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ANALYSIS AND MODELLING OF INFLUENCE FACTORS IN THE CONFIGURATION OF A SUSTAINABLE UNIVERSITY. CASE STUDY: "ȘTEFAN CEL MARE" UNIVERSITY OF SUCEAVA

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Abstract

Universities create study programs and organize extracurricular activities to prepare future generations of professionals, political and social leaders for responsible actions towards sustainable development. The purpose of this research is to identify the determinant factors and their level of influence, regarding the framing of the strategies of "Ștefan cel Mare" University of Suceava in the pattern of the sustainable university. Through this research we explored, from the perspective of the bachelor and the master students as main stakeholders, how "Ștefan cel Mare" University of Suceava develops and sustains educational and extracurricular programs, in order to train the skills necessary for a sustainable development. We undertook an exploratory research, the results of which we processed through factorial analysis and logistic regression, carried out using SPSS v.20. The conclusions suggest that the analyzed university applies strategies in the direction of developing entrepreneurial skills, first of for the students and masters, so that in the long term it will ensure a sustainable development in the direction of social and environmental challenges. The research findings have practical implications for universities and can support the advancement of educational programs related to sustainable development so that students become change agents.

Keywords: sustainable university, influence factors, sustainable development, entrepreneurial skills, change agents.

JEL Classification: I25, J24, L26, Q01.

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Introduction

Sustainability involves economic development, in the context of social welfare achieved in a healthy environment. In this respect, the principles of sustainable development could be successfully implemented at the level of the whole society and the role of education – in general – and that of higher education – in particular – is decisive. Universities are the ones that can majorly influence the sustainable development of society on several levels (Dabija, et al., 2017).

Confirming the development of entrepreneurship as a sustainable growth factor at national and regional level frequently arouses the interest of both theorists and practitioners (Scuotto et al., 2019). Taking into account the main characteristics of entrepreneurship – innovation, proactivity and risk taking, a number of positive effects are associated with entrepreneurship, directly or indirectly: sustainable development, overall growth of business performance and economic efficiency, creation of new jobs, improvement of regional and national competitiveness, more efficient management of economic crises, recognition and exploitation of opportunities (Ratten, 2017), technological and informational change and advance (Dragos et al., 2014; Pantelescu, et al., 2009), growth productivity and exports (Baran and Veličkaitė, 2008).

Starting from the premise that entrepreneurship education is one of the factors that stimulate growth in newly established companies and one of the European Union (E.U.) priorities in the field of entrepreneurship (Hoffmann, 2014) and to capture the role of university education in shaping the national entrepreneurial character or behaviour, we have included entrepreneurial education as a basic component of our study. The entrepreneurial university aims to develop the entrepreneurial and intrapreneurial approaches, at management level, in relation with the business community, as well as the entrepreneurial education and the dynamic preparation of students for the labour market (Hapenciuc et al., 2016).

The Lisbon Agenda underlined the need to provide a favourable environment for the creation and development of small and medium-sized enterprises. There is a substantial link between entrepreneurial density, sustainable economic growth and the progress of a nation and thus the policies practiced by a state can decisively influence the increase of entrepreneurial density. The entrepreneurial university involves the use of modern toolkits that raise the level of entrepreneurial approaches from capitalizing on know-how and research in partnership with the business environment, to consolidating self-contained and transdisciplinary entrepreneurial approaches (Munteanu, et. al., 2015).

In relation to this approach, we focus on presenting research results and solutions related mainly to the field of vocational education and training. In the introductory part we explain the scope of the research and underline the general purpose of the paper which is to identify the main factors of influence and their level regarding the classification of "Ștefan cel Mare" University of Suceava in the pattern of the sustainable university based on the results obtained in the research. Within the first section we summarize the literature review on the interconnection between entrepreneurship, ecological responsibility and the protection of the environment, as influencing factors in the approach of the sustainable university and in the formation of competences oriented towards the sustainability component in order to outline a possible model of the sustainable university. This section focuses on the role of students as change agents in the sustainable development of the university and society. The

research methodology and the research instrument, the sampling and data collection are presented in detail in the second section of the study. In the third section are presented data processing and interpretation of results, based on which the validation of the research hypotheses is performed. In the final section, from the conclusions, we highlight the research findings and propose the future research directions.

1. Literature review

In the content of the following four sections we argued based on the literature review, in terms of actuality, the main concepts of the researched theme, their role on socio-economic level and the effects interconnected between them. In the following we will present the major perspectives that are outlined in the literature and in practice on the dimensions of the concept of sustainable university, referring here to the four dimensions namely, educational, social, economic and ecological. For each approach we will emphasize the ways of involving, first of all, the sustainable university and secondly, the potential of the students to contribute to the sustainable development. Thus, we set out to present strategies and scenarios specific to the sustainable university model.

