The Features of Student Entrepreneurs as Leaders of Social, Environmental and Sustainable Entrepreneurial Projects[1]

Pauline BRUNNER
Université de Strasbourg, Université de Lorraine, CNRS
Bureau d'Économie Théorique et Appliquée (BETA), France
paulinebrunner@unistra.fr

Véronique SCHAEFFER
Université de Strasbourg, Université de Lorraine, CNRS
Bureau d'Économie Théorique et Appliquée (BETA), France
schaeffer@unistra.fr

ABSTRACT

This article aims to identify the characteristics of business, social, environmental, or sustainable entrepreneurial projects led by student entrepreneurs. We analyze the specificities of the projects based on a business and/or social and/or environmental orientation, regarding the profile of student entrepreneurs and the features of their projects. We use a unique database of 210 responses of student entrepreneurs involved in the French entrepreneurial program PEPITE between 2014 and 2021. We propose a typology of student entrepreneurs that highlights the specific features of business, social, environmental, and sustainable student entrepreneurs. We show that the individual determinants of sustainable and environmental entrepreneurial projects are quite close, those of social projects are very specific, while sustainable projects are not associated with specific projects or individual profiles. We formulate managerial recommendations to improve the contribution of universities to

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the emergence of sustainable innovation in society through entrepreneurship education programs.

KEYWORDS: Student Entrepreneurship, Social Entrepreneurship, Sustainable Entrepreneurship, Environmental Entrepreneurship, Entrepreneurship Education, Responsible University

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At the European level, governments and universities develop initiatives to support sustainable entrepreneurial projects to respond to the *Grand Challenges* (Arocena, Sutz, 2021). The European Commission and many governments in Europe have set up programs to support projects that promote social innovation (Moulaert *et al.*, 2017). Universities are more and more concerned by the impact of their research and teaching activities on society (Bayuo *et al.*, 2020). The development of entrepreneurship educational programs that promote sustainable innovation is a way for universities to contribute to the emergence of responsible or sustainable innovation in society. They are currently engaged in the development of entrepreneurship education programs and entrepreneurial communities (Brunner, 2021; Matt, Schaeffer, 2018), to transmit knowledge, beliefs, and values that can favor the emergence of sustainable innovations (Brown *et al.*, 2008).

Much previous research has highlighted the lack of clarity in the definition of notions such as social, environmental, responsible, and sustainable entrepreneurship. These notions are sometimes assimilated (Alberti, Varon Garrido, 2017), sometimes distinguished (Austin *et al.*, 2006; O'Neil, Ucbasaran, 2016). Environmental and social entrepreneurships both rely on projects that propose new solutions to specific perceived problems in society. The investment of entrepreneurs in social and/or environmental entrepreneurship is based on civic engagement, far from the model of the entrepreneur who detects and exploits a market opportunity to generate profit (Cohen, Winn, 2007; Dean, McMullen, 2007).

Zahra *et al.* (2009) show the diversity in the definition of social entrepreneurship that reflects the diversity of the reality of social entrepreneurship across the world. They propose the following definition: "*Social entrepreneurship encompasses the activities and processes undertaken to discover, define, and exploit opportunities in order to enhance social wealth by creating new ventures or managing existing organizations in an innovative manner*" (Zahra *et al.*, 2009, p. 522). Social entrepreneurs are driven by a social motivation more than a traditional profit maximization, but economic considerations are also a part of their activities (Austin *et al.*, 2006). Social entrepreneurship does not consider the environmental impact of entrepreneurial projects (Aguinis

et al., 2011), while environmental entrepreneurship is defined as an activity that "*seeks to promote environmental welfare generally and address various sustainability problems specifically, while being financially sustainable*" (O'Neil, Ucbasaran, 2016, p. 136).

Responsible entrepreneurship is derived from corporate social responsibility, and is about the design of entrepreneurial projects that explicitly integrate their environmental and social impacts (Tiba *et al.*, 2019). The environmental and social performance drives the building of the business model of responsible entrepreneurs (Choi, Gray, 2008). Sustainable entrepreneurship is about entrepreneurial projects that simultaneously integrate the social, environmental, and financial dimensions of performance (Filser *et al.*, 2019). Responsible and sustainable profiles refer to hybrid profiles between social, environmental, and profit-oriented entrepreneurs.

Regardless of the differences or nuances between social, environmental, responsible, or sustainable entrepreneurs, they all have specific values that drive their behavior. They are engaged in projects that can contribute to changing society (Roundy, 2016; Zahra, Wright, 2016; Gladwin *et al.*, 1995). All these profiles of entrepreneurs are relevant for universities engaged in the development of sustainable entrepreneurship. In order to be economically feasible and to gain legitimacy from the point of view of partners such as funders and customers, social or environmental projects can evolve to become sustainable projects (O'Neil, Ucbasaran, 2016). One role of universities' Entrepreneurial Education (EE) programs is to accompany this evolution of projects (Fichter, Tiemann, 2018).

The literature provides elements about the specific traits of social (Gartner, 1989; Saebi *et al.*, 2019), environmental (Hörisch *et al.*, 2017; Santini, 2017), responsible (Tiba *et al.*, 2019), or sustainable entrepreneurs (Kuckertz, Wagner 2010; St-Jean, Labelle, 2018), or about the social identity of entrepreneurs engaged in entrepreneurship to change society (Sieger *et al.*, 2016). Hörisch *et al.* (2017) show differences between the profile of social and environmental entrepreneurs, regarding their age, gender, and income. Only a few studies have focused on the specific traits of student entrepreneurs engaged in social, environmental, or sustainable projects (Anghel, Anghel, 2022; Passavanti *et al.*, 2023).

