

Exploring the crowdfunding opportunities for HE innovative projects

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Abstract— *In the current context, crowdfunding platforms are gaining more and more importance, allowing the coexistence of financing resources and investment opportunities for innovative projects all over the world. This is an echo of the "wisdom of the crowd" theory that brings value not only in decision making but also in problem solving, generating the development of new products that are thus tested to be viable on the market. Romania is at the beginning of the journey in this promising but also challenging world. The promising part results from statistics and facts on the successful campaigns in the last few years, especially in the tech domain, and the challenging part from the study of the most common reasons for the failure of a crowdfunding project. This article presents an analysis of the crowdfunding platforms to find how useful they can be for innovative university projects. Some projects carried out by students of the University of Petrosani were presented. In decision making of the most useful platform for each of the university projects, a multiple-criteria decision analysis was used. The identification of the best suited platforms for the projects within the University of Petrosani represents the main results of the present research.*

Keywords— *agility, crowdfunding, entrepreneurship, equity, innovation, investment, startup, project, prospective entrepreneurs, opportunity*

I. INTRODUCTION

In the modern world, funds are collected mainly on online platforms, and donors are rewarded for their contributions - some kind of prize, memorabilia, or a certificate for a future product, if it can be produced. In addition to financial assistance, for an entrepreneur, crowdfunding means moral support. The money does not need to be returned, but it must be used effectively so as not to lose people's trust. It allows collecting the necessary funds by attracting investors who want to get access to the project, generally using the Internet. Through networks, the founders try to reach out to the consumers to inform them about their start-ups, to ask for a small amount of funding, or to give valuable insights regarding improvements required. As a rule, a specific investment end date is set for a crowdfunding project. The founder will indicate the amount that he needs to collect during this time. The principle of crowdfunding is that all cash flows are transparent. The investor or backer must understand where and how much of his money has been spent.

Crowdfunding is a popular tool among tech startups, especially overseas. Because it can check how much their product is in demand and how strong the business founders are. Also, fundraising through international crowdfunding platforms allows businesses to enter new markets.

The research in this paper aims to find effective crowdfunding platforms for innovative projects carried out by teams of students from the University of Petrosani. The paper is divided into 6 parts and begins with an introduction and ends with conclusions. After the introduction, the landmarks in crowdfunding part tells the history of the crowdfunding. The third part contains statistics and facts about funding platforms. The fourth part shows the use of crowdfunding in higher education (HE) and leads to the part that shows the insides of the innovative projects of the University of Petrosani.

II. LANDMARKS IN CROWDFUNDING

Despite the fact that crowdfunding as a method of fundraising is now popular in the Internet environment, it began to be used 100 years ago. However, the term "crowdfunding" appeared only in 2006, [1].

The first example of online crowdfunding was fundraising for the 1997 tour of the rock band Marillion. Fans organized the action throughout the United States, raising over \$60.000. Subsequently, Marillion recorded and promoted several of their albums with this money.

With the rise of Financial Technology (FinTech), crowdfunding has become more popular. The crowdfunding market is growing rapidly in this era. Crowdfunding platforms allow people to raise money by donating or receiving rewards in return. Some platforms also allow people to borrow money or invest in projects, [2].

The leaders in terms of crowdfunding market volumes are China, Japan, South Korea, and the United States, where the share of such investments in the investment market ranges from 2% to 5%, [3]. The advantage of this method is the transparency of money transfers. That is, the investor or backer must be sure that his money will not be lost, but will go towards the implementation of the project.

Crowdfunding can be classified into four types, as shown in Fig 1.

According to, [4] "If you need to raise funds from donors, you need to study them, respect them, and build everything you do around them." As it is known, crowdfunding is carried out on special platforms. To start collecting money, it is needed to choose a suitable platform that will meet the specifics of the project. In choosing a platform it is worth finding out:

- how long this platform has existed;
- how many successful projects were implemented;

- how many entrepreneurs are raising money right now;
- what are the reviews about it.