1.1. The influence of sustainable university actions in various fields of social and economic life, including the field of ecology

The significance of the concept of "sustainable development", which the World Commission of Environment and Development (2014) presents as follows: "sustainable development is the development that satisfies the needs of the present without compromising the ability of future generations to meet their own needs" is the one most acknowledged. This perspective initially expressed as a profound and generous idea, but insufficiently outlined, remains exposed to many factual counterarguments, which suggest, with enough justification, reservations about the criteria for evaluating the "chances" of future generations.

Universities must allocate resources intelligently to become sustainable and to provide students with a life experience in a sustainable environment. They must be the catalyst for the necessary changes throughout the society and their graduates should be the tools by which should be possible the transformation of the whole society, in the direction of sustainable development (Dinu, 2020). The new Sustainable Development Goals (SDGs), in the perspective of 2030, emphasize, among other things, the relevance of higher education in the efforts for a better future (Ramos, 2016). Inclusion in the academic curriculum of the UN sustainable development goals will support the development of students' future-oriented skills.

There is a consensus among researchers that universities play an important role in meeting these challenges of sustainable development through education (Boström, et al. 2018; Eizaguirre, et al. 2019; Sibbel, 2009). Universities are seen as agents of change in many problems including sustainability awareness (Mochizuki and Fadeeva, 2010). In addition to education and research, the so-called "third mission of the university" consists of studies on improving the quality of life of people and solving global problems (Miotto, et al. 2018). Universities are a fundamental element, a vehicle for exploring, testing, and communicating the essential conditions for sustainable development (Filho, 2012; Salvioni, et al. 2017).

Therefore, universities need to be reformed in the field of teaching and research (Brito, et al. 2018). The role of universities is essential, as they play a crucial role in the development of economic systems by disseminating knowledge, creating innovation, promoting sustainable development, ecological protection and fostering cultural growth (Bejinaru, et al., 2018). For this, it is important to develop a new university governance and achieve an intellectual capital capable of performance (Bratianu and Pinzaru, 2015).

The development of skills oriented towards sustainability should be supported by improving, educating and introducing innovative forms of teaching and learning. According to the studies, the competences needed for students to support sustainability are: systemic thinking; interdisciplinary work; anticipatory thinking; justice; responsibility and ethics; critical thinking and analytical work; interpersonal relationships and collaboration; empathy and changing perspectives; digital communication and use of the media; strategic thinking; personal involvement; appreciation and evaluation; tolerance for ambiguity and uncertainty (Lambrechts, et al., 2013; De Haan, 2010). We argue, based on the literature review, that at present there is a real interest of the universities in the member states of the E.U. from Austria (Brudermann, et al., 2019), Poland (Sady, et al., 2019), Serbia (Cvijić, et al., 2019), or Spain (Bezanilla, et al., 2020), to endow students with oriented skills towards sustainable development, not only through formal education, but also through non-formal activities, in the direction of the socially and environmentally aware environmental challenges.

The main difficulty in sustainable education results from a multidisciplinary context, which makes the difference in education in traditional disciplines. Teaching and learning in the field of sustainable development requires new approaches (Aktas, et al., 2014; Sibbel, 2009; Eizaguirre, et al., 2019). The paradigm shift is complicated, because it should be implemented throughout the entire university system (Setó-Pamies and Eleni, 2016) and, therefore, the crucial role of the readers is based on the inclusion of global problems in the existing curricula (Tarozzi and Inguaggiato 2016). It is expected that a university graduate will have entrepreneurial skills and, at the same time, social skills, in order to be more competitive in his integration into the global labour market (Lackéus, 2015). Key forums for business education and scholars debate that students studying business need more skills related to professional ethics and social responsibility (Blasco, 2012; Ghoshal, 2005). The creation of a stimulating space for learning must take into account the new theories regarding the knowledge fields and knowledge dynamics (Bratianu and Bejinaru, 2020).

Universities contribute to the development of sustainability skills, both through formal education (according to the curriculum) and non-formal education (extracurricular activities) by developing essential interpersonal, communicative and cognitive skills, such as critical thinking, analytical skills, creativity, problem solving and resilience, which facilitates the transition of young people to adulthood and thus into the labor market (Jamali, 2016; Holfelder, 2019).

