maximize yield while reducing greenhouse gas emissions. AI-based decision support systems can help by collecting data about crops, microclimatic factors, water and energy consumption costs, and weather data. These data can provide valuable insights into crop performance and other related areas, contributing to the carbon footprint (TEDx19). AI-based decision support systems can also share information across various stages in the supply chain, allowing for more comprehensive insights into how things perform across multiple farms. Additionally, developing bespoke AI technologies like machine learning and artificial neural networks can be used as a support mechanism to support growers in making better decisions. (TEDx19).

The author initially thought AI would be used for big, complex projects like space exploration, self-driving cars, and robots. However, they later discovered that AI could have a significant impact on areas that are less popular and less explored. One of the overlooked areas with one of the biggest environmental footprints is agriculture. Agriculture is directly responsible for about 10% of foreign greenhouse gas emissions. (TEDx19).

Dr. Georgios Leontidis, Interim Director for Data and Artificial Intelligence (AI) at the University of Aberdeen in Scotland, UK declares,

.... also that agriculture is directly responsible for about 10 percent of foreign greenhouse gas emissions. (TEDx19).

Building a more sustainable future requires continuous research and innovation across multiple scientific disciplines and sectors, including AI. It suggests that interventions with

novel technologies are needed as a step change towards achieving **net zero targets** over the next few decades. Similar technologies can be applied to other sectors, such as energy industry and transportation. (TEDx19).

Co-creation is another important aspect of sustainable development, as it involves collaboration and co-creation with technologies. This requires people with diverse skills from different backgrounds and disciplines to work together, creating innovative solutions that meet the needs of the present without compromising the abilities of future generations. (TEDx19).

Dr. Georgios Leontidis suggests,

.... it's not enough on its own novel ideas new perspectives and effective solutions no matter how silly they might look like require people with diverse set of skills from different backgrounds and across multiple disciplines to come and work together just like power rangers did co-designed solutions are needed to bring about the much needed revolution if we are going to meet under your targets and give our children an attractive sustainable future. (TEDx19).

The journey to climate change as we venture into the fourth Industrial Revolution, driven by AI and decarbonization, teaches us three important lessons. First, rapid industrialization is a double edge sword, with the headlong rush to fill vacancies without understanding its full consequences. Second, delaying decarbonization can be costly, and if the Paris agreement had been signed 50 years earlier, we might not be in a global climate crisis. In conclusion, the journey to sustainability in the past 200 years has taught us valuable lessons about the potential impacts of AI on our future. (TEDx25).

Electric cars are a promising contribution to a shift towards renewable energy sources, but there are concerns about battery production, recharging, and toxic materials. Battery batteries contain rare earth minerals from conflict-ridden areas like Sudan and Democratic Congo, which can lead to armed conflicts and devastation of local landscapes. Child labor is another issue that needs to be addressed. Companies like IKEA and UNICEF have taken steps to address this problem by accepting child labor and providing structural solutions, such as schooling and access to credit facilities for parents. Sustainability standards, such as ecological labels and social schemes, can help address these issues and provide a brighter future for children. These standards are differentiated per region and group, ensuring that local needs and possibilities are met with more effective solutions. (TEDx08).

Scott Switzer, an electrical engineering student at the University of British Columbia, discusses the potential of AI in solving environmental issues. He highlights the use of AI in tracking animal species in rainforests and coral reefs, which are vital ecosystems with high biodiversity. AI is used to track animal species, identify endangered species, and inform policy decisions. Researchers have found that AI can be 85-99% accurate in identifying animal species in video footage, providing more data for conservation efforts. This innovative approach to problem-solving and innovation can help address the complex and pressing environmental challenges faced by our generation. (TEDx25).

IBM's infosphere stream uses artificial intelligence to predict climate change effects in rainforests, predicting droughts and wildfires. Acoustic monitoring uses recycled cell phones to identify natural or unnatural sounds, enabling Rangers to respond more effectively. AI is also being used to monitor coral reefs, which house 25% of marine life. Researchers at the University of California in San Diego developed a fish sense system that uses AI to identify fish species and lengths, improving research and data collection. This technology aims to break free of traditional limitations and improve the environment. (TEDx25).

4.2.4 AI in Achieving the SDGs

The speaker discusses the concept of integrating technology with sustainability, focusing on the integration of AI into sustainable development goals. They describe 17 Sustainable Development Goals (SDGs) that are divided into economic, environmental, and social aspects. These goals include gender equality, clean water and sanitation, affordable and clean energy, decent work in economic growth, environmental social economic, industry innovation and infrastructure, reducing inequalities, sustainable cities and communities, responsible consumption, and production, environmental, climate action, life below water, Clive on land, peace justice and strong institutions, and partnership for the goals. (TEDx20).

The speaker emphasizes that the United Nations has set a framework for focusing on economic, environmental, and social goals. Economic SDGs include good wealth, good health, quality education, and gender equality. Social SDGs include sustainable cities and communities, responsible consumption and production, and climate action. (TEDx20).

Intelligence is essential for making changes in sustainable development goals. The local level should collaborate with academia, corporates, and the public to create a holistic understanding of AI's role in sustainability. Collaborating with experts like Sir Andrew Lingeran, former Dean of London Business School, and German business leaders can help share ethical and environmental concerns. Germany has a long history of sustainability, particularly in recycling and research. However, it is crucial not to focus solely on theory and research. Building companies and products requires more than just theory and research. To be a leading voice in AI, it is essential to contribute to the discussion and have your voice heard. (TEDx03).

Michael Berns, Director for AI & FinTech at PwC articulates,

.... so overall what we have here is a system where without the new insights that ai generates it's very difficult to make those changes without it in some ways when we want to follow these sustainable development goals. (TEDx03).

The first Industrial Revolution was a turning point in human history, with innovations like the steam engine and cotton engine enabling mass production in factories. This led to increased income, life expectancy, and the double-digit growth of the human population. However, this progress came with unintended consequences, including a steep cost to the environment. Industrialized societies have been hit hard by climate change, with CO2 levels rising about 50% and the planet warming above one degree since pre-industrial times. (TEDx07).

To shape the AI Revolution differently, we must learn from history and view technology as a tool that reflects our goals and priorities. We must be a bug of responsibility to ensure that the technology we build today is ethical and sustainable. We must temper progress with fortitude and caution because we care about the potential destruction of us with climate change. (TEDx07).

Longtong Dafyak, engineer and researcher, proclaims,

..... and fast forward to the 21st century CO2 levels have risen about 50% and the planet has warmed above one degree since pre-industrial time now we are on a climate clock and struggling to stay ahead of the Curve at the same time we're witnessing a bigger transformation in how we live and how we work 2023 will be remembered as the year that AI Burst Into The public's Consciousness artificial intelligence promises to improve our lives in ways like never before but just like the steam engine of old. (TEDx07).