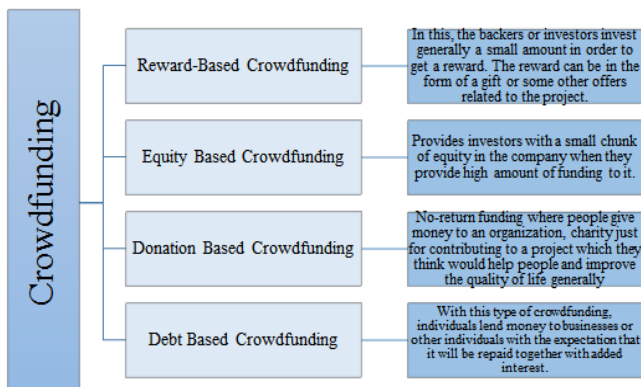


Fig. 1. Types of crowdfunding

The main benefits of the crowdfunding are summarized in Fig. 2.

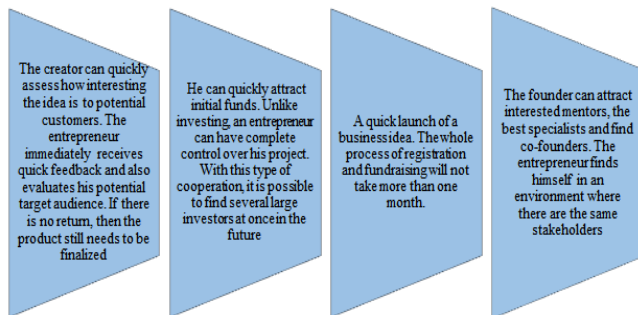


Fig. 2. Benefits of the crowdfunding

The majority of nations offer legal, financial, informational, and consulting support for entrepreneurship through state-run and nonprofit programs. However, the vast majority of startups receive only basic consultations, which include learning about the registration, company planning, accounting, and tax processes, [5].

Before publishing a project on platforms, the founder or author should think about whether it will be in demand and whether it will bring profit. This must be taken into account first of all if backers are promised remuneration or interest.

Also, checking out the platform requirements and terms, as some of them set strict rules: if the author cannot collect the required amount by the specified date, then he does not receive anything. On the one hand, this is the motivation to come up with profitable projects in advance, but on the other hand, there is a huge risk of being left with an unmaterialized idea.

Some of the best crowdfunding platforms are Kickstarter, Indiegogo and Boomerang for European users.

The most widely used source for crowdfunding right now is Kickstarter. It is one of the top 1000 most frequented websites in the world, which is a strong indication that Kickstarter is effective, [6].

It has mostly served as the model for subsequent crowdfunding websites of a similar nature. On Kickstarter, funds are raised for the implementation of particular ideas, not to support already-existing businesses. All of the money obtained is returned to the investors if the declared amount is

not collected within a specific amount of time, [7]. The project's creator decides both the minimum amount needed and the fundraising deadline.

Kickstarter specializes mainly in financing various creative projects, such as shooting independent films, creating video games, comics, music, technology, gadgets, etc. As a commission for services, Kickstarter takes 5% of the funds raised, [8]. At the moment, Kickstarter has 294 campaigns that are still live and also 239 upcoming projects in the domain of technology for the 2021 and 2022 years, [9]. In Fig. 3, the statistics regarding the technology domain for the Kickstarter are shown.

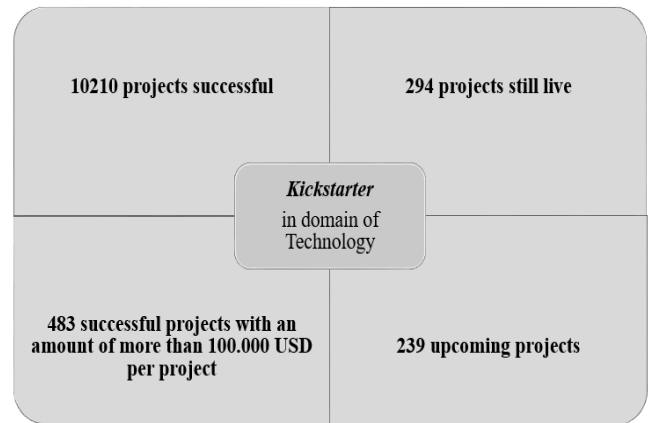


Fig. 3. Kickstarter in the technology field

Another well-known worldwide crowdfunding website is Indiegogo. Here, anyone can start a business, donate money to a good cause, or carry out any intriguing idea. In contrast to Kickstarter, IndieGoGo transfers all funds raised by a specific date to the project's author, even if the total is insufficient.