1.2. Entrepreneurial University, vector of sustainable development

The search for a model of entrepreneurship in education and a model for a university suited to the demands of the 21st century has become a priority for the managers of higher education institutions. The concept of "entrepreneurship in education or academic entrepreneurship" is rooted in the American research system (Etzkowitz, 2006). The creation of the entrepreneurial university must be focused on fulfilling the tasks of teaching, research and entrepreneurial activities (Guerrero et. al., 2016).

We can see that the new university missions, as Etzkowitz (2004) calls them, focus on social development and economic growth. Universities become entrepreneurial organizations and the members of the academic body are transformed into potential entrepreneurs. The purpose of education is to support students' personality development to handle complex situations and to make appropriate decisions, to bear responsibility and to have high ethical standards in accordance with the requirements of sustainable development (Neamtu, 2017).

James and Card (2012) showed that students were the key actors in diagnosing the perception and participation in the sustainability practices implemented by universities. In a similar study conducted in Poland, *The Role of Universities in Sustainability-Oriented Competencies Development: Insights from an empirical Study on Polish Universities* (Sady, et al., 2019) that had as research objective the analysis of how universities in Poland develops educational programs and extracurricular activities to enable students to develop their sustainability skills, the conclusions showed that Polish universities are trying to develop skills oriented towards sustainable development not only through formal education, but also through non-formal activities, in the direction of social and environmental challenges.

1.3. Ecological responsibility and sustainable consumption, essential approaches in the sustainable university

Due to the diversity of activities that are associated with higher education institutions, there are numerous mechanisms for them to contribute to social transformation and sustainable transition. Higher education can, and sometimes does, contributing to the social transformation towards sustainability, at all three levels – strategic, tactical and operational. At a strategic level, higher education can be involved in defining and developing a strategic vision of society and in establishing long-term goals. At the tactical level, higher education institutions can support and facilitate coalitions and cooperation between strategic actors. At the operational level, higher education can implement change through curriculum, research, own campus operations and through continuous and responsible adaptation with economic and social specific issues (Filho, 2012). Although there is a large-scale debate about the sustainability of university education and that opinions and approaches are and can be differentiated, a broad consensus has emerged for three main directions of action in accordance (Deneş, 2011).

- Increased concern about the future of society and "international equality";
- Increasing the role of students ("empowering" students) and crystallizing the increased belief that they can make a difference;
- Improve the personal desire to solve social and environmental problems;

In this sense, sustainability is focused on developing the "human-environment-nature" relationship. As much emphasis is placed on winning "hearts and minds" as well as formal training. The last 30 years of education aimed at protecting the environment, have shown that by teaching students this topic, the level of knowledge and awareness of environmental problems has been raised, but this does not necessarily translate into sustainable action (Bezanilla, et al., 2020; Brudermann, et al., 2019; Jucker, 2002).

1.4. The students' plurality within the sustainable university

Lately, students have become the main stakeholders of the university and consequently they are given increased attention on various plans. We consider that the student can also be the main resource that a university, which wants to become sustainable, must use in the strategy of ensuring sustainability (Prelicean and Bejinaru, 2018). The role of the university is amplified and surpasses the classical educational sphere, involving more and more social and economic practices so as to give students the best chance to succeed in a world in which the competition is redefined from day to day (Dima, 2014; Wissema, 2009). Encouraging entrepreneurship among students in Romania, implies improving their perception of their abilities and their potential for success in a real business (Bejinaru, et al., 2018).

In the current context, the success of students as entrepreneurs is a strategic objective for the "Ștefan cel Mare" University of Suceava, which reconfigured the curricula and introduced courses and seminars on entrepreneurship education, initiated projects under the aegis of the Business Incubator, of the Research Centre in Business Management and Administration and implements projects for setting up start-ups in the North-East region of the country. The combination of theoretical education with experimental education within projects aims to develop students entrepreneurial skills as well as strategic thinking. Strategic thinking is the main factor for success in business and is fundamental for achieving sustainability at any level, but especially at the beginning of this approach (Bratianu, et al., 2020).

An entrepreneurial university can achieve sustainable development mainly through collective action, of all categories of stakeholders. In the context of the entrepreneurial university, students have many values, they are members, they are actors, they are beneficiaries but they are also resources and their actions impact at least in two ways, from university to society and vice versa, from business to academic (Guerrero et al., 2016). A sustainable university needs sustainability strategies and resources, as well as change agents capable and involved in this endeavour (Boh, et al., 2016; Jansen, et al., 2015; Vaupell, et al., 2017; Wright, et al., 2017).

The university-student relationship is a dynamic and multidimensional one. Through the education it offers to students, the university must pay explicit attention to influencing their attitude towards the concept of sustainability and to facilitate students in identifying sustainable development opportunities (Trencher, et al., 2013; Wakkee, et al., 2019).

