

## HUMANITY-DRIVEN DIGITAL ENTREPRENEURSHIP: DESIGNING AND VALIDATING THE HADES MODEL AMONG UNIVERSITY STUDENTS

\* Ms. Ajab Tinwala, \*\*Mr. Ganesha Gundu & \*\*\*Mr. Ravi Singh

\* Lilavati Lalji Dayal Night College of Commerce

### Abstract:

The rapid advancement of digital technologies has transformed entrepreneurial ecosystems, providing university students with access to digital platforms, artificial intelligence, and online business tools. However, limited research integrates humanitarian values and sustainability awareness within student-led digital entrepreneurship frameworks. To address this gap, this study proposes and empirically validates the HADES Model (Humanity-Driven Agile Digital Entrepreneurship for Sustainability), a student-centric framework explaining Sustainable Startup Intention.

A quantitative cross-sectional design was employed, collecting primary data from 300 university students using a structured questionnaire measured on a five-point Likert scale. Reliability was confirmed through Cronbach's Alpha, and hypotheses were tested using multiple regression and mediation analysis in Jamovi. Bootstrapping with 5000 samples was applied to validate the mediation effect.

The findings reveal that Digital Competence and Humanitarian Orientation significantly influence Sustainable Startup Intention, while Sustainability Consciousness does not show a direct significant effect. Digital Entrepreneurial Agility partially mediates the relationship between Digital Competence and Sustainable Startup Intention. The model explains 58% of the variance, indicating strong explanatory power.

The study validates the HADES Model as a comprehensive framework aligning digital capability, ethical responsibility, and adaptive agility to foster sustainable digital entrepreneurship among university students.

**Keywords:** Digital Entrepreneurship, Sustainable Startup Intention, Digital Entrepreneurial Agility, Humanitarian Orientation, Sustainable Innovation & HADES Model

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### Introduction:

The present time sees an increase in natural and human made disasters which in turn has put forward questions on the efficacy and sustainability of humanitarian logistics systems. We see issues like coordination breaks down, resource shortages and also regulatory and ethical problems which in turn has brought to light the need for innovation. To that end we have seen the introduction of digital technologies into humanitarian services which has put forth a transformational approach. Digital humanitarianism which includes data driven platforms, AI, and collaborative digital ecosystems has improved coordination and real time response. That said we still see large gaps in legal, ethical and management governance structures.

Digital transformation refers to the changes that occur as a result of the growing use of digital technologies in business processes and their organizational capabilities. This has occurred across the world in many different industries. Studies show that when businesses incorporate digital technologies, they improve both their managerial and operational capabilities, resulting in advancements in performance of the business. Considering the parallel to digitalization, organizations must also prioritize the impact of their business practices on the environment and society. Sustainability has emerged as a primary strategic consideration for organizations. More and more, businesses recognize digital transformation and sustainability as an integrated approach to achieve sustainable value.

While the expansion of literature concerning digital transformation and sustainability has covered the different sectors of agility, business innovation, and humanitarian operations, the intersection of digital transformation and sustainability in humanitarian logistics has received little attention. The intersection of humanitarian logistics and digital technology is important for improving the coordination, transparency, and responsiveness of humanitarian logistics through the use of “crowd intelligence” and Artificial Intelligence (AI) systems. Despite the growing importance of these systems, issues with data ownership, accountability, and ethical use of data remain. Accordingly, this paper develops a comprehensive framework for the integration of digital transformation and sustainability in humanitarian logistics ecosystems. The paper sets out to close the identified gaps by attempting to develop a model for a sustainable digital business ecosystem, which is in harmony with the United Nations Sustainable Development Goals (SDGs) and strives to provide humanitarian logistics with a higher level of sophistication.