Climate change is a reminder that progress comes with responsibility. Nation states and tech giants must enact thoughtful regulations to ensure the welfare of their citizens. Civil societies and end-users must voice their hopes and concerns to guide innovation in our best interest. We must strike a balance between the undeniable benefits and the potential consequences of technology. (TEDx07).

AI, or artificial intelligence, is a technology that trains machines to understand humans and go beyond our intelligence. However, there are two main gaps in the integration of SDGs: interconnectedness and scalability. One issue is that one SDG must work on another, such as quality education, while ensuring that other interconnected SDGs are also working. Scalability is crucial for implementing the same change across India. The speaker emphasizes the importance of ensuring that AI is scalable and can contribute effectively to sustainable development goals (TEDx20). AI can significantly contribute to sustainable development goals, such as transitioning to a zero-carbon economy, increasing agricultural efficiency, fighting poverty, and detecting fraud. AI can perform natural language processing (NLP), predictive analytics, and fraud detection, which can help increase crop yields and combat poverty. (TEDx20).

Economically, AI can create jobs, as skilled labor is increasingly sought after. As AI becomes more prevalent, people will understand the importance of AI and adapt to its technology better. Environmentally, AI can help understand weather patterns and implement measures to protect people from floods and other natural disasters (TEDx20). In healthcare, AI systems have been developed to enable remote communication between individuals and doctors during COVID-19. AI can also help segregate waste and classify emails, ensuring efficient waste management. (TEDx20).

The journey towards AI in SDGs involves educating others about AI and focusing on responsible AI. Responsible AI is not just about detecting and preventing issues, but also creating impact simultaneously. By incorporating AI into sustainable development goals, we can work towards a sustainable future. AI has the potential to significantly contribute to sustainable development goals, such as transitioning to a zero-carbon economy, increasing agricultural efficiency, fighting poverty, and detecting fraud. As AI continues to evolve, it is essential to educate and educate others about its importance in achieving sustainable development goals. (TEDx20).

The speaker believes in the dream of a fair, peaceful, and sustainable world. They mention the United Nations' 17 Global Goals adopted in 2015 to ensure prosperity for all, combat poverty, and protect the planet. With the latest advancements in technologies, more people can contribute solutions to these goals from their homes. One example is goal 11 Sustainable Cities and Communities, where AI can generate solutions to their goals in just a few clicks. 06 Today, we need three and a half million data scientists for low- and middle-income countries for social impacts. However, where can they find them? The speaker is hopeful that each person can become one of these data scientists using generative AI large language models. At MIT, they teach a course on analytics for a better world, teaching students how to use optimization and AI for solving the goals. (TEDx06).

Contextualizing actions on a case-by-case basis can help identify optimal practices and make bold steps forward. Aligning incentives with long-term collective interests is crucial, and moving away from linear solutions and short-term agricultural practices can lead to more effective solutions both locally and globally. Sustainable business should not be about disagreements over terminology or practices, but about moving towards more effective solutions both locally and globally. (TEDx08).

4.2.5 Sustainable Entrepreneurship for Green Business Practices

Understanding the relationship between consumers and businesses is crucial for addressing the challenges of climate change and sustainability. By embracing natural laws and applying them to businesses, we can create more sustainable and ethical products that benefit both consumers and the planet. (TEDx10). Jeremy Moon discusses the importance of embracing the laws of nature, such as symbiosis, sustainability, and adaptation, to build stronger cleaner businesses. They highlight that companies need to make conscious choices and trade-offs to work in the best interests of their company, customers, and the environment. (TEDx10).

Jeremy Moon believes that businesses can build stronger cleaner businesses by introducing concepts such as symbiosis, sustainability, and adaptation. By thinking like nature, businesses can overcome the gap between being perfect and being on the journey for the better. The real power lies in being on the journey for better, and businesses must reflect on who they are or what they want to be. (TEDx10).

Jeremy Moon, Leading outdoor clothing producer and exporter in New Zealand, believes,

.... I believe we can build stronger cleaner businesses by introducing Concepts such as symbiosis sustainability and adaptation and thinking like nature business itself can overcome this gulf and start reconnecting and it's not about being perfect it's about being on the journey for better and us. (TEDx10).

The author envisions a future where sustainability and entrepreneurship are combined as the fastest and most effective solutions to the climate crisis. This approach will inspire and contagious, reducing unsolvable environmental problems and creating more business opportunities. The author is happy to have found the formula of sustainable entrepreneurship that balances non-profit and for-profit organizations. They are now wiser and wealthier, thanks to their decision to plant a tree 13 years ago. (TEDx09).

....the future of marrying sustainability and entrepreneurship as the fastest and effective solution to solve the worsening climate crisis imagine if everyone cares about being sustainable while caring and entrepreneurship spreads in them these solve a lot of underlying environmental problem and this approach will be inspiring and contagious there will be no more unsolvable environmental problem but more business opportunities. (TEDx09)

Ecoware, India's first and largest sustainable packaging company, offers 100 natural, biodegradable, and affordable eco-friendly products. Founded by Nari Shaktik Purist, the company has displaced over 300 million single-use plastic pieces and created jobs. The founder aims to build value and dominate a new category of products and services, transforming consumer behavior and influencing future buying decisions. Ecoware works with resident welfare associations, schools, colleges, and local communities to create awareness and change consumer behavior, aiming to create a more sustainable and environmentally friendly packaging industry. (TEDx12).

Rhea Mazumdar Singhal, an Indian entrepreneur, claims,

..... we all know plastic pollution has become one of our planet's greatest environmental threats. Here are some scary facts if you didn't know them already 9.1 billion tons of plastic is said to have been manufactured since the material was mass produced in the 1950s globally. Only nine percent of plastic waste is recycled 12% incinerated and a whopping 79% ends up in landfills in India where we account for almost 18% of the global population. We produce almost 26 000 tons of plastic waste every day. (TEDx12).

Similarly, Björn Söderberg, founder of a recycling company in Nepal, shares same information as Rhea Mazumdar Singhal does in TEDx12. Plastics have played a significant role in human progress, but their future role is questionable. With 9.1 billion tons of plastic

manufactured since the 1950s, only 9% is recycled, 12% is incinerated, and 79% ends up in landfills. In India, where nearly 18% of the world's population lives, 26,000 tons of plastic waste are produced daily. In 2009, an entrepreneur started a sustainable packaging company, focusing on safety, sustainability, and positive environmental and social outcomes. The company's three guiding principles include safety, sustainability, and environmental impact (TEDx13).

India, where nearly 18% of the world's population lives, produces 26,000 tons of plastic waste daily. In 2009, an entrepreneur named Ashok Kumar started a sustainable packaging company to address this issue. The company focuses on three guiding principles: safety, impact, and authenticity. Safety involves creating products that maintain the nutritional value of food and are certified 100 backyard biodegradables. Impact is built into the DNA of the organization, creating positive environmental and social outcomes for stakeholders. (TEDx13).

