

# ICT-BASED STUDENT ENTREPRENEURIAL PROJECTS ANALYSIS OF SYSTEMATIC SUPPORT AND EVALUATION OF STUDENT INTEREST

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## ABSTRACT

In today's modern world, more than ever before, stu-  
dents are faced with entrepreneurship based on the use  
of information and communication technology (ICT)  
as a reasonable and justified career choice. Whether  
their career choice would be successful or not depends  
a lot on the level of sys-tem support through entrepre-  
neurial ecosystem during their education.

The main objective of this paper is to present the cur-  
rent assessment, indicate the problems and possible so-  
lutions regarding the entrepreneurial infrastructure,  
culture and potential of higher education institutions in  
Banja Luka, Bosnia and Herzegovina. To achieve this,  
we have researched the level of the system support to  
students for development and launch of their ICT  
based start-ups during and after their university educa-  
tion respecting different educational profiles and de-  
mographic characteristics.

The research covers the sample of 436 students from  
seven higher education institutions in Banja Luka at  
their bachelor studies and includes focus groups, sur-  
vey, descriptive and inferential statistical methods.

We have found significant discrepancy between uni-  
versity ICT programs and infrastructure and student

needs. For instance, a quite large number of students interested in ICT industry attended some kind of informal education from this domain and at the same time they were unaware that those and similar programs were freely available at their universities. In this paper we have identified those and similar gaps and compared our research results with similar results in other countries.

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## **1. INTRODUCTION**

Information and communication technologies (ICT in further text) are the basis of economic development and specific entrepreneurial projects, especially for students who usually have higher level of information literacy compared to older generations.

The use of ICT for global economic growth has advanced to the next level of development which requires new technologies, new approaches to innovation, new integrations and especially new approach to the problem of the world poverty. Change phase of ICT to international development (ICT4D 1.0. towards ICT4D 2.0) is an opportunity for professionals in ICT field which offers a new market for ICT service providers and new fresh ideas for ICT entrepreneurs.

New challenges for traditional approach to work and embrace the need for new expert knowledge are forcing economy into a new world. Compared to the first phase, focused on the offer which creates new needs, new phase 2.0 changes the focus to active producers and innovators of demand (Heeks, 2008).

ICT is the main engine of economic development and social changes in the modern world. In many countries there is a need for economic and social development in order to justify investments in the reform of education and the introduction of ICT to education. Connection between development goals and ICT reforms of education are usually more rhetoric than pragmatic. There is a need to identify factors which influence economic growth, based on connections be-

tween policies and ICT education systems. Additionally, there is a need for coordination of the program of different shareholders such as public bodies, organizations and businesses (Kozma, 2005) in order to maximize positive effects of ICT reforms, especially in education sector, on economic and social development.

## 2. LITERATURE REVIEW

The importance of education, not only formal but also non-formal, as well as extracurricular activities during education, play an important role in the success of entrepreneurship projects. Therefore, some authors say that even 30 percent of current entrepreneurs believe that university education was crucial in the success of their entrepreneurial projects (Ghina, Simatupang, & Gustomo, 2017). Additionally, some authors state that it is equally important for success to have present and functional systematic support in development of entrepreneurial projects, internally at higher education institutions including physical space and resources, structural ability of the institution, regulated processes and the existence of entrepreneurial culture (Piperopoulos, 2012). Bing and Qin in their analysis of systematic support for student entrepreneurial projects, classify types of support into several segments: connection with government entrepreneurial support, targeted research connected to government policies in domain of entrepreneurial support, research of the above-mentioned support of higher education institutions for student entrepreneurial project and general society support for student entrepreneurship (Bing & Qin, 2017).

In their research about development of student entrepreneurial eco-system as a new challenge for universities, Matt and Schaeffer examine advantages and disadvantages of above-mentioned systems in order to identify key success factors (Matt & Schaeffer, 2018).

Additionally, some authors state that one of the key social contributions of universities is development of entrepreneurial projects but not only through economic exploration of academic knowledge but also through counseling, conferences, education and creation of new entrepreneurial projects (Stephan, 2009). The same author states that integration of start-ups in academic entrepreneurship leads to broader understanding of entrepreneurship and those start-ups do not

need to be high-tech and can be non-technological, social sciences based and promote different values of socially responsible economy.

