BRIDGING THE TRIPLE BOTTOM LINE: ART & DESIGN STUDENTS' PERSPECTIVES AND INCORPORATION OF ARTIFICIAL INTELLIGENCE FOR THEIR ENTREPRENEURIAL PROJECTS

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ABSTRACT

The current research investigates the interrelationships within the field of sustainable entrepreneurship, focusing on the evolution of the construct concerning the triad social, economic, and environmental and the incorporation of Artificial Intelligence (AI) in creative practices. Within the management discipline, sustainable entrepreneurship is a new construct. Most of the literature addresses the practice as 'sustainability' or 'sustainable business practices'. The term entrepreneurship is sustained in the literature to bridge the entrepreneurship and sustainable development literature. For this research, a qualitative approach was taken. The participants of the study included 39 students from Art & Design. They were also part of the research sample. These students were later assigned an entrepreneurial project where they incorporated sustainability and creatively AI integration as a core variable in the design, operational, and ethical frameworks. The sample comprised students from the last semester of four different sectors: Fashion Design, Textile Design, Interior Architecture Design, and Graphic Design. Adopting sustainable entrepreneurship strategies that satisfy all stakeholders' operational needs and advantages is challenging. This is due to institutional frameworks prioritizing established businesses and non-sustainable practices over newly sustainable alternatives. The results from this research offer valuable information regarding certain aspects of sustainable entrepreneurship, student perspectives regarding the role of AI in enhancing the ethics of the design and production processes, and the capacity of such innovations to promote a transition to a developing country's economy.

Keywords: Sustainable Entrepreneurship, Sustainability, Triple Bottom Line, Art & Design, Artificial Intelligence.

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Introduction

Over 80% of world populations live in developing and underdeveloped countries. Most of these populations, however, are uncertain and informal, and are living below the poverty line. Furthermore, there are currently national and international organizations who are integrating these countries business and investment opportunities for entrepreneurship to enhance the socio-economic developmental programs of these countries. Within the past decade, and among sustainable development promoted strategies to enhance economic development, sustainable entrepreneurship and the entrepreneurial discourse surrounding it have gained attention as a possible solution to environmental degradation (Terán-Yépez, Marín-Carrillo, del Pilar Casado-Belmonte, & de las Mercedes Capobianco-Uriarte, 2020). This sparked the interest of researchers, who began to work on the overlaps of entrepreneurship and sustainable development to formulate a novel type of entrepreneurial practice, Sustainable Entrepreneurship (SE) (Urbaniec, 2018). There is no doubt that in these developing countries, one of the top priorities is to achieve sustainable growth, which is definitely possible through the promotion of sustainable entrepreneurship. The "sustainability" approach also entails the integration of social, environmental, and economic (commonly referred to as "the triple bottom line") ethical elements within the organizational frameworks (Urbaniec, 2018). Businesses that practice sustainable entrepreneurship are more likely to achieve steady growth and survive the competitions that emerging economies, and their market-oriented structures, have to offer.

Recent additions to terminology in the area of sustainable development include green entrepreneurship, environmental entrepreneurship, eco-entrepreneurship, social entrepreneurship, and corporate social responsibility and these have the potential to help economies of scale. Although several studies have provided a comprehensive understanding of social entrepreneurship, the related dimensions of social cognition and decision-making within the context of sustainable entrepreneurship remain relatively unexplored (Terán-Yépez et al., 2020). Innovation as well as the challenges that entrepreneurs encounter in rendering their projects sustainable, is of utmost importance to the achievement of such objectives. In today's inventive industries, the pursuit of innovation tends to converge, in unprecedented ways, with the use of AI (Artificial Intelligence). AI-enabled tools prospect sustainable design, streamlined resource allocation, and social value creation, thereby enhancing resource accessibility and efficient social

impact. AI tools empower learners with advanced methods of green business development like waste-to-value processing and digital-only production that considerably reduce the cost and resource demand to create eco-friendly ventures. Therefore, the existing literature views social entrepreneurship as a novel concept that aids businesses to align their strategic objectives in terms of social, environmental, and economic value (Terán-Yépez et al., 2020). In management literature, the concept of sustainable entrepreneurship is fairly recent while business practices can simply be termed as "sustainability business practices."