Regardless of the projects they are involved in, student entrepreneurs have a specific profile compared to other kinds of entrepreneurs because they are usually younger (Schimperna *et al.*, 2022), have fewer professional experiences and networks (Clarysse *et al.*, 2022; Kaandorp *et al.*, 2020), and have a lower human and social capital (Delanoë-Gueguen, 2015; Leyronas, Loup, 2020; Longva, 2021). The role of universities is important to facilitate access

to resources, networks, competences (Bergmann *et al.*, 2018; Breznitz, Zhang, 2019; Gabay-Mariani, Boissin, 2021; Longva, 2021; Schimperna *et al.*, 2022) and, more broadly, the development of student entrepreneurs' human and social capital that can lead to innovative sustainable projects (Brunner, 2021; Fichter, Tiemann, 2018). Considering the role of universities in favoring the emergence of sustainable innovation, it would be reductive to focus only on student entrepreneurs with sustainable projects. Those pursuing social and environmental projects are motivated by specific values that contribute to changing society. One role of entrepreneurship education should be to lead student entrepreneurs to make their projects sustainable, through the integration of the economic, social, and environmental dimensions of performance. Business projects that are purely for profit can evolve toward sustainable projects. This paper addresses two research questions: do student entrepreneurs engaged in business, social, environmental, or sustainable projects present a specific profile? Does entrepreneurship education influence the emergence of these types of projects?

We use a survey that gathers the answers of 210 student entrepreneurs about the entrepreneurial project in which they are engaged, their individual profile, and their educational background. We propose a typology of students involved in business, social, environmental, responsible, or sustainable entrepreneurial projects. We show the influence of educational background and entrepreneurship education on the emergence of these projects. The article is structured as follows: a literature review about the characteristics of social, environmental and sustainable student entrepreneurs (1), the presentation of data (2) and method (3), the proposition of a typology of student entrepreneurs and the determinants of the nature of their projects (4). The last section (5) discusses the results.

Literature Review

Student entrepreneurs, exploring entrepreneurial activities at the same time as their university studies (Bergmann *et al.*, 2016; Nielsen, Gartner, 2017), are generally described in the literature by their individual attributes, such as age, gender, student status, educational background, entrepreneurial intention (Beghain, 2019; Gabay-Mariani, Boissin, 2021; Leyronas, Loup, 2015, 2020; Longva, 2021), and by the perception of their projects by external actors likely to provide them with resources (Delanoë-Gueguen, 2015). There is little research that considers the specificities of the profile of student entrepreneurs engaged in social, environmental, or sustainable projects (Passavanti *et al.*, 2023), while this question has been investigated in the

entrepreneurship literature about non-student entrepreneurs (Alberti, Varon Garrido, 2017; Austin *et al.*, 2006; O'Neil, Ucbasaran, 2016).

Features of Social Entrepreneurs

Over the last few decades, there have been considerable developments in research on social entrepreneurship (Gupta *et al.*, 2020; Saebi *et al.*, 2019). Zahra *et al.* (2009) distinguish three types of social entrepreneurs: the social bricoleur who addresses local social needs, the social constructionist, such as an NGO or charitable foundations, who develops alternative structures to respond to specific needs that are not satisfied by governments or markets at a local or global level, and the social engineer, who creates new and more effective social systems to replace non-efficient existing systems, such as the Grameen Bank created by Yunus, which received the Nobel Peace Prize. Although social entrepreneurship lacks a universal definition (Choi, Majumdar, 2014; Dwivedi, Weerawardena, 2018; Nicholls, 2010), the dual balance between social and economic value creation is the core source of diversity in the definition of social entrepreneurship (Doherty *et al.*, 2014; Saebi *et al.*, 2019).

In line with the trait approach that describes the specificities of entrepreneurs (Gartner, 1989; Gibb, 1987), previous research provides elements to characterize the profile and the motivation of entrepreneurs engaged in social entrepreneurship (Saebi *et al.*, 2019). Prior experience in the fields of social entrepreneurship determines the intention to engage in social entrepreneurship (Hockerts, 2017). This engagement is based on several antecedents (moral obligation, self-efficacy, empathy, and perceived support) suggested by Mair and Noboa (2006). Several works highlight the importance of compassion in the creation of a social venture and describe cognitive and affective processes (Grimes *et al.*, 2013; Miller *et al.*, 2012; Yitshaki et *al.*, 2022). Past distressing experiences (such as experience of unemployment, of rural poverty, or limited education opportunities) strengthen feelings of sympathy favoring engagement in social entrepreneurship (Yiu *et al.*, 2014). Other works highlight the importance of the aspiration to make some kind of difference in the world by the core values and ethical beliefs of social entrepreneurship, intentions, or the sense of purpose (Waddock, Steckler, 2016), the identity capital, which refers to a set of psycho-social skills that are deployed by individuals to both define themselves and represent how others define them (Lewis, 2019), or the passion characterized by enthusiasm, excitement, and a desire to make a mark (Yitshaki, Kropp, 2016). Ruskin *et al.* (2016) discuss the emotions in a multi-case study and show that sympathy and empathy lead to other-oriented motivations while passion and frustration

are precursors for self-oriented motives. Other works emphasize the impact of post-materialism cultural values and gender on the type of value creation supported by entrepreneurs (Hechavarría *et al.*, 2017).

Features of Environmental Entrepreneurs

Choi and Gray (2008) show the evolution of the notion of social responsibility over time, from a perspective of profit maximization to the inclusion of a diversity of stakeholders (employees, suppliers, communities…), and issues such as the quality of life, society's principal social problems (minority employment, environmental pollution, health and safety issues, business ethics and corporate governance, international social issues, and broad environmental concerns). Scholars have provided many definitions of environmental entrepreneurship, also called ecopreneurship (Santini, 2017). The environmental entrepreneur or ecopreneur is focused on the economic and environmental dimensions of the projects they lead (Filser *et al.*, 2019). The vision of the environmental entrepreneurs was initially associated with "*a green vision to a naive marketplace*" moving to the vision of "*business people who are determined to gain a reasonable market share in the relatively competitive environment*" (Santini, 2017, p. 2). A distinctive feature of the ecopreneurs is their engagement, reflected in organizational solutions and management practices that profoundly modify usual business models (Kirkwood, Walton, 2010; Schaltegger, 2002). Other works distinguish a different profile of environmental entrepreneurs. By combining personal motivations and the external context Walley and Taylor (2002) highlight a typology of four green entrepreneurs: innovative opportunists, visionary champions, ethical mavericks, and environmental entrepreneurs. Linnanen (2005) classifies ecopreneurs as self-employed, engaged in a non-profit business, opportunists, and successful idealists. Many works (Linnanen, 2005; Santini, 2017; Schaltegger, 2002) explore the differences between environmental and traditional entrepreneurship. They find similar traits associated with traditional entrepreneurship and ecopreneurship, such as the central role of financial and human capital, the relation between risk and profit, and the challenges associated with time to market. However, ecopreneurs seem less materialistic and oriented to the maximization of profits than traditional entrepreneurs (Phillips, 2005). In this perspective, Santini (2017, p. 8) suggests that "*the systematic integration of sustainability in the set of cultural values that belong to entrepreneurs is the main feature that characterizes ecopreneurs*".