#### Review of Literature:

1. **Gunaseelan et al. (2022)** in “*Digital Entrepreneurship among Higher Education Students*” examines the digital entrepreneurship in Malaysia appreciating higher education mostly by students and the intensification by the ministry of higher education. It further contributed to the adaptation to the technological transition and incorporating the skills into the market. However, the policies proposed and the increased number of universities and colleges in Malaysia appreciating the program have emphasized its adoption.
2. **Elia, Margherita, and Passiante (2020)** in “*Digital Entrepreneurship Ecosystem: How Digital Technologies and Collective Intelligence are Reshaping the Entrepreneurial Process*” this article proposes a definition of digital entrepreneurship ecosystem by highlighting the integrated digital- output and digital-environment perspectives. Digital transformation is today widespread and pervasive into most industries and companies, and a new paradigm of digital entrepreneurship emerges, which is driven by the innovation potential embedded into large groups of individuals contributing to develop innovative technology-based solutions.
3. **Gohil et al. (2024)** in “*Digital Business Models for Sustainability*” examines how to predict the digital transition of businesses. It aims to establish a causal relationship between various components of the business model and parts of digital technologies. This improves our understanding of how technology affects digitally-

drives business structures. Digitalization profoundly changes business and society by eradicating outdated business paradigms and generating sustainable value.

4. **Sahar et al. (2025)** in “*Organizational Sustainability in the Face of Digital Transformation with a Bibliometric and Content Analysis for Future Research Agenda*” explores the intersection of organizational sustainability and digital transformation by providing a comprehensive bibliometric and content analysis of existing literature. The study acknowledges limitations, including the exclusive use of the Scopus database, which may omit relevant literature from other sources.
5. **Aghayari et al. (2023)** in “*The Impact of Digital Transformation on Sustainability: A Case of the Iranian Telecom Industry*” examines that corporate landscape is highly affected by two market factors, namely digitalization and sustainability. These two driving forces have been the topic of several studies on how they change management methods, businesses, and society in general. The present study attempts to elaborate on the relationship between digital Transformation and sustainability.
6. **Pappas et al. (2025)** in “*Responsible Digital Transformation for a Sustainable Society*” discussed the emergence of corporate digital responsibility (CDR) and the shift from industry 4.0 to industry 5.0, which focuses on human-centric approaches and human-AI partnerships. The suggestions in this paper, coupled with the nice research contributions included in the special issue, seek to offer a broader foundation to support responsible digital transformations for sustainable societies.
7. **Baffoe et al. (2019)** in “*Humanitarian Relief Sustainability: A Framework of Humanitarian Logistics Digital Business Ecosystem*” developed a Humanitarian Logistics Digital Business Ecosystem (HLDBE) framework as an alternative way to sustain the humanitarian logistics operations and reliefs through hybrid humanitarian-business logistics sector. Implementation of this ecosystem will have a positive impact on affected economies.
8. **Kumar et al. (2022)** in “*Digital Humanitarianism and Crisis Management: An Empirical Study of Antecedents and Consequences*” proposed a digital humanitarianism dynamic capability (DHDC) paradigm that explores the direct effects of DHDC on disaster risk reduction (DRR) and the mediating effects of process-oriented dynamic capabilities (PODC) on the relationship between DHDC and DRR. Technological innovation has reshaped the way humanitarian organizations (Hos) respond to humanitarian crises.
9. **Barrios et al. (2025)** in “*Digital Technologies for Inclusive Innovations in Humanitarian Response*” examines the role digital technologies play in facilitating inclusive innovation processes. The findings indicate that digital technologies enhanced inclusive innovation processes through different mechanisms, facilitating a dialogical innovation process between NPOs and refugees. The article concludes by discussing how findings expand the current theory on inclusive innovation and their implications for policy and practice.
10. **Ubiparipovic et al. (2023)** in “*Digital Business Agility*” examines Business agility, as the ability To identify and adapt to digital technologies in a timely manner, represents a successful Response and plays a profound role in the organization’s success. By analyzing recent Literature, this paper examines the importance of digital business agility and how digital Technologies themselves contribute to the development of

comprehensive business agility. The paper describes the results of the research, which can serve as a strategic orientation for organizations on their journey to digital transformation and improved business agility.

### Development of Hades Model:

The HADES Model (Humanity-Driven Agile Digital Entrepreneurship for Sustainability) is proposed to explain sustainable startup intention among university students by integrating technological capability, humanitarian values, sustainability awareness, and adaptive agility.

The model is grounded in three theoretical foundations: digital entrepreneurship theory, sustainability orientation literature, and dynamic capability theory. Digital Competence is what we see as students' use of digital technologies for business purposes. Humanitarian Orientation is the tendency to develop responsible social ventures, while Sustainability Consciousness is the degree of that which we are aware of long term environmental and social issues.