It has an objective of connecting entrepreneurship with books on sustainable development (Bawono & Rahmana, 2021). Based on this theoretical perspective, sustainable entrepreneurship integrates conventional with social entrepreneurship. Sustainable entrepreneurship involves the ability to identify and create economic, ecological, and social benefits. A person must be innately driven to identify and exploit value-creating opportunities to construct a business that may be termed conventional entrepreneurship. This type of entrepreneurship seeks only to satisfy the bare socioecological demand, as set by the law and policy, with a focus on the economically viable part of value added. The opposite of this is social entrepreneurship, which engages with social and environmental problems, seeks to improve the social system, and associates financial sustainability with social goals. Sustainable enterprise is the intermediate concept between conventional and social entrepreneurship (Bawono & Rahmana, 2021). It integrates and balances the two components of economic goals and socio-ecological goals to construct a business with positive sustainable economic performance. As AI continues to develop into a transformative creative tool, particularly in offering data-informed sustainable insights and facilitating automated ethical production methods, this research seeks to capture these learners' views on sustainable entrepreneurship and their attitudes on AI integration to contribute to the literature on three vital components on sustainable business.

Review of Literature

For a long time, research in the field of entrepreneurship with potential for self-employment (Schaltegger and Wagner, 2011) and creation of workplaces (in the case of job entrepreneurship) focused only on the economic dimensions, that is, on the growth of the economy. In simple terms an entrepreneur seems to be responsible for creating an economic activity and the associated

jobs, whereas social and environmental entrepreneurship aspects have been neglected. Considering the potential negative impacts of entrepreneurial activity on the environment, some scholars, for example, Schaltegger and Wagner (2011) state that "entrepreneurship focuses on activities that meet the demands and needs of a modern economy and that have commercial, social and environmental objectives." This indicates the potential for social entrepreneurship, environmental entrepreneurship and sustainable economic growth has been overlooked. Shepherd and Patzelt (2011) points out that an entrepreneur also needs to adopt entrepreneurial ventures for social and environmental objectives and include that in the business plan. This will result in the creation of a viable business that foster growth in sustainable ecosystems. Recently, there has been an increase in the interest of business people and entrepreneurs in the social and environmental impacts of their business activities.

Because of this, the traditional perspective on entrepreneurship has shifted to encompass the non-monetary benefits and value that can be generated economically. Consequently, a few scholars began to prioritize the connection between entrepreneurship and sustainable development, thereby leading to the development of sustainable entrepreneurship (SE) (Hall, Daneke, & Lenox, 2010). SE revolves around the Triple Bottom Line and connects its three aspects: 1. the environment, with long-term orientation and aims to minimize any potential harm; 2. the social aspect, which focuses on clients, stakeholders, partners, employees, and the broader community; and 3. the economy, which focuses on profit (Majid & Koe, 2012). Modern sustainable entrepreneurs are therefore regarded as change agents who hold the equilibrium among economic viability, social welfare, and environmental preservation.

Innovation is a key element when it comes to entrepreneurship. In terms of innovative sustainable initiatives, the businesses that focus on sustainability must be resourceful in the use of innovative sustainable resources. The use of AI technology within the creative process and the business process is now a necessity, especially in multiple fields of Art and Design. Generative Cmodels of AI and predictive analytics can be a game changer to resource optimization, design for circularity, and reduction of logistics carbon footprints in the production process. The integration of this technology can potentially eliminate the need for physical production and replace it with the production of high-value circular products with minimal carbon footprints. The technological integration aims to achieve more through SE innovation and sophisticated,

data-driven design solutions as opposed to the more focused organizational changes only. To embed this innovation within the scope of education, the principles laid in the UNESCO AI Competency Framework for Students and Teachers is highly necessary to be incorporated. The Framework advocates that a human-centered AI approach should improve human capacities, strengthen social justice, and enhance sustainability.

When students work on integrating AI into their Art and Design specialized area-related projects, they work on more than merely tool usage. They learn AI Ethics, AI System Design, and a Human-Centered Mindset. This way, they become "responsible and creative citizens" while designing AI solutions that are purposeful and environmentally sustainable. Sustainable entrepreneurship positively impacts the social and economic environment. However, there is limited research on the social cognitive factors that promote sustainable entrepreneurship for specific social projects and innovative processes that incorporate AI.