In literature, as key stakeholders and success-factors of entrepreneurial projects, several groups are identified: students, alumni, academic staff, university incubator, accelerators, business sector and companies, co-working spaces, institutions, public support systems and local stakeholders who develops local policies of entrepreneurship development (Wright, Siegel, & Musatr, 2017).

### **3. METHODOLOGY**

A survey data was collected via Google form and distributed online to public and private higher education institutions in Banja Luka. The questionnaire creating process had two phases: a draft phase and a final phase which included evaluation of the survey via focus groups of students and a project supervisor. Five students in the first, second and third year of bachelor studies were chosen to form the focus group. After the focus group suggestions and proposals, the number of questions in total decreased and some questions were modified and at some places the question type was changed in order to obtain more suitable data for the analyses phase. The final version of the questionnaire was distributed via Google form and completed online by the respondents. The survey has a few segments where each segment has a different aim and some segments are mutually exclusive and dependent on students' answers.

- The first part of the survey has a question related to general and demographic features of the respondents.
- The first part of the survey has questions related to general and demographic features of respondents in order to deeply describe our sample and its structure.
- The second segment of the survey is dedicated to entrepreneurial interest of respondents, i.e. their relationship with a family company. The main goal was to split the sample into two groups: the students who have entrepreneurial environment during growing up and the ones who do not have. We want to check the hypothesis that the students who grow up in the entrepreneurial families are more interested in entrepreneurship than others.

- In the next, third part of the questionnaire, we set up the questions about students' activities and performances during university education in order to identify active and passive students.
- The fourth part of the questionnaire was a place for checking the level of interest in ICT domain among respondents.
- The fifth and sixth part of the survey had an aim to find out the level of interest among students for starting up their own company and their opinion about the level of systematic support as major instrument for developing student ICT companies during university education and after. We search respondents' opinions about systematic support level at universities and local communities.

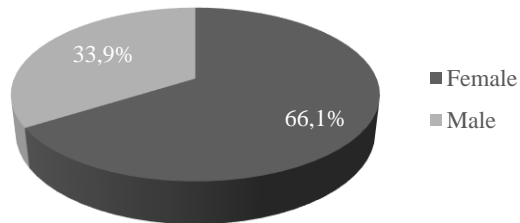
The questionnaire has 27 different types of questions like open answer questions, multi answer questions and questions which ask respondents for their level of (dis)agreement with a statement or a question. The first question type is mutually exclusive since the respondent can chose only one among provided answers. The multi answer type of questions are provided because we wanted to ensure more alternative answers for the respondents and, in order to avoid the incompleteness, it has been added the file "other" for open form answers. The closed type of questions are Likert 5 scale (dis)agreement questions and those questions are mainly in the fifth segment of the questionnaire (Likert, 1932) where we collect data related to student interest in ICT domain. In our survey last questions were open answer type of questions. Here we used qualitative technique for data analysis (coding by key words first and using tools for qualitative analysis). The filter type of questions was provided in order to direct the respondents to different parts of the survey.

After data collection, data were analyzed in MS Office Excel and using the SPSS software in the domain of crosstabs and a correlation. In data analysis process we used descriptive and inferential statistics methods, one and two variable data analysis.

Confidence interval used in SPSS is 95%, therefore sample data research results are at least 95% applicable to all population. Additionally, for all crosstab correlation tables, chi square test of independence is done in order to identify statistically important associations.

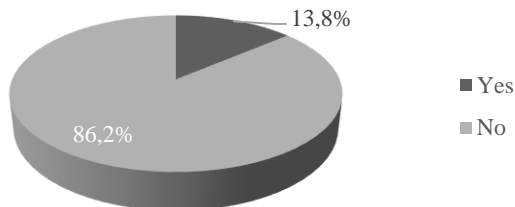
#### 4. RESULTS

The survey was distributed and completed by 436 students at seven different higher education institutions in Banja Luka from different study programs: economics and business informatics, the security science, psychology, design and software engineering etc. The gender structure of the sample is showed in Figure 1, where we can see that more than one third are male students and 66.1 percent are female students.



**Figure 1.** Gender of the sample. Source: Authors' calculations using gathered data

The significant percentage of students, 13.8 percent, come from the entrepreneurial families where one or more of the family members are entrepreneurs and this is the target group of samples for the next part of the analysis in this research. The economic sector structure of those entrepreneurs is as follow: 36.7 percent belong to the trade sector, 18.3 percent to the service sector, 15 percent are manufactures, 11.7 percent are in the construction sector, and 8.3 percent are in the finance sector while all other sectors are represented with 5 percent or less. Only 1.7 percent of students come from the families who work in the information and communication technology sector.