This approach is confirmed by a recent study by NUS-UK (National Student Union of the United Kingdom / UK) that investigated students' experiences and expectations regarding education for sustainable development within their universities (NUS-UK, 2018). The results can be summarized as follows:

- 91% agree that their university should promote sustainable development;
- 70% would like to see sustainable development included and promoted through all courses;
- 81% would like to know more about sustainable development;
- 61% would accept a salary of 15% lower than the average to work in a company with a good social and environmental reputation;
- 93% say that governments around the world should do whatever it takes to address climate change (NUS-UK, 2018).

The results of this study demonstrate that students are a key resource in ensuring sustainability and their involvement presents a number of advantages: they are easy to motivate, mobilize and coordinate in such projects. They are willing to strive for a cause with high impact and visibility in society such as – sustainable development (NUS-UK, 2018). In order for this strategy to be accurately constructed and appropriately structured, it is imperative that we identify the level of knowledge, the level of skills and the level of student determination to succeed in the global economy in the future.

2. Research methodology

2.1. The purpose, objectives and hypotheses of the research

The purpose of this research is to identify the main factors of influence and their level regarding the classification of the "Ștefan cel Mare" University of Suceava in the pattern of the sustainable university.

The research carried out has essentially a qualitative purpose, because we aimed to obtain a data basis of analysis that allows the outline of some guidelines regarding how the competences and skills formed, the involvement in extracurricular activities, the entrepreneurial dimension and the ecology influence the transition to the sustainable university at the level of the students of "Ștefan cel Mare" University of Suceava. To achieve the general purpose of the research we have outlined a number of specific objectives such as:

O1 – Identification of the factors that allow to describe the students' perception of the educational process and extracurricular activities.

O2 – Identification of the factors that allow the description of the students' perception on the university activity promoting the entrepreneurial spirit and the ecological education.

O3 – Identification of the factors with major / significant influence on the students' perception regarding the status of "Ștefan cel Mare" University of Suceava as an entrepreneurial and sustainable university.

The study was based on a sample of 346 students, which ensures a sampling error of maximum 5%, from several faculties from "Ștefan cel Mare" University of Suceava: the Faculty of Forestry, the Faculty of Food Engineering, the Faculty of Economic Sciences and Public Administration, and the Faculty of Mechanical Engineering, Mechatronics and Management. The selection of these faculties was made on the basis of the connections found in the curricula of these faculties and the research topics regarding the concept of sustainable university.

We determined the sample size based on the statistical formula, as follows:

$$n = t^2 \cdot p \cdot (1-p) / e^2 \quad (1)$$

where:

n = sample size;

t = the theoretical value of the accepted probability (we used t = 1.96 for a 95% confidence level);

p = the percentage in which the population has the sampling characteristic (usually = 0.50);

e = the allowed limit error of representativeness (values between 1% and maximum 5% are accepted).

Thus, in the case of this research, for a maximum admitted error of 5% and confidence level of 95%, the calculations are as follows:

$$n = (1,96^2 * 0,5 * (1-0,5)) / 0,05^2 = 384 \quad (2)$$

To find out the opinions of graduate and master students regarding the inclusion of "Ștefan cel Mare" University in the matrix of the sustainable university, we investigate the results of 346 respondents, as 38 questionnaires were invalidated due to incomplete answers.

The relevance of the researched theme is justified on the basis of the following research hypotheses:

(H1) A set of factors can be identified at the level of "Ștefan cel Mare" University of Suceava students that allow their perception of the educational process to be described.

(H2) A set of factors can be identified at the level of "Ștefan cel Mare" University of Suceava students that allow the description of their perception on extracurricular activities.

(H3) A set of factors can be identified at the level of "Ștefan cel Mare" University of Suceava students that allow the description of their perception on the university activity to promote the entrepreneurial spirit.

(H4) A set of factors can be identified at the level of "Ștefan cel Mare" University of Suceava students that allow the description of their perception on the university activity to promote ecological education.

(H5) A set of factors, with major / significant influence, can be identified at the level of "Ștefan cel Mare" University of Suceava students that allow the description of their perception on the university as an entrepreneurial and sustainable university.

2.2. The research tool

The investigated population in this research is made up of the students of "Ștefan cel Mare" University of Suceava, from the final years of the bachelor's and master's cycles because we considered that this way we maximize the chances of obtaining relevant and knowledgeable answers. The research method used as a tool for data collection was the questionnaire – with online administration.

