



## QUALITY PARAMETERS ON HIGHER EDUCATION PHD PROGRAM IN ROMANIA

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### **ABSTRACT**

This More and more universities are striving to provide competitive education programs to help graduates integrate into market areas. In this fight, universities need to have strong communication and support in the business world. The purpose of this article is to identify the main factors that would improve the quality of the doctoral program and facilitate the integration of students into the labor market in Romania. A questionnaire was applied to PhD students from the universities in Bucharest, and the data collected were interpreted.

The linear regression model developed shows that the library facilities, school infrastructure, access to Doctoral Theses, dialog between academia and students, doctoral coordinator and committee proficiency, staff attitude and multiple way of communication are some important factors that have positive influence over the quality of the higher education in the PhD program and the students' integration on labor market in Romania.

The open questions of survey revealed new interesting suggestion for improving PhD programs in Romania.

**Keywords:** quality in higher education, PhD program, Romania, Virtual Reality, Augmented Reality



## 1. INTRODUCTION

Education is for all countries of the world one of the most important services in the category of those financed from the budget. Therefore, universities should anticipate changes in the labor market and adapt their study programs to these changes (MANEA, 2015), because education leading to development means quality education. With the transition to Bologna (2005), doctoral studies have become more popular and more common at national level. Worldwide, the number of doctoral students and the number of doctoral degree holders has increased significantly (ANDRES et al., 2015).

## 2. LITERATURE REVIEW

In Romania the number of students enrolled in PhD program is decreasing every year as National Institute of Statistics shows. Data is available at: <http://statistici.insse.ro/shop/?lang=ro&page=register>. Thus, the higher education institutions have to take the necessary measures to reduce the dropout rate. They have to increase the quality of educational program and the degree of satisfaction for PhD graduates, offering specific skills and increasing the opportunity to get a higher decision position in the field of work.

The specialty literature shows that a PhD program should be organized with sufficient structure and resources for PhD students, upon completion of their PhD programs, to have specific skills and knowledge in the following areas: in-depth knowledge of work as a profession and discipline, research and scholarship, and teaching (HARRINGTON et al, 2013). Quality PhD programs should build expertise and skills in the following areas (HARRINGTON et al, 2013).

1. Know the state-of-the-art practices/interventions within the student's field of inquiry.
2. Critically evaluate and review published work in the student's area of expertise
3. Identify the strengths and limitations of their own research.
4. Conduct research that is guided by theory.
5. Understand both the technical aspects and conceptual underpinnings of a broad range of methodological and statistical techniques.

Several authors (ASSBRING; NUUR, 2017; GUSTAVSSON; NUUR ET SÖDERLIND, 2016) have shown that doctoral training is a powerful tool in addressing skills gaps in industry and identified successful industry and doctoral factors. Also, (ARMNIO 2003) showed that participatory behavior, practical guidance, conscientiousness and courtesy can help improve the quality of higher education in the quality of the teaching-learning process. The curriculum of higher education has to be improved and in compliance with new technological facilities for teaching (JESA, 2017).

Nowadays the national policy has to create conditions to improve the quality of teaching, learning and assessment, and promote transparency in the management of higher education (VARUGHESE, 2017).

In Romania, the quality in doctoral programs is evaluated by Romanian Agency for Quality Assurance in Higher Education (ARACIS). The periodic evaluation of university study programs, study fields, doctoral schools or higher education institutions is carried out at intervals of no more than five years and has as a general objective: certification that study programs, study fields, schools doctoral or accredited higher education institutions meet in further standards and performance indicators specific to the values minimum accreditation (ARACIS1, 2018).

In Romania the evaluation results are set on developing research skills, improving the link between learning and research, new valuable contributions to the research field, performing preparation for academic career and the final evaluation of the PhD thesis.

The doctoral theses have to addresses topics of interest, use appropriate and recognized scientific methods and publish the research results.

In Romania were opened many private institutions after the political revolution from 1989. Some of them achieved very high quotations, regarding the quality of educational process. Our study is realized on public institutions because there are 53 public institutions that organize doctoral programs in 394 different fields of study and only 4 private institutions that has this accreditation (ARACIS2, 2018).