Features of Sustainable Entrepreneurs

The concept of sustainable entrepreneurship has emerged more recently and takes a comprehensive approach by using economic gains as both a means and an end to solve environmental and societal problems (Filser *et al.*, 2019). Sustainable entrepreneurs support multiple objectives in their organizations by the pursuit of economic, social, and environmental goals. This notion is often associated with the triple bottom line introduced by Elkington (1994) which refers to a triple measure of performance: the social impact, the environmental impact, and the profitability of the project (Cohen, Winn, 2007; Gladwin *et al.*, 1995; Hart, 2005; Thompson *et al.*, 2011). The triple bottom line strengthens the dual balance between societal impact and economic profitability (Pache, Santos, 2013). Some entrepreneurs include the triple objectives as soon as their project idea is generated (Matzembacher *et al.*, 2019), others start with a double objective and reach the triple objectives during the development of their project (Belz, Binder, 2017).

Several researchers seek to understand the motivations of sustainable entrepreneurs. Kuckertz and Wagner (2010) study the strength of entrepreneurial intention among individuals concerned with sustainable development issues. They use a large-scale survey collected from students and alumni of engineering and business programs at three European universities. They conclude that the sustainable orientation of individuals has a positive impact on entrepreneurial intentions, but this positive effect declines with stronger business experience. In contradiction, St-Jean and Labelle (2018), through a study conducted in the Canadian context, highlight the fact that sustainable orientation has a negative impact on entrepreneurial action. This negative effect decreases when the entrepreneurs believe that entrepreneurship is as a way to change the world. In this perspective, Kuckertz and Wagner (2010) and St-Jean and Labelle (2018) emphasize the role of EE in supporting potential entrepreneurs to engage in sustainable entrepreneurship. As shown for social entrepreneurship, the recognition of sustainable opportunities is determined by the prior knowledge of individuals and their motivation to create gains for themselves and others (altruism) (Hanohov, Baldacchino, 2017; Patzelt, Shepherd, 2011). Hanohov and Baldacchino (2017) suggest that entrepreneurial knowledge strengthens this relation and shows that previous projects, jobs, and the amount of communal and natural environmental knowledge enhances entrepreneurial knowledge. Following on from this, Ploum *et al.* (2018) show that pro-environmental behavior values and moral competencies (normative and strategic actions) have a higher positive effect on sustainable opportunity recognition than self-transcendence values

(altruism). Then moral aspects seem more prevalent in social entrepreneurship than in environmental or sustainable entrepreneurship.

Table 1 summarizes the main features of social, environmental, and sustainable entrepreneurs identified in the literature according to the dimensions of the project and the individual features of the entrepreneur.

***Table 1* – Synthesis of the features of social, environmental, and sustainable entrepreneurs**

	Dimensions of the project			**Individual features**
	Economic	**Social**	**Environmental**	
Social entrepreneurs	X	X		-Prior experience in social entrepreneurship (Hockerts, 2017) -Cognitive and effective processes: compassion, aspiration, sympathy, empathy, moral obligation, self-efficacy, perceived support (Grimes *et al.*, 2013; Lewis, 2019; Mair, Noboa, 2006; Miller *et al.*, 2012; Ruskin *et al.*, 2016; Yitshaki *et al.*, 2022; Yitshaki, Kropp, 2016) -Gender (Hechavarría *et al.*, 2017) -Past distressing experiences: unemployment, rural poverty, limited education opportunities (Yiu *et al.*, 2014)
Environmental entrepreneurs	X		X	-Less materialistic and oriented to the maximization of profits than a traditional entrepreneur (Phillips, 2005) -Integration of sustainability in the set of cultural values (Santini, 2017) -Self-employed (Linnanen, 2005)

	Dimensions of the project			Individual features
	Economic	Social	Environmental	
Sustainable entrepreneurs	X	X	X	-Sensitivity to sustainable and environmental issues, individual values (Kuckertz, Wagner, 2010; Ploum *et al.*, 2018) -Belief in entrepreneurship to change the world (St-Jean, Labelle, 2018) -Motivation to create gains for themselves and others (Hanohov, Baldacchino, 2017; Patzelt, Shepherd, 2011) -Previous projects, jobs, knowledge (Hanohov, Baldacchino, 2017; Patzelt, Shepherd, 2011) -EE and knowledge (Hanohov, Baldacchino, 2017; Kuckertz, Wagner, 2010; St-Jean, Labelle, 2018)

The Specificities of Student Entrepreneurs

Because student entrepreneurs have some specificities compared to other entrepreneurs, their involvement in social, environmental, or sustainable entrepreneurial projects should also present some specificities. Student entrepreneurs generally lack resources (Clarysse *et al.*, 2022; Longva, 2021) and are divided between financing their schooling and creating a business (Beghain, 2019). The lack of resources may be even more pronounced for students with a social or environmental project and who are facing the dual balance between societal impact and economic profitability (Pache, Santos, 2013). Previous experiences and professional activities are important in the accumulation of knowledge about social issues that is necessary to engage in social or sustainable entrepreneurship (Hanohov, Baldacchino, 2017; Hockerts, 2017). Student entrepreneurs generally lack experience and knowledge of the professional world (Clarysse *et al.*, 2022; Delanoë-Gueguen, 2015; Kaandorp *et al.*, 2020; Leyronas, Loup, 2015), which may explain their lack of social and human capital outside the university context (Leyronas, Loup, 2015, 2020; Longva, 2021), reducing their legitimacy with potential investors and/or partners (Delanoë-Gueguen, 2015).