To put digital skill into the picture of entrepreneurial action the model puts forth Digital Entrepreneurial Agility as a mediating variable. Agility here is the ability of the individual to adapt to tech changes and dynamic market forces thus it strengthens the connection between digital competence and the intent of green startups. Also the HADES Model puts forth a very comprehensive, student-based framework that brings digital innovation in line with social responsibility and sustainability.

### Conceptual Framework:

This study's conceptual framework presents the HADES Model pertaining to the Sustainable Startup Intention among university students. It is proposed that the variables Digital Competence, Humanitarian Orientation, and Sustainability Consciousness influence Sustainable Startup Intention directly. Moreover, it is suggested that Digital Entrepreneurial Agility, which is proposed to mediate the relationship between Digital Competence and Sustainable Startup Intention, transforms technological capability into entrepreneurial intent.

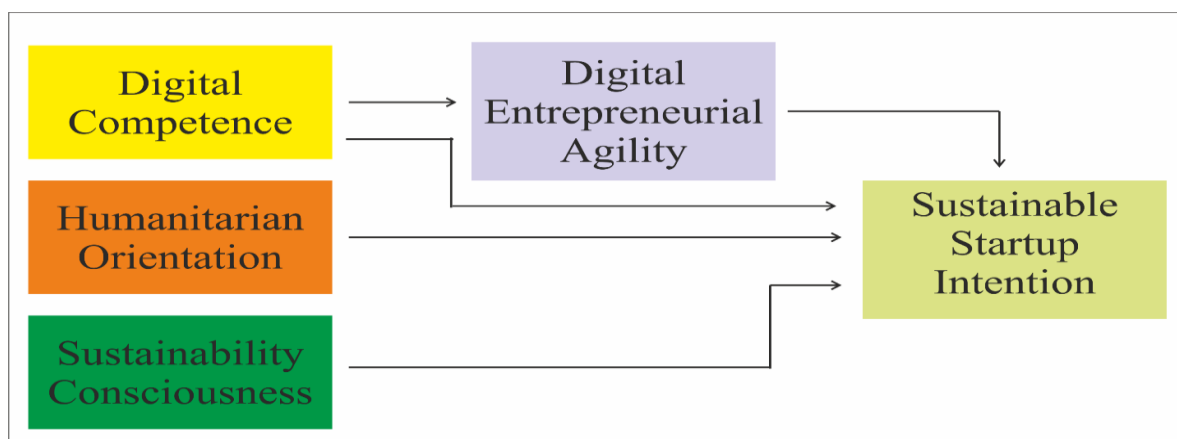


Fig 1: Conceptual Frame Work

### Objectives:

- To examine the influence of digital competence, humanitarian orientation, and sustainability consciousness on sustainable startup intention among university students.
- To analyze the mediating role of digital entrepreneurial agility in the relationship between digital competence and sustainable startup intention.
- To develop and empirically validate the HADES Model as a student-based framework for sustainable digital entrepreneurship.

### Research Methodology:

This research adopts a quantitative cross-sectional methodology to study the HADES Model among university students. Primary data were collected from 300 participants using a structured questionnaire measured on a five-point Likert scale. Reliability was measured using Cronbach's Alpha. Multiple regression and mediation analyses were conducted using Jamovi statistical software. Mediation effects were tested using bootstrapping (5,000 samples) to  $p < 0.05$ .

### Problem Statement:

The swiftness of change in technology has transformed all fields of business as it gives students ease of access to digital technologies, AI, and business tools. However, research focusing on student-run digital startups that incorporate humanitarian aspects and an understanding of sustainability is scarce. Also, the joint effect of digital agility, humanitarian focus, sustainable awareness, and the digital entrepreneurial agility remains largely unexplained. This study attempts to address this by presenting the HADES Model (Humanity-Driven Agile Digital Entrepreneurship for Sustainability). The model is a student-centric approach that combines digital ability, ethically driven sustainability, and agility.

### Data Analysis and Inferential Results:

The statistical analysis and inferential results of the study conducted to validate the HADES Model (Humanity-Driven Agile Digital Entrepreneurship for Sustainability). The analysis was performed using Jamovi statistical software.

### Demographic Profile of Respondents:

The study collected 300 valid responses from university students.