Hierarchy of IOSUD (Organizational Institution of University Studies) according to the number of doctoral schools in the academic year 2017-2018, shows

that 11 institutions have more than 7 doctoral schools in different fields. The other 42 institutions have 1 or 2 doctoral schools. In the top of this hierarchy there are:

1. Univ Babes-Bolyai, Cluj Napoca with 28 doctoral schools in 31 PhDs fields of studies and 413 doctoral coordinators,
2. Univ. București, with 21 doctoral schools in 19 PhDs fields of studies and 463 doctoral coordinators,
3. Univ. Politehnica București, with 14 doctoral schools in 14 PhDs fields of studies and 321 doctoral coordinators.

The most frequent PhD fields of studies in IOSUD in the academic year 2017-2018 were engineering (mechanical, industrial and electrical), philosophy, history, medicine, math, law, chemistry, economy.

As a synthesis, the organization of the doctoral education in Romania favored it important diversification at doctoral level that could bring important benefits for the future profession and for the Romanian economy. The increasing number of doctoral programs and their diversity make very difficult their quality evaluation by ARACIS. Having in mind the extension and importance of PhD programs in Romania a further analysis regarding the quality of doctoral program from the student point of view is done below. The PhD student offer a complete panorama regarding the usefulness of PhD studies, they offer more than statistics, they even suggest possible solutions for better interaction between academia and business field.

### **3. METHOD**

This research is a descriptive research on a sample of 251 respondents. The instrument used was the questionnaire, consisting of dichotomic, trihothotic, multithoric and open questions. The study is based on an online survey distributed in public universities in Bucharest. The students derived from different fields of study.

Based on literature review we discovered the high-quality education in the PhD program. Our study, based on the students' perceptions reveals some important factors that have a positive influence over students' successful integration on labor market, attending a doctoral program, such as (MANEA, 2015):

1. Library facilities services, program
2. Infrastructure offered (research equipment, software)

3. Access to Doctoral Theses and scientific databases (such as web of science, Scopus, EBSCO, ProQuest, etc)
4. During the lecture there is a dialogue with the students about the taught
5. Scientific proficiency of doctoral coordinator: teachers can answer any questions about topics discussed at the course / scientific seminar
6. Scientific proficiency of the doctoral committee: good suggestions and direction of research in order to improve the theses content
7. Staff (secretariat) attitudes towards students
8. Multiple ways to communicate with the students (notice, phone, e-mail, dedicated forum, videoconferences, virtual reality, etc).

In the first step of the research a cluster based on nearest neighborhood, finding some commune characteristics, such as the importance of communication between academia and PhD students and the academia proficiency.

In the second step of the research a linear regression has been done, starting from null hypothesis that the quality of the higher education in the PhD program and the students' integration on labor market is not influenced by the library facilities, school infrastructure, access to Doctoral Theses, dialog between academia and students, doctoral coordinator and committee proficiency, staff attitude and multiple way of communication.

#### **4. RESULTS**

Most of the students (76.5%), who were investigated have chosen a budget funding, considering very difficult to pay the taxes. They would prefer to pass more difficult exams and face a bigger competition, but not to pay the tax. For most of them (86%) the way of admission to the doctoral program were admitted through contest (grid test, synthesis) and the others through interview, essay, etc.

Most of the students have a Ph.D. fundamental in Social sciences (legal sciences, sociology, political and administrative sciences, military sciences, information and public order, economic sciences and business management, psychology and behavioral sciences) -61% and Mathematics and Natural Sciences (Mathematics, Informatics, Physics, Chemistry, Earth Sciences) -19%. From Engineering sciences (civil engineering and management, materials engineering,

chemical engineering, medical engineering, materials science and nanomaterials, electrical engineering, power engineering, electronics) comes 14% and 6% from Humanities and arts (philology, philosophy, history and cultural studies, theology, architecture and urbanism, visual arts, performing arts) Figure1.

The Romanian society is characterized by a high degree of polarization. Most of the PhD (84,3%) come from the urban environment, where the school network and facilities are very extensive and the access to information (libraries, book shops, access of internet) is well developed.

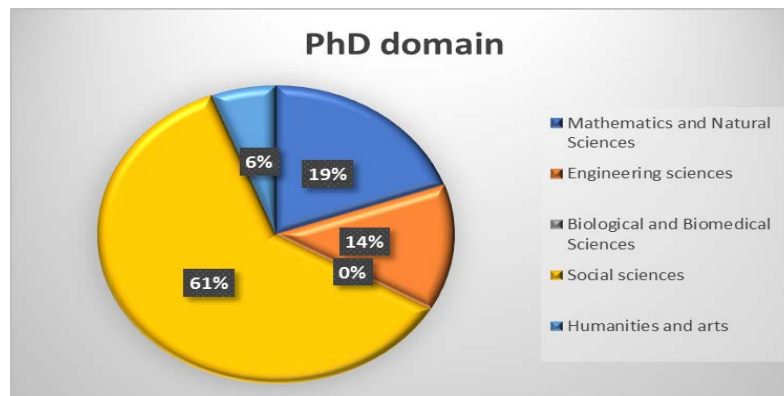


Figure 1: Main PhD domain attended by the students in Romania.