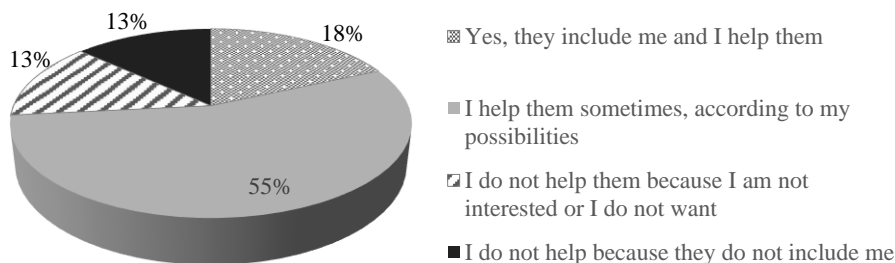


**Figure 2.** Percentage of students who come from entrepreneurial families – answers of those who have one of partners of family members who are entrepreneurs. Source: Authors' calculations using gathered data

The most frequent age of the students was nineteen and average age among the sample is twenty. Respondents were between 18 and 27 years old. Respondents were mostly from the bachelor level of education.

### ***Family business partaking***

Almost three quarters of respondents (73.3 percent) who have one of partners of family members who are entrepreneurs state that they are participating in the family business regularly or from time to time, while 13.3 percent of respondents are not included in the family business because students are not willing to take part in it, or the family members do not include them.



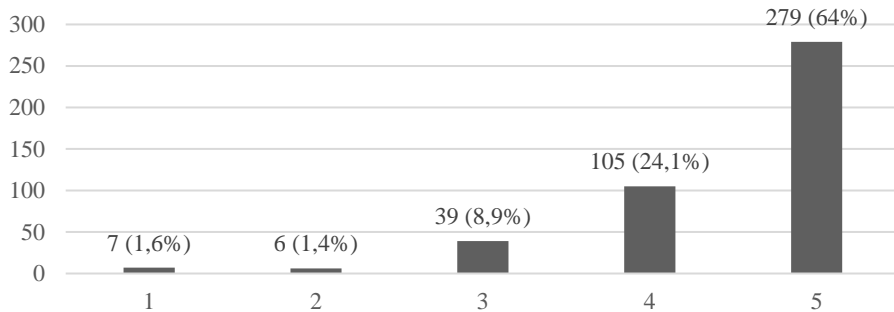
**Figure 3.** Percentage of students who answered if parents or family members include them in the family business. Source: Authors’ calculations using gathered data

On the contrary, 25 percent of students are very interested in taking part in the family business after they finish their education and 11.7 percent of them are interested to the certain extent. Surprisingly, a high number of respondents, 35 percent are not interested or are very little interested in taking part in the family business after finishing their studies.

### ***Internships and extracurricular activities during education***

Exactly 88.1 percent of students are interested in gaining internships and other forms of practical education during their education, but only 7.6 percentage of them really had the internship experience. This information should be considered with caution since at some study programs the student internship is compulsory

part of education in the last year of bachelor studies. This is one possible explanation of low number of students who gained internship experience.



**Figure 4.** Percentage of students interested in having internships and other forms of practical education during university education (very interested 5, not interested 1).

Source: Authors' calculations using gathered data

Every second respondent has some kind of extra-curriculum or free time activities during their education (such as courses, trainings, workshops etc.)

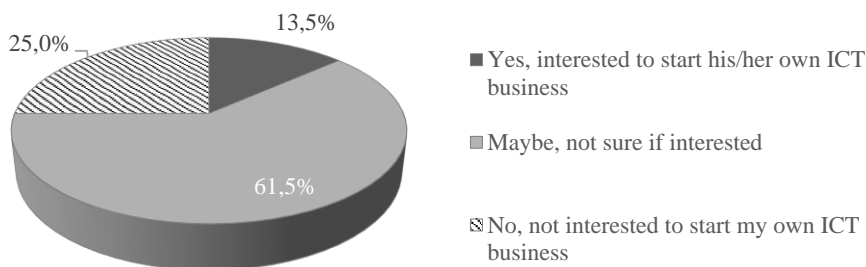
### *Students' self-perception after graduation*

More than a half of respondents (51.3 percent) consider themselves as full time workers in their branches, and almost one quarter of them (24.9 percent) plan to continue education after bachelor studies. More than 37 percent of students have a plan to leave the country in terms of work or to continue the education in a foreign country. Every fourth student thinks that he or she will start their own business as the major source of living or as the second source of finance income. This question was multiple answers type.