Table 4.1 Gender Distribution		
Gender	Frequency	Percentage
Male	158	52.67%
Female	142	47.33%
<b>Total</b>	<b>300</b>	<b>100%</b>

Table 4.2 Qualification Level		
Qualification	Frequency	Percentage
Undergraduate	210	70.00%
Postgraduate	88	29.33%
Doctorate	2	0.67%
<b>Total</b>	<b>300</b>	<b>100%</b>

Table 4.3 Startup Experience		
Experience	Frequency	Percentage
Yes	144	48.00%
No	156	52.00%
<b>Total</b>	<b>300</b>	<b>100%</b>

*Source: Primary Data*

### Interpretation:

The sample consisted of 300 university students from various disciplines and with different levels of entrepreneurial exposure. The sample appears to be adequately gender-balanced with 52.67% males and 47.33% females. Most participants were undergraduates (70%). Postgraduates and PhDs made up 29.33% and 0.67%, respectively. This means that the majority of the participants were early stage postgraduate students. In terms of entrepreneurial exposure, 48% respondents said they had previously planned or attempted to initiate a digital business and 52% stated they did not have prior start

up experience. This means that the research is capturing both aspiring entrepreneurs and students with some degree of entrepreneurial exposure. Overall, the demographic composition reflects a balanced and academically relevant sample for examining sustainable startup intention within the university ecosystem.

*Reliability Analysis*

**Table 4.4: Reliability Test**

Cronbach’s Alpha was used to assess internal consistency.

Construct	Alpha	Interpretation
Digital Competence	0.95	Excellent
Humanitarian Orientation	0.889	Very Good
Sustainability Consciousness	0.917	Excellent
Digital Entrepreneurial Agility	0.871	Good
Sustainable Startup Intention	0.916	Excellent

In this study we used Cronbach’s Alpha in Jamovi to determine the reliability of the measurement scales. We report strong internal consistency for all constructs which we saw to go beyond the put forth threshold of 0.70. Digital Competence ( $\alpha$  0.950), Sustainability Consciousness ( $\alpha$  0.917) and Sustainable Startup Intention ( $\alpha$  0.916) we found to have excellent reliability, at the same time Humanitarian Orientation ( $\alpha$  0.889) and Digital Entrepreneurial Agility ( $\alpha$  0.871) we noted to have very good reliability. We present that the results confirm the reliability of the measurement scales which in turn are fit for the next stage of analysis.

**Inferential Analysis – Hypothesis Testing:**

*Testing of Hypothesis 1 (Multiple Regression)*

**H01:** Digital Competence, Humanitarian Orientation, and Sustainability Consciousness do not influence Sustainable Startup Intention.

**H1:** Digital Competence, Humanitarian Orientation, and Sustainability Consciousness influence Sustainable Startup Intention.

**Multiple regression analysis was carried out.**

Table 4.5 Model Summary				
R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	Sig.
0.718	0.516	0.511	105.4	< 0.001

The model accounts for 51.6% of the variance in Sustainable Startup Intention. The overall regression model was statistically significant.

Predictor	Beta ( $\beta$ )	p-value	Decision
Digital Competence	0.306	< 0.001	Significant
Humanitarian Orientation	0.341	< 0.001	Significant
Sustainability Consciousness	0.115	0.058	Not Significant

**Interpretation:**

Digital Competence and Humanitarian Orientation are significant predictors of Sustainable Startup Intention. Sustainability Consciousness, however, does not have a statistically significant direct effect (p 0.05).

As a result, H01 is partially rejected. H1 is partially corroborated.

**Testing of Hypothesis 2 (Mediation Analysis):**

**H02:** Digital Entrepreneurial Agility does not mediate the relationship between Digital Competence and Sustainable Startup Intention.

**H2:** Digital Entrepreneurial Agility mediates the relationship between Digital Competence and Sustainable Startup Intention.

Bootstrapping (5000 samples) was conducted.

**Step 1: Effect of DC on DEA**

Path	Beta	R <sup>2</sup>	p-value
DC → DEA	0.686	0.54	< 0.001

Digital Competence significantly predicts Digital Entrepreneurial Agility.

**Step 2: Effect of DC and DEA on SSI**

Predictor	Beta	p-value
Digital Competence	0.228	< 0.001
Digital Entrepreneurial Agility	0.599	< 0.001

R<sup>2</sup> = 0.580

The inclusion of DEA increases explained variance from 51.6% to 58%.

### Mediation Conclusion:

Since:

- DC significantly predicts DEA,
- DEA significantly predicts SSI,
- DC remains significant after including DEA, Partial mediation is confirmed.

Therefore, H02 is rejected and H2 is supported.

