



Students as Sustainability Change Agents: Examining Barriers and Opportunities within University Incubators

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Abstract

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As universities increasingly recognize their role in addressing global sustainability challenges, their business incubators have the potential to become hubs of innovation for a more sustainable future. This qualitative study explored the integration of sustainability principles within two university business incubators based in Ireland. Using thematic analysis of interviews with incubator staff and student sustainability leaders, the research examined the facilitators and barriers to sustainability integration within these environments. Key findings revealed a strong influence of university strategy and priorities on incubator actions. While both incubators desire a holistic approach to sustainability, resource limitations and lack of structured staff training often create hurdles. The study highlighted a "mindset gap" between traditional and sustainability-focused approaches and emphasized the untapped potential of student leaders who face barriers of "limited time" and a lack of financial resources. Additionally, the strategic use of external partnerships helps compensate for internal capacity limitations.

Based on these findings, the study recommends aligning the incubator's mission with overarching sustainability goals, providing formal training for incubator staff, bridging mindsets through intergenerational collaboration, integrating sustainability into the student experience, providing funding opportunities to students, and empowering student-led initiatives. While acknowledging limitations such as potential selection bias and the Irish context, this research offers valuable insights for universities seeking to cultivate a new generation of sustainability-minded entrepreneurs. It further emphasizes the need for future research to explore best practices and track the implementation impact of such interventions within university incubation environments.

Keywords: sustainability, university incubators, sustainable entrepreneurship, student engagement, institutional theory

Declaration

I, Anum Chaudhary, hereby, declare that this thesis, submitted in partial fulfilment of the requirements for the degree of MSc in Entrepreneurship at the National College of Ireland, is my original work. All sources of information and ideas used within this research have been fully and accurately cited and referenced. Neither this thesis nor any portion of it has been submitted for any other degree or professional qualification.

I understand that any false claim in respect of this work could result in disciplinary action by university policies.

Signature: _____

Date: _____

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Chapter 1

1 Introduction

The 21st century demands urgent action to address complex environmental, social, and economic challenges. Universities, as hubs of innovation and knowledge creation, are uniquely positioned to foster sustainable practices across the entrepreneurial landscape (Comin *et al.*, 2019). University business incubators offer a dynamic environment to nurture the next generation of entrepreneurs dedicated to creating a more sustainable future. While universities increasingly emphasize sustainability, there's a gap in understanding how their business incubators adapt to this focus (Hamdan *et al.*, 2024). Research often examines the broader benefits of sustainable entrepreneurship or the challenges faced by sustainable startups in general (Feola, Parente, and Cucino, 2021), but offers limited insights into the specific strategies, obstacles, and transformative potential within the unique context of university incubators. This thesis bridges this gap, offering insights to empower incubators to become drivers of sustainable innovation.

To investigate this topic, this thesis explores the central question: How can university business incubators effectively integrate sustainability principles into their operations, support the unique challenges faced by sustainable ventures, and leverage their position within the university ecosystem to drive broader transformations? A qualitative multiple-case study approach examines two university incubators with varying approaches to sustainability. Semi-structured interviews with incubator staff and student sustainability leaders illuminate diverse perspectives on the facilitators and barriers to sustainability integration.

Furthermore, Institutional theory provides a valuable lens for this research. It posits that organizations are shaped by the rules, norms, and expectations of their broader environment (DiMaggio and Powell, 1983). This study examines how a university's sustainability mission, funding, and broader norms influence the incubator's actions. Institutional theory highlights the profound impact the broader university environment has on incubator actions (Shrum, 2001). Our findings revealed that a strong university-wide commitment to sustainability, backed by tangible funding and policies, provided a fertile ground for the incubator to prioritize sustainable ventures. Conversely, where the university's sustainability mission was vaguely defined or competing priorities diluted resources, the incubator struggled to gain traction in integrating sustainability.

The study also explores the degree of alignment between the incubator's desire for a holistic sustainability approach and the university's own priorities. These findings are consistent with the Institutional theory's point of view where Hjortsø, Honig, and Riis, (2015), suggest that incubator staff play a crucial role. Where staff were primarily trained in traditional business models, they tended to conform to existing institutional norms, potentially hindering support for ventures with innovative but less immediately profitable sustainability solutions. However, where staff actively embraced normative isomorphism (Kezar and Bernstein-Sierra, 2019), seeking out sustainability-focused training opportunities and professional networks, a greater degree of agency was evident, enabling the incubator to champion sustainability even when facing some institutional resistance.

1.1 Significance of the Study

This research contributes to both theory and practice. It adds to the literature on sustainable entrepreneurship, specifically within the context of university business incubators. Additionally, it offers actionable insights for incubators seeking to integrate sustainability effectively, identify common challenges, and utilize student engagement as a transformative force. Ultimately, this thesis aims to empower universities to become catalysts for sustainable innovation by fostering a new generation of socially and environmentally conscious entrepreneurs.

1.2 Gap Statement

While universities are increasingly incorporating sustainability into their missions, a gap exists in understanding how business incubators within these universities are adapting to this focus (Bodolica and Spraggon, 2021). Existing research offers limited insights into how incubators develop the internal capacity to guide sustainable startups, address the challenges of this transformation, and leverage external partnerships for mutual benefit (Karahan, 2024). Additionally, the specific role of student engagement and the methods to encourage departmental sustainability through incubator leadership remain under-explored (Karahan, 2024).

1.3 Core Research Question

1. How do university business incubators define and incorporate sustainability into their missions and approaches to supporting new ventures?
2. What key obstacles do incubators face in supporting sustainability-minded startups, and what solutions are they implementing to overcome them?

3. How well do students understand sustainability in a business context, and what are the barriers to greater student involvement with sustainability within the incubator?

1.4 Conclusion

This thesis delves into the challenges and best practices of integrating sustainability within university incubators. The goal is to move beyond theoretical discussions and provide concrete recommendations that address real-world barriers. The findings will offer guidance for incubators seeking to navigate institutional pressures, overcome limitations in staff knowledge, foster student engagement, and leverage partnerships to maximize their impact. This research is designed not only to expand our understanding but also to empower incubators to play a decisive role in building a more sustainable and equitable future.

Chapter 2

2 Literature Review

2.1 Universities as Catalysts for Sustainable Development

In 2015, the United Nations adopted the 17 Sustainable Development Goals (SDGs), a blueprint for creating a more equitable and sustainable world by 2030. While progress has been made, challenges remain and the looming deadline underscores the urgency for accelerated action across all sectors of society (Sachs *et al.*, 2021). Universities have a pivotal role to play as drivers of sustainability innovation and agents of societal transformation (Karatzoglou, 2013). The UN's Sustainable Development Solutions Network emphasizes the importance of "Education for the SDGs" (ESDGs) to empower students to address the complex challenges outlined in the goals. This requires "transformative learning approaches" focused on interdisciplinary, action-oriented experiences that equip students with the skills, knowledge, and mindsets to drive change (Cottafava, Cavaglià and Corazza, 2019; Žalėnienė and Pereira, 2021).

Within Ireland, there's a growing recognition of the need to align higher education with the SDGs. Irish universities embrace ESDGs, and there's a national strategy for this, but the gap is still emerging within the Irish context (Ryan-Fogarty *et al.*, 2016). One crucial space where ESDGs can be translated into action is within university business incubators. These incubators are designed to nurture early-stage entrepreneurship (Marques *et al.*, 2022). By integrating sustainability principles and transformative learning approaches into their operations, incubators can empower the next generation of Irish entrepreneurs to create businesses that drive not only economic growth but also positive environmental and social impact.

Universities often approach ESDGs through teacher-centred models, relying on lectures and passive knowledge transfer (Brinkhurst *et al.*, 2011; E. Akins *et al.*, 2019). However, to foster the critical thinking, problem-solving, and action-oriented mindsets required for sustainability, a shift toward student-centred learning is crucial (Brinkhurst *et al.*, 2011). This emphasizes hands-on activities, collaborative projects, and independent research (Block *et al.*, 2016; Ely, 2018; Meza Rios *et al.*, 2018). Universities must recognize students as potential change agents, empowering them to drive sustainability initiatives that span disciplines and extend beyond the classroom (Barth, 2013).

This emphasis on student engagement and action-oriented learning aligns strongly with the goals of sustainable entrepreneurship. University business incubators can benefit from harnessing the energy and innovative ideas of students. The current study suggested that by moving away from traditional teaching models and providing opportunities for students to engage directly with sustainability-focused projects and venture creation, incubators can tap into a powerful source of transformative potential.

Furthermore, Universities and their business incubators do not operate in a vacuum. Global initiatives like the UN Global Compact and the Principles for Responsible Management Education (PRME) exemplify the growing normative pressure to embrace sustainability at the institutional level. These frameworks, by providing tools and defining standards, shape the expectations placed upon universities and their commitment to training socially responsible business leaders (Blanco-Portela *et al.*, 2017).

2.2 Universities Need to Empower Students as Sustainability Leaders

Developing leadership skills in students goes beyond just universities; it requires a broader, systemic approach. Research highlights three key areas for fostering sustainability leadership: the leader's perspective, their actions, and the context in which they operate (Lynch, McCormack, and McCance, 2011). While leadership in university management and the role of academics are important (Missimer and Connell, 2012; Dyer and Dyer, 2017), there's a growing emphasis on empowering students as agents of change for sustainability (Borges, Cezarino, *et al.*, 2017); (Borges, Ferreira, *et al.*, 2017). Research also explores the characteristics and skills needed for sustainability leadership. Studies examine if leaders and followers possess specific competencies, values, and knowledge that drive them to lead in ways that protect the environment (Wesselink and Wals, 2011; Lans, Blok, and Wesselink, 2014). To enhance leadership effectiveness, universities can develop specific skills and capabilities in students (Gipson *et al.*, 2017). Common methods include feedback, coaching, mentorship, and networking, although their effectiveness still requires further study (Gipson *et al.*, 2017).

Universities have the potential to be leaders in promoting sustainability. They can positively impact their regions' sustainable development and are recognized for their ability to solve problems, educate leaders, and create sustainable solutions (Krizek *et al.*, 2012). Including SDGs in university activities highlights the need to go beyond just teaching and research, and instead focus on developing new sustainability-focused approaches (Alonso-

Almeida *et al.*, 2015). This transformation impacts students, local communities, staff, and faculty alike.

While universities strive to incorporate sustainability, the process is challenging (Leal Filho *et al.*, 2018; Di Carlo *et al.*, 2019). Motivation can stem from the institution seeking a new model Wals, (2014), or from high-level leadership promoting sustainability (Shawe *et al.*, 2019). Universities adopt various strategies, such as signing declarations, integrating sustainability into curricula, or even establishing new institutions that fundamentally align with sustainability (van Weenen, 2000). However, successful implementation in research, teaching, or campus operations faces barriers like overcrowded curricula, lack of emphasis by instructors, limited staff knowledge, and insufficient institutional commitment (Wals, 2014).

2.3 Focus on Transformation

A growing body of research emphasizes the crucial role of students as active agents in driving sustainability transformations within universities and beyond. While faculty-led initiatives are essential, there's a need for greater recognition and support of student-led sustainability projects (Albareda-Tiana, Vidal-Raméntol and Fernández-Morilla, 2018). Student leaders, especially those directly involved in SDG initiatives, offer unique insights and innovative approaches that can accelerate progress within institutions of higher education. This research aims to highlight the experiences of such student leaders, identifying both the impact on the students themselves and the best practices for universities seeking to empower this form of leadership.