Although previous works explain the drivers of student entrepreneurship through the main individual features that support student entrepreneurial intention (Donaldson, 2019; Schimperna *et al.*, 2022) such as gender, age, self-efficacy, risk tolerance, environmental characteristics, only a few studies

highlight students' involvement in social, environmental, or sustainable projects (Anghel, Anghel, 2022; Passavanti *et al*., 2023) and their features. The current generation of students seems to be increasingly responsive to societal challenges. This generation is often called Generation Z or the E-Generation, even if this notion is quite fuzzy and questionable. One of the characteristics of this generation of students (among many others, such as being overprotected) is that they show a motivation to find solutions to societal problems and to be involved in projects that change the world for a better world (Seemiller, Grace, 2017). This should lead to strong involvement in social, environmental, and sustainable entrepreneurial projects. Moreover, since student entrepreneurship can be linked to diverse fields of study, such as politics, social sciences, economic-statistical studies, or engineering (Chiarello *et al*., 2019), these types of projects can be carried out by students whatever their educational background.

The literature explores the features of business, social, environmental, and sustainable entrepreneurs, but there is a lack of research about these features for student entrepreneurs, who constitute a very specific population, because they are young, have few prior experiences outside the academic context, and seem to be particularly concerned by the '*Grand challenges*' and the involvement in projects that can change the world for the better (Seemiller, Grace, 2017). In order to fill this gap, we investigate the specificities of the profile and projects of student entrepreneurs engaged in business, social, environmental, or sustainable projects.

Data Collection and Characteristics of the Sample

The empirical analysis is based on a database built from an online survey, sent to student entrepreneurs involved in the French PEPITE (Student Centers for Innovation Transfer and Entrepreneurship) program between 2014 and 2021. These centers result from a national initiative launched in 2014 by the Ministry of Higher Education, Research, and Innovation. It aims to support the development of entrepreneurship in French higher education. Enrolment in a PEPITE program results from a personal choice and is not mandatory for students. The managers of 10 PEPITE centers relayed our online survey by email to the student entrepreneurs. Data collection was from December 2019 to March 2020 and from March to April 2021. We collected 210 responses. In 2019, there were 35% of female students in the population of students involved in the PEPITE program and the average age

of students was 24 years. Regarding these criteria, our sample is representative of the whole population (Table 2).

We asked students about the business, social, or environmental orientation of their project and about the factors that could influence the nature of their projects: gender (Hechavarría *et al*., 2017), and factors that mitigate the lack of experience and the lack of human capital that characterize student entrepreneurs (Hockerts, 2017). The age, level of education, field of education, utility of entrepreneurship education, duration of involvement in entrepreneurship education programs, are factors that influence the human capital of student entrepreneurs (Brunner, 2021). While they are students, some of them are entrepreneurs and have accumulated more experience than others. They can also be jobseekers. It can influence their perception of the financial dimension of performance. Finally, we asked them about the features of the projects that can influence their business, social, environmental, or sustainable orientation. The degree of maturity of the project can influence intention for sustainable projects under the influence of EE (Kuckertz, Wagner, 2010; St-Jean, Labelle, 2018). For these authors business experience also influences intention for sustainable projects. We characterize the diversity of the business world through the sector of activity (agriculture and food, digital, art and culture) and the nature of the intended output (web application, object, service, consulting).

Method

We analyzed the data in two steps, with two complementary methods, to characterize the specificities of business, social, environmental, responsible, and sustainable oriented projects, and the influence of individual features, EE, and the features of the projects.

In a first step, we used a Multiple Component Analysis (MCA) and an Ascendent Hierarchical Classification (AHC) to explore the features of the projects led by student entrepreneurs, regarding the characteristics of the projects, the profile of student entrepreneurs, and their experience of EE. We defined 12 activity variables to characterize the entrepreneurial projects of student entrepreneurs (Table 2). Five variables characterize the individual features of the student entrepreneur (gender, age, professional or student status, education level, education background), three variables characterize their EE (region of the entrepreneurial center, duration of presence in the entrepreneurial center, involvement in more than one entrepreneurial program), and four, their projects (orientation, sector, project type, project phase).

Table 2 – **Features of the respondents and their entrepreneurial projects**

Variables	Modalities	Number	%
Individual features			
Profile			
Gender	Female	74	35%
	Male	136	65%
Age	18 to 22	84	40%
	23 to 26	83	40%
	≥27	43	20%
Status	Student	158	75%
	Entrepreneur	32	15%
	Jobseeker	20	10%
Education			
Level	Bachelor	82	39%
	Master	120	57%
	PhD	8	4%
Field	Science	96	46%
	Management	72	34%
	Humanities	27	13%
	Law/Economics	15	7%
Entrepreneurial Education (EE)			
Region	R1	61	29%
	R2	16	8%
	R3	21	10%
	R4	70	33%
	R5	18	9%
	R6	24	11%
Years ≥2	Yes (≥2 years in PEPITE)	44	21%
	No (≤1 year in PEPITE)	166	79%
Other EE	Yes (other entrepreneurial program beside PEPITE)	116	55%
	No (no entrepreneurial program beside PEPITE)	94	45%
Features of the project			
Orientation	Business (for-profit only)	70	33%
	Social (social and for-profit)	52	25%
	Environmental (environmental and for-profit)	31	15%
	Responsible (social and environmental and non-profit)	7	3%
	Sustainable (social and environmental and for-profit)	32	15%
	Other	18	9%

Variables	Modalities	Number	%
Sector	Culture (including Art and Tourism)	57	27%
	Digital	44	21%
	Agriculture	37	18%
	Consulting	32	15%
	Health (including wellbeing)	29	14%
	Design/Real estate	11	5%
Project type	Web application	63	30%
	Objects	60	29%
	Services	56	27%
	Purchase/Resale	31	15%
Project phase	Phase 4 (Industrialization - Commercialization)	63	30%
	Phase 3 (R&D)	79	37%
	Phase 2 (Feasibility)	56	27%
	Phase 1 (Ideation)	12	6%

In a second step, we used a binary logit model to characterize the determinants of business, social, environmental, or sustainable orientation of entrepreneurial projects. The modalities of the orientation of the entrepreneurial projects (Table 2) results in four binary dependent variables (Table 3). Responsible projects are not considered because they are only seven out of a total of 210 projects.