There is increasing scrutiny from consumers, employees, investors, and other stakeholders on the role of businesses in addressing climate change. Leadership teams that build sustainability into their DNA and organizations are better able to deliver financial value and wider stakeholder impact. Businesses need to see sustainability as an immense value addition and an opportunity. Sustainable organizations are purpose-led businesses that inspire their people and partners to deliver lasting financial performance, equitable impact, and societal value that earns and retains the trust of all stakeholders. As CEO and founder, the founder ensures that their values are communicated through their actions to all stakeholders. Alignment has allowed the company to remain steady and create impact, and the key to a successful enterprise is its people. (TEDx13).

The author discusses the reduction of poverty in Asia by over 25% in 10 years, with improvements in education, healthcare, and infrastructure. They also discuss the potential for a scarcity of resources and raw materials in the coming years. They discuss the success of a cleaning company in Kandhu, which employs people from poor backgrounds, trains them, and provides them with modern cleaning machines. The author believes that modern companies must focus on efficiency and invest in their staff, as minimum wage work creates inefficiencies. They believe that the future belongs to those who take responsibility and take responsibility today. (TEDx14).

4.2.6 Green Business Practices for Achieving SDGs

Nyleve Henry, CEO of a Fashion/Tech startup, discusses the impact of plastic pollution on the environment and the importance of reducing plastic consumption. Plastic is a derivative of fossil fuels, which can be tasteless, odorless, and colorless, and can pollute air, water, and soil. Over 60,000 endocrine-disrupting chemicals are on the market, and they are not regulated by the government. The speaker also discusses the impact of human activity on climate change, such as the heatwave in the UK and the devastating natural disasters in the UK. The speaker suggests that if we don't keep the global temperature below 1.5 degrees Celsius by 2030, tragedy will touch every country and over 216 million people will have to evacuate their homes by 2050. The speaker encourages people to take action to reduce plastic consumption and promote green business innovation. (TEDx16).

Nyleve Henry, CEO of a Fashion/Tech startup, proclaims,

.... plastic is a derivative of fossil fuel fossil fuel one of the most efficient and versatile substances can be tasteless odorless colorless that's why it's called Liquid Gold. (TEDx16).

The author suggests that if we invest that 145 billion dollars towards green business innovation instead of disaster cleanup, developed countries could save a significant amount of money. (TEDx16).

Nyleve Henry declares,

*..... Florida have been devastated with 15 feet of water and California experienced one of the most severe heat waves and droughts in 2021 natural disasters totaled 145 billion dollars in economic damage the third costliest year in American history. And, according to the National Oceanic and Atmospheric Association, if we do not keep the global temperature below 1.5 degrees Celsius by year 2030, tragedy will touch every country and over 216 million people will have to evacuate the place that they call home by year 2050. I couldn't help but to think what if we use that 145 billion dollars towards **green business Innovation** instead of Disaster Clean-up. (TEDx16).*

He discusses the environmental impact of human activities, such as generating over 1600 pounds of trash annually and setting homes on fire. They argue that human greed can destroy our environment within the next 100 years due to our current consumption habits. This presents an opportunity for green business innovation to replace toxic habits that no longer serve us. The future of green business depends on corporations creating ways for conscious consumers to make zero carbon purchases. (TEDx16).

The environmental impact of human activities and the need for green business innovation to replace toxic habits is that the future of green business depends on corporations creating ways for conscious consumers to make zero carbon purchases. Zero carbon purchases involve maximizing the use of an item and responsibly discarding it when done. Innovative startup companies like Amber Cycle, Nova Loop, and Silver Effect are creating ways for businesses to keep their way circular. The author encourages readers to practice conscious consumption and use reusable containers, utensils, and bags to reduce their carbon footprint. They also suggest that America can lead the global efforts to slow climate change by prioritizing infrastructure where zero carbon purchases are possible. (TEDx16).

Private equity funds are increasingly investing in clean tech and renewable energy projects, despite the financial crisis in Europe. These funds are investing in projects like wind farms, solar farms, and geothermal opportunities. The new green business model involves deploying capital into these projects, monetizing environmental attributes. The acid rain program in the Northeast and stringent air quality laws in the US are examples of this. The carbon market, dominated by the EU Emissions Trading Scheme, is also growing, with California starting stringent reductions in CO₂ emissions. This shift towards renewable energy sources is a significant market for hedge funds and regulators. (TEDx17).

Currently, our purchases are driven by external influences, such as advertising. Advertising is effective in aggregating personal data and presenting products in an accessible way. However, if we could use this information to drive positive change, we could use it to explain our impact and make our purchases more environmentally friendly. A project was started in 2017 to gather information from various sources, including bank and credit card companies, social networks, search engines, and sustainability information. This information is then sent to an app on mobile phones, providing transparency and making it easily accessible. The goal is to educate consumers about their impact and provide an easy way to act on it for an eco-friendly life. Modern technologies and the vast amount of data we aggregate every second provide an incredible opportunity to educate consumers and drive positive change. (TEDx21).

Sustainability is a global concern, but many people are lazy to adopt sustainable practices. To make people more sustainable long-term, it is important to appeal to their own side of their personalities and convince them that they can help curb climate change while

benefiting from it. A course at the University of Maryland focused on sustainability plus innovation, which involved three main steps: understanding stakeholders, identifying problems, and testing prototypes. (TEDx11).

One project focused on food waste, where participants observed people's behavior and developed solutions for reducing waste. Another project explored pedestrian safety, reducing car use, and encouraging walking or cycling. Another project explored fish stores in Thailand, where they found ways to use less money and help the environment by selling used items like appliances, electronics, and clothes. (TEDx11).

One example of a successful project was the Tata Go Green gift box, which included usable bags and information cards for sharing with others. Another project explored pedestrian safety, where people were encouraged to walk or cycle instead of driving. By reducing car use and promoting walking, we can reduce pollution and save money on fuel. (TEDx11).

The presenter emphasizes the importance of sustainable consumption and production, arguing that companies should invest in real solutions to real problems to make a difference. They highlight the need for companies to question their production models, replace materials, and invest in developing real solutions to real problems. The author also discusses the changing world, including climate instability, access to clean water, and communication in remote villages. The author suggests that a factory treating workers with respect and treating them with respect can be more profitable and sustainable. The author also highlights the importance of learning from developing countries, such as Nepal, where infrastructure, roads, and power have collapsed due to rapid population growth. (TEDx14).

The issue of food waste and its impact on the environment is presented on TEDx15. The speakers mention that for an average family in the U.S. to consume 20 clementines a week, they need to buy 26 items, which often end up in the back of the shelf, spoil or mould before being ready to eat. This waste is not only a problem with waste and food security but also a significant issue for climate change. Food waste accounts for about 8% of global greenhouse gas emissions and costs the global economy about 2.6 trillion dollars each year.