Furthermore, the complex challenges of operating at the intersection of environmental, economic, and social sustainability demand strong leadership across all sectors of society (Griggs *et al.*, 2013; Hahn *et al.*, 2015). Businesses, in particular, face pressures to balance sustainability goals with traditional economic objectives (Sanders and Wood, 2024). The United Nations, through initiatives like the Global Compact and Principles for Responsible Management Education (PRME), provides frameworks to guide businesses and universities towards more sustainable practices. However, true transformation requires not just organizational shifts but also the development of individual sustainability leaders.

Universities play a vital role in nurturing the next generation of sustainability-minded leaders. Exposing students to sustainability concepts, empowering them with systems thinking competencies, and enabling them to tackle 'wicked' real-world problems is crucial to fostering their leadership potential (Benton-Short and Merrigan, 2016; Gill and Singh, 2020). While the

global trend emphasizes student agency in sustainability efforts, this research revealed a gap within the Irish university context. Opportunities for students to lead sustainability initiatives, engage in systems thinking exercises, and translate classroom concepts into action remain limited. Irish universities stand to benefit significantly by embracing the transformative potential of student-led sustainability innovation. The findings of this study suggested that by investing in student-led initiatives and prioritizing experiential learning opportunities focused on the SDGs, universities can create a powerful pathway for transforming passionate students into the sustainability leaders of tomorrow.

2.4 Conclusion

This literature review highlights the transformative potential of student-led sustainability initiatives. While the literature emphasizes the importance of sustainable entrepreneurship, it also reveals a gap in understanding how to effectively nurture student leaders within the Irish higher education context. The current study addressed this gap by investigating the impact of student-led sustainability projects on both student development and university practices. By exploring specific initiatives and best practices, this research provides insights into how Irish universities can empower students to become sustainability leaders.

Chapter 3

3 Methodology

3.1 Philosophical Assumptions

The current study was carried out using the constructivist lens, recognizing that knowledge is co-constructed through interactions between researchers and participants. In this view, reality is not an objective, fixed entity; rather, it emerges from our collective engagement with the world (Parker, 2014). Researchers engage in dialogue, negotiation, and sense-making with participants, shaping meaning and understanding (Cunliffe, 2011). By acknowledging subjectivity, the study aims to capture the rich and diverse interpretations of sustainability within the business incubation context. For both student leaders and incubator leaders, the study aims to capture the richness and complexity of how sustainability is interpreted and operationalized within the incubator. Thematic analysis of interview transcripts will identify key themes and variations in how participants understand and approach sustainability goals and practices.

3.2 Research Design

The current study design utilized a qualitative approach, which is well-suited for exploring the lived experiences, perceptions, and meanings related to sustainability integration within university business incubators (Hammarberg, Kirkman, and de Lacey, 2016). Qualitative research involves collecting and analyzing non-numerical data such as text, video, or audio to gain in-depth insights into a problem or generate new ideas for research (Pedler, 2012). Unlike quantitative research, which focuses on numerical data, qualitative research delves into the richness of human experiences and interpretations (Schoonenboom, 2023). This approach aligns with this research's goal of understanding sustainability within the context of business incubation centers at universities.

3.2.1 Participants Sampling Strategy

Purposive sampling was employed to select participants for this study. This approach allowed the researcher to intentionally choose individuals with characteristics directly relevant to the research objectives (Palinkas *et al.*, 2015). Furthermore, convenience sampling Emerson, (2021) was employed which allowed the research to assign participants into two groups: incubator staff (including leaders and program managers) and student sustainability leaders from two universities based in Ireland. This division facilitated the investigation of perspectives

from both those managing the incubator and students actively involved in sustainability initiatives.

3.2.2 Participant Selection Criteria

Participants were required to be (a) leaders or program managers within university business incubators, and (b) actively involved in sustainability initiatives.

3.2.3 Sample Size and Data Saturation

The final sample size was determined by data saturation (Guest, Namey, and Chen, 2020). For instance, the researcher stopped recruiting new participants when the data became repetitive, and no significant new insights were emerging.

3.2.4 Participant Demographics

The researcher conducted semi-structured interviews with two participants, aiming for in-depth insights into their experiences with sustainability within the incubator context. Interviews lasted approximately 45-55 minutes, providing ample time for discussion. Participant demographics are summarized in Tables 1 & 2 below.

3.2.4.1 Case 1 – University # 1

Table 1: Case 1 - University # 1

Characteristics	Participant 1	Participant 2
Role	Program Manager	Student Leader
Gender	Female	Female
Age Range	45 - 50	25-30

3.2.4.2 Case 2 – University # 2

Table 2: Case 2 – University # 2

Characteristics	Participant 1	Participant 2
Role	Manager Incubation Centre	Student Leader
Gender	Male	Female
Age Range	50 - 55	25-30

3.3 Procedure

Prior to participant recruitment, the study received ethical approval from the National College of Ireland's Research Department. To ensure informed participation, researcher developed a consent form written in clear, non-technical language. This form outlined the study's purpose, data handling procedures, potential risks and benefits, and participants' rights to confidentiality and withdrawal. After careful drafting, researcher obtained approval for the form from thesis supervisor (see Appendix A for a detailed copy).

Additionally, interview schedule has been designed to closely align with research objectives. The questions were predominantly open-ended to facilitate in-depth responses. For incubator staff, key question sections focused on sustainability definitions and practices, capacity building, challenges and solutions, and student engagement. For student leaders, the key sections included sustainability awareness on campus, incubator collaboration, perceived contributions, and desired support. A full copy of the interview schedule can be viewed in Appendix B.

3.3.1 Participant Recruitment Procedure

Purposive sampling was employed. University business incubators within Ireland were identified. Leaders/program managers directly involved in sustainability initiatives were contacted via email with an invitation and information sheet. Student leaders were recruited based on the information the incubation centre provided.

3.3.2 Data Collection Procedure

Semi-structured interviews were conducted either in person (at a quiet location on campus) or remotely via video conferencing software (Zoom and Microsoft Teams), based on participant preference. Interviews ranged from 45-55 minutes. See Tables 1 & 2 for details. Furthermore, detailed notes were taken during each interview, capturing key points and observations. With consent, interviews were audio-recorded and transcribed verbatim using Microsoft Word.

Table 3: Interview Details of where, when and duration of each interview

Participant ID	Date	Duration (minutes)	Setting
P1	22 nd March 2024	52 minutes approx.	In-person
P2	26 th March 2024	47 minutes approx.	Remote
P3	28 th March 2024	53 minutes approx.	Remote
P4	9 th April 2024	56 minutes approx.	Remote

3.3.3 Data Preparation Procedure

To protect participant confidentiality, a rigorous anonymization process was followed, removing names, locations, and any potentially identifying information from the transcripts. Data cleaning involved the removal of irrelevant information to maintain focus. Throughout this process, detailed notes were maintained, including initial impressions, analytical memos to track emerging themes and alternative interpretations, and reflexive notes to document potential biases. To further minimize bias, transcripts, notes, and memos were meticulously

reviewed multiple times. This iterative process deepened familiarization with the data and allowed for critical reflection on interpretations.

3.4 Conclusion

This chapter presented the study's qualitative methodology, grounded in a constructivist approach, to explore diverse perspectives on sustainability within university business incubators. Purposive sampling was employed to select incubator staff and student sustainability leaders from two Irish universities. Semi-structured interviews will delve into the definitions of sustainability, resources, and challenges faced, and the role of student engagement within the incubators. Thematic analysis will be applied to the collected interview data to answer the research questions and provide a nuanced understanding of how sustainability is enacted within these incubators. This methodological framework aims to identify strategies for enhancing student leadership in sustainability initiatives within higher education.

Chapter 4

4 Results or Findings

4.1 Data Analysis

Thematic analysis, a rigorous qualitative method, was employed to analyse the collected data. This process involves data familiarization, initial coding, theme development, theme review, data interpretation, and reporting (Castleberry and Nolen, 2018). Data familiarization was involved in immersive reading and re-reading of data to develop a thorough understanding of the content. Initial Coding was developed to code data segments relevant to the research questions and emerging themes. This step leads to theme development which identifies the clustering codes into overarching themes and sub-themes that capture the essence of the data. Then iterative review and refinement of themes has been done to ensure they accurately represent the data's complexity. This data review leads to interpreting themes about the research questions and relevant literature. In the end, reporting was done which presented findings with illustrative quotes and examples to provide a rich narrative that supports the identified themes.

4.2 Thematic Analysis

4.2.1 Case 1, Participant 1 – Incubation Center Leader

Table 4: Mission and Sustainability Definition

Interview Questions	Relevant Quotes	Codes	Themes
Has your incubator formally defined sustainability within its mission statement? If so, how is it defined?	"...we have defined sustainability in the context of our work, but it's really under the umbrella of the university." "In Strategy... all of that, is really written in the context of the importance and the relevance of sustainability..."	<ul style="list-style-type: none">• Umbrella Concept• Strategy-driven• Relevance• Strategy Alignment	Alignment and Institutional Influence
Beyond a basic definition, how does your incubator approach the concept of	"... there is the kind of general holistic approach across...But there is a very specific...core	<ul style="list-style-type: none">• Holistic but Specific• Funding Driven	Duality of Approach

sustainability in the context of supporting ventures? Does it focus on a specific aspect or take a more holistic approach?	research area that the university is focused on..."		
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The quotes provided in the table above reveal two interconnected themes: Firstly, phrases like "...under the umbrella of the university" and "...written in the context of...sustainability" illustrate the theme of "Alignment and Institutional Influence." This emphasizes the incubator's reliance on the university's broader mission and strategy in defining and approaching sustainability. Secondly, the tension between "...general holistic approach..." and "...a very specific...core research area..." contributes to the theme of "Duality of Approach." This underscores the conflict between the incubator's aspirations for a comprehensive approach to sustainability and the limitations imposed by the university's narrower focus.

Table 5: Capacity Building and Training

Interview Questions	Relevant Quotes	Codes	Themes
Does your incubator staff have any training or expertise in evaluating and supporting sustainable ventures?	...we haven't engaged in like people going on specific postgraduate courses... but we would all be involved in sustainability courses, workshops...to kind of bring us up to speed..." "So, we would kind of be up to date in terms of...the latest thinking strategies approaches...based in... that kind of professional organizations..."	<ul style="list-style-type: none"> • Informal Learning • Time Constraints • Staying up to date • General Knowledge 	Ad-Hoc Expertise
What specific programs or resources does your incubator offer to startups interested in	... well, we don't [have specific programs] ... because the sustainability piece is so integral now	<ul style="list-style-type: none"> • No specific programs • Embedded Topic • Targeted workshops 	Integrated Approach

integrating sustainability into their ventures?	in everything...we incorporate [sustainability] into all... programs and workshops...sustainability and sustainable business models would be...a topic for discussion..."		
How do university business incubators leverage partnerships with other institutions to achieve their sustainability goals?	* "...start-up ecosystem is a very broad part of our key role is if we don't have something that's a good fit, we would often signpost them to other people other universities within the ecosystem in some cases we would collaborate we run part of the program in collaboration with...It really depends...do we have the adequate resources to deliver that or we don't want to reinvent the wheel. So, it makes sense to collaborate with someone else..."	<ul style="list-style-type: none"> • Ecosystem Approach • Referral Network • Formal Partnerships • Knowledge Sharing • Resource Pooling 	Partnerships for Expanded Support

The above table explores staff training and partnerships within university incubators. The theme of "Ad-Hoc Expertise" emerges in quotes like "...we haven't engaged in like people going on specific postgraduate courses, but we would all be involved in sustainability courses, workshops to kind of bring us up to speed..." This reveals a lack of formal training opportunities and a reliance on self-driven learning through more informal channels. Additionally, a theme of an "Integrated Approach" is suggested by statements about sustainability being "...so integral now in everything..." This underscores the incubator's attempt to embed sustainability concepts throughout its activities, though this may come at the expense of targeted, in-depth expertise in supporting sustainability-focused ventures.