Table 3 **– Description of the dependent variables**

Variables	Definition of the modality 1 (alternative modality is 0)	Number of projects
BusinessProj	The orientation of the project is purely business and neither social or environmental	70
SocProj	The orientation of the project is simultaneously social and business but not environmental	52
EnvProj	The orientation of the project is simultaneously environmental and business but not social	31
SustProj	The orientation of the project is simultaneously social, environmental, and business	32

The 16 independent variables (Table 4) are binary variables. Eight variables characterize the individual features of student entrepreneurs: female, aged over 23, entrepreneur, jobseeker or employed, Master's level, humanities or science as field of education, duration of involvement in the PEPITE program, other experience of EE. Eight variables characterize the projects: Agriculture, Culture, Digital (for the sector of the project), Object, Web

application, Consulting, Purchase/Resale (for the type of project), and Phase 4 for the most advanced projects.

We controlled for the regional origin of the PEPITE programs, to integrate the specificities of the regional contexts.

Table 4 – **Description of the independent variables**

Independent variables	**Definition of the modality 1 (the alternative modality is 0)**
Individual features	
Profile	
Female	Being a woman
Age ≥23	Being 23 years old or more
JoblessEmpl	Being employed or jobseeker
Entrepreneur	Having the status of entrepreneur
Education	
Master	Enrolment in a Master's program
Humanities	The field of study is humanities, literature, or art
Science	The field of study is science including health
	EE
Years ≥2	The student is enrolled for 2 years or more in the PEPITE program
Other EE	Having been enrolment in another entrepreneurship education program
Projects features	
Agriculture	Sector of activity in agriculture, food, or energy
Digital	Digital project
Culture	Project in art, culture, or tourism
Consulting	Consultancy sector
Object	The project is based on the development of a material good
WebAppli	The project is a web application
Purchase/Resale	The project is a commercial activity (Purchase and Resale)
Phase 4	Project in the phase of commercialization or industrialization

Results

The two methods result in the characterization of the profile of student entrepreneurs regarding the intended impact (economic and/or social and/or environmental) of their entrepreneurial projects.

A Taxonomy of Student Entrepreneurs

According to the Davies-Bouldin index the best classification obtained with the AHC counts six classes, presented below. The modalities that define the classes are significant for test-values >2.

Class 1 **– Business entrepreneurs (43 projects – 20%)**

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Gender	Male	93	65	4,543
Level	Master	91	57	5,141
Other EE	Yes	84	55	4,199
Education	Science	65	46	2,695
Project phase	Phase 4	60	30	4,542
Project orientation	Business	56	33	3,255
Region	R4	51	33	2,554
Sector of activity	Digital	44	21	3,77
Status	Entrepreneur	42	15	4,771
Years ≥2	Yes	40	21	3,005
Gender	Female	7	35	-4,543
Project orientation	Sustainable	2	15	-2,601
Region	R5	0	9	-2,219
Sector of activity	Health	0	14	-3,176
Sector of activity	Agriculture	0	18	-3,771

Class 1 is characterized by an overrepresentation of projects led by men (93% in the class compared to 65% in the sample), being at Master's level (91%), with a slight overrepresentation of students in the field of science (65% compared to 46% in the sample). 60% of these projects are in a phase close to market (60% compared to 30% in the sample) and 42% of the leaders are already entrepreneurs. There are no projects in the sector of health or agriculture. Women (7%) and sustainable projects (2%) are significantly underrepresented.

***Class 2* - Social entrepreneurs (40 projects – 19%)**

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Gender	Female	85	35	7,097
Level	Master	73	57	2,03
Age	23 to 26	60	40	2,739
Project phase	Phase 3	58	38	2,67
Project orientation	Social	55	25	4,471
Project type	Services	50	27	3,374
Sector of activity	Health	40	14	4,597
Education	Humanities	33	13	3,539
Sector of activity	Digital	5	21	-2,776
Project orientation	Sustainable	3	15	-2,416
Project type	Purchase/ Resale	3	15	-2,416
Sector of activity	Agriculture	3	18	-2,87

Class 2 is characterized by a significant overrepresentation of women (85%) aged from 23 to 26 (60%), studying at Master's level (73%), in the field of humanities (33% versus 13% in the sample), engaged in service (50% versus 27%), social projects (55% versus 25%) in the research and development phase (58% versus 38%), in the health sector (40% compared to 14%). Because of the advanced phase of their project, they present the features of nascent entrepreneurs, engaged in a process of organizational emergence (Davidsson, 2006; Gartner, 1993). This class is also characterized by the underrepresentation of projects based on purchase/resale (3%), being in the digital (5%), agriculture, food, or renewable energy (3%) sectors. Sustainable projects (3%) are underrepresented in this class characterizing social projects.

***Class 3* – Environmental entrepreneurs (30 projects – 14%)**

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Level	Master	87	57	3,501
Gender	Male	83	65	2,169
Education	Science	73	46	3,103
Project type	Objects	60	29	3,723

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Age	23 to 26	60	40	2,254
Sector of activity	Agriculture	57	18	5,181
Status	Jobseeker	37	10	4,381
Project orientation	Environmental	30	15	2,133
Project orientation	Responsible	23	3	4,846
Project orientation	Social	0	25	-3,742

Class 3 is characterized by overrepresentation of responsible (23% versus 3% in the sample) or environmental (30% versus 15%) projects, based on the development of objects (60% versus 29% in the sample), in the sector of agriculture, food, or renewable energy (57% versus 18%). It is also characterized by a high proportion of males with a scientific background. They are aged 23 to 26 and some of them are graduates and jobseekers, so fully engaged in the development of their entrepreneurial project. They also present the features of nascent entrepreneurs. The class is also characterized by the underrepresentation of social projects (0% versus 25%).