The growth of entrepreneurship is greatly influenced by its economic aspects, regardless of its sustainability. In a booming economy, people want to start new businesses and become their own bosses, which, in turn, fosters entrepreneurship since they look to utilize the economic conditions for growth. Past studies show that income levels directly affect the rate of entrepreneurship, as increases in income allow more people to start new businesses or expand existing ones. This also increases their chances of succeeding, which draws more people to entrepreneurship. Conversely, during economic downturns, businesses are more likely to fail and shut down. This leaves their owners with paid employee positions, as they can no longer save their own businesses. This situation is what led a portion of the research to focus more on the intersection of entrepreneurship with sustainable development and led to Hall and other researchers introducing the concept of sustainable entrepreneurship (SE) in 2010. Consequently, the economic side has been called a key part for the first time in the history of sustainable enterprises. For example, the impact of having money through regulated public securities markets is undoubtedly a great boost for entrepreneurship and keeping these businesses viable (Iqbal, Khan, Gill, and Abbas, 2020). Political and economic stability fostering a favourable transparent investment climate highly influence the consequences of sustainable entrepreneurship and the stability and longevity of these enterprises over time. The integration of AI tools such as market predictive analytics and generative design for rapid prototyping in

sustainable entrepreneurship (SE) models is economically competitive and less capital intensive, saving time and material costs that go into traditional Art and Design concepts development. The ability to optimize and operate efficiently adds to the focus on the economic stability and profitability these entrepreneurial models can contribute in the long run. This helps sustain the drive on innovation described in the Sustainable Development Goals (SDGs), primarily in target SDG 9 (Industry, Innovation and Infrastructure). In near future, sustainable entrepreneurship will advance clean and sustainable industrial and infrastructural development and integration of new processes that will advance marketing systems, supply chain management, and sustainable industrial frameworks. Sustainable Entrepreneurship can focus on building sustainable water structures like cisterns, parks, and eco-friendly job centers, or industrial locations. Using AI makes it even easier to guarantee that Sustainable Entrepreneurship meets contemporary efficiency standards. This shows that moral practices can be more profitable, thus, enhancing the long-term economic sustainability.

The World Commission for Environment and Development (WCED) has put forward the idea that sustainable development needs to be undertaken without further elaboration, so that future generations would still have their needs guaranteed. After being first mentioned at a United Nations (UN) conference in 1972, sustainable development continued to be the focus of attention in the WCED report in 1987. International initiatives appealed to Sustainable Development Goals (SDGs) in order to improve the social order and cater to human wants and aspirations. This word is a focus of attention in Pakistan as well. Consequently, sustainable development is the focus of development and how it can be equitably provided to and for future generations. Sustainable development is without end, as it continues to be a focus in many global and national initiatives. Many multinational companies have undertaken Elkington's (1998) study on the triple bottom line in their practices, which evaluates the financial, environmental, and social components of a firm. Properly managed sustainable development is based on a balance among social, environmental, and economic factors. This was the conclusion that the evolution of prevailing arguments has brought forth. Elkington's (1998), describes the three interpretations of the 'Sustainability' concepts as, first, Economic sustainability, which implies ground level economic development through rational public policy and a sustainable balance between the conflicting sectoral of the economy. Secondly, when it comes to environmental sustainability, it