Most of the students have a bachelor's degree and master's degree in economics (more than 50%), technic (around 20%), humanities (around 6%) and exact sciences (around 10%).

Most of them (37%) are working in education, research (14%), marketing and IT (6%), consultancy (4%), tourism and other fields (31%). The weight is in favor of education and scientific research where higher studies are required, meaning that they choose these studies as to be able to obtain a higher position in the field they work. (Figure 2). Most of them have a medium salary of 3000-4500 lei (Figure 3).

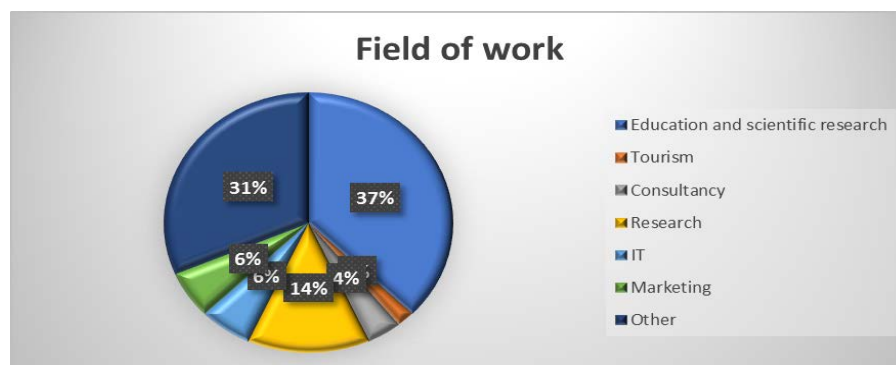


Figure 2: The fields in which PhD students work in present.

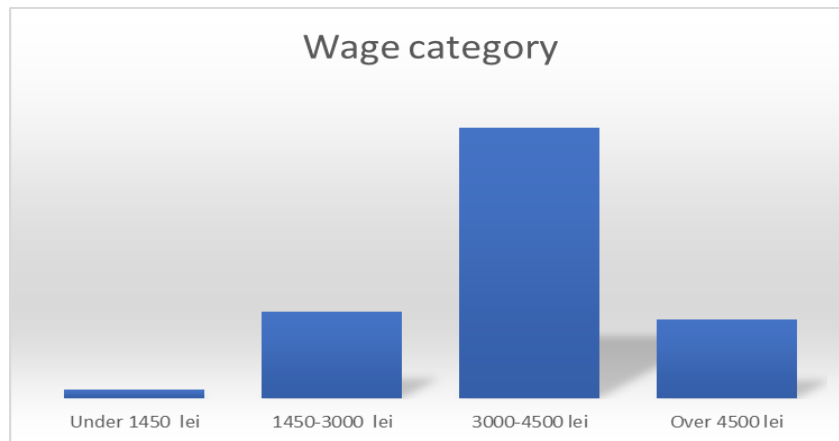


Figure 3: The wages of PhD students.

Most of them (41%) are very young, with ages between 24-28 years old. The rest of the 60% is split almost equally (20%) between other 3 categories of ages (Figure 4).

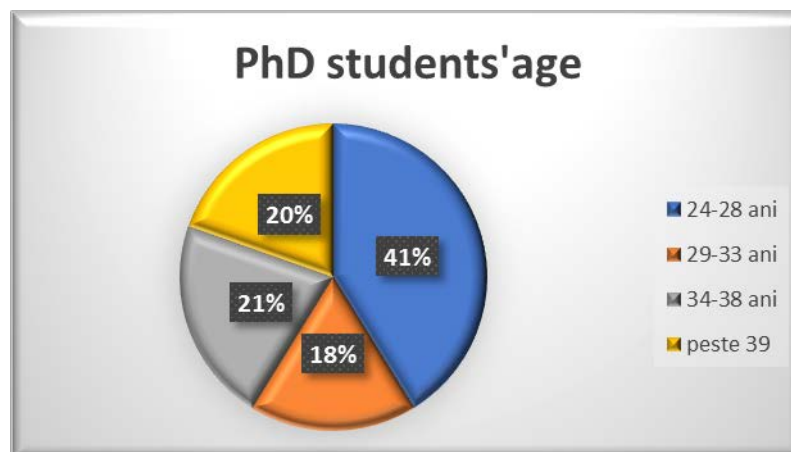


Figure 4. PhD students' age.