Class 4 **– Sustainable entrepreneurs (28 projects – 11%)**

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Project orientation	Sustainable	75	15	7,956
Project type	Purchase/ resale	54	15	5,160
Sector of activity	Agriculture	46	18	3,667
Education	Law/ Economics	29	7	3,658
Region	R6	29	11	2,503
Project orientation	Social	4	25	-2,852
Project type	Services	4	27	-3,065
Project orientation	Business	4	33	-3,781

Class 4 is characterized by an overrepresentation of sustainable project (75%) in purchase/resale (54%) in the field of agriculture, food, or energy (46% versus 18% in the sample) led by students in law or economics (29% versus 11%). The modalities that are underrepresented are the social (4%) and business (4%) orientation of the projects, and the projects based on services (4%).

Class 5 **– Aspiring entrepreneurs (60 projects – 29%)**

Variable	**Modality**	**% of the modality in the class**	**% of the modality in the sample**	**Test value**
Status	Student	95	75	4,402
Years ≥2	No	90	79	2,373
Level	Bachelor	82	39	7,935
Age	18 to 22	80	40	7,4
Gender	Male	78	65	2,492
Other EE	No	75	45	5,475
Region	R1	55	29	4,95
Education	Management	48	34	2,525
Sector of activity	Culture	42	27	2,768
Project orientation	Other	18	9	2,584
Project orientation	Environmental	3	15	-2,988
Region	R6	2	11	-2,855
Status	Entrepreneur	2	15	-3,666
Age	≥27	2	20	-4,652
Region	R2	0	8	-2,687

Class 5 does not present a strong specificity regarding the motivation of project leaders. It is characterized by the presence of young (80%) male (78%) students that have not yet developed their project (95%), study at Bachelor level (82%), experiencing their first entrepreneurial program (75%). This class is also characterized by the overrepresentation of students studying management (48% versus 34%), motivated by the development of their entrepreneurial competences more than the external impact of their project (18% versus 9%). Only 3% of the projects have an environmental orientation, only 2% are already entrepreneurs. This class also shows the regional influences on the features of projects.

Class 6 – Academic entrepreneurs (9 projects – 4%)

Variable	Modality	% of the modality in the class	% of the modality in the sample	Test value
Age	≥27	100	20	4,987
Level	PhD	89	4	7,336
Region	R4	89	33	3,173
Education	Management	0	34	-2,037
Level	Bachelor	0	39	-2,313
Age	23 to 26	0	40	-2,34
Age	18 to 22	0	40	-2,368

This small class is characterized by the presence of all students being 27 years and more, with a PhD degree (89% compared to 4%) and a strong local identity. This class does not present any specificity regarding the orientation of the projects, which are close to the average features of the sample.

The Determinants of Business, Social, Environmental, and Sustainable Projects of Student Entrepreneurs

The results presented in Table 5 show the influence of individual profiles, educational background, experience of EE and features of the project on the orientation of the entrepreneurial projects of student entrepreneurs.

Table 5 – **Results of the binary logit model: the determinants of business, social, environmental, and sustainable projects**

	BusinessProj	**SocProj**	**EnvProj**	**SustProj**
	n=70	**n=52**	**n=31**	**n=32**
Individual features				
Female	-0,199*	0,217**	0,125	0,067
Age ≥23	0,003	0,011	0,351**	-0,076
Master	-0,026	-0,003	-0,086	0,167
Humanities	-0,134	0,014	-0,066	0,101
Science	0,086	-0,124	0,119	-0,026
JoblessEmpl	0,115	0,064	-2,708	-0,156
Entrepreneur	-0,232**	-0,020	0,090	0,153
Years ≥2	-0,152	0,165	0,025	-0,067
Other EE	0,239**	-0,126	-0,017	-0,043
Features of the projects				
Agriculture	-0,023	-0,726***	0,389***	0,307**
Digital	0,191	-0,060	0,093	-0,144
Culture	0,174	-0,237*	0,029	-0,095
Consulting	0,035	-0,118	-0,028	0,140
Phase 4	0,332***	-0,149	-0,275	0,006
WebAppli	-0,129	0,192*	-0,313*	0,132
Purchase/ Resale	-0,033	-0,447**	0,052	0,351***
Observations	210	210	210	210
R^2(Nagelkerke)	0,231	0,298	0,338	0,277
AIC	267,126	225,246	167,889	187,804

* p-value<0,01 **p-value<0,05 ***p-value<0,1

Three individual factors influence the orientation of the project. Being female positively influences the social orientation of projects and negatively influences their business orientation. Being an entrepreneur that has already created also negatively influences the business orientation of projects, while the involvement in at least two entrepreneurial programs shows a positive effect on business orientation. Being older than 23 years appears as a factor that positively influences the environmental orientation of projects.

For all types of projects, the variables characterizing the education of the students are not significant for having a social, environmental, or sustainable project: being a Master's student, having a background in humanities or science, or having followed another entrepreneurial program, suggests that many students, regardless of their education, are likely to be latent social, environmental, or sustainable entrepreneurs. The students declaring only an orientation for a business-oriented project are significantly characterized by

their involvement in more than one EE program. The results also show the regional influence on the orientation of the projects.

Five characteristics of the projects influence their orientation. The agriculture, food, or energy sectors are positively associated with environmental and sustainable entrepreneurial projects and negatively associated with social entrepreneurial projects. Projects based on purchase and resale activities are very significantly and positively associated with sustainable projects, but negatively associated with social projects. The sector of culture and purchase and resale activities also negatively influences the social orientation of the projects, while purchase and resale is positively associated with sustainable projects. Projects based on Web applications are positively associated with social orientation and negatively associated with environmental orientation. Business orientation is strongly and positively associated with advanced projects that are in the phase of commercialization or industrialization, more often than the other kind of projects, led by the youngest students, as shown by the taxonomy.