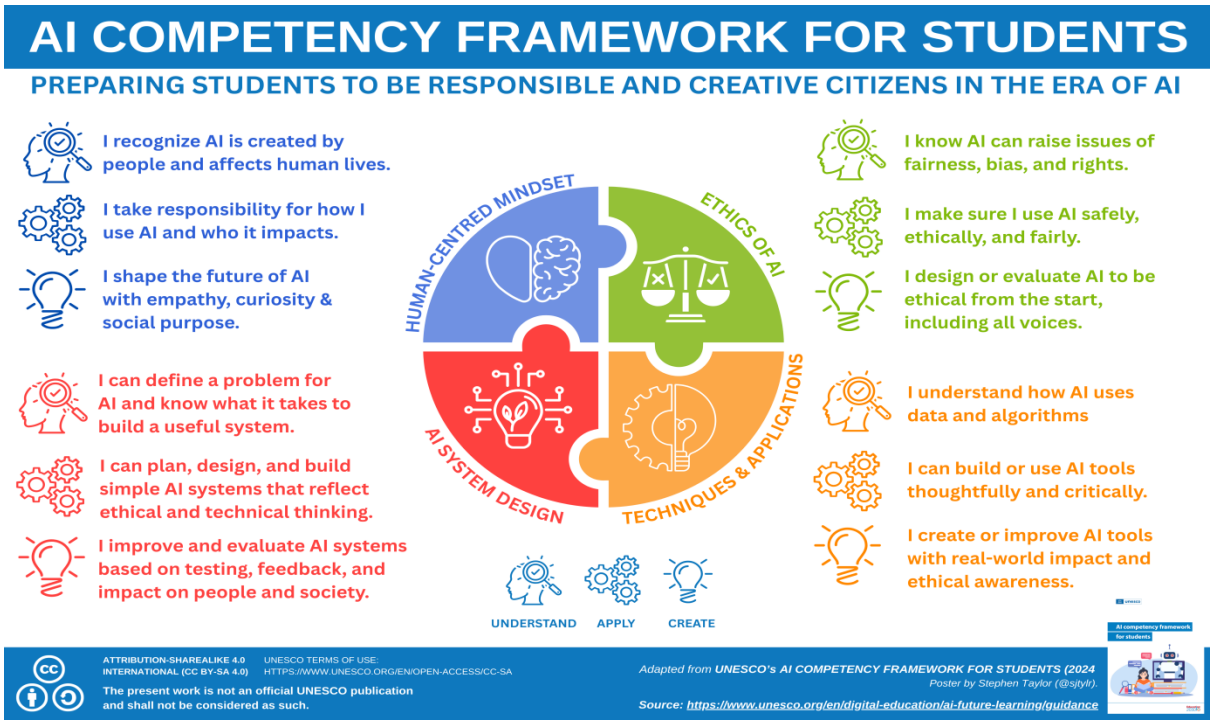
also takes into account phenomenon like biodiversity, balance of the atmosphere, and the various functions of ecosystems that do not fall within the economic resources. Thirdly, social sustainability which is the ability to provide equity and social services, especially healthcare and education.

Using AI for Art & Design projects helps deal with the issue of balancing the different pieces of the design by offering measuring and optimization features. The principal of the UNESCO AI Competency Framework of "inclusive, sustainable AI design" is particularly relevant guiding people to design with AI focusing on social and environmental equity because they will be integrated at the design stage. The idea of sustainable development has certainly been surrounded by debate. It starts with the claim that businesses are to be profitable irrespective of the social and environmental impacts. Then, the demand of the environmentalists is to make the business preserve the environment where it operates (Iqbal et al., 2020). Next, the business is to be committed to helping the environment. Ultimately the idea has to contain the three pillars of profit, environmental, and social sustainable development so that people can live productively. In this case, Sustainable Development Goal 6 (SDG6) pertains to clean water and safe sanitation. With an understanding of the need to resolve water scarcity, sustainable entrepreneurship has adapted to meet these challenges over time. Instantly, eco-innovations emerged “polluted water to drinkable water”, affordable technology and clean tech resource ecologically (i.e., reducing water and fossil fuel.

AI must figure into any possible solution for any unsolved environmental problem. With many people still lacking access to electricity, addressing the energy crisis continues to fall under the environmental component of the seventh SDG. Sustainable entrepreneurship underpins the development and organizing of businesses and the acquisition and management of the funds necessary for achieving social and environmental success. Sustainable entrepreneurship also encompasses more advanced solutions, such as the construction of energy-efficient buildings and green buildings, the establishment of eco-facilities, and the use of alternative energy resources such as wind, solar, hydro and biomass energies for conservation of energy and reduction of energy consumption and dependence. The environmental and economically sustainable AI practices in students’ projects as predictive modeling and design optimization for circular economy frameworks focus on the elimination of waste and energy. The provision of safe,

reliable, and environment sustainable AI systems is a central tenet of the UNESCO's framework in the other component. Another dimension of SDG 13 is climate change, needing a revision of climate control policies to enable the use of emerging technologies aimed at achieving a sustainable low carbon economy.

Using AI in design helps reduce the amount of materials wasted in prototypes and digital productions while also improving the supply chain logistics. In turn, this supports in achieving important environmental Sustainable Development Goals (SDGs) and maintains ecosystem health (Del Vecchio et al., 2021).



Conceptual Framework

Source: https://www.unesco.org/en/articles/ai-competency-framework-students

The theoretical framework of the proposed research combines Sustainable Entrepreneurship (SE), the strategic introduction of Artificial Intelligence (AI), aided by four major areas of competency introduced by UNESCO, to the perceptions of students. SE functions as the connection between the traditional entrepreneurship and social entrepreneurship as it seeks to

work out the Triple Bottom Line (TBL) of Economic (Profit), Social (People), and Environmental (Planet) elements. The study addresses the perception of students on the role of AI in building businesses with economic, ecological, and social values in the Art and Design industry.