The questionnaire used in the research contained a number of 8 items to identify the respondents and 130 closed items, each representing a variable on the researched topic, with a rating on a Likert scale from 1 to 5. The questionnaire contained items structured on four themes: a) students' perception of the process of education (available resources, skills acquired and teaching methods used); b) students' perception of extracurricular activities – opportunities and challenges; c) students' perception of the entrepreneurial component of the university – an essential factor in the transition to a sustainable university, and not least d) students' perception of the ecological perspective that integrates the image of the sustainable university.

3. Processing and discussion of results

3.1. Using the analysis of the main components at the research variables level

In order to synthesize the collected data, a factorial analysis was carried out that allowed the identification of the most significant factors able to describe the coordinates of the investigated population. The application of the analysis of the main components was made at the level of the four categories of questions delimited in the questionnaire. The fundamental principle of this method is to extract the smallest number of components to recover as much as possible from the total information contained in the original data (Giannelloni and Vernet, 2001).

The accuracy of the method was verified by using Bartlett and Kaiser-Meyer-Olkin tests (Bratianu and Vatamanescu, 2017). Both the Bartlett test and the KMO test suggested very good accuracy for using factorial analysis, the values determined for the KMO test were each time higher than 0.9 (according to table no. 1), indicating that the correlation models are relatively compact, and factorial analysis can be used on the data set. At the level of the items grouped on the 4 themes of the research, an analysis of the internal consistency of the measurement scale was performed, to test the reliability of all the variables. The results of the tests each indicated values greater than 0.9 of Cronbach's alpha coefficients (according to table no. 1), proving a good internal consistency.

Table no. 1: Test results of Cronbach's alpha, KMO and Bartlett

Group of items	Cronbach's alpha	KMO	Bartlett
(I)	0.943	0.941	5044**
(II)	0.911	0.900	2430**
(III)	0.958	0.937	11086**
(IV)	0.919	0.919	5790**

**Sig.<0,01

(I) The analysis of the main components for the items that describe the perception about the educational process specific for a sustainable university, led to the retention, through the Varimax rotation method, of four principal components (PC) that explain a proportion of the answers variation of approximately 57%.

PC1 – *Self-improvement*. The most important variable in this analyzed category refers to the students' perceived ability to identify new opportunities and to act quickly to track and capitalize on them. Thus, we noticed the students' desire to continuously improve, to coordinate activities in order to formulate new ideas and solutions in the field of study.

PC2 – *High level skills*. It was observed a grouping of the variables regarding the students' perception of the communication skills in foreign languages and of the digital skills, correlated with the variable regarding the equipment endowment and instruments necessary for the practical activities, as resources used in the didactic process, around a new main component. This new main component indicates the orientation of the students to those skills needed at the moment for a rapid integration in a global labour market.

PC3 – *The reputation of the study program*. From the internal analyzes regarding the admission process of students to the study programs organized at the "Ștefan cel Mare" University of Suceava, it is known that the choice of the study program is a complex

decision-making process, which is generally influenced by family and/or colleagues. The family refers to the reputation of the program in giving the graduates the best chance of finding a job, which will ensure a high social status and the colleagues refer to their own experience during the studies carried out in the respective study program. Thus we can notice a strong influence from the variables: "*The program has a good academic reputation*" and the "*Program is oriented towards the professional training*" (for a specific occupation) on this main component identified.

PC4 – *Two-way student communication – higher education institution*. A last identified main component groups the variables that indicate how the students want their involvement in the academic and administrative activity within the university. The students want a diversified coordination from the teachers regarding the resources and methods of teaching used but also the possibility to have a control over the decisions at the university level that can influence their development possibilities during the studies.

(II) The analysis of the main components for the items that targeted the perception on extracurricular activities led to the retention, through the Varimax rotation method, of two main components (PC5, PC6), which explain a proportion of the answers variation of approximately 69%.

PC5 – *Group (team) activities*. We can notice a strong influence from the variables that describe the students' willingness to get involved in the life of the academic community and to contribute to the implementation of academic activities.

PC6 – *Personal development*. The main motivational driver for involvement in extracurricular activities seems to be the desire for self-development and to gain practical experience and to create a network of relationships, as a prerequisite for future development.

(III) The analysis of the main components for the items that describe the institutional effort to promote the entrepreneurial spirit, led to the retention, through the Varimax rotation method, of six main components (PC7, PC8, PC9, PC10, PC11, PC12) that explain a proportion of variation of responses of about 60%.

PC7 – *Promotion of entrepreneurship through partnerships*. The perception of the students is that a closer collaboration between the university and the private sector is necessary to allow a transfer of know-how and, at the same time, to ensure the status of a sustainable university and entrepreneurial oriented.