The cluster analysis shows that integration into the labor market of the students depends on 2 major factors PhD domain of study, very performant academia (teachers) in their field and a good communication between academia and PhD students. In the figure 5 it may be observed 2 clusters in Economic sciences with very high level of communication and proficiency of the academia (5 - very satisfied, 4 - satisfied). It may be observed other 4 cluster in the field of Sciences and Technical with the same characteristics. Basically, most of the students are content with the doctoral program offer and consider that it helps them to work in the field of study. There are also 2 cluster in the Economic field where the Ph. students weren't satisfied of the doctoral program. (Figure 5)

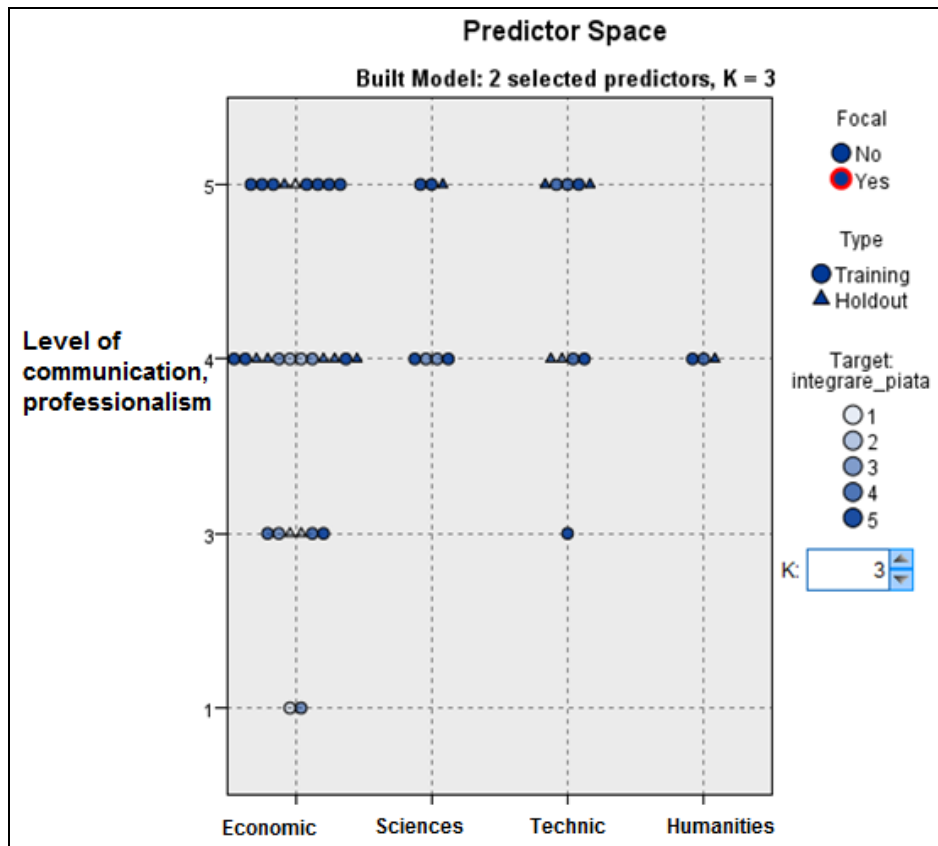


Figure 5: Cluster of integration into the labor market of the PhD students.

In the second step of the research we find out some factors that have an important influence over the quality of higher education and the integration into the labor market (QHEILM).

The data analyzed was the base of a linear regression model. The regression equation is:

$$\text{QHEILM} = 0.08\text{Library} + 0.12\text{Infrastruture} - 0.24\text{Theses} + 0.21\text{Dialog} + 0.07\text{Coordonator\_proficiency} + 0.07\text{Committee\_proficiency} + 0.48\text{Staff} + 0.39\text{Multiple\_communication} - 0.83$$