This framework assumes that the strategic combination of AI is a groundbreaking creative device and a crucial scientific instrument that SE purposes need to meet and innovate. According to the students, AI is the key to improving the economic sustainability of sustainable initiatives due to radical reduction in production expenses and waste, material optimization and competitive presence in the market, as predictive analytics and lean digital processes. This is dedicated to the profit pillar of the TBL because it aids in economically competitive and less capital consuming operations like generative design that allows rapid prototyping and predictive modeling.

In the case of the "People" and "Planet" elements of TBL, the framework correlates AI integration with the principles of the UNESCO AI Competency Framework requiring a human-centered approach and inclusive, sustainable development of AI. AI is considered by students as a way to achieve social sustainability through the democratization of professional tools, allowing micro-entrepreneurship, and designing products that benefit the community effectively without having an impact on human agency. To ensure environmental sustainability, AI is regarded as an effective means of record-breaking optimization that can serve as a Green Audit tool and allow creating circular economy models based on scrap-free waste disposal and source of energy minimization.

In the end, the conceptual model also emphasizes the fact that the students are not utilizing the AI as a mere tool and the way they are exposed to it includes not only AI Ethics, AI System Design, and a Human-Centered Mindset. This leads to a high dependency of dealing with the regenerative turn and taking AI ethically-aligned as a business proposal that is optically clear, practical, and technologically implementable to enhance sustainable entrepreneurial activity. This inclusion enables the student entrepreneurs to come up with a plan and purposeful AI solutions that are environmentally sustainable, and therefore, a responsible and inventive citizen.

Research Objectives

The objectives outlined for this particular study include the following:

1. To examine graduating students' understanding of the role Artificial Intelligence (AI) integrated vocational Art & Design projects can play in the construction of an economically sustainable society.
2. To explore students' understanding of social and community development possible through the socially responsible use of AI in vocational Art & Design projects.
3. To analyze students' perspectives on the use of Artificial Intelligence in the enhancement of sustainable design practices within vocational Art & Design projects oriented towards the promotion of better ecological practices.
4. To assess the practical application of ethics and human-centered values of the AI Competency Framework in the design, functional, and ethical frameworks of the sustainable entrepreneurship projects by the students.

Methodology

Given the exploratory nature of this study, an inductive qualitative methodology was followed. The qualitative method provides the flexibility needed by the researcher to analyze in detail the interconnected dimensions of sustainable entrepreneurship. To gather the respondent's thoughts and feelings, and achieve an exhaustive study of the intricate multi-dimensional phenomena, sustainable entrepreneurship, an interview method of data collection was integrated into the research design. To teach students the principles of sustainable entrepreneurship, 12 workshops were conducted, involving 39 students in this research. As part of the research activities, students were tasked with an entrepreneurial project, factoring in elements of project sustainability to be submitted as part the whole work. The participants in this study were students in their final semester of four sectors: Fashion Design, Textile Design, Interior Architectural Design, and Graphic Design. The subsequent analysis focused on the 8 selected projects from diverse fields. Based on the three thematic areas of sustainable entrepreneurship, the projects were evaluated on varying areas of sustainability. A case study approach was also incorporated in this research.

As Sturman (1997) indicates, the term "case study" can apply to the investigation of an individual, a group, or even a phenomenon. So a case study consists of both the narrative of an

event and the accompanying analysis, recounting the events of the case and detailing how those elements were identified throughout the research process (Mesec, 1998). Framing social work within education, the case study can be defined as follows: Mesec describes case study as “a description and analysis of a particular issue or case to identify variables, structures, forms, and orders of interaction between the participants in the situation (theoretical purpose), or, to assess the performance of work or progress in development.” The findings from the top five student projects and the sustainable methods used are discussed in the preceding section.

Analysis

Case Study 1: EcoDesign Studio (AI-Based Sustainable Graphic Design Business Plan)

EcoDesign Studio is determined to transform the graphic design industry by incorporating ecological balance into every sustainable design practice as the first point of focus. The studio aims to serve every customer, no matter where they are, by providing beautiful, functional, design solutions that are eco-friendly and have a lightweight carbon footprint. This is a response to the often ignored negative consequences of wastefulness on the environment and climate that are associated with digital practices, such as the waste of disk space and the energy use of servers, as well as print waste. The studio aims to change the perception that a design studio has to be 'profitable' to be 'eco-friendly' and hopes to set the standard for eco-conscious graphic design practices and digital design ‘innovation’ that is fully aligned with today's technological advancements for the benefit of people.