Table 6: Challenges and Solutions

Interview Questions	Relevant Quotes	Codes	Themes
What are the main challenges you encounter when supporting startups that prioritize sustainability?	<p>"...definitely it is a challenge for everybody here was less concern with well, where are those inputs coming from what happens with the waste products afterward? Whereas now...that's fundamental to everything"</p> <p>"...there's so many projects now that are saying, well, our source material is actually a waste product in order to make a commercial business out of the reprocessing of a waste..."</p> <p>"...it's a mindset thing, that sort of circular economy reusing things should be designed for deconstruction and reconstruction. So that is it's hard to kind of change your mindset..."</p>	<ul style="list-style-type: none"> • Universal Challenge • Waste-as-opportunity. • Mindset Shift • Generational Divide 	<ul style="list-style-type: none"> • Innovation from Constraint
Can you describe any specific initiatives or strategies your incubator has implemented to address these challenges?	<p>"...if [senior researchers] has postdocs or Ph.D. students...who have that more circular economy perspective, then there's always that tension...of trying to formulate a project...in the context of those people being involved..."</p>	<ul style="list-style-type: none"> • Mindset Gap • Project Tension • Back-to-basics • Problem-focused • Redefining-better • Facilitating Collaboration 	<ul style="list-style-type: none"> • Innovative Sustainability Strategies

	"...trying to bring it back to the basics...So how is your problem? Is your solution fixing a problem better than the current solution?... interpret the term better allows people to bring those different perspectives if you have that mix you come up with a good kind of value proposition..."		
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This table highlights both the challenges and opportunities incubators face in supporting sustainability-focused ventures. A key theme is "Innovation Constraints," illustrated by quotes emphasizing mindset barriers ("...it's hard to kind of change your mindset...") and potential generational divides in approach. However, a second theme of "Innovative Sustainability Strategies" also emerges. Quotes about re-envisioning waste as a resource ("...our source material is actually a waste product...") and creating collaborative, problem-focused environments ("...trying to bring it back to the basics...") suggest that the incubator can play a crucial role in driving sustainable innovation by transforming limitations into drivers of change and fostering collaboration across diverse stakeholders.

Table 7: Student Engagement

Interview Questions	Relevant Quotes	Codes	Themes
In your opinion, what are the biggest barriers preventing students from engaging more actively with sustainability efforts within the incubator?	"...it's hard to get student engagement...students are very busy...curriculum is full...part-time jobs...sport...social life...it's definitely extracurricular..."	<ul style="list-style-type: none"> • Time Constraints • Competing Priorities • Curriculum Focus • Extracurricular Perception 	Limited Time and Competing Priorities
	"...maybe we just need to think more about what exactly the student wants. We just kind of do	<ul style="list-style-type: none"> • Student Overload • Lack of Integration • Misaligned offerings 	Potential Misalignment

	the things that we've always done..."		
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This table highlights two central barriers hindering student engagement with sustainability initiatives within the incubator. Theme 1, "Limited Time and Competing Priorities," is evident in quotes "...emphasizing students' busy schedules filled with academic work, extracurricular activities, and potentially even part-time jobs...". This leaves little room for "extracurricular" activities like sustainability involvement. Theme 2, "Potential Misalignment," is revealed by the quote acknowledging that the incubator might need to better understand "...what exactly the student wants." This suggests that its current offerings may not resonate with student needs and that a more student-centred approach is essential for increasing engagement.

4.2.2 Case 1, Participant 2 – Student Sustainability Leader

Table 8: Awareness and Student Understanding

Interview Questions	Relevant Quotes	Codes	Themes
How well do you feel students on campus understand the concept of sustainability?	"I think there's a mixed bag when it comes to sustainability awareness on campus. Some students are very passionate and knowledgeable...true champions for sustainability. There's also a large portion of students who...might not have sustainability as a top priority...It could be due to a lack of exposure, competing priorities, or feeling like their individual actions can't make a significant difference."	<ul style="list-style-type: none"> • Mixed Bag • Lack of Exposure • Competing priorities 	<ul style="list-style-type: none"> • Varied Levels of Sustainability Awareness
In your experience, what are the main misconceptions or challenges students face in understanding how sustainability can be	"Honestly, there are a few things that tend to trip students up...Like, a lot of students assume going green is automatically super expensive...Sometimes, students might not realize	<ul style="list-style-type: none"> • Cost-misconception • Complexity • Greenwashing 	Misconception: Sustainability is High Cost

integrated into business ventures?	just how much impact a business can have...Sustainability gets complicated fast!... Plus, with all the companies saying they're 'eco-friendly'...I think it'd be way easier to learn this...if we had more real-world examples..."		
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The table highlights the theme “Varied Levels of Sustainability Awareness” that is based on the quote "I think there's a mixed bag..." clearly illustrates this theme, acknowledging a spectrum of engagement among students. Phrases like "lack of exposure" and "competing priorities" further explain why sustainability may not be top-of-mind for all students. Furthermore, in the second theme “Misconception: Sustainability is High Cost” The quote "a lot of students assume going green is automatically super expensive..." directly states this misconception. The mention of "greenwashing" further suggests that students might be sceptical of sustainability claims made by businesses.

Table 9: Collaboration and Incubator Engagement

Interview Questions	Relevant Quotes	Codes	Themes
Are there any existing channels for collaboration between students and the incubator on sustainability initiatives?	"There is, definitely, I'm aware of a few existing channels...Student Council plays a significant role...Professors actively encourage students...online platforms...mentorship programs..."	<ul style="list-style-type: none"> • Online Research-collaboration • Feedback Mentorship 	<ul style="list-style-type: none"> • Varied but Limited Channels

This table represent quotes, especially phrases like "I'm aware of a few..." and "Varied but Limited Channels," support the idea of existing collaboration opportunities. However, the words "few" and "limited" indicate that these channels might not be sufficient to foster widespread student engagement in sustainability initiatives. The codes like "Online" and "Mentorship" offer some clues about the nature of these channels.

Table 10: Student Contribution and Opportunities

Interview Questions	Relevant Quotes	Codes	Themes
What specific skills or knowledge do student sustainability leaders believe they can offer to startups pursuing sustainable business models?	Good communication skills are a big one...being able to...communicate your ideas..."Proper time management...consistency and perseverance trying to get everybody to show up to the meetings start working on projects as a team..."Student leaders...must have the ability to convince people about new ideas... the impact of our diets on sustainability...encouraging more vegetarian and plant-based meals..."	<ul style="list-style-type: none"> • Communication • Passion Driven Awareness • Project Management 	<ul style="list-style-type: none"> • Communication and Outreach
What resources does the university provide to students for sustainability initiatives?	"Relies too much on volunteering...not fair...could benefit from...compensated roles...reward sustainable actions...not rewarding it...free work...they should invest...rely purely on volunteering...hope they put more resources..."	<ul style="list-style-type: none"> • Volunteer Reliance • Lack of Incentives • Unfair Burden • Investment Needed 	<ul style="list-style-type: none"> • Over-reliance on Student Volunteers
What kind of support or resources would student sustainability leaders find most valuable to contribute more actively to the university incubator's sustainability efforts?	"We need a proper budget... a lot of our initiatives are more like one-time events... they wouldn't necessarily fit the incubator model. We don't have any direct funding from the university... they should get a yearly budget allocated. If they are	<ul style="list-style-type: none"> • Project Funding • Alignment with Incubator • Financial Commitment 	<ul style="list-style-type: none"> • Need for Targeted Support and Funding

	serious about sustainability, I don't understand why there's no money being put into it..."		
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This table represent three themes. Theme one Communication and Outreach based on the Phrases like "communicate your ideas...", "convince people about new ideas...", and "encouraging more vegetarian..." directly illustrate students' belief in their ability to drive change through communication. The second theme, Over-Reliance on Student Volunteers hinted towards the student's frustration which is evident in phrases like "not fair", "free work", and "rely purely on volunteering...". Furthermore, the third theme "Need for Targeted Support and Funding" emphasis on the need for "a proper budget", "yearly budget allocated", and questioning why "there's no money being put into it" clearly expresses the need for financial backing from the university.

4.3 Case 2, Participant 3 – Incubation Centre Leader

Table 11: Mission and Sustainability Definition

Interview Questions	Relevant Quotes	Codes	Themes
Has your incubator formally defined sustainability within its mission statement? If so, how is it defined?	"...we have a clear definition of sustainability that aligns with the university's broader strategic plan... sustainability holistically – it goes beyond solely environmental focus. We prioritize supporting ventures that address not just environmental challenges... It's about fostering businesses that have long-term viability and make a positive impact within communities."	<ul style="list-style-type: none"> • Strategic Alignment • Holistic View • Community Impact 	<ul style="list-style-type: none"> • Integrative Sustainability Approach

This table demonstrates the incubator's commitment to an "Integrative Sustainability Approach." This theme is evident in the emphasis on a "holistic" definition of sustainability

that extends beyond narrow environmental concerns. Specific phrases like "goes beyond solely environmental focus" and the focus on supporting ventures that contribute to "long-term viability" and "positive impact within communities" clearly highlight how this approach encompasses social and economic dimensions alongside environmental responsibility.

Table 12: Capacity Building and Training

Interview Questions	Relevant Quotes	Codes	Themes
Does your incubator staff have any training or expertise in evaluating and supporting sustainable ventures?	"We believe in continuous learning...no mandatory postgraduate courses...participate in...workshops, networking events...leverage the expertise within our university network...inviting researchers..."	<ul style="list-style-type: none"> • Informal Learning • Networking • Knowledge Development 	<ul style="list-style-type: none"> • Ongoing Learning and Collaboration
What specific programs or resources does your incubator offer to startups interested in integrating sustainability into their ventures?	"We offer workshops and seminars on sustainability regulations, evolving preferences...innovative sustainable practices...dedicated innovation pathway program...embed sustainability as a key consideration...connect them with mentors..."	<ul style="list-style-type: none"> • Workshops • Knowledge • Innovation • Mentorship 	<ul style="list-style-type: none"> • Diverse Support Mechanisms
How do university business incubators leverage partnerships with other institutions to achieve their sustainability goals?	"Collaboration is essential partnerships with other universities...joint research initiatives focused on sustainability challenges...partner with various businesses...strong commitment to sustainability...mentorship opportunities, industry	<ul style="list-style-type: none"> • Industry Partner • Business Alignment • Research 	<ul style="list-style-type: none"> • Strategic Partnerships for Sustainability

	insights, potential commercialization channels..."		
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The table reveal that the incubator tackles the challenge of supporting sustainable ventures through a multi-faceted strategy. First theme “Ongoing Learning and Collaboration” is based on phrases like "continuous learning", "workshops, networking events", and "leverage the expertise within our university network" indicate a focus on self-driven learning and collaboration. Second theme “Diverse Support Mechanisms” based on mentions of "workshops and seminars", "innovative sustainable practices", "innovation pathway program", and "connect them with mentors" illustrates the range of support mechanisms offered by the incubator. Finally, the theme “Strategic Partnerships for Sustainability” based on phrases like "joint research initiatives", "strong commitment to sustainability", and "mentorship opportunities" underline the strategic value of partnerships in expanding knowledge and resources.