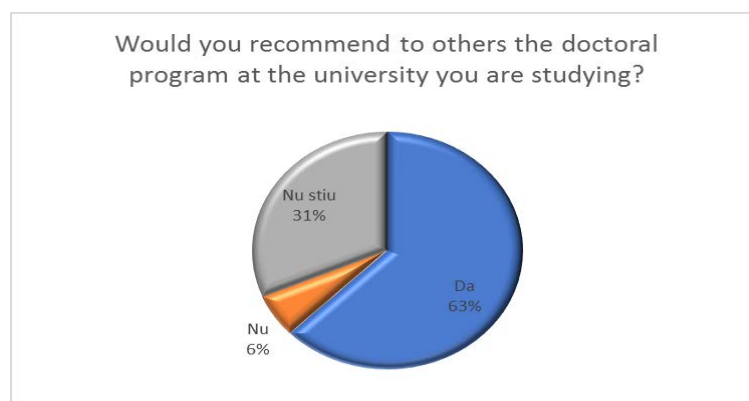


Figure 6: The % of students that are contented by the doctoral program.



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The R<sup>2</sup> coefficient of this model is 0.91, indicates that 91% of the variable QHEILM variance is determined by the variation of causal variables and 9% of this influence cannot be explained by the model. As R<sup>2</sup> takes values closer to 1, the regression model better adjusts the data in the sample. In this case, the value of 0.91 demonstrates that the model is good, but there are other factors that has to be included in the model (Table 1).

Also, the adjusted value of R<sup>2</sup> (0.87) is close to the value of R<sup>2</sup>, which proves that the influence of the independent variables (from table 3) are significant to explain variance of the dependent variable QHEILM.

Since the Adjusted R<sup>2</sup> value is close to the value of R<sup>2</sup>, this allows the extension of the proposed regression model to the entire population surveyed. In this case, the variance of the dependent variable decreases with the difference between the two coefficients (0.91 - 0.87 = 0.04). This difference can be seen to be below 1%.

Table 1: Linear regression model validity

<i>Regression Statistics</i>	
Multiple R	0.935601
R Square	0.875349
Adjusted R Square	0.851605
Standard Error	0.469137
Observations	251

Source: Own research

Table 2: Anova model significance

ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	8	64.9131	8.114138	36.86744	1.42E-16
Residual	42	9.243759	0.22009		
Total	50	74.15686			

Source: Own research



Table 3: Coefficients of the regression model

<i>Model independent variables</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>
Intercept	-0.83	0.48	-1.73	0.09	-1.80	0.14
Library	0.08	0.11	0.77	0.45	-0.13	0.29
Infrastructure	0.12	0.08	1.49	0.14	-0.04	0.28
Access to Doctoral Theses	-0.24	0.11	-2.22	0.03	-0.47	-0.02
Dialogue with the students on taught course	0.21	0.11	1.83	0.07	-0.02	0.43
Scientific proficiency of doctoral coordinator	0.07	0.12	0.58	0.57	-0.18	0.32
Scientific proficiency of the doctoral committee	0.07	0.13	0.50	0.62	-0.20	0.34
Staff attitudes	0.48	0.11	4.49	0.00	0.27	0.70
Multiple ways to communicate with the students	0.39	0.11	3.57	0.00	0.17	0.62

Source: Own research

The F test for each variable generated validates the model and contributes to the predictive power of regression. The Prob the significance threshold of the variables should be less or around 0.05. In our case Significance F (1.42E-16) is lower 0.01.

In the table 3 are evaluated the factors that influence the quality of higher education.

Attention must be paid to the estimated coefficients of regression equation (Table. 3).

For most of the variables in table 3 the significance threshold is probability (P-value) is lower or around 0.05, meaning that with a high probability and a small standard error (under 0.5), the coefficients are well estimated.

In conclusion, the alternative hypothesis is accepted. It stands that the quality of quality of higher education and the integration into the labor market is influenced by all 8 factors mentioned above.

In our analysis we found out that bachelor's degree and master degree from all fields are a good base that can support doctoral studies. The doctoral program gained in different fields are important for labor market: there are available jobs on the market for graduates from different fields.

Most of the students (63%) would recommend the doctoral program, but we think that further improvement has to be done in order that students to be content of the doctoral program, because 31% of them are not very pleased with their achievements during the years of study.

Moreover, most of the PhD students are working during the day and find it very difficult to reach all the classes. This survey and other literature review shows that a balanced working-education life it is essential for higher quality studies. “A model of combined distance lectures and face-to-face meetings with the teacher” (VASILEVSKA, 2017) seems to be the solution of future research and education.

The students mention as a method to improve the quality of higher education the immersion of Virtual Reality (VR) and/or Augmented Reality (AR) in the process of presenting the information and knowledge acquisition. There are other studies that support this thesis. (BUCEA, 2018).