PC8 – *Mixed learning*. The students consider that the most efficient methods of stimulating the entrepreneurial spirit during the studies are the internships, the activities of counselling and career orientation, respectively, methods that combine the participation in specialized courses and the involvement in drafting business plans.

PC9 – *Awareness of the entrepreneur profile*. During the years of study, the students discovered the main personality traits of the entrepreneurs and the degree to which they overlap with the individual personality traits.

PC10 – *Entrepreneurial networking*. Among the most effective tools for promoting entrepreneurship among students are indicated the extracurricular actions that approach this topic, respectively, various specific social-media channels.

PC11 – *Personal SWOT analysis*. Students try to make their own assessment of the strengths, weaknesses, opportunities and threats associated with starting a business in a competitive market. Among the business categories to which, with a predilection, the attention of students is focused are start-ups, businesses in the field of promoting products and services. However, we can notice a strong correlation with this main component of two variables that indicate a series of fears regarding the entrepreneurial path, namely the mistrust that they can find solutions to the common problems faced by an entrepreneur in the Romanian economy, respectively, identifying sources of financing.

PC12 – *Fear of failure and need for guidance*. Among the most important fears can be listed: lack of entrepreneurial knowledge, lack of entrepreneurial skills, lack of own experience. Even if the fears indicated by the students are generic, their identification allows the university to investigate more deeply these directions pointed by the students, in order to respond through effective methods and tools to reduce/eliminate these fears.

(IV) The analysis of the main components for the items aimed at the ecological perspective of sustainability, led to the retention, through the Varimax rotation method, of four main components (PC13, PC14, PC15, PC16), which explains a proportion of the variation of the responses of about 60%.

PC13 – *Active involvement in environmental protection activities*. In the perception of students, among the concerns of a sustainable university, from an ecological perspective, it should be found the identification of solutions to reduce pollution and its causes and protect nature by avoiding waste and encouraging sustainable social consumption.

PC14 – *The need for strong state-level institutions in the field of environmental protection*. In the perception of students, the institution that should play the central role in environmental protection is the Government, which has legislative and logistical levers to carry out such activity. Together with the Government, should be positioned, as a whole, Universities, civil organizations and civil society.

PC15 – *Education as a pillar of sustainable development*. Some of the main causes identified by students regarding environmental degradation seem to be the lack of ecological education and carelessness. Involvement in projects such as Greenest University, incorporating the concept of sustainable development in the university curriculum can be remedies for these deficiencies.

PC16 – *Passive involvement*. The analysis of the main components has also led to the identification of a particular category of students, namely those who declare that they are interested in environmental protection, but they are used to just talking about it with family and friends. They are interested in theory, ecological themed information lessons, but who see that the problem environmental degradation has financial causes.

To determine the potential influence of these 16 factors, with a higher precision, *the logistic regression method* was applied to identify a simplified statistical model based on which development strategies can be formulated in the direction of the sustainable university.

3.2. Statistical modelling of the influence of the studied variables

In order to measure the conjugate influence of the studied variables on the students' perception regarding the status of "Ștefan cel Mare" University of Suceava as a sustainable university, respectively, to identify the factors with major/significant influence, we used *the*

logistic regression method. The logistic regression model describes the relationship between a dichotomous nominal variable Y, taking values 1 (success) and 0 (failure), and k factorial variables $x_1, x_2, x_3 \dots x_k$, according to the methodology presented by Agresti (2002) and Green (2003).

We used as dependent variable the statement "*Do you consider the university in which you dream is an entrepreneurial and sustainable university?*", which we measured on a dichotomous scale (0 = No, 1 = Yes) and as the predictive variables we used the scores of the 16 principal components (PC1-PC16) obtained in the previous stage.

The refinement of the factorial variables was performed by testing the significance of the coefficients using the *likelihood ratio test* (LR). The LR test is recommended in the case of step-by-step model construction, verifying whether the variable eliminated from the model is significant, so that the model can be simplified. (Table 2)

Table no. 2: Summary of the refining steps of the factor variables

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	407.915	.144	.195
2	372.129	.229	.310
3	345.191	.288	.389
4	332.201	.315	.424
5	325.717	.328	.442
6	320.001	.339	.457
7	315.393	.348	.469
8	310.930	.356	.480
9	306.576	.364	.491

From the analysis of the Nagelkerke R Square indicator it can be specified that the last model retained (Table 2), manages to explain about 50% of the variation of the dependent variable, and contains 9 predictive variables:

(PC13) Active involvement in environmental protection activities

(PC14) The need for strong state-level institutions in the field of environmental protection

(PC15) Education as a pillar of sustainable development

(PC16) Passive involvement

(PC5) Group (team) activities

(PC6) Personal development

(PC1) Self-improvement

(PC3) The reputation of the program / field of study

(PC4) Two-way student communication – higher education institution.