Table 13: Challenges and Solutions

Interview Questions	Relevant Quotes	Codes	Themes
What are the main challenges you encounter when supporting startups that prioritize sustainability?	"...shift in mindset required for circular economy traditional linear thinking...finding affordable solutions...there was very little about sustainability [in strategic review] ...challenges in helping startups shift towards a circular economy...scaling up sustainable solutions while maintaining affordability...struggled to source affordable, compostable materials..."	<ul style="list-style-type: none"> • Mindset Shift • Cost Constraints 	<ul style="list-style-type: none"> • Mindset Transformation
Can you describe any specific initiatives or	"It's a collaborative process connect them	<ul style="list-style-type: none"> • Collaboration • Problem Solving 	<ul style="list-style-type: none"> • Collaborative Problem Solving

strategies your incubator has implemented to address these challenges?	with relevant experts...help them understand that 'better' doesn't always mean perfect...continuous iteration and improvement..."	<ul style="list-style-type: none"> • Iterative Approach 	
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This table shows that supporting sustainability-focused startups requires more than just good intentions. The theme “Mindset Transformation” is based on phrases like "shift in mindset required", "traditional linear thinking", and "challenges in helping startups shift..." all clearly exemplify this central challenge. Furthermore, “Collaborative Problem Solving” emphasis on a "collaborative process", connecting startups with "relevant experts", and promoting an understanding that "better' doesn't always mean perfect" highlights the incubator's solution-oriented approach.

Table 14: Student Engagement

Interview Questions –	Relevant Quotes	Codes	Themes
In your opinion, what are the biggest barriers preventing students from engaging more actively with sustainability efforts within the incubator?	We have several initiatives and design sprints connect students with researchers seed funding our incubator's activities are strongly aligned with the university's sustainability goals...we continuously work to improve [student pathways]. ...strong leadership support is essential. This top-down emphasis creates a powerful environment. It often comes down to competing priorities. Students have full course loads, and sometimes even part-time jobs...	<ul style="list-style-type: none"> • Program Variety • Strategic Alignment • Time Constraint • Integration Need • Mentorship Need 	<ul style="list-style-type: none"> • Balancing Student Engagement with Existing Constraints

	need to integrate sustainable entrepreneurship seamlessly into their... experience... more structured mentorship...		
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The This table explores factors limiting student involvement in the incubator's sustainability initiatives. The central theme is “Balancing Student Engagement with Existing Constraints”. The quotes directly highlighted the core constraint of students' limited time and other obligations like "...often comes down to competing priorities, students have full course loads, and sometimes even part-time jobs...". Furthermore, "...need to integrate sustainable entrepreneurship seamlessly into their... experience..." this quote emphasizes that sustainability initiatives need to fit into students' existing academic lives, rather than feeling like an added burden. However, "... more structured mentorship..." quote reveals that students could benefit from greater guidance and support when engaging in sustainability projects, which could help overcome some of the time and knowledge barriers.

4.3.1 Case 2, Participant 4 – Student Sustainability Leader

Table 15: Awareness and Student Understanding

Interview Questions	Relevant Quotes	Codes	Themes
How well do you feel students on campus understand the concept of sustainability?	"...some students are deeply engaged...holistic sense...students who may have a limited understanding...lack of awareness, competing priorities...our role is to bridge this gap...workshops and campaigns..."	<ul style="list-style-type: none"> • Student Engagement • Limited Understanding • Student Leadership Role • Raising Awareness 	<ul style="list-style-type: none"> • Student Leader as Change Agent
In your experience, what are the main misconceptions or challenges students face in understanding how sustainability can be	"... the belief that sustainability is solely about environmental conservation... the perception that sustainability initiatives are costly...may not fully	<ul style="list-style-type: none"> • Innovation Gap • Cost concerns • Narrow Focus • Environmental Focus 	<ul style="list-style-type: none"> • Limited understanding of Sustainability in Business

integrated into business ventures?	understand how sustainability can drive innovation... work to address these misconceptions...emphasize that sustainable practices can lead to cost savings...highlighting real-world case studies...collaborate with faculty and industry partners..."		
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This table demonstrate two themes such as “Student Leaders as Change Agents” and “Limited Understanding of Sustainability in Business”. Quotes such as "...some students are deeply engaged...holistic sense..." illustrates the existence of passionate student leaders who see sustainability in a comprehensive manner. Additionally, the phrase "...our role is to bridge this gap...workshops and campaigns..." reveals that these leaders see themselves as facilitators of change, actively working to raise awareness among their peers. Furthermore, the second theme is based on phrases such as "...belief that sustainability is solely about environmental conservation..." and "...perception that sustainability initiatives are costly...". This common misconception could deter students from exploring sustainable ventures.

Table 16: Collaboration and Incubator Engagement

Interview Questions	Relevant Quotes	Codes	Themes
Are there any existing channels for collaboration between students and the incubator on sustainability initiatives?	"...yes, most students are aware...channels for collaboration...Student Council...workshops, partnerships with student clubs, and joint research projects...turn their ideas into impactful ventures..."	<ul style="list-style-type: none"> • Awareness • Student Bodies • Outreach Activities 	<ul style="list-style-type: none"> • Student Awareness of Sustainability

The table represented theme “Student Awareness of Sustainability” based on the quote “...yes, most students are aware...channels for collaboration...Student Council...workshops, partnerships with student clubs, and joint research projects...turn their ideas into impactful ventures...”.

Table 17: Student Contribution and Opportunities

Interview Questions	Relevant Quotes	Codes	Themes
What specific skills or knowledge do student sustainability leaders believe they can offer to startups pursuing sustainable business models?	"...deep understanding of sustainability principles...strong research and analytical skills...identify opportunities...exceptional communication skills...fresh perspective and creativity...collaborative approaches...motivate students...valuable assets..."	<ul style="list-style-type: none"> • Communication Skills • Innovation Mindset • Research • Motivation 	<ul style="list-style-type: none"> • Diverse Skillset for Sustainable Business
What resources does the university provide to students for sustainability initiatives?	"...access to faculty expertise and research facilities...workshops...academic resources...need for ...funding...flexible scheduling options, virtual resources..."	<ul style="list-style-type: none"> • Accessibility Barriers • Funding Needs • Workshops 	<ul style="list-style-type: none"> • Existing Resources and Areas for Improvement
What kind of support or resources would student sustainability leaders find most valuable to contribute more actively to the university incubator's sustainability efforts?	"...dedicated funding...designated workspace...foster collaboration...mentorship programs...workshops and certificate programs...recognition and incentive mechanisms..."	<ul style="list-style-type: none"> • Funding workspace • Mentorship Skill • Development Recognition 	<ul style="list-style-type: none"> • Targeted Support Needed to Empower Student Leaders

Above given table demonstrated that “Diverse Skillset for Sustainable Business” is based on quotes such as "...deep understanding of sustainability principles, strong research and analytical skills...", "...exceptional communication skills, fresh perspective and creativity, and collaborative approaches motivate students...". Furthermore, the second theme “Existing Resources and Areas for Improvement” based on phrases like "...workshops, academic resources..." which indicates existing support structures available to students. Additionally, the

quote "...need for ...funding...flexible scheduling options, virtual resources..." highlights areas where support is lacking, including financial resources and flexibility to accommodate student schedules. Finally, the last theme based on quotes "...dedicated funding...designated workspace...foster collaboration" which emphasizes the need for resources that enable practical work and teamwork. Furthermore, quote "...mentorship programs...workshops and certificate programs..." indicated that their desire to develop specific skills and gain formal recognition. Also, the phrase "...recognition and incentive mechanisms..." suggests that valuing their contributions through non-monetary means is also important.

4.4 Conclusion

This chapter's thematic analysis illuminated both the potential and challenges faced by university business incubators in effectively integrating sustainability. Despite a commitment to sustainability, incubators grapple with limited staff expertise, student time constraints, and the need to bridge mindsets between traditional and sustainability-focused approaches. Student sustainability leaders could play a key role, but often lack adequate support and the integration of sustainability into their coursework. Furthermore, to maximize the potential for sustainable entrepreneurship, universities must invest in targeted training for incubator staff, integrate sustainability into student curricula, and provide dedicated resources and recognition to empower student sustainability leaders.

Chapter 5

5 Discussion

This study explored the integration of sustainability principles within university business incubators, focusing on the facilitators and barriers experienced by two institutions within the Irish higher education context. The qualitative analysis revealed a complex interplay of factors, including a commitment to sustainability, limited staff expertise, the need to bridge mindsets, and the untapped potential of student sustainability leaders. This chapter discusses these findings in relation to existing literature, interprets them through the lens of institutional theory, and proposes actionable recommendations for university incubators seeking to drive sustainable innovation.

5.1 Institutional Influence and the Alignment Challenge

A central finding was the profound impact of university priorities and strategic direction on the incubators' ability to integrate sustainability. This supports institutional theory's emphasis on the influence of broader norms and expectations (DiMaggio and Powell, 1983). While both incubators expressed a desire for a holistic approach, they often found themselves prioritizing projects that aligned with the university's existing research strengths or funding focus. This aligns with the findings of Hjortsø, Honig, and Riis, (2015) highlighting how university strategy shapes incubator actions.

Despite this common foundation, notable differences emerged between the two cases. In Case 1, the incubator's desire for a holistic sustainability approach seemed constrained by the university's focus on a specific research area. This reveals that even where sustainability is prioritized by the university, a narrow definition might limit the incubator's autonomy. This limitation was reflected in the theme of "Duality of Approach."

In contrast, Case 2 exhibited a far stronger "Strategic Alignment" between the university's sustainability mission and the incubator's actions, allowing them to adopt a more "Integrative Sustainability Approach." This highlights the importance of a clear and coherent mission flowing from university leadership for incubators to fully realize their sustainability potential. Where sustainability was a central pillar of the university's mission, the incubator had greater freedom and resources to pursue innovative ventures. However, when sustainability priorities were vaguely defined or competed with other goals, the incubator struggled to gain traction.

5.2 Ad-Hoc Expertise and the Capacity Building Imperative

Both incubators relied heavily on informal learning channels like workshops and conferences for sustainability knowledge, resulting in a dependence on "ad-hoc expertise." This created challenges in effectively evaluating and supporting sustainability-driven ventures. However, a key difference emerged in how the cases approached this limitation. Case 1 staff seemed resigned to relying on informal learning, reflecting a theme of "Ad-Hoc Expertise." In contrast, Case 2 exhibited a commitment to "Continuous Learning," emphasizing the importance of ongoing professional development.

This proactive stance highlights how even with resource constraints, incubator mindsets can significantly shape their approach to knowledge acquisition. This finding underscores a crucial point often emphasized in the sustainable entrepreneurship literature (Feola, Parente, and Cucino, 2021), universities must go beyond simply raising general awareness. They need to invest in targeted staff training programs specifically designed to deepen incubator staff's understanding of sustainability principles within a business context.

5.3 Bridging the Mindset Gap for Transformative Collaboration

The interviews revealed a clear "mindset gap" across both incubators, highlighting the tension between traditional business approaches and the circular economy principles embraced by newer researchers and students. This gap can hinder project development and underscores the need for facilitated knowledge exchange within the incubator environment. However, the cases diverged in their strategies to address this challenge. Case 1 adopted a more reactive approach, emphasizing a "back-to-basics" problem-solving methodology to find common ground. While this might be necessary in highly traditional settings, it risks stifling the incubator's innovative potential.

In contrast, Case 2 exhibited a theme of "Collaborative Problem Solving," demonstrating a greater openness to co-creation. Their emphasis on "collaboration" and "iterative problem-solving" suggests a willingness to bridge the gap by developing new solutions that integrate diverse perspectives. To fully leverage the energy and expertise of sustainability-focused researchers and students, incubators should proactively create spaces for dialogue and co-learning. This could involve mentorship programs, collaborative workshops, or funding for interdisciplinary research projects focused on developing sustainable solutions. By fostering a more collaborative and inclusive environment, incubators can bridge the mindset gap and accelerate the pace of sustainable innovation.