The speaker emphasizes the importance of focusing on innovation and understanding the complexity of food waste. By focusing on understanding the problem and looking under the surface in every direction, the speaker can come up with the right answers to help

reduce food waste and improve the overall quality of life for consumers. The speaker explains that some highly nutritious foods like fruits and vegetables go to waste the most, with up to 50% of things like clementines going to waste. About 10 years ago, scientists in Santa Barbara became obsessed with this problem and developed an edible plant-derived coating that slows down the rate of water loss and oxidation in fresh fruits and vegetables. This product appeal is available on certain fruits and vegetables and is available in tens of thousands of grocery stores worldwide. (TEDx15).

5 Discussion

The integration of Artificial Intelligence (AI) into sustainable entrepreneurship represents a dynamic intersection of technology and environmental responsibility. This discussion delves into the current state of sustainable entrepreneurship, highlighting how AI is revolutionizing green business practices. It examines the profound impact of AI on promoting and implementing sustainable strategies, shedding light on both the challenges and opportunities that entrepreneurs face in leveraging AI for sustainability. Additionally, it provides strategic recommendations to enhance green business practices through the effective use of AI, aiming to foster a more sustainable and eco-friendly business landscape. By exploring these dimensions, this discussion underscores the critical role of AI in driving sustainable innovation and entrepreneurial growth in an increasingly digital and environmentally conscious world.

5.1 Current State of Sustainable Entrepreneurship

The current state of sustainable entrepreneurship represents a dynamic landscape where innovation, technology, and environmental stewardship converge to address pressing global challenges. Entrepreneurs are increasingly recognizing the potential for profitability while simultaneously prioritizing sustainability and social responsibility. At the heart of this movement lies the integration of AI into sustainable business practices, offering unprecedented opportunities for efficiency, innovation, and market competitiveness.

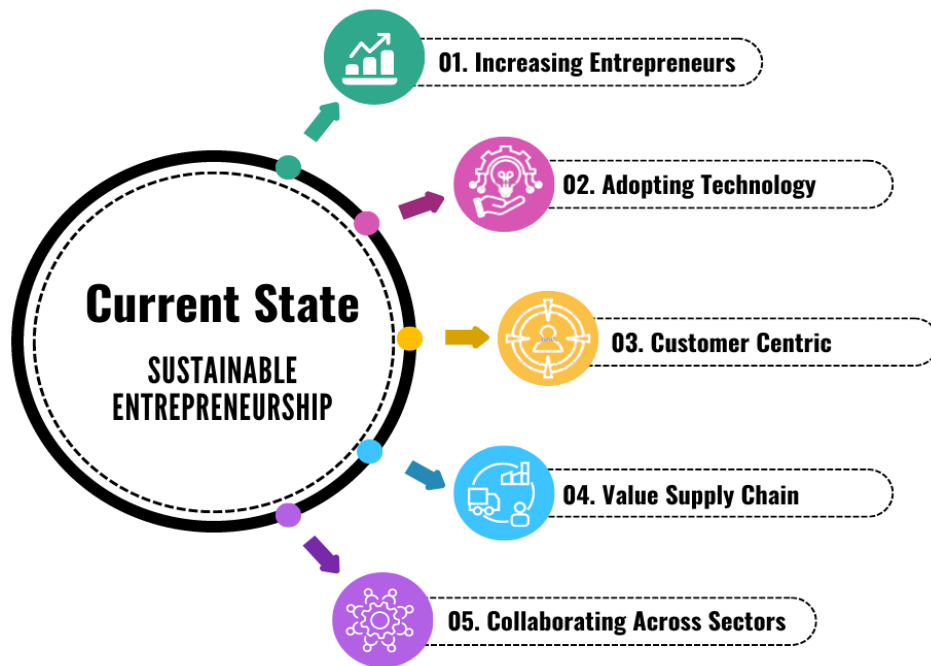


Figure 7: Current state of Sustainable Entrepreneurship at a glance.

Figure 7 summarizes the current state of sustainable entrepreneurship in the digital age. Based on data analysis, five key aspects of sustainable entrepreneurship are identified: increasing entrepreneurship, adopting technology, being customer-centric, enhancing value supply chains, and collaborating across sectors. These elements, presented in Figure 7, reflect the dynamic and multifaceted nature of sustainable entrepreneurship today.

An increasing number of entrepreneurs are leveraging artificial intelligence to drive sustainability initiatives within their companies. This strategic adoption of AI not only fosters innovation but also addresses pressing environmental and social challenges. From optimizing energy usage to streamlining supply chains, AI-powered solutions are reshaping businesses towards more sustainable practices. Entrepreneurs are increasingly realizing the transformative potential of AI in boosting operational efficiency and mitigating environmental harm, making it a fundamental component of sustainable business approaches spanning various sectors.

One notable aspect is the democratization of AI tools, as seen in the case of Yuktav Srinivas, a student entrepreneur who leverages various AI applications to run his fashion business. By utilizing tools like ChatGPT, logomaster.ai, and durable.co, Srinivas streamlines his design process and even seeks AI assistance in finding printing companies for his designs.

This exemplifies how AI is empowering individuals with limited resources to enter and thrive in sustainable entrepreneurship, breaking down barriers to entry.

Moreover, AI's role extends beyond operational efficiency to decision-making and problem-solving. AI-based decision support systems are described as instrumental in optimizing resource utilization, reducing waste, and mitigating environmental impacts across various industries, including agriculture. By collecting and analyzing diverse datasets, these systems offer insights that contribute to more sustainable practices, such as maximizing crop yields while minimizing greenhouse gas emissions. Entrepreneurs can leverage AI's capabilities to analyze a wide range of data sets, enabling them to streamline operations, increase efficiency, and reduce their environmental impact. From precision agriculture to supply chain optimization, AI-driven solutions are driving tangible progress towards sustainability goals.

The alignment of sustainable entrepreneurship with the United Nations' Sustainable Development Goals (SDGs) which encompasses economic, environmental, and social dimensions, providing a comprehensive framework for addressing global challenges. Sustainable entrepreneurs are actively seeking to contribute to these goals by leveraging technologies like artificial intelligence (AI) to drive positive change across various sectors, from renewable energy to waste management and agriculture. By integrating sustainability into their business models, entrepreneurs are not only driving positive environmental impact but also tapping into growing consumer demand for ethical and eco-friendly products and services.

Consumer behavior plays a pivotal role in shaping the trajectory of sustainable entrepreneurship. Increasingly, consumers are prioritizing sustainability, seeking out products and services that align with their values and environmental concerns. Entrepreneurs are responding to this demand by adopting transparent and eco-friendly practices, thereby creating market opportunities, and driving positive change.