### *Starting the business based on ICT*

About 13.5 percent of respondents are interested in starting their own ICT based business and for the 61.5 percent of them starting their own ICT based business is one of the possible options. One quarter of respondents claim that they are not interested in starting the ICT based business.





**Figure 5.** Interest of students in starting their own ICT business

Source: Authors' calculations using gathered data

As the major barriers to starting their own business respondents find the finance problems (63.9 percent), lack of adequate technical knowledge (47.3 percent), lack of confidence regarding the compliance with all procedures and obligations (31.1 percent), lack of confidence in themselves (19.4 percent), not knowing the procedures of setting up the company (19.4 percent). This question was also a multi answer type.

For 28.8 percent of respondents, the major obstacle to starting the company are external conditions like governments institutions, universities etc. because those institutions do not provide enough systematic support to development of entrepreneurial companies, which confirms the assumption for necessity of higher systematic support to the student entrepreneurial projects.

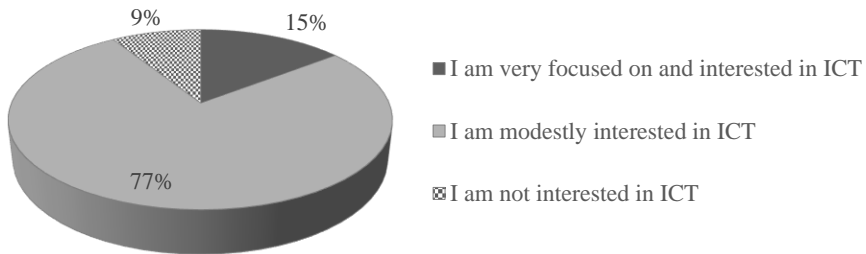
### ***ICT domain attractiveness***

One fifth of respondents (18.2 percent) claim they are very interested in attending classes related to ICT, and additional 25.2 percent are interested, while 40.6 percent of students have a neutral opinion on attending courses related to ICT domain. Around 16 percent are not at all or have a little of interest in attending mentioned courses.

A bit more than one quarter of all respondents actively look for education in ICT domain beside the formal university courses (free or informal courses, seminars, lectures, specialized web pages etc.), while more than 40 percent of respondents

are not interested in extending their knowledge in ICT domain which is provided by their university.

On the other hand, more than three quarters of respondents (76.5 percent) are moderately focused while they read and listen about ICT topics, and 14.6 percent have high attention for ICT topics. Only 9 percent of students claim they are not interested in ICT domain topics and they do not read or listen anything related to.



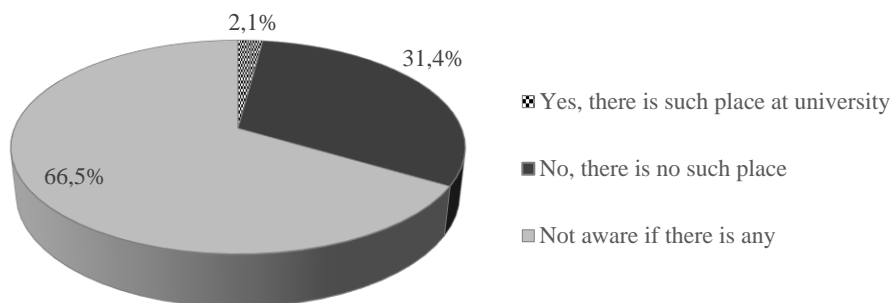
**Figure 6.** Interest in reading and listening about ICT

Source: Authors' calculations using gathered data

### ***Systematic support to the student ICT business development***

Only 11 percent of respondents stated they know there is student co-working space at their higher education institution, and only 2.1 percent of them know there is a business incubator for student start-up business development.