Table no. 3: Variables contained in the equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 9	PC13	.573	.151	14.490	1	.000	1.774
	PC14	.352	.145	5.905	1	.015	1.422
	PC15	.782	.158	24.375	1	.000	2.186
	PC16	-.325	.151	4.612	1	.032	.722
	PC5	.630	.155	16.449	1	.000	1.878
	PC6	.880	.168	27.577	1	.000	2.412
	PC1	.339	.147	5.301	1	.021	1.404
	PC3	.300	.144	4.341	1	.037	1.350
	PC4	-.309	.153	4.081	1	.043	.734
	Constant	.493	.144	11.757	1	.001	1.637

From the analysis of the coefficients related to the model with predictors it can be observed that we find only variables with a statistically significant influence, which lead to the following logistic regression equation (Ec.1):

(Ec. 1)

$$\log(p/1-p)=0,493*(\text{Constant})+0,573*(\text{PC13})+0,352*(\text{PC14})+0,782*(\text{PC15})-0,325*(\text{PC16})+0,630*(\text{PC5})+0,880*(\text{PC6})+0,339*(\text{PC1})+0,300*(\text{PC3})-0,309*(\text{PC4})$$

Analyzing the values related to Exp (B), from the last column of table no.3, we specify that the increase with a unit of the score of each component, leads to an increase in the chances that the student will identify the host university as a sustainable university with the following values, in each case: – PC13 leads to an increase of 1.7 times; PC14 leads to a 1.4 fold increase; PC15 leads to a 2.2 fold increase; PC16 leads to an increase of 0.7 times; PC5 leads to a 1.8 fold increase; PC6 leads to a 2.4 fold increase; PC1 leads to a 1.4 fold increase; PC3 leads to a 1.3 fold increase; PC4 leads to an increase of 0.7 times.

From the analysis we can select the first three factors, with the most important influence on students' perception, namely:

- PC 15 – *Education as a pillar of sustainable development*
- PC 5 – *Group (team) activities*
- PC 6 – *Personal development.*

3.3. Interpretation of results and validation of hypotheses

Thus, it can be concluded that a better awareness of the causes of environmental degradation at the level of the teaching staff and by carrying out joint projects with students, as part of extracurricular activities, can improve the perception of the students regarding the degree of proximity of the host university to the status of sustainable university.

Applying the analysis of the main components to the 130 variables of the questionnaire used in the research, allowed us to identify a set of influence factors for each of the four research topics.

At the level of the perception of the students from "Ștefan cel Mare" University of Suceava on the educational process the following influence factors could be highlighted:

- *Self-improvement*. It was possible to identify the students' desire to benefit from new opportunities and to formulate new ideas and solutions in the field of study.
- *High level skills*. The students' answers highlighted their orientation towards acquiring communication skills in foreign languages and digital skills.
- *The reputation of the study program*. Students want to follow study programs that have proved useful in the educational market and feel the need to certify their choice through the opinion of third parties from family or colleagues.

• *Bidirectional student communication – higher education institution*. Students want to be involved in the development and implementation of the university development strategy.

From the four identified factors we can conclude that hypothesis 1 of the research is considered to be confirmed.

At the level of students' perception of "Ștefan cel Mare" University of Suceava on extracurricular activities the following influence factors could be highlighted:

- *Group (team) activities*. It was possible to highlight the students' desire to get involved in the life of the academic community through activities that involve teamwork.
- *Personal Development*. On the other hand, compared to teamwork, students are also looking for opportunities to improve their CV in terms of practical experience.

The identification of this set of two factors allows us to conclude that hypothesis 2 of the research can be considered confirmed.

At the level of the perception of the students of "Ștefan cel Mare" University of Suceava on the university activity for promoting the entrepreneurial spirit, the following influence factors could be highlighted:

- *Promoting entrepreneurship through partnerships*. It was possible to highlight the students' request to extend the university's collaboration framework with the private sector, which would ensure their status as a sustainable university and with an entrepreneurial orientation.
- *Mixed learning*. The students' request to combine entrepreneurship courses with specialized internships and involvement in drafting business plans could be found.
- *Awareness of the entrepreneurial profile*. Entrepreneurial education allows students to objectively evaluate their entrepreneurial profile.
- *Entrepreneurial networking*. To promote entrepreneurship, students highlighted the positive impact of using social media channels, respectively, extracurricular actions that promote the creation of a collaborative environment.
- *Personal SWOT analysis*. It was found that students are trying to make their own assessment of the strengths, weaknesses, opportunities and threats associated with starting a business on a competitive market.