AI significantly enhances value supply chains in green business practices by optimizing resource management, reducing waste, and improving efficiency. Through predictive analytics and real-time monitoring, AI can forecast demand and manage inventory more effectively, thereby minimizing overproduction and waste. AI-powered systems

revolutionize sectors such as agriculture, energy, transportation, and water management by predicting usage patterns, improving smart grids, and enabling precise planning and resource allocation. These advancements help reduce greenhouse gas emissions and improve the overall sustainability of supply chains in agriculture, AI aids in yield forecasting, reducing pesticide use, and improving water efficiency, directly addressing environmental concerns. Additionally, AI enhances transparency across supply chains, allowing businesses to track and verify sustainable practices from production to consumption. By addressing issues such as data privacy, algorithmic bias, and ethical implications, AI fosters responsible deployment, further aligning business practices with sustainable development goals. Thus, AI not only enhances operational efficiency but also supports the broader objectives of sustainable entrepreneurship and green business practices by enabling more informed and environmentally conscious decisions. By enabling better decision-making and operational efficiency, AI supports businesses in achieving their environmental goals while maintaining economic viability.

AI plays a pivotal role in fostering collaboration across sectors in sustainable entrepreneurship and green business practices by bridging gaps between academia, industry, and public initiatives. By facilitating data sharing and predictive analytics, AI enhances communication and cooperation among diverse stakeholders, including researchers, businesses, and policymakers. For example, AI's capacity to analyze complex environmental data enables academia and industry to jointly develop innovative solutions to sustainability challenges, such as optimizing energy usage and improving agricultural practices. Additionally, AI-driven platforms enable real-time data exchange and collaborative problem-solving, which are essential for co-creating sustainable solutions. This cross-sector collaboration is crucial for integrating sustainable practices into various industries, from energy and transportation to agriculture and water management. Furthermore, AI helps democratize access to advanced technologies, empowering smaller businesses, and marginalized communities to participate in green innovation. By addressing common goals and leveraging collective expertise, AI fosters a holistic approach to sustainability, ensuring that diverse sectors work together effectively towards a more sustainable future.

In summary, the current state of sustainable entrepreneurship reflects a convergence of innovation, technology, and social responsibility. Entrepreneurs are harnessing the power of AI, collaborating across sectors, and aligning with global sustainability goals to drive meaningful impact. As the movement towards sustainability continues to gain momentum, entrepreneurs play a vital role in shaping a more sustainable and prosperous future for all.

5.2 Impact of AI on Promoting and Implementing Green Business Practices

The impact of artificial intelligence (AI) on promoting and implementing green business practices is profound, offering innovative solutions to environmental challenges and driving sustainability across industries. AI technologies are revolutionizing the way businesses operate, enabling more efficient resource management, waste reduction, and environmental impact mitigation.

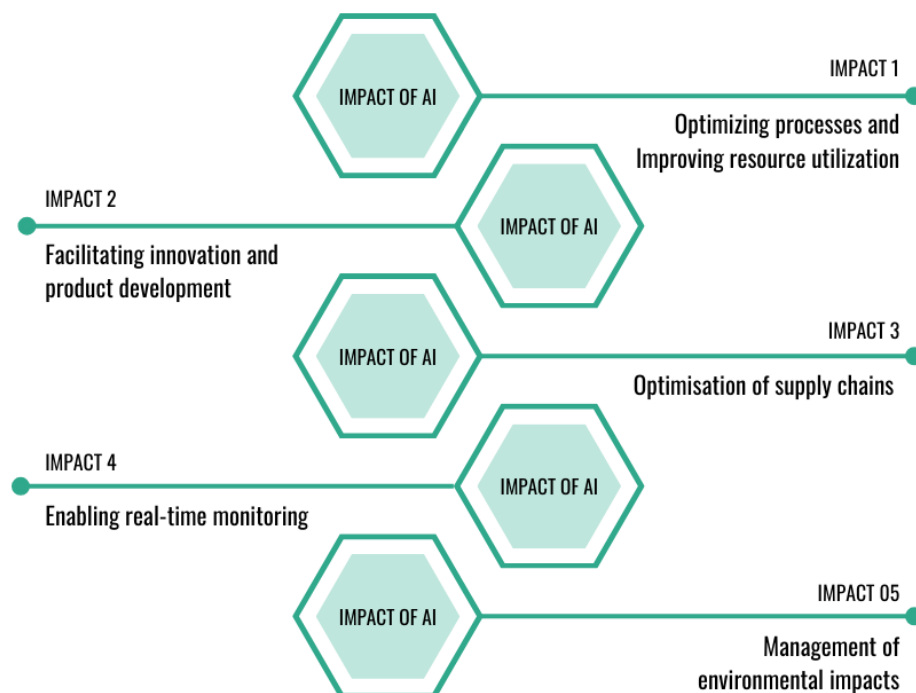


Figure 8: Impact of AI on promoting and implementing green business practices briefly.

Figure 8 presents the impact of AI on promoting and implementing green business practices, focusing on five key areas derived from qualitative data analysis and results. These areas include optimizing processes and improving resource utilization, facilitating innovation and product development, optimizing supply chains, enabling real-time

monitoring, and managing environmental impacts. By playing pivotal roles in these aspects, AI significantly enhances business sustainability and operational efficiency.

One significant impact of AI is its ability to optimize processes and improve resource utilization within green business practices. AI-powered analytics and decision support systems enable businesses to analyze vast datasets and identify opportunities for efficiency improvements. For example, in agriculture, AI algorithms can examine factors like soil quality, weather trends, and crop information to enhance irrigation efficiency, decrease pesticide usage, and boost crop yields. Through AI's predictive abilities, companies can base decisions on data analysis, leading to decreased resource utilization and diminished environmental impacts.

Furthermore, AI facilitates innovation and product development in green business practices. By leveraging AI-driven design tools and simulations, businesses can create sustainable products and services that meet consumer demand for eco-friendly alternatives. For instance, AI algorithms can assist in the development of biodegradable materials, energy-efficient technologies, and sustainable packaging solutions. This enables businesses to differentiate themselves in the market, attract environmentally conscious consumers, and drive the adoption of green products and services.

Another impact of AI is its role in enabling real-time monitoring and management of environmental impacts. AI-powered sensors and monitoring systems can track energy usage, emissions, and waste generation in industrial processes, enabling businesses to identify inefficiencies and implement corrective actions promptly. Additionally, AI-based predictive maintenance systems can help businesses optimize equipment performance, reduce downtime, and minimize environmental risks associated with equipment failures.

Moreover, Artificial intelligence enables the optimization of supply chains and supports sustainability initiatives in the context of environmentally friendly business practices. AI-driven supply chain management systems enable businesses to track and trace products throughout the supply chain, ensuring transparency and accountability in sourcing and production processes. This allows businesses to identify opportunities for reducing carbon emissions, reducing waste, and promoting fair labor practices throughout the supply chain.

In essence, the influence of AI on advancing and enacting green business practices is transformative, and revolutionary, providing businesses with unparalleled chances to foster sustainability, and ingenuity, and enhance competitiveness. By harnessing AI technologies, businesses can optimize processes, develop sustainable products, monitor environmental impacts, and enhance supply chain transparency, thereby advancing the transition towards a more sustainable and resilient economy.