For EcoDesign Studio, AI integration is a pillar of their studio’s design sustainability model. As fully generative AI engineered on eco-sustainability parameters such as Firefly, DALL-E, and Runway ML is licensed for studio use, the studio explores AI for sustainability more than creativity. Generative AI is used to complete design automation, so human designers can spend more hours on complex designs that focus on the ecological positive. More importantly, the studio will soon use AI based on eco-sustainability calculations to design a model that prevents the negative eco-sustainability impacts of design. These include design adjustments that minimize ink use, limit storage-resolved file high resolutions, dependably proposed print

material carbon footprint, and thus AI will be used as a "Green Audit" tool for the complete digital design process.

Case Study 2: AI-CINEMATIC (Revolutionizing Cinematic Videography)

AI-Cinematic advocates for revolutionary digital services aimed at democratizing top-tier filmmaking. In contrast to the historical dependence on costly, resource-heavy professional gear that is often out of reach, this project focuses on individuals who wish to produce cinema, including students and low-budget independent artists. These individuals face logistical challenges tied to expensive productions. The primary goal is to attain cinema-quality visuals using raw footage taken with widely available consumer technology, such as smartphones and entry-level DSLRs. By prioritizing artistic intention, rather than the available capital for investment in costly hardware, AI-Cinematic promotes social sustainability. This approach dramatically reduces the environmental impact of filmmaking and lowers the economic barriers to entry for individuals who wish to engage in the creative economy.

This undertaking relies completely on the neural processing tools and cutting-edge artificial intelligence software like Runway ML, Pika Labs, and Topaz Video AI. These systems perform sophisticated AI post-production, and with the help of complex algorithms, they artificially create the effects produced by expensive cameras and lenses. These AIs create lens blurs, depth of field shifts, and color grades with the precision of a professional and stabilize footage as well. The integration of such AI tools makes avoidance of the acquisition, production, transportation, and disposal of industrial quantities of specialist equipment like cameras, tripods, and lighting rigs possible. Hence, filmmaking is a "green digital creation" process. In this sense, AI replaces the hardware with a technologically advanced digital tool and addresses the environmental concern of disposing of traditional hardware obsolete in the highly logistic, environmentally invasive, and cinematic hardware industry.

Case Study 3: NOVA CARRY BAGS (Sustainable Fashion-Tech)

Nova Carry Bags is an innovative fashion-tech brand working with circular economy models by up-cycling textile and furniture waste into smart and stylish bags for contemporary women. The project uses innovative design to combat textile waste pollution, by recycling and adding solar

charging, LED lights, and wireless charging. Other than being socially innovative, Nova Carry Bags creates self-employment and empowers local women artisans to manufacture the products. This waste transformation, along with the socially innovative sourcing, captures the essence of the project's triple bottom line (People, Planet, Profit) holistically.

The Nova Carry Bags model aims to validate and improve the brand's aesthetic and zero-waste operational efficiency. This project aims to predict and track upcycled designed consumer fashion trends using AI market analysis tools to ensure desirable and profitable designs. This is crucial to prevent unsold stock and further waste. Also, in sorting waste and identifying materials, AI tools like image recognition can be used for speed and accurate classification of reusable fabrics (Olurin et al., 2023). This project aims to leverage AI for digital marketing and design testing. This shows that sophisticated and inexpensive digital intelligence helps scale a handcrafted upcycled product to a competitive, sustainable, and advanced fashion business.

Case Study 4: Packwise (Eco Packaging Made from Food Waste)

Packwise is an innovative startup focusing on local organic food waste such as banana peels and rice husks and converts them into sustainable and biodegradable packaging. This tackles the global plastic pollution problem as it directly replaces typical fossil-fuel-derived packaging. The sustainable design offered by Packwise is the first fully compostable design which closes the circular economy at the community level. The business model is based on the local sourcing of waste, local production, and community participation, and is committed to integrating environmentally sustainable and protective practices with socio-economic community empowerment.

The successful engineering of Packwise's product relies on the seamless integration of Artificial Intelligence within the intersection of material science and design optimization. This project details the application of AI-powered algorithms to determine the chemical and physical attributes of different combinations of organic waste. A scientific approach to this problem is invaluable to determine precisely what combination, what combination, texture, thickness, and strength of the packing material should be to achieve both functional durability required for food and retail packaging and complete composability (Wiyata et al., 2023). Furthermore, the ability

of AI to iterate and test material prototypes within the shortest time frame possible significantly reduces wasted time and material within the traditional R&D cycle. In this scenario, AI transcends the realm of cutting-edge technology and assumes the role of a fundamental scientific instrument to convert raw, heterogeneous waste materials into a uniform, high-quality, and commercially viable sustainable product.