Synthesis of the Results

The two methods, the AHC and the binary logit model, used in a complementary way, lead to the characterization of business, social, environmental, and sustainable student entrepreneurs described in Table 6.

Both methods characterize the 'business entrepreneurs' as male students having pursued several EE programs and engaged in advanced projects. The only contradiction between the AHC and the logit model is about the relation of the status of entrepreneur and the business orientation of the project. The AHC shows that the modality 'Entrepreneurs' is significantly overrepresented in Class 1, with a strong t-value 4,771, while the logit model shows a negative relation between the status of entrepreneurs and the sole business orientation of the projects. However, both methods show that the advancement of the project (Phase 4, which means commercialization or industrialization) is a significant characteristic of business projects.

Both methods show that 'social entrepreneurs' are positively and significantly associated with women developing service projects, based on Web applications, for the health sector, for a significant number of them. 'Environmental entrepreneurs' are characterized by students aged 23 years and more, developing objects for the agricultural sector. Their status of jobseekers, their age and their level of education, may suggest that they are fully engaged in the development of their entrepreneurial projects. According to both methods, 'sustainable entrepreneurs' are characterized by the features

Table 6 – Characterization of student entrepreneurs engaged in business, social, environmental and sustainable projects

	Orientation of the project			**Individual features**			**Features of the project**
	Economic	**Social**	**Environ-mental**	**Profile (gender, age, status)**	**Education (level, field)**	**EE (duration, other EE)**	**Sector, type, phase**
Business entrepreneurs	X			Male Entrepreneur	Master* Science*	Years ≥2 Other EE	Digital* Commercialisation
Social entrepreneurs	X	X		Female 23 to 26 years*	Master* Humanities*		Health Services Development*
Environmental entrepreneurs	X		X	Male*, 23 to 26 years Jobseeker*	Master* Science*		Agriculture Objects
Sustainable entrepreneurs	X	X	X		Law/ Economics*		Agriculture Purchase/Resale

* Characteristics revealed by the AHC only

of their projects (sector of activity in agriculture, purchase and resale activity), more than by their individual features.

Discussion

While there are many works about student entrepreneurs, the definition and the contours of this heterogeneous population is still unclear. An originality of our approach is to consider the intended economic, social, and environmental impacts and the features of the projects, beside the traditional characterization of the student entrepreneur's individual profiles (Beghain, 2019; Gabay-Mariani, Boissin, 2021; Leyronas, Loup, 2015, 2020; Longva, 2021; Passavanti *et al.*, 2023). The typology of student entrepreneurs proposed (Table 7) contributes to the emerging literature about the profile of student entrepreneurs engaged in business, social, environmental, and sustainable projects (Anghel, Anghel, 2022; Passavanti *et al.*, 2023).

Table 7 – A typology of student entrepreneurs

Type of student entrepreneurs	Individual features	Features of the project	
		Main sector	Phase
Business entrepreneurs	Male Founder or close to be Master level, science Several EE programs	Digital	Commercialisation
Social entrepreneurs	Female 23 to 26 years old Master level, humanities	Health	Development
Environmental entrepreneurs	Male 23 to 26 years old Master level, science Jobseekers	Agriculture	/
Sustainable entrepreneurs	Students in Law/ Economics	Agriculture	/
Aspiring entrepreneurs	Male 18 to 22 years old Bachelor level, management 1st EE program	Culture	/
Academic entrepreneurs	27 years old and over PhD	/	/

Among the six classes of student entrepreneurs and projects identified, four illustrate the specific features of business, social, environmental,

or sustainable student entrepreneurs. The class of business entrepreneurs includes students that follow a single objective of profitability (economic impact). This class is the only one characterized by a long involvement (at least two years) of students in entrepreneurial programs. It can be interpreted as a sign of the influence of entrepreneurship education on the business orientation of the entrepreneurial projects of student entrepreneurs. An important objective of EE is to lead students to be aware of the reality of the markets and to build profitable business models that integrate the economic dimension of performance. EE programs traditionally focus strongly on the development of entrepreneurial skills, such as the ability to detect and exploit entrepreneurial opportunities, to build a business model, a business plan, a business strategy (Loue, Baronet, 2015; Mitchelmore, Rowley, 2010; Verzat, Fayolle, 2013). Our results show that the accumulation of several entrepreneurial training courses is positively associated with business-oriented projects. Our analysis reveals no relation between the time spent in EE programs, and the social, environmental, or sustainable orientation of the projects.

The classes of social and environmental entrepreneurs both describe mature student entrepreneurs aged 23 to 26 years, some of them graduates, that present the features of nascent entrepreneurs. The characteristics of these two classes allow us to generalize to the population of student entrepreneurs several results of entrepreneurship literature about social and environmental entrepreneurs. First, it shows that the maturity of students, associated with the accumulation of more experience, is significantly associated with involvement in social and/or environmental projects (Hanohov, Baldacchino, 2017; Hockerts, 2017; Patzelt, Shepherd, 2011). Second, it shows that the proximity between environmental entrepreneurs and business entrepreneurs shown by Filser *et al.* (2019) and Santini (2017) is present in the population of student entrepreneurs. The maturity, the male gender, and the scientific background of environmental entrepreneurs are strong common characteristics with the class of business entrepreneurs. Third, a strong specific feature of social student entrepreneurs is the high proportion of women. This specificity is also shown in the literature about non-student entrepreneurs (Hechavarría *et al.*, 2017).