5.4 Student Leaders as Change Agents: Overcoming Barriers to Engagement

A consistent theme across both cases was the mismatch between students' passion for sustainability and the structural barriers limiting their active engagement with the incubator. Both cases acknowledged that student sustainability leaders faced "Limited Time and Competing Priorities." This points to a broader lack of "Integration" of sustainability into the core student experience a disconnect between student interest and the opportunities offered within the curriculum. Despite this shared challenge, there might be a nuanced difference in how aware the incubators were of this issue. One or both incubators might acknowledge the value of student input without fully grasping the structural changes needed to enable deeper involvement. This disconnect reveals a missed opportunity and aligns with the need for a shift towards experiential, action-oriented learning around sustainability (Ely, 2018). To tap into the transformative potential of this passionate stakeholder group, universities must critically examine their curricula and create pathways for students to directly engage with sustainability initiatives within the incubator environment.

5.5 Partnerships for Expanded Support: Strategic Collaborations

Both incubators demonstrated a pragmatic and resourceful approach by leveraging external partnerships to compensate for in-house limitations. This aligns with existing literature on the importance of networks and knowledge sharing for sustainability ventures (Karahan, 2024) and reflects the theme of "Partnerships for Expanded Support." By collaborating with institutions possessing complementary expertise, incubators can co-create programs and resource hubs that benefit both startups and the broader university community. However, it's crucial to emphasize that partnerships, while valuable, cannot fully substitute for developing in-house sustainability expertise and a strong internal culture focused on sustainability within the incubator itself. Partnerships are most effective when they complement a foundational commitment to sustainability that drives the incubator's mission and informs its internal capacity-building efforts.

5.6 Recommendations

This study suggests several key actions for universities and their incubators to enhance sustainability integration. Firstly, aligning the incubator's mission with the university's overarching sustainability strategy is crucial, ensuring coherence and enabling dedicated funding and resource allocation. Secondly, investing in formal training programs for incubator staff is essential. These programs should concentrate on sustainable business models, the

principles of a circular economy, and systems thinking, equipping staff with the specialized knowledge to effectively support sustainability ventures. Thirdly, bringing mindsets between generations is vital. Create cross-generational platforms for knowledge exchange through mechanisms like workshops, mentorships, or joint projects, to cultivate a common understanding of sustainability across diverse perspectives within the incubator. Fourthly, embed sustainability entrepreneurship into existing curricula and offer interdisciplinary programs. This empowers the next generation of graduates to drive solutions. Finally, universities must actively support student-led sustainability initiatives within the incubator environment. This includes providing funding, dedicated workspace, mentorship, and recognition channels that allow students to become transformative change agents.

5.6.1 Theoretical Implications

This study highlights the continued relevance of institutional theory in understanding the operations of university incubators. The alignment of university-wide strategy, resources, and the broader culture around sustainability significantly shapes an incubator's ability to move beyond theoretical commitment into practical actions. Additionally, this research emphasizes that within the incubator, mindsets matter as much as structures. A proactive, problem-solving attitude among staff opens greater possibilities for fostering sustainable innovation within the incubator. Finally, the findings suggest a need for nuanced, context-specific approaches to sustainability integration. Incubators cannot rely on a one-size-fits-all model but must tailor their strategies based on their resources.

5.6.2 Methodological Strengths & Weaknesses

This qualitative study employed thematic analysis to investigate sustainability integration within university business incubators. The flexibility of thematic analysis allowed for the nuanced exploration of complex themes derived from interview data. Furthermore, the use of codes and their detailed descriptions enhances the study's reliability. In-depth, semi-structured interviews facilitated a deep understanding of perspectives, boosting the internal validity of the findings. However, the research is limited by a small sample size derived from two Irish institutions, impacting its generalizability. To strengthen future research, a larger and more geographically diverse sample would enhance the transferability of findings. Additionally, incorporating quantitative methods alongside qualitative analysis could offer a more robust examination of themes and uncover potential correlations.

5.6.3 Practical Implications

This study offers several practical insights for universities seeking to make their incubators catalysts of sustainable innovation. A critical first step is to scrutinize the alignment between the university's sustainability goals and the actions of the incubator. Additionally, the research highlights the transformative potential of student-led initiatives. Structural changes that facilitate student engagement with sustainability within the incubator environment, along with targeted support, could yield a significant positive impact. Finally, universities need to prioritize capacity building for incubator staff. This means going beyond simple awareness-raising and offering formal training programs that develop deep expertise in the unique area of sustainability-driven entrepreneurship and investing in these initiatives.

5.7 Limitations and Future Research

This study contributes valuable insights into the dynamics of university business incubators and their efforts to integrate sustainability principles. However, it is essential to acknowledge its limitations. One notable limitation is the potential for selection bias during participant recruitment. Despite efforts to recruit a diverse sample of participants from the two cases, those who volunteered might possess unique characteristics compared to non-participants. This volunteer bias could affect the generalizability of the findings to the wider population of university incubators. Additionally, the reliance on self-reported data through interviews introduces the possibility of response bias and inaccuracies. Participants might unintentionally misremember events or present themselves in a particular light. Moreover, the study's focus specifically on university business incubators in Ireland may limit the extrapolation of results to other types of incubators or entrepreneurial ecosystems with different structures and contexts. These limitations are important considerations that may impact the broader applicability of the study's conclusions.

5.7.1 Future Research

Future research can address these limitations by employing a larger sample size and more diverse recruitment strategies to mitigate selection bias. Additionally, incorporating mixed methods approaches that combine interviews with objective data sources could enhance the robustness of the findings and minimize response bias. Furthermore, broadening the research scope to encompass a wider range of incubator models and geographical contexts could provide a more generalizable understanding of how sustainability integration unfolds across different settings. Finally, longitudinal studies tracking the long-term impact of

implementing the suggested recommendations could offer valuable insights for incubator development efforts.

5.8 Conclusion

This qualitative study explored the challenges and transformative potential of integrating sustainability principles within university business incubators. The thematic analysis across two Irish institutions revealed the profound influence of university strategy on incubator actions, the need for targeted staff training, the importance of bridging mindsets, the untapped potential of student leaders, and the strategic value of external partnerships. These findings underscore the complex interplay of institutional context, capacity building, internal culture, student engagement, and collaborative networks in determining an incubator's ability to become a sustainability innovation hub.

While contributing valuable insights, this research acknowledges limitations including potential selection bias and the focus on the Irish university context. These limitations suggest the need for future studies with larger sample sizes, diverse recruitment strategies, and a broader geographical scope to achieve more generalizable findings. Additionally, longitudinal tracking of incubator development could offer insights into the long-term impacts of implementing the recommendations derived from this study.

Despite these limitations, this research has significant implications for universities seeking to empower their business incubators as drivers of sustainable change. By strategically aligning incubator goals with broader sustainability strategies, investing in staff development, fostering an inclusive knowledge-sharing environment, integrating sustainability into curricula, and empowering student-led initiatives, universities can create a fertile ground for innovation focused on tackling complex sustainability challenges. Ultimately, this study illuminates a path for universities and their incubators to not only fulfil their societal role in addressing pressing global issues but also to nurture the next generation of entrepreneurs who will build a more sustainable and equitable future for all.

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7 Appendix (A) - Informed Consent Form

Students as Sustainability Change Agents: Examining Barriers and Opportunities within University Incubators

Consent to take part in research.

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without any consequences of any kind.
- I understand that I can withdraw permission to use data from my interview within two weeks after the interview, in which case the material will be deleted.
- I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.
- I understand that I will not benefit directly from participating in this research.
- I agree with my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research, my identity will remain anonymous. This will be done by changing my name and disguising any details of my interview that may reveal my identity or the identity of the people I speak about.
- I understand that disguised extracts from my interview may be quoted Dissertation.
- I understand that signed consent forms and original audio recordings will be retained in the recorder until the end of May 2024.
- I understand that a transcript of my interview in which all identifying information has been removed will be retained for three months.
- I understand that under freedom of information legalization, I am entitled to access the information I have provided at any time while it is in storage as specified above.
- I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

Researcher: Anum Chaudhary

Program: MSc Entrepreneurship

Contact: x22118128@student.ncirl.ie

Signature of research participant

Date

Signature of researcher

I believe the participant is giving informed consent to participate in this study.

8 Appendix (B) - Interview Schedule

This interview schedule was designed to collect qualitative data for a thesis investigating how university business incubators support sustainable ventures. The interviews, aligned with a multiple-case study approach, will involve incubator staff and student sustainability leaders at 2 universities in Dublin, Ireland. The purpose is to understand the facilitators, challenges, and transformative potential of integrating sustainability into incubator operations.

Interviewee Groups

- **Incubator Staff:** Individuals directly involved in the management and operation of the university business incubator.
- **Student Sustainability Leaders:** Students actively engaged in sustainability initiatives, clubs, or organizations on campus.

Interview Format

- Interviews were conducted using a mix of in-person and remote formats to accommodate participant availability.
- One interview was conducted in-person.
- Three interviews were conducted remotely via Zoom video conferencing, scheduled at the participants' convenience.

Questions: Incubator Staff

Mission and Sustainability Definition

- Has your incubator formally defined sustainability within its mission statement? If so, how is it defined?
- Beyond a basic definition, how does your incubator approach the concept of sustainability in the context of supporting ventures? (Focus on a specific aspect or a holistic approach?)

Capacity Building and Training

- What specific programs or resources does your incubator offer to startups interested in integrating sustainability into their ventures?
- Does your incubator staff have any training or expertise in evaluating and supporting sustainable ventures?

Challenges and Solutions

- What are the main challenges you encounter when supporting startups that prioritize sustainability?
- Can you describe any specific initiatives or strategies your incubator has implemented to address these challenges?

Student Engagement

- How does your incubator currently collaborate with student sustainability leaders or groups?
- In your opinion, what are the biggest barriers preventing students from engaging more actively with sustainability efforts within the incubator?

Questions: Student Sustainability Leaders

Awareness and Student Understanding

- How well do you feel students on campus understand the concept of sustainability?
- In your experience, what are the main misconceptions or challenges students face in understanding how sustainability can be integrated into business ventures?

Collaboration and Incubator Engagement

- Are you aware of the incubator's focus on sustainability, and are there any existing channels for collaboration between students and the incubator on sustainability initiatives?

Student Contribution and Opportunities

- What specific skills or knowledge do you believe student sustainability leaders could offer to startups pursuing sustainable business models?
- What kind of support or resources would help you contribute more actively to the university incubator's sustainability efforts?

Note: These questions are designed for a semi-structured interview. Interviewers should follow up with probing questions based on interviewee responses to gain deeper insights.

Consent Disclaimer

Participants in this study provided informed consent prior to the interview. The researcher has assured them that all information collected will remain confidential and be used solely for the purposes of this thesis research. Participants' identities will be anonymized in any publications or presentations resulting from this study.

9 Appendix (C) - Case 1, Participant 1 - Incubation Center Leader

Interviewer: Introduce yourself and tell me about your designation at the incubation centre.

Interviewee: OK, so my name is “Participant 1” and I'm the innovation pathway manager at “Subject 1”, which is part of the Research and Innovation Group at “Subject 1”.

Interviewer: Thank you for introducing yourself. My first question is, has your incubation centre formally defined sustainability within its mission or if it is then how? How is it defined?