Case Study 5: DESLANCE (A Global Design Intelligence Ecosystem)

As a next-generation digital publication, and a publishing design and intelligence ecosystem, new market trends are synthesized and assessed, suggesting responsible digital publication design, and focusing on sustainable publication and design integration nesting. DESLANCE is not a design agency but aims making publication design more socially and environmentally responsible. Harnessing AIDSD, it will transform global design trends data into actionable insights to help business leaders and policymakers in the creative industry on the responsible and sustainable design and publication integration. This design intelligent ecosystem aims to bridge the wide gap between business strategies and creative intuition integration nesting.

Artificial Intelligence sits strategically at the heart of DESLANCE's operations as a data-mining and analytical engine. The flagship offering of the project, Deslance Intelligence Dashboard offers a deep dive into the design trends and brand visual identities and sustainability campaigns and dashboards offered as AI Powered dashboards. The AI's proficiency goes beyond specifying dashboards by performing in-depth analysis estimating the potential and actual environmental impact of design choices involving materials and the supply chain. By offering AI generated "Sustainable Design Quotient", DESLANCE enables its clientele to make intelligent and environmentally conscious design and business choices. Thus, AI serves as a key differentiator, providing consulting-like strategy at the design interface and encouraging the design ecosystem to align their outputs towards a measurable positive environmental impact.

Discussion

The results of the research clearly indicate that the perception of sustainable entrepreneurship as it was introduced into the study through AI is highly consistent with the principles that can be found in the UNESCO AI Competency Framework to Students. The student projects have gone

beyond considering AI as an invention tool, to the fact that AI is applicable to affect the whole business ecosystem with regards to design ethics and financial sustainability. The change in direction is indicative of the call by the Framework to equip students as responsible and creative citizens in the AI era who design the future of AI and shape it with empathy, curiosity, and social purpose. The students were also able to participate actively in the four domains of the Framework: Human-Centered Mindset, Ethics of AI, AI System Design, and Techniques and Applications by applying AI to their Art and Design projects.

The direct application was the Human-Centred Mindset found in the Framework in the manner in which the students approached the matter. The values of social and community development proposed by them were based on the use of AI ethically and showed that they valued the influence of AI on the human lives and the importance of maintaining the human agency. The artificial intelligence projects such as AI-Cinematic facilitated social sustainability through the democratization of professional filmmaking, which undoubtedly reduced economic obstacles and placed previous interest in the artistic intent over financial investment (Islam, 2024). Likewise, NOVA CARRY BAGS relying on AI to expand a business model empowering the local women artisans. This indicates that the students acknowledge how ethical AI use can be applied to ensure social sustainability, namely, by making them more inclusive, accessible, and supportive of communities in the same way as the UNESCO’s framework.

The research mission related to developing sustainable design practices with the help of AI had a close connection with the Framework AI System Design and Ethics of AI quadrants. Students regarded AI as an effective instrument to maximize the environment. An example is the project of the EcoDesign Studio, which was going to be AI-powered as an attempt to have a "Green Audit" to reduce ink consumption and manage file resolutions directly tackling the adverse eco-unsustainability effects of digital design. Similarly, Packwise applied AI algorithms in material science to optimize biodegradable recipes to achieve the total eradication of plastic waste and to allow the functional durability with full composability (Agboola, 2024). The use of AI in practical form as illustrated shows that the students were in a position to either design or evaluate AI in a manner that seemed to be ethical initially and design systems that reflected ethics and technology thought processes as proposed by the framework.

The knowledge about the role of AI in building an economically sustainable society which students have developed was projected on the framework on Techniques & Applications. The results show there is a view that AI has great potential in the economic feasibility of projects that are sustainable and it is no longer a simple creative tool. The students suggested AI-solutions lower the cost, the waste, and the accessibility, developing competitive, lean, and digital processes (Appio et al., 2024). One example of this is the DESLANCE which utilizes AI as a data-mining and analytical engine to generalize market trends and offer a "Sustainable Design Quotient" to its clients in order to make profitable and more eco-friendly decisions. It proves that students are applying AI to design or utilize tools intelligibly and critically and to develop or enhance AI tools that have actual influence and moral cognizance (Cocu et al., 2025). Probably, strategic deployment of the concept of ethically-aligned AI is viewed as the technical process according to which the triple bottom line does not remain a vision, but is presented as a business proposal that can be carried out and competitive in a developing economy.