The data we collected and the analysis we conducted show that a large part of social entrepreneurs have an educational background in humanities and are engaged in services in the sector of health or wellbeing. This evidence is a contribution to the literature about the role of universities in societies (Mailhot *et al.*, 2007; Matt, Schaeffer, 2016), over the traditional approaches of technology transfer from research to innovation (Créplet *et al.*, 2007; Schaeffer, 2019). Another original contribution of this analysis is the role of

Web applications in social entrepreneurship, which shows that technological innovation and social innovation are not contradictory. Technological innovation has always played an important role in social innovation, sometimes forgotten by the recent literature on social innovation, which focuses more on the dark side of innovation and the negative social effects of technological innovation.

While business, social, and environmental projects present individual specificities, sustainable entrepreneurs do not present strong specificities, despite a higher proportion than average of students from the fields of economics and law, of the projects based on purchase/resale activities, and/or being in the agriculture/food/energy sector, such as environmental projects. However, there are no common features with social projects, which remain very specific.

Beside these four classes describing the main features of business, social, environmental, and business oriented projects, two classes are characterized by the sole specific identity of student entrepreneurs and not by the orientation of their projects. The class of aspiring entrepreneurs include students, aged 18 to 22 years, studying at Bachelor level and the class of PhD students that are academic entrepreneurs, whose projects emerge from the discovery of opportunities resulting from their research activities and are not led by their profitability or their environmental or social impact.

Our results show the relevance of the distinction between aspiring, nascent, and founder student entrepreneurs, as in Gabay-Mariani and Boissin (2021). While the distinction between these three types of student entrepreneurs is based on the maturity of the entrepreneurial project, our typology integrates more detail about the motivation and the intended impact of the entrepreneurial projects of student entrepreneurs. There is no contradiction between the two typologies. Our typology brings several contributions to the general characterization of the population of student entrepreneurs. First, aspiring entrepreneurs do not seem to be motivated by a specific intended impact of their entrepreneurial project. They are more motivated by the learning process itself than by the impact of their still unclear project. Entrepreneurial and general education have a major role to play to make them aware of sustainability issues. Second, there are two distinct populations within nascent entrepreneurs involved in the development of their project, studying at Master's level or already graduates: women with a background in humanities engaged in social entrepreneurial projects and men with a background in science, who are more oriented toward environmental projects. This constitutes new evidence about gender issues in the field of entrepreneurship. Third, we show that digital technologies are an important

source of entrepreneurial opportunities for social student entrepreneurs, especially through the development of Web applications. This brings evidence to contradict the current opposition between technological and social innovation. Fourth, we show regional effects, which can be explained by the influence of the economic and academic context, and also by the regional specificities of the EE programs in which students are involved. These specificities could be used as complementarities at the extra-regional level.

Conclusion

This research highlights the role of student entrepreneurship as a vector of development of sustainable innovation and the dissemination of knowledge from university to society and the economy, over traditional schemes that focus on high-tech projects. It contributes to the literature about the features of social, environmental, and sustainable entrepreneurs, through a focus on the population of student entrepreneurs. The typology proposed highlights the diversity of student entrepreneurs in terms of the intended impact of their projects, features of the entrepreneurial projects, individual profiles, and entrepreneurial education (EE) experiences. While previous works show the role of EE in developing entrepreneurial competences (Kuckertz, Wagner, 2010; Passavanti *et al.*, 2023; St-Jean, Labelle, 2018), we emphasize the role of entrepreneurial and general education in leading student entrepreneurs to engage in sustainable entrepreneurial projects.

As universities are more and more concerned by their social responsibility, a managerial recommendation that derives from these results would be to consider the diversity of the profile of students in the evolution of general and EE programs. Different kinds of students show different sensitivities to economic, social, or environmental issues. Educational programs dedicated to different kinds of students could encourage them to develop sustainable projects, in line with the triple bottom line (Pache, Santos, 2013). The youngest students at Bachelor level, or the oldest, who are PhD student entrepreneurs, do not show specific expectations about the societal impact of their projects. Entrepreneurial and general education should contribute to developing their awareness to societal issues. Students with a scientific background, more engaged in business or environmental entrepreneurship, could benefit from being made aware of social entrepreneurship. Students in the field of humanities could be made more aware of environmental issues. We showed that most advanced projects focus only on the economic dimension of the performance. As a result, it would be appropriate for EE programs to favor the development of sustainable projects that integrate the triple bottom

line notion of performance. Our results highlight the fact that the location of the entrepreneurial centre has an influence on the orientation of the project to business and sustainable entrepreneurship but not to social entrepreneurship. It would therefore seem interesting for future research to understand more precisely the influence of the location of entrepreneurial centers on the orientation of projects. The EE programs we studied result from a national policy but each of them has its own organization and the regional specificities of the programs are strong, depending on the local context and academic strategies. National coordination between regional actors would make it possible to guide student entrepreneurs toward the program best suited to their profile. For example, student entrepreneurs from the regional center of the Alsace area, called ETENA, benefit from a bio-incubator, very useful for PhD student entrepreneurs in life sciences, that could benefit other student entrepreneurs with specific projects in life sciences. The results also show some gender specificities. They seem to be associated with gender differences in study orientation, with more men in science and more women in the humanities. Erasing these gender differences is not just a matter of university or EE programmes, but of cultural differences within our societies, which are engaged in reflection and development beyond the university context.

There are some limitations to this research, which provide avenues for future research. Despite the quality of the data collected in the PEPITE network, it would be interesting in future research to explore other types of entrepreneurial programs such as those deployed in business schools, engineering schools, incubators, or accelerators, with the same methodology. This extension could permit a deeper exploration of the evolution of societal motivation. Sustainable entrepreneurs can start their project with a double objective and then achieve a triple objective during the development of the project (Belz, Binder, 2017), or tackle the triple objective as soon as the idea is generated (Matzembacher *et al.*, 2019). A longitudinal study could complement our research by adopting a dynamic perspective of the addition or removal of three dimensions (social, environmental, economic) of the entrepreneurial project as it progresses. Finally, the diffusion of an environmentalist culture is facilitated more in some countries than in others (Kirkwood, Walton, 2010). Then it would be interesting to pursue this research in other regions and other countries where EE support policies are different, to compare and highlight the influence of the context on sustainable entrepreneurship.

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