• *Fear of failure and need for guidance.* The students have acknowledged a number of fears about starting an entrepreneurial activity, but which allows the university to investigate more deeply these directions indicated by the students, so that they can respond by effective methods and tools to mitigate / eliminate these fears.

The influence factors identified at the level of the perception of the students of "Stefan cel Mare" University in Suceava on the university activity for promoting the entrepreneurial spirit allow the confirmation of hypothesis 3.

At the level of the perception of "Stefan cel Mare" University of Suceava students on the university activity for promoting the ecological education, the following influence factors could be highlighted:

• *Active involvement in environmental protection activities.* The students consider that among the activities carried out by a higher education institution, it is necessary to find solutions to reduce pollution and its causes and to protect nature by avoiding waste and encouraging sustainable social consumption.

• *The need for strong State-level institutions in the field of environmental protection.* In the perception of students it was found that the State, through its institutions, must exercise more responsibility for the protection of the environment.

• *Education as a pillar of sustainable development.* Students consider that one of the main factors that ensure the premises of environmental degradation would be the lack of ecological education. Thus, the involvement of the academic environment should be intensified by incorporating the concept of sustainable development into the university curriculum.

• *Passive involvement.* It was also found the existence of a category of students who are limited to the debate of the ecological problem and who consider that they cannot do more. For this category of students an extension of ecological education is all the more necessary.

The identification of this set of factors allows us to conclude that hypothesis 4 of the research can be considered confirmed.

Confirmation of hypothesis number 5 was possible following the application of the Logistic regression method. This allowed us to filter the factors identified by the principal component analysis method and we were able to select three factors, with the most important influence on the students' perception regarding the status of "Stefan cel Mare" University in Suceava as an entrepreneurial and sustainable university, namely:

- *Education as a pillar of sustainable development,*
- *Group/(team) activities,*
- *Personal Development.*

Conclusions

The university must reconsider its values reference system, must change the organizational culture and be able to activate social responsibility. The social responsibility of universities must be oriented in order to further create a sustainable society. In order for students to

become successful change agents and to create university and societal sustainability, they must have: 1. knowledge about environmental, economic and social issues regarding sustainability – which translates as, *comprehension*; 2. a system of values and a proper conception of care to support and measure the actions of a change agent – namely, *motivation*; 3. abilities needed for the change agent – more exactly, *skills*.

Students have presented many of the attributes required for the role of change agent and must be trained to provide active citizenship in order to sustainably drive and sustain the global economy. Perhaps the most important thing is that universities have the role of turning an idealistic concept, like sustainable development, into reality. Thus, we considered important to identify the main factors of influence (and to have information) regarding the framing of "Ștefan cel Mare" University of Suceava in the pattern of the sustainable university.

By using the factorial analysis applied to the categories of questions delimited in the questionnaire, we identified the most significant factors capable of describing the coordinates of the investigated population and thus we can say that the 5 hypotheses of the performed study are confirmed.

Also, through the regression model we found that an awareness of the causes of environmental degradation at the level of the teaching staff and through the development of joint projects with students, as part of the extracurricular activities, can improve the perception of students regarding the degree of closeness of the "Ștefan cel Mare" University of Suceava students' of the status of a sustainable university and, thus, we can confirm with new arguments the hypotheses of the research.

"Ștefan cel Mare" University of Suceava is defined as "a reference pillar of the integrative approach in the university triangle, public administration and the community made up of economic and social actors" (*University Mission*). Through its expertise and infrastructure, the ability to disseminate knowledge through graduates in the territory, as well as the ability to contribute to regional innovation, the University of Suceava has the potential to become one of the main actors contributing to sustainable development with locally and further impact. This evolution was highlighted by experts in the OECD Report (2019, p.46) "*Supporting Entrepreneurship and Innovation in Higher Education in Romania*" by formulating that "Ștefan cel Mare" University of Suceava is an "*anchor institution for a region, playing a key role in the community and in the surrounding ecosystem, being clearly committed to developing an entrepreneurial agenda*".

In perspective, this research can be extended to other universities, at national and even international level, in order to compare the results obtained depending on the context, namely on macro-economic factors, on decision-makers at the level of academic management as well as on the cultural factors that influence students in the hypostasis of respondents.

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