Interviewee: So, I suppose we are basically defined. We have defined sustainability in the context of our work, but it's really under the umbrella of the university. In Strategy which I'll send you a link to later on, and like all of that, is really written in the context of the importance and the relevance of sustainability in all areas of work that we undertake. So, I suppose our vision and mission are defined in the “Subject 1” strategy document, and that kind of ripples down into the work that we all do.

Interviewer: Oh great, so you are not taking it in general terms, I mean sustainability and you focus on a specific aspect like maybe it could be environmental impact reduction or clean technology? or consider it in a more holistic approach, could you?

Interviewee: Well, I mean there is the kind of general holistic approach across. I think everybody's doing that now in terms of the way that they formulate their work. But there is a very specific kind of core research area that the university is focused on the interior in terms of its areas of expertise and so that's why they defined strategic areas of interest in the strategy. Document and they're all about, like a lot of the SDG goals, type stuff and. And so, a lot of our expertise and I suppose the focus of getting research, uh funding would be targeted at those fields and what happens is because when the research income comes into the university in those key areas then it ripples through the research is undertaken and then there's impact from the research. And we're really involved in the economic impact of the research. And so that then comes through. So, all of our activity is really aligned with those kinds of strategic objectives.

Interviewer: OK. So, can you please tell me if your staff have any training or expertise in evaluating and supporting sustainable ventures? Any specific, there any specific training or expertise you are providing your staff, or do they already have it?

Interviewee: UM, so I suppose we haven't engaged in like people going on specific postgraduate courses or anything like that, but we would all be involved in kind of professional bodies, and we would attend kind of CPD, continued professional development type activities and courses, workshops, network. Events on an ongoing basis in all of our areas. So, we would kind of be up to date in terms of you know the latest thinking strategies approaches, UM, areas for further development based in the in the context of those kind of professional organisations that would be involved in. So, like the AI act that's coming up now like. We did it in in one of our colleagues, went on a training course on that recently and then came back and did kind of a session with all of us to kind of bring us up to speed. So, there's that informal sharing of knowledge and expertise based on events that we might go to individually. So that's kind of how we do it. But we haven't under. They can, you know, a specific kind of, as I say, postgraduate diplomas or anything like that for our staff. I think that's mainly because of time, to be honest. We're just so busy. Nobody has time to be going off and doing these things, even though we might like to.

Interviewer: What specific programs or resources does your incubator offer to startups interested in integrating sustainability into their ventures?

Interviewee: Oh, sorry. OK, I misunderstood that question. All right, so well, we don't. I suppose the thing is because the sustainability piece is so integral now in everything. So, you know where for example like in the past and the courses that we provide and workshops and support programme that we have, we have a structured support programme for researchers and students. Umm. And you know in the past like regulation for example used to mainly be a kind of a concern in terms of uh, life sciences. So, FDA approval for things but now because regulation is so relevant to all sectors, it's really something that we incorporate into all of the kind of programmes and workshops that we run. So, we have an in what we call an innovation. Pathway programme. I'll

send you on a brochure on it afterwards and basically that just shows how a researcher can navigate through from having a kind of a general idea. For something that could be commercialised all the way through to actually spinning out a company, so we have a roadshow events, we have innovation sprints, we have customer discovery programmes and then we have a venture launch programme. And so, within the context of all of those sustainability and sustainable business models would be, you know, a topic for discussion. On each of those programmes and in the individual workshops. Sessions and we would bring in people to talk about those particular areas depending on, you know, who was coming to the workshop. So, were they computer scientists? Are they engineers or you know, depending on the field of the areas that those researchers are in, does that answer or?

Interviewer: Thank you for the detailed answer. My next question is How you leverage partnerships with other institutions to achieve their sustainability goals and also eventually yours too.

Interviewee: Yeah. So, I mean I suppose. The start up, uh, you know, ecosystem is very broad as you know from your research and so really it, I think part of our key role is when someone comes in with an idea or a business idea or something they're trying to work on. You know if we don't have something that really is a good fit for the stage, they're at in terms of development or. You know what they Need. Then we would often signpost them to other people. So other universities dog patch labs, you know the end or see all of those sorts of organisations that are within the ecosystem. We would be very sort of. It's a matching process. So, what does the researcher need the based on the stage they're at and then where is the best place for them to get that? Support so in some cases we'll just refer someone to another organisation, but in other cases we would collaborate. So, for example, we run part of the new frontiers programme, which is a support programme by Enterprise Ireland. You might be familiar with it well, we run that in collaboration with IAT Iadt, the Institute of Art and Design in Dunlap. UM. And so that's kind of a formal, uh collaboration that we have with them. So, it really depends on you know what we're doing and how we have the do we have the adequate resources and the good skill set to deliver that just ourselves or we don't want to reinvent the wheel. So, it makes sense to actually just collaborate with someone else who's doing that. Piece of work and then it provides access to that and that sort of UM offering. For our researchers.

Interviewer: Can you shed light on some main challenges you encounter when supporting startups that prioritise sustainability? Let's suppose. It could be any lack of awareness from their end or yours end on a specific topic or some funding excess, or maybe market readiness. Such kind of challenges. Do you have faced any kind of challenges?

Interviewee: And. It's hard to think of anything specific. Like definitely it is a challenge for everybody, you know, because if you know previously you might have been thinking about, OK, so we have a particular product or technology we're going to take it through a process. We need these inputs to, you know, the research process or the manufacturing process. And we there was less concern at that stage with well, where are those inputs coming from, what type of materials. Are they? What happens with the waste products afterwards? Whereas now, like, that's absolutely fundamental to everything that everybody thinks about? What are our inputs going to be? Where do we get them? Are they scarce resources? And then what are the outputs? But I think what we've Seen a lot of is. Really, I suppose in the face of that challenge, really looking to see, like there's so many projects now that are saying, well, our source material is actually a waste product. And what can we do with that in order to make a commercial business out of the reprocessing of a waste from another product or process. So, I would say there's a lot of projects. In that area, but really that's not something that like we've come up with the idea that people should do that. That's becoming because the research. Community are facing those challenges are realising that those are global challenges that need to be addressed and have to be really taking care of and therefore they're doing the scientific research on using the output of one process as the input for material for another process and what can actually be done with it or, you know, look at say, you know, in terms of meat consumption, there was one project that was looking at kind of 3D printing. Of meat alternatives you know as being their remit. So, there's theirs, you know, I would say nearly every project that comes across our desk has got some element of that sort of sustainability and it is a challenge, I suppose, because it's a mindset thing, that sort of circular. Economy. You know, reusing things, and that things should be designed for deconstruction and reconstruction. So that is it's hard I think for everybody from that early researcher all the way through to, you know, us supporting startups. It's hard to kind of change your mindset and actually I find that the younger students. I do run a programme with students sort of second level sort of, you know, first year, second year, third year undergraduate. Those students are actually much more in the mindset already of that circular economy

concept than some of our older maybe professors or researchers who you know have grown up and developed in their careers without that being absolutely fundamental to everything that they do.

Interviewer: Can you give any practical example of such a project where you must face such challenges?

Interviewee: Where we sometimes have this because there might be the principal investigator, you know. Would be the senior person on the project and if they have postdocs or Ph.D. students working with them who have that more circular economy perspective, then there's always that tension between not tension in a bad way, but just the challenge of trying to formulate a project to do the research in the context of those people being involved in the project, you know.

Interviewer: Then what strategies you used to overcome such challenges?

Interviewee: And well, I think it's really a case of trying to bring it. Back to the. Basics of you know the fundamental question we ask when someone comes in with an idea for a business is. So how is your problem? Is your solution fixing a problem better than the current solution? And if we can try and. Just come to the table with that quest. And not think too much about, you know? Oh, I've invented this great new technology, and it does all of these things, but like, bring it back to the basic question of why is your solution better than the existing solutions? And if we interpret the term better, like, do a whole slip chart on what's, how do you design better then it allows people to bring those different people. Actives, you know, whereas before maybe it was just about being a cheaper version or a faster method. You know, whereas now there's different interpretations. Of what better? Is and so if you have that mix of the more experienced, more mature researchers say, and then the younger PhD postdocs, who've kind of grown up in that circular economy. Environment. You'll get those new ideas in, and then you come up with a really good kind of value proposition which everybody around the table can appreciate that yes, actually that's a better solution because and better is to define in a much broader context.

Interviewer: OK. When it comes to student engagement like obviously incubator centres has to engage the students into their activities. Are there any existing programmes or initiatives in place to encourage students' involvement in sustainability focused startups within the incubator?

Interviewee: Yeah.

Interviewee: Yeah. So yeah, I mean we launched a programme called "know that vision". You'll find information about it on our website and that was a new initiative this year which where we wanted to try and engage more students. In the activity that that's going on at Nova and so we formulated, we did a big launch event in February and then we formulated 3 design sprints. The first one actually was last night and that's really sort of focusing in on the key SDG's that we were interested in. And so, like last night was around, I think there was there was. Projects on UM, I'm trying to think there was like 10 projects up on the wall. You know, recycling of reusable, for reusing furniture. Uhm, you know, growing food locally, all of the transportation, any of those. So basically, the three design sprints are around different SDG's. And we got, we've had great engagement like we had 200 students registered for our launch event and a lot of these would have been new students who hadn't come to our events before, UM. And then the. So, the first Sprint we had last night that would have been about, I'd say, 30 students and we just ran to a design thinking model. I don't know if you're familiar with that. And they then came up with, you know, had posters up on the wall, and we all voted about, which we thought were interesting. And so like, that has been a really good initiative for widening out the number of students that are sort of engaged with what we. Doing and the idea is we run these three sprints and then I run a student enterprise competition every year, which is the closing date is kind of end of April time and those students then it would be it would be students who would apply for that anyway because they just know we run it. But what we're hoping is that some of these projects that will come out of that as design. Sprint would then be able to apply for that student enterprise competition, which takes place for a month after the exams. Finished. And it's really kind of like a business accelerator just for students. And I think we're going to have a lot more of those kind of SDG orientated projects this year. So, it's a bit of an experiment, but I think so far, it's gone really well, and I'd say we'll probably make that part of our core programme, you know, for next.

Interviewer: Thinking is something like you can simply align with the innovation and these startups and these mindsets which you are giving to your students, make them more innovative. Hmm. So, you think like leadership commitment plays an important role in all these uh activities?

Interviewee: Oh yes. absolutely it does. Yeah. So, I mean, that's very important part of all of it really it has to be well, I think it has to be top down and bottom up and I think I think the bottom up is there because the students are really interested in it. They just by their nature. And so, I mean there is definitely a push. I mean you'll see that from the strategy document that's you know that's definitely a top down. And there will be a lot of emphasis. Like there's sustainability groups and committees at leadership level within the university and the director of No visited would sit on those groups. So, you know, I think it's definitely the top down. The bottom up is working very. Well, I hope.

Interviewer: Obviously, in your opinion, what are the biggest barriers preventing students from engaging more actively within sustainable efforts in the incubator?

Interviewee: Well, this is a great question and it's something that we're kind of we're kind of struggling with because we feel like it's a great learning experience for the students to be involved in the programmes that we run. But to be honest, it's hard. It is hard to get student engagement like you could run an event and you know, maybe 100 people would sign up. But you know, it's quite normal that 50% of those people don't. You know, so and that's why the Nova vision one, I'm really happy with the way that's going. But I think the biggest challenge is that students are very busy like their curriculum is full. Uh. In terms of lectures commitments in terms of you know accredited content then if they have part time jobs, they have their sport, they have their social life, I think. It's because it's kind of seemed to be like it's definitely extracurricular as opposed to part of. The core now. They will study entrepreneurship modules and sustainability modules, but we our activity in the incubation centre kind of sits outside of. That UM, so it's hard for us to compete for, for student time. Uh, and I don't know. Like it's sometimes I think well actually maybe we just need to think more about what exactly the student wants. We just kind of do the things that we've always done. And so that's why we're trying to put in something new this year in terms of noble. Addition to try and. Address that. Uh, but I think that's a challenge. Time is definitely very limited.