### FINDINGS, MODEL VALIDATION AND IMPLICATIONS:

#### Findings:

- University students' Sustainable Startup Intention is influenced by Digital Competence.
- Humanitarian Orientation is a positive contributor to Sustainable Startup Intention.
- There is no direct statistical effect of Sustainability Consciousness on Startup Intention.
- There is a significant (partial) mediating effect of Digital Entrepreneurial Agility on the relationship between Digital Competence and Sustainable Startup Intention.
- Compared to the other models, the HADES Model has the strongest explanatory power as it accounts for 58% of the variance in Sustainable Startup Intention.
- Students' sustainable digital entrepreneurship is a function of their digital capability, humanitarian values, and adaptive agility, rather than just technological skills.
- By building on the integration of digital competence, ethical orientation, and sustainability, the research addresses a gap in the literature.

#### Validation of the Hades Model:

The empirical analysis provides strong validation for the HADES Model.

The model explaining 58% of variance in Sustainable Startup Intention, demonstrates considerable explanatory power in student entrepreneurship. The validation process demonstrates

1. Digital Competence and Humanitarian Orientation have significant direct effects.
2. Digital Entrepreneurial Agility has a significant mediating effect.
3. There is structural consistency between theory and evidence.

Sustainability Consciousness did not have a direct effect, but the integration of the concept is relevant for developing sustainable entrepreneurial ecosystems. Therefore, the HADES Model has validating proof of being a humanity and agility-driven model of digital entrepreneurship.

*Theoretical and Practical Implications of the Hades Model*

Theoretical Implications	Practical Implications
Integrates digital entrepreneurship and sustainability into a unified framework.	Universities should strengthen digital skill development programs.
Establishes humanitarian orientation as a key driver of sustainable startup intention.	Entrepreneurship education should include humanitarian and social responsibility components.
Extends Dynamic Capability Theory by positioning digital entrepreneurial agility as a mediator.	Agility-focused training such as hackathons and innovation labs should be promoted.
Develops and empirically validates a student-centric entrepreneurship model.	Policymakers should encourage youth-led sustainable digital ventures aligned with SDGs.
Bridges technological capability with ethical entrepreneurship.	Provides a roadmap for institutions to nurture sustainable digital entrepreneurs.

Bridging Technology & Ethics in Entrepreneurship

**Limitations and Future Research Directions:**

*Aside from the positive aspects of the study, the following limitations should be highlighted:*

- i) Sample limited to university students.
- ii) Cross-sectional design limitations regarding causality.
- iii) Self-reporting reposes the risk of bias.

**Future research may include:**

- Trialing the HADES Model in several countries.
- Designing the research longitudinally.
- Stretching the model to accommodate other moderators like institutional support or entrepreneurial self-efficacy.

**Suggestions & Recommendations:**

- Universities must improve their digital skills programs which in turn will increase students’ sustainable entrepreneurial goals.
- In to the picture of social responsibility and humanitarian values entrepreneurship education must play a key

role in putting out purposeful startups.

- We see a need for institutions to put together flexible training programs which in which they will help students to take their digital skills into the world of entrepreneurship.
- Policy makers should back youth based green tech businesses through financial support, incubation programs and initiatives that tie in with the SDGs.
- As we increase sustainability awareness we must also present practical digital skill building at the same time.
- Universities should develop ecosystems which include tech, ethics, and adaptability in which they can grow sustainable entrepreneurs.
- For future research we ask that the HADES Model be looked at in a variety of geographies and types of institutions.

#### Conclusion:

This research developed and empirically verified the HADES Model which we put forth to explain sustainable startup intention among university students. We looked at digital competence, humanitarian orientation, sustainability consciousness, and digital entrepreneurial agility which we incorporated into the model to present a framework for study of digital sustainable entrepreneurship. We found out that Digital Competence and Humanitarian Orientation do have a great impact on Sustainable Startup Intentions which in turn Sustainability Consciousness did not play a main role. Also we did a mediation analysis which reports that Digital Entrepreneurial Agility is very much in the picture in the transition from digital skill to action. Also we report that the model which we present explains 58% of the variation in startup intention which is a strong result. Overall, the HADES Model is validated as a comprehensive framework that aligns digital innovation with ethical responsibility and adaptive capability, emphasizing that sustainable digital entrepreneurship requires not only technological skills but also humanitarian values and agility.

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