Ethical Considerations

The ethical implications of the proposed projects are closely centered on the responsible and fair inclusion of Artificial Intelligence to Art & Design entrepreneurial ventures and aimed aided by Ethics of AI and Human-Centred Mindset sphere of the UNESCO framework. One of the central issues is how the algorithmic bias can corrupt the priorities of the stated goals of the project as social equity and environmental fairness and especially in the environment of developing countries. As an example, AI operation, be it market analytics or a generative design, should be audited so that non-inclusive or culturally insensitive results are not propagated, which would be inconsistent with the intention to pursue a true form of social sustainability and democratize access. The study thus has to take into account the knowledge of students about AI possibilities of creating challenge of fairness, bias, and rights and how they can curb the effects of these threats to ensure a safe and ethical and fair use of AI.

The second ethical aspect is a point of concern because of the automation of AI on human labor and creativity, in particular, considering the emphasis of the students on crafts empowerment and locality. Although AI implements can be cost and time optimized, ethical balance would mean that the technology can be implemented to prevent substituting labor and traditional knowledge

and instead enhance social justice and be used to advance human abilities. The results provide evidence that students are starting to work on assumptions that resemble the protective factors of the UNESCO framework that are geared towards furthering human agency and inclusivity without dispossessing the labor. Thus, the ethical considerations should be discussed within the context of the students' attitude towards keeping the human-centered approach, to augmenting rather than substituting the creative and entrepreneurial as the means of improving the social objectives by ensuring financial affordability and keeping the value of human skill.

Conclusion

This qualitative study examined how graduating Art & Design students define and perceive sustainable entrepreneurship, more specifically how the use of Artificial Intelligence (AI) functions within creative projects in their specialized Art & Design sectors. For the purpose of this study, students' perspectives relative to the integration of AI, design, and the three components of the sustainability (economic, social, and environmental) interlinked within the scope of the study were comprehensive and addressed the objectives of the research.

In the first objective, students' understanding and perception of AI integration in constructing sustainable economy (green economy) pivots around the students' perception that AI holds potential for the economic viability of sustainable (green) projects. More than simply a creative tool, students see AI integration as hyping the economic workflow and thus changing the financial viability of sustainable projects. AI dramatically decreases production and waste (cost) by optimizing material use, predictive analytics, and production trending, while also increasing entry accessibility, and market competitiveness. Several students put forward AI project proposals which constructed a waste to rewarding sustainable production in developing economy within the training project. Rather than the traditional, costly production process, students proposed that AI could create lean, digital workflows which positively transform the production of a sustainable business model.

As for the second objective, focusing on the students' attitudes towards the social and community growth value from the ethical use of AI in enhanced vocational Art & Design themed projects, findings focused on the value of human-centered AI integration in students' thinking.

Students considered integration of AI as a way to promote social sustainability by democratizing access to professional AI tools and revenue-generating micro-entrepreneurship, and efficiently designing demand-driven, community-supporting, and local crafts. The students' reasoning around the ethical use of AI technology, operating on assumptions comparable to the protective elements of the UNESCO's AI Competency Framework, demonstrated the extent to which technology could advance and preserve human agency, inclusivity, and access by not displacing labor. Students acknowledge the scalability and cultural relevance of AI in social initiatives amplifying social value of the proposed projects.

Lastly, for the third goal, understanding students' perceptions implements AI to optimize sustainable design with the goal of achieving better environmental stewardship, positioned AI as a powerful tool for environmental stewardship. Students perceived AI as enabling unparalleled degrees of environmental optimization, including the use of AI algorithms to fine-tune biodegradable material recipes for the complete elimination of plastic waste and the optimization of digitally designed assets for reduced energy consumption across the design lifecycle. The ability to accurately assess and reduce the environmental impact of physical and digital designed outputs clearly shows students' perceptions of AI as a baseline requirement for the realization of true and quantifiable environmental stewardship. This signaled a strong predisposition to address the regenerative turn, along with other enabled shifts in the digital economy. In the case of Art and Design students, sustainable entrepreneurial practice, the study posits, relies on the strategic use of "ethically-aligned" AI no longer a vague conceptual ethical goal, but a clear, actionable, and technologically executable business proposition.

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