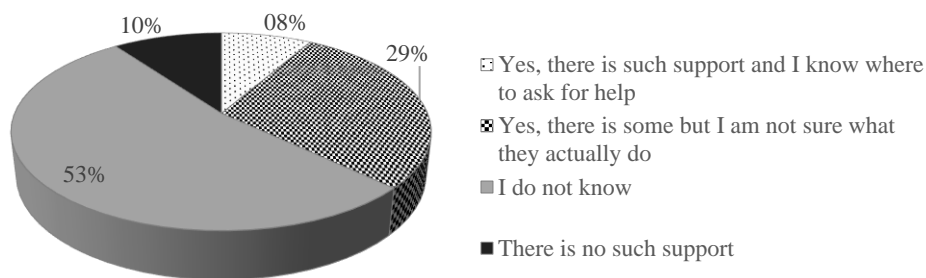
Surprisingly, only 8.9 percent of respondents claim that their higher education institution has some of the entrepreneurial study programs, and only 5.3 percent of respondents know for sure about online or some other kind of support for starting up their business at their home institution even at those universities with entrepreneurial courses and study programs.



**Figure 7.** Presence of incubators for student business at the university

Source: Authors' calculations using gathered data

At the same time the respondents are not familiar with the existence and work of institutions, persons or organizations from local communities which provide systematic support to the student entrepreneurial ventures. Only 8.3 percent of respondents are familiar with the domain of services they need and students know where and who they may ask for assistance. There are 28.7 percent of students which are also informed about the assistant for the mentioned services but they are not sure what they provide to students. In contrast, more than a half of respondents do not know about the existence of student support services and 10 percent claim that such services do not exist at their universities.



**Figure 8.** Systematic support for student ICT business in community: percentage of answers if there is an institution, person or organization in the local community where students can ask for help in the development of ICT entrepreneurial businesses

Source: Authors' calculations using gathered data

***Interconnection among different segments of the research***

Significantly higher number of male respondents declared they are interested in starting ICT business (21.6 percent of men compared to only 9.4 percent of female respondents).

**Table 1.** Respondents who are interested in starting their own ICT business venture by gender

	Are you interested in starting your own ICT based business?		
	Yes	Maybe / Not sure	No
Male	21.6%	56.8%	21.6%
Female	9.4%	63.9%	26.7%

Source: Authors’ calculations using gathered data

The respondents who come from entrepreneurial families are not willing to start ICT company (35 percent) compared to those whose families do not have their own company (23.4 percent). Reasons may be some of the following:

- Respondents want to participate and continue developing the existing family business rather than starting their own,
- Their company is not from ICT domain and they are not interested in another domain,
- Challenges and struggling as negative experience in family business may be demotivating factor for starting their own business.

**Table 2.** Link between entrepreneurial families and motivation to start an ICT company

Do you have one of partners of family members who is an entrepreneur?	Are you interested in starting business in ICT domain?		
	Yes	Maybe / Not sure	No
Yes	15.0%	50.0%	35.0%
No	13.3%	63.3%	23.4%

Source: Authors’ calculations using gathered data

Nevertheless, we found an unusual link between a group interested in attending the internship during education and those who are interested in starting their own business. The question was defined through Likert scale of (dis)agreement. For

instance, the groups which showed the highest interest in starting the ICT company were those who had the highest and the lowest level of disagreement with the question if they are interested in having student internship during their university education. As is showed in Table 3 there are 16.8 percent of the respondents who are very interested in gaining internship (at the same time they are very interested in starting ICT company) and 14.3 percent of those who are not interested in having internship but they are interested in starting ICT company.

**Table 3.** Link between internship during university education and starting up ICT company

Are you interested in obtaining internship during university education?	Are you interested in starting your own ICT company?		
	Yes	Maybe / Not sure	No
No	14.3%	28.6%	57.1%
A little bit		33.3%	66.7%
I do not have opinion	2.6%	76.9%	20.5%
Interested	9.5%	65.7%	24.8%
Very interested	16.8%	59.1%	24.0%

Source: Authors’ calculations using gathered data

We found a direct link between interest in starting ICT company and interest in ICT topics, as it was expected (Table 4).