5.3 Challenges and Opportunities for Entrepreneurs in Leveraging AI for Sustainability

Entrepreneurs leveraging AI for sustainability face both challenges and opportunities in their endeavors to drive positive environmental impact. While AI presents powerful tools for innovation and efficiency, navigating its complexities and ensuring ethical use can pose significant challenges for entrepreneurs.

One major challenge is the accessibility and affordability of AI technologies. While AI has the potential to revolutionize sustainability efforts, the initial costs associated with implementing AI solutions can be prohibitive for many entrepreneurs, particularly those operating on limited budgets. Additionally, the expertise required to develop and deploy AI applications may be beyond the reach of smaller businesses without access to specialized talent or resources. Addressing these barriers to entry is crucial for ensuring that all entrepreneurs can harness the potential of AI for sustainability.

Ethical considerations also present challenges for entrepreneurs leveraging AI for sustainability. As AI becomes increasingly integrated into business operations, concerns about data privacy, algorithmic bias, and unintended consequences loom large. Entrepreneurs must navigate these ethical minefields carefully, ensuring that their AI applications are developed and deployed in a responsible and transparent manner. This may involve implementing robust data governance frameworks, conducting thorough impact assessments, and engaging with stakeholders to address concerns and build trust.

Despite these challenges, entrepreneurs leveraging AI for sustainability also have numerous opportunities to drive positive change. AI technologies offer unprecedented capabilities for optimizing resource use, reducing waste, and mitigating environmental impacts across industries. By harnessing AI-driven analytics, businesses can identify

opportunities for efficiency improvements and cost savings, while also reducing their environmental footprint. Additionally, AI can enable the development of innovative sustainable products and services that meet consumer demand for eco-friendly alternatives.

Furthermore, AI can facilitate collaboration and knowledge sharing among entrepreneurs, researchers, and policymakers working towards common sustainability goals. By leveraging AI-powered platforms and networks, entrepreneurs can access valuable insights, best practices, and resources to support their sustainability initiatives. This collaborative approach can accelerate innovation, scale impact, and drive systemic change towards a more sustainable future.

Finally, while entrepreneurs leveraging AI for sustainability face significant challenges, they also have unique opportunities to drive positive environmental impact and create value for their businesses and society. By tackling barriers to entry, navigating ethical considerations, and embracing collaboration, entrepreneurs can harness the full potential of AI to advance sustainability goals and build a more resilient and prosperous future for all.

5.4 Recommendations to Enhance Green Business Practices through AI

To enhance green business practices through AI, several recommendations can be considered to maximize the benefits of technology while minimizing its potential negative impacts. Firstly, there is a need for increased investment in research and development to advance AI technologies specifically tailored for sustainability applications. This includes the development of AI algorithms and tools that can optimize resource management, enhance energy efficiency, and facilitate sustainable product design and lifecycle management.

Secondly, it is essential to promote collaboration and knowledge-sharing among businesses, researchers, and policymakers to foster innovation and best practices in AI-driven sustainability initiatives. This could involve the establishment of public-private partnerships, industry consortia, and innovation hubs dedicated to advancing AI for sustainability. By sharing data, insights, and expertise, stakeholders can collectively address common challenges and accelerate progress towards shared sustainability goals.

Additionally, there is a need for regulatory frameworks and standards to govern the ethical use of AI in green business practices. This includes guidelines for data privacy, transparency, and accountability in AI applications, as well as mechanisms for addressing algorithmic bias and unintended consequences. By establishing clear rules and guidelines, policymakers can create a conducive environment for responsible AI innovation while protecting against potential risks and harms.

Furthermore, there is a need to invest in education and capacity-building initiatives to equip entrepreneurs and businesses with the knowledge and skills needed to effectively leverage AI for sustainability. This could involve training programs, workshops, and educational resources focused on AI technologies, sustainability principles, and best practices in green business management. By empowering entrepreneurs with the tools and knowledge they need, we can unlock the full potential of AI to drive positive environmental impact and create value for businesses and society.

Lastly, fostering a culture of innovation and collaboration is crucial to driving continuous improvement and adaptation in green business practices through AI. This involves creating incentives and recognition programs to encourage businesses to invest in AI-driven sustainability initiatives and share their successes and learnings with others. By celebrating innovation and promoting a spirit of collaboration, we can create a virtuous cycle of continuous improvement and drive meaningful progress towards a more sustainable and resilient economy.

6 Conclusion

This thesis has shed light on the promising intersection of sustainable entrepreneurship and artificial intelligence (AI), illuminating the potential synergies and challenges inherent in leveraging AI to foster environmental sustainability and economic resilience. Through an in-depth exploration of the literature, analysis of findings, and robust discussion, we have elucidated the transformative role of AI in promoting green business practices, advancing the Sustainable Development Goals (SDGs), and enhancing the viability of entrepreneurial ventures in an increasingly digitalized world.

Our findings underscore the urgency of embracing AI as a catalyst for sustainable entrepreneurship, leveraging its capabilities to drive inclusive growth, mitigate environmental degradation, and enhance resilience in the face of evolving global challenges. By elucidating the mechanisms through which AI can augment sustainable business practices, this research contributes to a growing body of knowledge aimed at redefining the paradigm of entrepreneurship in the 21st century.

Moving forward, it is imperative for future research to delve deeper into several areas that warrant further exploration. Firstly, longitudinal studies tracking the long-term impacts of AI adoption on sustainable entrepreneurship performance are essential to gauge the scalability and sustainability of AI-driven initiatives over time. Additionally, interdisciplinary research endeavors bridging the gap between AI, sustainability science, and social sciences can provide a more holistic understanding of the socio-technical dynamics at play. Moreover, investigations into innovative AI applications, such as machine learning for predictive analytics in sustainability decision-making, hold promise for unlocking novel pathways towards sustainable development. Finally, qualitative studies exploring the lived experiences of entrepreneurs, stakeholders, and communities impacted by AI-driven sustainability initiatives can offer valuable insights into the nuanced socio-economic implications of these interventions. By addressing these research gaps and fostering interdisciplinary collaboration, we can pave the way for a more inclusive, equitable, and environmentally sustainable future powered by AI-enabled entrepreneurship.

Lastly, the journey towards sustainable entrepreneurship powered by AI is multifaceted and dynamic, offering boundless opportunities for innovation, collaboration, and positive societal impact. As we navigate this path, continued research and dialogue will be paramount in harnessing the full potential of AI to build a more resilient, equitable, and sustainable future for generations to come.