Interviewer: Do you think like this gap exist because there is a gap in between the universities mission and incubators mission for sustainability? Like the universities overall mission is a bit different.

Interviewee: I don't think. I don't think so, no, because I mean it's there in the strategy. I think that. I don't know, I think. Because they've got such a busy timetable when they're in college, like everybody will be finishing college and wanting to get a job, and so then jobs become relevant and important. And I think sometimes as the students don't necessarily think of, you know, starting their own business as being a possible career path. I think there is a mindset, and I don't know whether it's an Irish cultural thing. Or where people sort of thing. OH. You know there's the security of getting a job with an existing firm, whether it's an SME or a multinational. And because we have so many opportunities, career and job wise here in Ireland. UM, you know, if you look at the number of multinationals who are here, I think that students often don't have that kind of, uh, entrepreneurship is a is a valid career path. So, I think they can get jobs with, you know, companies who are really big on sustainability, but they can join an organisation that's already established. They can get a good salary. And it's less risky.

Interviewer: You think these are the barriers?

Interviewee: Yes, I think, yeah, well, I think that is a barrier now. I mean, I understand it. I mean, I'm a parent myself, so I understand the concept of wanting your kids to have a job that they know they get paid, and you know, entrepreneurship is a kind of more really risky sort of pathway. Uh. But I think that probably is it's a challenge, let's.

Interviewer: All Right, thank you so much for such detailed answers from your side. This discussion gave me insights about really what is happening in the incubator centres and how they are struggling to encourage students to work for them or to work with them.

Interviewee: And I'll send you the "Subject 1" strategy as well, so you can just see what our kind of overarching UM umbrella of our activities also. So that'll be good, uh, and I'll send you the whole stuff that might. Be of interest. Yeah. OK. All right, I know.

Interviewer: Thank you so much. And I'm grateful to you.

Interviewee: You're welcome. My best wishes with the rest of the project.

10 Appendix (D) - Case 1, Participant 2 – Student Sustainability Leader

Interviewer: Researcher explained the research objective and introduced herself.

Interviewer: You can tell me something about yourself then we will continue our conversation.

Interviewee: OK, well, my name is "Participant 2". I am a postgraduate student at "Subject 1" doing a Masters in smart and sustainable cities. OK. And I have been Green Campus secretary on campus since. I think November. 2023. So I was previously involved with Weeping Compass. Just as an ordinary member, I suppose, since my final year, because I did my undergraduate study here as well. I. Yeah, I'm. I've been involved with a few different projects on campus, even before my role. I led the project for the Trash to Treasure initiative, which we hosted on campus at the start. With the year. That's probably the biggest thing that I have personally contributed to. Which was an initiative where we collected waste and will not waste. We collected all the. Items that people left behind at the end of the year when they were moving out of student residences in May of 2023 had been stored over the summer, and then we resold them to students again in September at like very low prices. The reason why the sale, why the sale costs something is mostly because we must cover the costs. Running the. But the amount of waste saved was a full like 20-foot container worth of items that we managed to collect and stack and store over the summer. So, Uh, yeah. And I've always been involved, like, very interested in waste management and circular economy concepts. So that is also kind of what I'm researching for my dissertation.

Interviewer: How well do you feel students on campus understand the concept of sustainability?

Interviewee: I think my experience in "Subject 1" I think there's a mixed bag when it comes to sustainability awareness on campus. Some students are very passionate and knowledgeable. They participate in environmental clubs, promote recycling, and try to minimize their impact. They're true champions for sustainability. There's also a large portion of students who, while not opposed to the idea, might not have sustainability as a top priority. They might not fully understand the complex links between our lifestyle choices. It could be due to a lack of exposure, competing priorities, or feeling like their individual actions can't make a significant difference. So, so that I believe there's room to increase awareness across the whole student body. More engaging campaigns, integration of sustainability into different courses, and showcasing real-world examples of sustainability in practice could all help.

Interviewer: What are the main misconceptions or challenges students faced in understanding how sustainability can be integrated into business ventures?

Interviewee: Honestly, there are a few things that tend to trip students up when thinking about sustainable businesses. Like, like a lot of students assume going green is automatically super expensive. They don't always think about saving money down the line, or how customers are starting to care about this stuff. Sometimes, students might not realize just how much impact a business can have. It's not just about recycling, it's the whole chain – where they get stuff, how it's made, and even the company vibe can make a difference. Sustainability gets complicated fast! It can be hard to wrap your head around everything. Plus, with all the companies saying they're 'eco-friendly', it's tough to know who's doing the write things. I think it'd be way easier to learn this sustainability if we had more real-world examples. Like getting students from actual sustainable businesses to talk, or maybe even doing projects where we see how these ideas work in practice.

Interviewer: Are there any existing channels available for collaboration between students and the management or the department?

Interviewee: There is, definitely, I'm aware of a few existing channels for this. Student Council plays a significant role in advocating for student initiatives and providing feedback to the department. Professors actively encourage students to collaborate on research projects relevant to sustainability. Also, our university has online platforms where students can submit feedback and suggestions directly to the department like, facility improvement ideas and general inquiries. My university has mentorship programs where students can connect

with industry professionals for guidance and networking opportunities. Some students often collaborate on the projects with them.

Interviewer: Any collaboration channel that is currently working in your university?

Interviewee: Well, the tangent is like a space in our university that is there to support startups. And then I know that especially maybe more not so much maybe undergraduate students. But when you get to a more PhD level or potentially even postgraduate. Depending on your course, and depending on your supervisors, there are. Initiatives to. To spin, spin out research into businesses into like actual. Enterprises. So, I know from within our school because we're now related to the My Masters is in the natural sciences school. So, we've come across professors who have. Research on sustainable projects like nature-based solutions and food waste. Those are a couple of examples I can think of right now where I mean, I know of a couple of professors who, alongside their researchers, have started businesses based on their research. So, these are not official channels, but if you are involved in these research projects. There are many cases of student staff and researchers. Putting together a business based on their research in the field of sustainability.

Interviewer: OK, as a student leader, you have to answer this question. What specific skills or knowledge do student sustainability leaders believe they can offer to startups pursuing sustainable business models?

Interviewee: Well, good communication skills are a big one, and being able to reach out to people. Effectively communicate your ideas, your plans, people, but also. I mean. Proper time management and uh. Consistency and perseverance is important because if you start a project but it fails. We're right now within Green Campus trying to set up subcommittees, for example, and trying to set them up. Can sometimes be difficult because we rely on it. A lot of volunteers, and I think that's a problem and sustainability is a lot of the work, is often volunteer-based. And so trying to get everybody to show up to the meetings, to set up communication channels, to start working on projects as a team. Was difficult and for the last month. I've been spending a lot of time. To try and organize. Other groups of people to collaborate and to start this network of subcommittees that we never had before. So, this whole process requires a lot of planning, organizing, patience, and consistency. Student leaders must have to convey ideas and must have the ability to convince people about new ideas. Actually, there was an initiative before COVID, but because of COVID, it kind of fell apart. And so we're restarting the idea of setting up subcommittees and trying to make them independent to kind of be able to start working on projects on campus. To improve waste, to improve energy efficiency. We have one on green canteens, which is the idea behind that subcommittee would be that they would work on. Lowering our raising awareness, for example, around like the impact of our diets on sustainability and the carbon footprint that comes with that. So, improve by encouraging more vegetarian and plant-based meals. That kind of idea and reducing food waste as well. But I think you're setting them up and doing these projects and trying to keep them going on. A lot about like just being consistent and continuing to work on things until they're finished, and because it's very. Easy to start such a project and then just to kind of slowly let it die. Yeah. If you continue to push forward, OK.

Interviewer: What resources does the university provide to students for these initiatives?

Interviewee: I really think that the university relies too much on. Volunteering. OK. Relies a lot on. People's personal. Like self-motivation to do things. And. We could benefit from it. Like more substantial supports in terms of maybe setting up more. Compensated roles within sustainability that are accessible to students. Actually. Properly reward as well as incentivize. And sustainable actions on campus. Because. I don't think it's fair, necessarily, that the university can. Rely so much on our own. I guess motivation and our own time that we volunteered to work on these things. Uh, and then simultaneously, you know, claim. The results from our work evidence that our university is becoming a more sustainable institution. Without ever. Rewarding it. And I'm like, it's actually. I would quite honestly say, in a monetary way, because it is free work. And it's for their benefit because they can present themselves. The more work we do and the more improvements we create for the university. I think it's great and that is why I'm doing it, but I also believe that if the institution isn't serious about it. To become truly sustainable then they should also invest in that because it takes work. It takes real effort, and it takes real time to establish those goals. And it's not necessarily fair to continue to. Rely purely on volunteering. There's a lot of awareness both with the staff and the students about wanting to do more and

wanting to do better. So, because. Our student body and our staff are so motivated too. To want to improve things, it will. Kind of inevitably I think results in better outcomes in terms of sustainability. Yeah. I just. I just hope that it also means that they will start. Putting more resources into it. Yeah, and not just relying on people's goodwill.

Interviewer: What kind of support or resources would student sustainability leaders find most valuable to contribute more actively to the university incubator's sustainability efforts?

Interviewee: For some initiatives, it probably would be a good thing. Like initiatives that actually are? I suppose some bit like maybe more related to like almost like a business idea and. On campus, but in terms of a lot of the things that we do are more. Maybe one time projects one time events. They wouldn't necessarily be. Entrepreneurial as such. They're like a one time. Short term project that just gets started from start to finish. But. Having proper resources available to us. To be able to. To have a proper budget when we're approaching these things and all that kind of thing, that is definitely a support that I think we could benefit from being integrated. Into the incubators. Like. It would maybe benefit some things, but it wouldn't be beneficial for all aspects of the types of projects that we work on. Like for example, one of the things that we organize is we set up events during Green Week. A Green Week is 1 specific week of the year, which is themed. Towards sustainability and during that week we obviously often organized a lot of events. To raise awareness around sustainability. Give an opportunity to. NGOs and other community groups and businesses to come on campus to give talks and presentations. Kind of open up that forum of sustainability. To like, raise the conversation around that. Uhm, which I I don't see how something like that for example would benefit from working within an incubator setting. The university has, like almost every week, been kind of themed towards something. So like we have like. Another week for biodiversity and climate action, and there's another week for sports and health. They're college-wide. I don't know where. Green Campus is the Initiator of Green Week. But it's an opportunity for all organizations on campus that are related to sustainability to. Organised during that week, some specific events like we have the Urban Garden. They organized an event during that week, like a plant swap. We have the environmental society, which is a student-run society on campus, and they organize events during that week. So, it's essentially it's a themed week around sustainability. And a lot of organizations that are somehow related to sustainability take the opportunity to do something during that week to contribute towards the conversation, to encourage more sustainable practices. There are resources through Green Campus available to students. But I don't think that those resources are sufficiently supported. By the university. Our. A large part of our funds. Come from our initiatives. So, we kind of self-raise. We don't have any. Direct funding from the university. Which I think is crazy because we're a committee of the university. We should get a yearly budget allocated. If they are serious about sustainability, then I don't understand. Why there's no money being put into it? Because at the end of the day, we all know that like as soon as an organisation is serious about something, they invest in that something. And right now it doesn't feel like they're investing in. This aspect of sustainability.

Interviewer: You highlighted the lack of resources specifically on the monetary terms. Yeah. Thank you so much. Thank you so much for your time. Thank you.