**Table 4.** Relationship between interest in ICT topics and starting ICT company

I search for courses, web sources, unofficial education, conferences, lectures related to ICT topics that are not provided at my university.	Are you interested in starting your own ICT company?	
	Yes	Maybe / Not sure
No	5.2%	94.8%
A little bit / sometimes	9.0%	91.0%
I do not have opinion	19.4%	80.6%
Moderately agree	30.9%	69.1%
I completely agree	40.0%	60.0%

Source: Authors’ calculations using gathered data

An important factor for starting a company is the existence of an adequate entrepreneurial program at the university. Our data confirm this, we found there are 50 percent more of those students who are interested in starting their own company if they have entrepreneurial program at higher education institution compared with students who do not have those programs (26.3 percent compared

with 13.5 percent). We found similar data comparing the universities which have accelerator or student business incubator and those which do not have. The respondents who come from universities that have an accelerator are more interested in starting their own company – 22.2 percent, compared with those who are not interested in starting the company and at the same time their university does not have an accelerator.

**Table 5.** Relationship between entrepreneurial study program and starting their own ICT company

Do you have entrepreneurial study program at your university?	Are you interested in starting your own ICT company?		
	Yes	Maybe /Not sure	No
Yes	26.3%	65.8%	7.9%
No	13.5%	57.7%	28.8%
I do not know	11.8%	62.1%	26.1%

**Table 6.** Relationship between the existence of business incubator and interest in starting their own ICT company

Do you have student business incubator at your university?	Are you interested in starting your own ICT company?		
	Yes	Maybe / Not sure	No
Yes	22.2%	77.8%	
No	14.6%	57.7%	27.7%
I do not know	12.8%	62.8%	24.5%

## 5. DISCUSSION AND CONCLUSION

There are several facts that can be concluded based on this research. There is a specific level of student interest in becoming an entrepreneur, especially if that can be an option of “side-job”. There is a significant level of research participants who recognize ICT sector as a sector with high potential for development of entrepreneurial projects. However, students who are also potential entrepreneurs are usually not informed or unaware if there is adequate eco-system at education institutions or in the local community for development of entrepreneurial projects, especially those based on application of ICT because it requires specific infrastructure and agility in project development.

Interest for development of ICT based entrepreneurial projects is significantly higher among male students who come from higher education institutions which have a support system for student entrepreneurial projects such as entrepreneurship programs, student incubators, co-working spaces and similar. However, the majority of students can not recognize the systematic support or they are not aware if there is such at their higher education institutions. Additionally, having in mind the importance of presence of such systematic support, especially for ICT based projects, it is alarming how low level of such infrastructure is present at local higher education institutions.

This paper provides the ground for further analysis of systematic support, especially for ICT entrepreneurship, through further diversification of the sample and area of research and also through further specification and identification of specific elements and characteristics of university entrepreneurial eco-system as a factor in development of student entrepreneurial projects based on ICT application.

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## ИКТ СТУДЕНТСКИ ПРЕДУЗЕТНИЧКИ ПРОЈЕКТИ: АНАЛИЗА СИСТЕМСКЕ ПОДРШКЕ И ПРОЦЈЕНА ИНТЕРЕСА СТУДЕНАТА

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### САЖЕТАК

У савременом свијету, више него икада прије, студенти се окрећу предузетништву заснованом на употреби информационо комуникационих технологија (ИКТ надаље) као обећавајућем каријерном избору. Успјех у помешном каријерном избору значајно зависи од системске подршке кроз предузетнички еко-систем током њиховог образовног процеса.

Основни циљ овог рада је оцјена тренутног стања, указивање на постојеће проблеме и могућа рјешења за изазове предузетничке инфраструктуре, културе и потенцијала у високом образовању у Бањалуци и Босни и Херцеговини. Кроз рад је дат преглед истраживања степена подршке студентима у развоју предузетничких бизниса заснованих на ИКТ-у током и након универзитетског образовања, уз уважавање њихових различитих образовних профила и демографских карактеристика.



Истраживање обухвата узорак од 436 студената са седам високошколских установа у Бањалуци, са основних студија. Приликом прикупљања и анализе података коришћене су фокус групе, анкетање и дескриптивна статистика.

Уочили смо значајно неслагање између универзитетских ИКТ програма и универзитетске инфраструктуре са потребама студената. Примјера ради, значајан број студената заинтересованих за ИКТ индустрију је присуствовао некој неформалној обуци повезаној са овом облашћу, а у исто вријеме нису били упознати са постојањем сличних програма на својим универзитетима и то обично бесплатно.

Кроз овај рад настојимо идентификовати такве и сличне недостатке и упоредити их са сличним истраживањима у другим земљама.

**Кључне ријечи:** студент, ИКТ индустрија, универзитет, анализа подршке система, предузетништво