Talking about evaluation the students preferred a practical approach in order to prove themselves that they gained specific abilities and interiorized the knowledge. They also preferred a progressive, cascade evaluation, because they fill more comfortable to take the test if they gave a correct answer to the first item. This statement is confirmed by other studies. (TAGHINEZHAD,2017)

The number of doctoral students is decreasing: less students enroll in a doctoral program or some of them abandon it (Figure 7). The reason that PhD students abandon their studies is that they have chosen the specialization in the wrong way, or because the university has too high standards, as they declared in the survey.

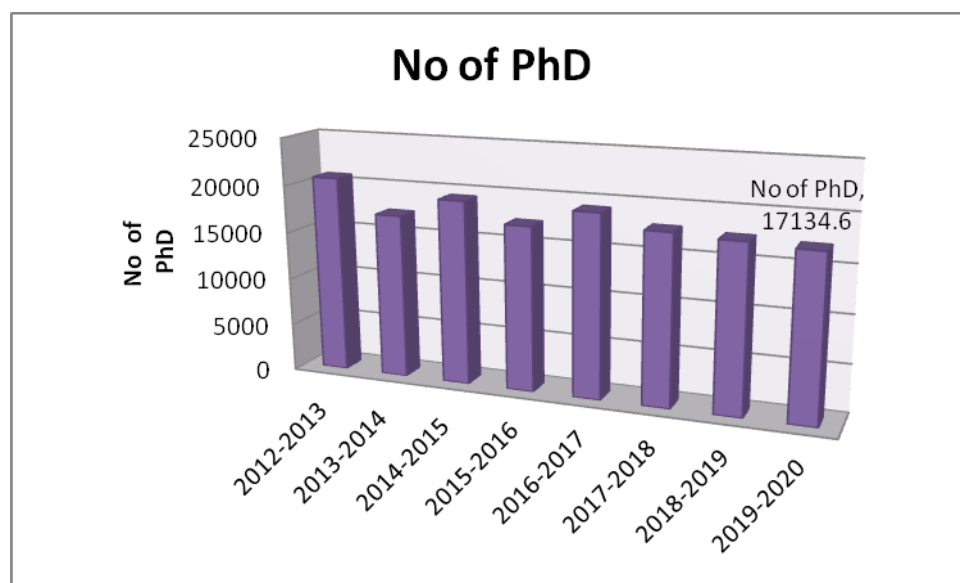


Figure 7: Forecast regarding the number of PhD students for 2018-2020  
 Source: ARACIS - own preluclration

In order to maintain and attract students to doctorate programs, universities in Romania has to offer grant scholarships. Also, doctoral students have to be involved in important scientific research projects on the field of doctoral thesis.

They also suggested some improvements that can be achieved in the PhD program, such as:

- Intense collaboration with business field
- Immersion of VR and AR technologies in education
- Psychological training for teachers to increase the emotional intelligence
- International collaborations with other universities

## 5. DISCUSSION

The survey implemented shows that Doctoral programs in Romania have a positive impact on students' integration on labor market. In general, the Romanian education programs have a high quality, but are characterized by deficient practice activities. The Romanian universities should consider integrating more foreign visiting professors and international collaboration through European projects, and Business-University partnerships.

The article tests the influence of library facilities, school infrastructure, access to Doctoral Theses, dialog between academia and students, doctoral coordinator and committee proficiency, staff attitude and multiple way of communication over the quality of education in PhD programs in Romania. Overall the null hypothesis has to be rejected. All 8 factors chosen have an important influence over the PhD quality education.

In a further research we still need to add other variables in the model, such as:

- Integration of social media channels in education, in order to be where the students are and answer in real time to their expectations.
- Integrate Virtual Reality (VR) and Augmented Reality (AR) in education field offering a better interactivity, 3D visualization,



having a positive influence on knowledge acquisition, while having fun at the same time

- Teacher emotional intelligence
- Access to case studies and workshops that could facilitate the knowledge exchange between universities and business field, increasing the innovation and creativity.
- Adapting the lecture at mobile technologies
- Establishing a good balance between working and learning activities
- Interdisciplinarity the increasing scientific research.
- Difficulties regarding the qualification of a PhD in one predefined area

## 6. AUTHORS' AFFILIATION AND BIOGRAPHY

Authors' names and details must not be included anywhere in the article. Instead, a brief autobiographical note (about 100 words) must be supplied, including full name, affiliation, email address and full international contact details, on a separated sheet of paper.

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