Interviewee: Thank you

11 Appendix (E) - Case 2, Participant 3 – Incubation Center Leader

Interviewer: Introduce yourself and tell me about your designation at the incubation centre.

Interviewee: OK, so my name is "Participant 3", and I'm the program manager at the incubation centre here at "Subject 2" University. Our centre may be more involved with the startup and a very early stage. Our incubation centre is associated with a sustainability body operational here in Dublin. This body run through many of the business incubation centres, but it's really more, uh, through the technology universities. And they will work very, very much side by side with the new frontiers programme and the business incubator. So, the participants in the programme. Generally, guess free office accommodation during the programme and maybe for a period afterwards until they have a very, very solid, established business idea to take forward. So, they do work hand in hand. And that's obviously very, very important to uh startups, certainly in the technology areas that they have access to high-quality broadband. And because, uh, the business incubator is part of the college here and is recognised by Enterprise Ireland, which is the state body overseeing all this.

Interviewer: Has your incubation centre formally defined sustainability within its mission or if it is then how? How is it defined?

Interviewee: Yes, we have a clear definition of sustainability that aligns with the university's broader strategic plan. We view sustainability holistically it goes beyond solely environmental focus. We prioritize supporting ventures that address not just environmental challenges but also consider social and economic sustainability. It's about fostering businesses that have long-term viability and make a positive impact within communities.

Interviewer: OK. So, can you please tell me if your staff have any training or expertise in evaluating and supporting sustainable ventures?

Interviewee: We believe in continuous learning and development for our staff. While we don't have mandatory postgraduate courses in sustainability, we actively participate in professional development activities, workshops, and networking events on topics related to sustainable business practices. We also leverage the expertise within our university network, inviting researchers and sustainability specialists to share their knowledge and insights with our team.

Interviewer: What specific programs or resources does your incubator offer to startups interested in integrating sustainability into their ventures?

Interviewee: We offer a mix of structured and flexible support. We host workshops and seminars where we address sustainability regulations, evolving consumer preferences, and innovative sustainable practices within various industries. Additionally, we have a dedicated innovation pathway program that guides entrepreneurs through their journey. Within this program, we embed sustainability as a key consideration throughout the startup's development and connect them with mentors that specialize in this area.

Interviewer: How you leverage partnerships with other institutions to achieve their sustainability goals?

Interviewee: Collaboration is absolutely essential. We actively build partnerships with other universities, nationally. These partnerships open doors for joint research initiatives specifically focused on sustainability challenges. We also partner with various businesses, particularly ones that have a strong commitment to sustainability. This helps us provide mentorship opportunities, industry insights, and potential commercialization channels for our startups. Because when some people talk about sustainability and sustainable companies and startups, they're talking about uh companies that are involved in environmental areas. OK,

Interviewer: Can you shed light on some main challenges you encounter when supporting startups that prioritise sustainability?

Interviewee: Yes, certainly. One of the key challenges we encounter is the shift in mindset required for circular economy models. Many early-stage startups are still accustomed to traditional linear thinking. We work closely with them to find ways to repurpose waste streams etc. Sometimes, there are also challenges in finding

affordable solutions that align with sustainability goals. Yeah. So just to give you an example here, we were preparing uh and in the midst of a strategic review back in 2021 as in the entire uh institute here at "Subject 2". And we had, uh, fantastic consultancy company. Uh, come in and work with us and in the first draft of the strategic review. There was very, very little about sustainability. There was one or two words and there was little paragraph at the end. Why are we not doing more and talking more about what we are going to do from a sustainability point of view now when I say sustainability, I'm talking about all-encompassing sustainability, you know, so what can we align? Also, one common challenge is helping startups shift towards a circular economy mindset. There's often a need to rethink traditional design and manufacturing processes to prioritize waste reduction and the use of sustainable materials. Also, scaling up sustainable solutions while maintaining affordability can be another hurdle for early-stage startups. One example is a startup we supported that was developing a biodegradable alternative to plastic packaging. While their product was innovative, they struggled to source affordable, compostable materials in the quantities needed for large-scale production. We helped them connect with researchers who were exploring alternative raw materials and eventually find a more cost-effective solution.

Interviewer: Then what strategies you used to overcome such challenges?

Interviewee: It's a collaborative process. We encourage startups to approach sustainability challenges with an open mind. We connect them with relevant experts, whether within our university network or industry partners, to explore innovative solutions. We also help them understand that better doesn't always mean perfect, continuous iteration and improvement are key to developing sustainable, market-ready products and services.

Interviewer: OK. When it comes to student engagement like obviously incubator centers have to engage the students into their activities. Are there any existing programs or initiatives in place to encourage students' involvement in sustainability-focused startups within the incubator?

Interviewee: Absolutely! We have several initiatives aimed at students. We run design sprints focused on addressing sustainability problems, offering students a hands-on way to develop solutions. We also connect students directly with researchers working on sustainability projects and offer seed funding opportunities specifically for sustainable startup ideas. Our incubator's activities are strongly aligned with the university's sustainability goals. However, translating the broad sustainability mission into practical entrepreneurship pathways is something we continuously work to improve. I think strong leadership support is essential. Our university has integrated sustainability into its strategic vision, and that commitment cascades down to our incubator. This top-down emphasis, combined with the enthusiasm we see from students, creates a powerful environment for fostering sustainable innovation.

Interviewer: In your opinion, what are the biggest barriers preventing students from engaging more actively within sustainable efforts in the incubator?

Interviewee: It often comes down to competing priorities. Students have full course loads, and sometimes even part-time jobs. While there's a growing interest in sustainability, we need to continue finding ways to integrate sustainable entrepreneurship seamlessly into their educational experience and offer flexible pathways for engagement.

Interviewer: You think these are the barriers?

Interviewee: Yes, I believe time constraints are a significant factor. We also recognize that some students may benefit from more structured mentorship focused specifically on translating their sustainability ideas into viable business models.

Interviewer: All Right, thank you so much for such detailed answers from your side. This discussion gave me insights about really what is happening in the incubator centres and how they are struggling to encourage students to work for them or to work with them.

Interviewee: You're welcome and thank you for the opportunity to share our work. I'm always happy to discuss ways to further bridge the gap between academia and sustainable entrepreneurship.

12 Appendix (F) - Case 2, Participant 4 – Student Sustainability Leader

Interviewer: How well do you feel students on campus understand the concept of sustainability?

Interviewee: well, it depends, some students are deeply engaged and well-informed about the concept. They actively seek out information, participate in sustainability initiatives, and advocate for sustainable practices both on and off campus. These students often understand sustainability in a holistic sense, recognizing its dimensions like environmental, economic, and social. They are passionate about making a positive impact and are willing to take action to promote sustainability in their daily lives. On the other hand, there are students who may have a limited understanding of sustainability or may not prioritize it in their lives. This could be due to various reasons, maybe a lack of awareness, competing priorities, or simply not knowing how their actions contribute to broader sustainability goals. I think, as student leaders, our role is to bridge this gap by providing opportunities and raising awareness about sustainability. We often organize workshops and campaigns to inform students about key sustainability issues, like climate change, waste management, and renewable energy. We also collaborate with staff, and community partners to create sustainable campus policies that can engage and empower students. We student leaders try to frame sustainability as a collective responsibility that transcends individual actions, we encourage students to see themselves as part of a larger movement toward a more sustainable and equitable world.

Interviewer: Perfect, in your experience, what are the main misconceptions or challenges students face in understanding how sustainability can be integrated into business ventures?

Interviewee: yes, definitely, one of the main challenges that students face in understanding how sustainability can be integrated into business ventures is the belief that sustainability is solely about environmental conservation. Many students may not realize that sustainability encompasses a broader range of considerations, including social and economic factors. Some students have the perception that sustainability initiatives are costly and can only be implemented by large companies. This misconception can deter students from exploring sustainable business practices, as they may believe it's not feasible for smaller enterprises or startups. Students may not fully understand how sustainability can drive innovation and attract customers. As student sustainability leaders, we work to address these misconceptions and challenges by providing education and resources that highlight the business case for sustainability. We emphasize that sustainable practices can lead to cost savings, increased efficiency, and access to new markets and opportunities. By highlighting real-world case studies and engaging students in hands-on projects I think we help them see the practical applications of sustainability in business ventures. As I mentioned before we collaborate with faculty and industry partners to incorporate sustainability principles into business and promote interdisciplinary learning. This approach helps students develop a holistic understanding of sustainability and its integration into business strategy and other areas.

Interviewer: Are students aware of the incubator's focus on sustainability, and are there any existing channels for collaboration between students and the incubator on sustainability initiatives?

Interviewee: yes, most students are aware. Also, there are some channels for collaboration available between students and the incubator. One key channel is through the Student Council, which plays a significant role in advocating for student initiatives and providing feedback to the department. Collaboration channels often include events like workshops, partnerships with student clubs, and joint research projects. These initiatives enable students to engage with the incubator, learn about sustainable entrepreneurship, and work on initiatives that tackle real-world sustainability challenges. It's a great way for students to turn their ideas into impactful ventures while contributing to a more sustainable future.

Interviewer: What specific skills or knowledge do student sustainability leaders believe they can offer to startups pursuing sustainable business models?

Interviewee: We believe we can offer a range of skills and knowledge. We can bring a deep understanding of sustainability principles. This knowledge encourages students to integrate sustainability into their core business strategies. Strong research and analytical skills are also important. Because after conducting market trends we

can identify opportunities for innovation and growth. Exceptional communication skills are also important. We can bring a fresh perspective and creativity to problem-solving. We can brainstorm innovative solutions to sustainability challenges and collaborative approaches. We can motivate students if we can communicate our ideas. We can offer a unique blend of expertise, skills, and passion that can significantly benefit startups pursuing a sustainability focus. According to me, we are valuable assets in driving positive change and creating a more sustainable and resilient economy.

Interviewer: What resources does the university provide to students for sustainability initiatives?

Interviewee: that's a brilliant question. Well, University provides various resources to support students but there's room for improvement. There is a need to make resources more accessible and accommodating to students' schedules. One key resource is access to faculty expertise and research facilities related to sustainability. Students can collaborate with professors on research projects, participate in workshops, and access academic resources to deepen their understanding about it. Also, there is a need for the university to offer funding for sustainability projects. This financial support can help students cover costs associated with implementing sustainability initiatives, such as materials, equipment, or event organizing expenses. the university needs to recognize the challenges students face like balancing academics, part-time jobs, and extracurricular activities. And our university most of the time considers sustainability as an extracurricular activity. Providing flexible scheduling options, virtual resources, and opportunities for remote collaboration can make it easier for students to engage in sustainability initiatives without overwhelming their already busy lives.

Interviewer: What kind of support or resources would student sustainability leaders find most valuable to contribute more actively to the university incubator's sustainability efforts?

Interviewee: I think access to dedicated funding would be immensely helpful. This financial support would enable us to implement innovative sustainability initiatives. Also, we are having a designated workspace within our incubator where we could foster collaboration and share ideas among student leaders and other stakeholders. This space could include access to prototyping tools, technology resources, and mentorship from industry professionals with expertise in sustainable business practices. Also, establishing formal mentorship programs where student sustainability leaders can connect with experienced entrepreneurs, sustainability experts, and alumni would provide valuable guidance, feedback, and networking opportunities. Offering workshops and certificate programs focused on sustainable entrepreneurship would help us to enhance our skills. Creating recognition and incentive mechanisms would motivate and inspire student leaders. These initiatives would encourage us to continue our efforts. Providing financial support collaborative spaces and recognition incentives would empower us to make a more significant impact on the university incubator's sustainability initiatives.