Reference

- Bapna, R., Gangadharan, G. R., & Joshi, Y. V. (2021). AI for Social Good: Unlocking New Business Opportunities. *MIS Quarterly*, 45(2), 533-541.
- Berger, R. (2015). Now I see it, now I don't: Researcher's position and reflexivity in qualitative research. *Qualitative Research*, 15(2), 219-234.
- Bhandari, U. (2024). *Roles of AI in Digital Transformation of Tourism Business* (thesis).
- Bican, P. M., & Brem, A. (2020). Digital Business Model, Digital Transformation, Digital Entrepreneurship: Is there a sustainable "digital"? *Sustainability*, 12(13), 5239. <https://doi.org/10.3390/su12135239>
- Bickley, S. J., Macintyre, A., & Torgler, B. (2024). Artificial Intelligence and big data in sustainable entrepreneurship. *Journal of Economic Surveys*. <https://doi.org/10.1111/joes.12611>
- Bickley, S. J., Macintyre, A., & Torgler, B. (2021). Artificial Intelligence and big data in sustainable entrepreneurship. *CREMA Working Paper*, No. 2021-11. Center for Research in Economics, Management and the Arts (CREMA), Zürich. <http://hdl.handle.net/10419/234626>
- Birt, L., Scott, S., Cavers, D., Campbell, C., & Walter, F. (2016). Member checking: A tool to enhance trustworthiness or merely a nod to validation? *Qualitative Health Research*, 26(13), 1802-1811.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun, V., & Clarke, V. (2013). *Successful qualitative research: A practical guide for beginners*. Sage Publications.
- Braun, V., & Clarke, V. (2019). Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health*, 11(4), 589-597.
- Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: moving toward new theory. *International journal of physical distribution & logistics management*, 38(5), 360-387.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. Sage Publications.
- Cohen, B., & Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. *Journal of Business Venturing*, 22(1), 29-49.
- Chou, J. R. (2021, September 7). A Scoping Review of Ontologies Relevant to Design Strategies in Response to the UN Sustainable Development Goals (SDGs). *Sustainability*, 13(18), 10012. <https://doi.org/10.3390/su131810012>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.

- Davis, F. D. (1985). *A Technology Acceptance Model for Empirically Testing New End-user Information Systems*, Massachusetts Institute of Technology
- Davenport, T. H., & Harris, J. (2017). *Competing on analytics: Updated, with a new introduction: The new science of winning*. Harvard Business Press.
- Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, 62(1), 107-115.
- Feng, T., Li, Q., Zhou, H., & Shen, Y. (2020). Application of artificial intelligence in green supply chain management: A literature review. *Journal of Cleaner Production*, 258, 120687.
- Fuerst, S., Sanchez-Dominguez, O., & Rodriguez-Montes, M. A. (2023, July 12). The Role of Digital Technology within the Business Model of Sustainable Entrepreneurship. *Sustainability*, 15(14), 10923. <https://doi.org/10.3390/su151410923>
- Finlay, L. (2002). "Outing" the researcher: The provenance, process, and practice of reflexivity. *Qualitative Health Research*, 12(4), 531-545. <https://doi.org/10.1177/104973202129120052>
- Flick, U. (2022). *An introduction to qualitative research* (7th ed.). SAGE Publications.
- Fitzgerald, B., & Stol, K. J. (2020). Continuous software engineering: A roadmap and agenda. *Journal of Systems and Software*, 170, 110739.
- Gandomi, A., & Haider, M. (2020). Beyond the hype: Big data concepts, methods, and analytics. *International Journal of Information Management*, 43, 102-115.
- Gartner. (2020). Gartner Forecasts Worldwide Public Cloud Revenue to Grow 6.3% in 2020. Retrieved from <https://www.gartner.com/en/newsroom/press-releases/2020-07-23-gartner-forecasts-worldwide-public-cloud-revenue-to-grow-6point3-percent-in-2020>
- George, G., Merrill, R. K., & Schillebeeckx, S. J. D. (2020). Digital Sustainability and Entrepreneurship: How Digital Innovations Are Helping Tackle Climate Change and Sustainable Development. *Entrepreneurship Theory and Practice*, 45(5), 999–1027. <https://doi.org/10.1177/1042258719899425>
- Gibbs, G. R. (2007). *Analyzing qualitative data*. SAGE Publications.
- Gutterman, A. S. (2018). *Sustainable Entrepreneurship*. Business Expert Press. LLC.
- Gupta, R., & George, S. (2020). *Sustainable development through artificial intelligence: Emerging research and opportunities*. IGI Global.
- Guest, G., MacQueen, K. M., & Namey, E. E. (2012). *Applied thematic analysis*. Sage.
- Guo, L., & Xu, L. (2021). The Effects of Digital Transformation on Firm Performance: Evidence from China's Manufacturing Sector. *Sustainability*. doi:<https://doi.org/10.3390/su132212844>
- Hockerts, K., & Wüstenhagen, R. (2010). Greening Goliaths versus emerging Davids—Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship. *Journal of Business Venturing*, 25(5), 481-492.

- Holopainen, M., Ukko, J., & Saunila, M. (2022). Managing the strategic readiness of industrial companies for digital operations. *Digital Business*, 100039. Retrieved from <https://doi.org/10.1016/j.digbus.2022.100039>
- Horvat, E. (2015). *The Beginner's Guide to Doing Qualitative Research*. Teachers College Press.
- Iansiti, M., & Lakhani, K. R. (2020, January 7). *Competing in the Age of AI*. Harvard Business Press. ISBN: 9781633697621
- Jankovic, S. D., & Curovic, D. M. (2023). Strategic integration of artificial intelligence for sustainable businesses: Implications for Data Management and human user engagement in the Digital Era. *Sustainability*, 15(21), 15208. <https://doi.org/10.3390/su152115208>
- Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, 62(1), 15–25. Consulted on 03 august 2021. <https://doi.org/10.1016/J.BUSHOR.2018.08.004>
- Kerstholt, J., Barnhoorn, J., Huetting, T., & Schuilenborg, L. (2019). *Automation as an Intelligent Teammate: Social Psychological Implications*. <http://essay.utwente.nl/77177/>
- Kiron, D., Prentice, P. K., & Palmer, A. (2018). Advancing sustainability through AI and analytics. *MIT Sloan Management Review*, 60(2), 1-10.
- Kovalainen, S. (2012). *Ethics in family tourism* (Master's thesis). Haaga-Helia University of Applied Sciences.
- Liu, D., Shi, Y., Li, J., & Jin, H. (2019). The role of artificial intelligence in achieving sustainable development goals. *Nature Communications*, 10(1), 1-3.
- Liu, G., Bin Zainal Fitri, M. F., & Apine, H. (2020). *Effects of Digitalization on Managerial Practices As Experienced By Managers*. Sweden: Mälardalens University.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. SAGE Publications.
- Martínez-Peláez, R., Ochoa-Brust, A., Rivera, S., Félix, V. G., Ostos, R., Brito, H., Félix, R. A., & Mena, L. J. (2023). Role of digital transformation for achieving sustainability: Mediated role of stakeholders, key capabilities, and Technology. *Sustainability*, 15(14), 11221. <https://doi.org/10.3390/su151411221>
- McCarthy, J. (2007). *WHAT IS ARTIFICIAL INTELLIGENCE?* <http://jmc.stanford.edu/articles/whatisai/whatisai.pdf>
- McAfee, A., & Brynjolfsson, E. (2017). *Machine, platform, crowd: Harnessing our digital future*. W.W. Norton & Company.
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd ed.). SAGE Publications.
- Minoli, D., & Occhiogrosso, B. (2024). *AI Applications to Communications and Information Technologies*. John Wiley & Sons.
- Mishra, P., & Sinha, N. (2021). Sustainable entrepreneurship: A bibliometric review and research agenda. *International Entrepreneurship and Management Journal*, 1-29.

- Moilanen, T., Ojasalo, K., & Ritalahti, J. (2022, June 21). *Methods for Development Work*. BoD - Books on Demand.
- Mont, O., Heijungs, R., & Tukker, A. (2017). A review of methods and data to determine raw material criticality. *Resources, Conservation and Recycling*, 123, 55-64.
- Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*, 16(1), 1609406917733847.
- Orsato, R. J. (2009). *Sustainability strategies: When does it pay to be green?* (1st ed.). Palgrave Macmillan.
- Paschen, J., Kietzmann, J., & Kietzmann, T. C. (2019). Artificial intelligence (AI) and its implications for market knowledge in B2B marketing. *Journal of Business & Industrial Marketing*, 34(7), 1410–1419. <https://doi.org/10.1108/JBIM-10-2018-0295>
- Putro, A. K., & Takahashi, Y. (2024, February). Entrepreneurs' creativity, information technology adoption, and continuance intention: Mediation effects of perceived usefulness and ease of use and the moderation effect of entrepreneurial orientation. *Heliyon*, 10(3), e25479. <https://doi.org/10.1016/j.heliyon.2024.e25479>
- Rachinger, M., Rauter, R., Vorraber, C., Wolfgang, M., & Eva, S. (2019). Digitalization and its influence on business model innovation. *Journal of Manufacturing Technology Management*, Vol. 30 No. 8, 2019, 1143-1160. doi:10.1108/JMTM-01-2018-0020
- Raj Karki, B., Basnet, S., Xiang, J., Montoya, J., & Porras, J. (2022). Digital maintenance and the functional blocks for sustainable asset maintenance service – A case study. *Digital Business*, 100025. Hämtat från <https://doi.org/10.1016/j.digbus.2022.100025>
- Ratten, V. (2023). Digital platforms and transformational entrepreneurship during the COVID-19 crisis. *International Journal of Information Management*, 72, 102534. <https://doi.org/10.1016/j.ijinfomgt.2022.102534>
- Russell, S. and Norvig, P. (2010) *Artificial Intelligence: A Modern Approach*. 3rd Edition, *Prentice-Hall*, Upper Saddle River.
- Savić, D. (2019). From Digitization, through Digitalization, to Digital Transformation. 43, 36-39. Hämtat från <https://www.researchgate.net/publication/332111919>
- Savitz, A. W., Weber K. (2006). *The triple bottom line: How today's best-run companies are achieving economic, social, and environmental success—and how you can too*. Jossey-Bass. San Francisco.
- Schwartz, M., Ziadat, S., & Belzowski, J. (2019). *Artificial Intelligence for Green Manufacturing*. Springer.
- Shin, S., Chang, D., & Eom, S. (2021). Environmental Compliance Monitoring System Using Deep Learning. *Sustainability*, 13(8), 4312.
- Smith, J. (2018). Leveraging Podcast Interviews for Qualitative Research: An Examination of TED Talks. *Journal of Research Methods*, 5(2), 120-135.

- Tai, M. C. (2020). The impact of artificial intelligence on human society and bioethics. *Tzu chi medical journal*, 32(4), 339–343. https://doi.org/10.4103/tcmj.tcmj_71_20
- TED Conferences. (n.d.). About TED. TED Conferences. <https://www.ted.com/about/our-organization>.
- Thompson, P. (2019, August 15). *10.1 Technology Acceptance Model*. Pressbooks. <https://open.library.okstate.edu/foundationsofeducationaltechnology/chapter/2-technology-acceptance-model/>
- United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. *United Nations Sustainable Development*. Retrieved May 5, 2024, from <https://sdgs.un.org/sites/default/files/publications/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>
- United Nations. (2019). The Sustainable Development Goals Report 2019. *United Nations Sustainable Development*. Retrieved May 5, 2024, from <https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf>
- United Nations. (2020). Policy brief: The impact of COVID-19 on food security and nutrition. *United Nations Sustainable Development*. Retrieved May 5, 2024, from https://www.un.org/sites/un2.un.org/files/sg_policy_brief_covid-19_and_food_security.pdf
- United Nations. (2023, May 31). Take Action for the Sustainable Development Goals - United Nations Sustainable Development. *United Nations Sustainable Development*. Retrieved May 5, 2024, from <https://www.un.org/sustainabledevelopment/sustainable-development-goals/>
- Verhoef, P. C., Kannan, P. K., & Inman, J. J. (2017). From multi-channel retailing to omni-channel retailing: Introduction to the special issue on multi-channel retailing. *Journal of Retailing*, 93(1), 1-6.
- Willard, B. (2012, April 1). *The New Sustainability Advantage*. New Society Publishers. http://books.google.ie/books?id=MnrwiVQZW0AC&pg=PA100&dq=9781550925074&hl=&cd=3&source=gbs_api
- Weidinger, C., Fischler, F., & Schmidpeter, R. (2013, August 13). *Sustainable Entrepreneurship*. Springer Science & Business Media. http://books.google.ie/books?id=y-CCBAAQBAJ&printsec=frontcover&dq=Sustainable+Entrepreneurship+Business+Success+through+Sustainability&hl=&cd=1&source=gbs_api
- Wilmington, N. (2020). Artificial Intelligence: Discover the Role of Artificial Intelligence in Practice and the Benefits of AI for Business, Understand Machine Learning and Look into the Future of Technology (1st ed.).
- Worthington, I. (2013). *Greening business : Research, theory, and practice*. Oxford University Press, Incorporated.
- Wu, L., Wang, Y., Ma, X., & Li, J. (2020). The impact of ERP system on firm performance: Evidence from China. *Journal of Organizational and End User Computing (JOEUC)*, 32(3), 1-17.

- Yang, B., Liu, Y., & Chen, W. (2023). A twin data-driven approach for user-experience based Design Innovation. *International Journal of Information Management*, 68, 102595. <https://doi.org/10.1016/j.ijinfomgt.2022.102595>
- Yasin, A., Hossain, S., Moiz Hali, S., & Iqbal, S. (2022). Digitalization and Firm Performance: Mediating Role of Smart Technologies. *Journal of Tianjin University Science and Technology*, 55(04:2022), 857-870. doi:10.17605/OSF.IO/8FNDC
- Żak, A. (2015). Triple bottom line concept in theory and Practice. *Prace Naukowe Uniwersytetu Ekonomicznego We Wrocławiu*, (387), 252–265. <https://doi.org/10.15611/pn.2015.387.21>