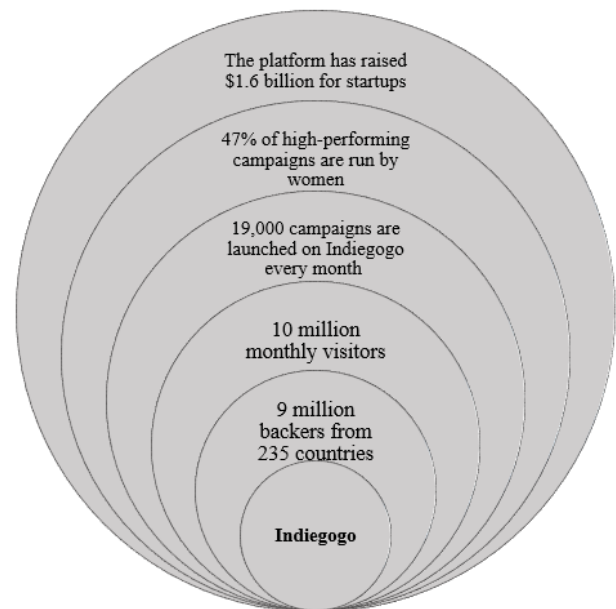


Fig. 4. Indiegogo statistics

Only the commission percentage varies; if the fundraising project's objective is met, the platform keeps 4 percent, if not, 9 percent. The platform can be referred to as being the most international because the IndieGoGo service offers coverage for roughly 200 nations worldwide, [10]. The overall statistics

are presented in Fig. 4. The fact that the rating of projects on IndieGoGo is calculated automatically rather than manually sets it apart from other comparable websites. A ranking of the popularity of projects on IndieGoGo is created using an algorithm that examines the degree of activity of authors and donors (investors), the number of updates, comments, etc.

One of the most popular crowdfunding platforms in Europe is Boomerang. Although it was only recently created in Denmark, it has already made a strong claim for itself. Initially, as Kickstarter was the primary role model, the focus was on funding video games and music projects. However, Boomerang soon settled on social and community programs as its primary focus. Boomerang's asking prices are lower than those of many other crowdfunding websites. The sums rarely reach \$10,000 on average.

Boomerang prides itself on having more victories for its magnanimous and social ventures than its Kickstarter partners. The author of Boomerang chose that individuals would contribute much more eagerly to such socially noteworthy ventures than to the creation of a modern contraption or commercial benefit. And he truly did not go off-base. Boomerang has gotten to be one of Europe's primary crowdfunding assets for raising reserves for social purposes..

III. CROWDFUNDING – STATISTICS AND FACTS

According to, [11] "No one has ever become poor by giving." Crowdfunding platforms have already established themselves as platforms for developing and creating business projects. Long-standing foreign platforms collect billions of dollars here.

Crowdfunding platforms gather the best audience: people with higher education and free money, interested in innovation and the social focus of projects.

Judging by platform statistics, the game projects are likely to succeed. This is supported by Kickstarter data, where games increased by 16% while design and technology decreased by 3% and 42%, respectively. The most stable projects on Kickstarter are those that raise small amounts (up to \$ 10,000).

From a global comparison perspective, it is shown that the highest transaction value is reached in the United States (US\$ 537 million in 2021). In Fig. 5, the world's fundraising revenues is shown for each continent.

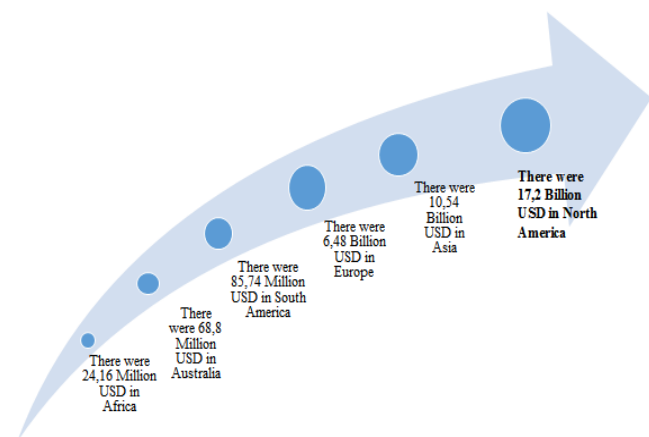


Fig. 5. The world crowdfunding revenues by each continent

The crowdfunding market is projected to grow to \$300 billion by 2030 and there are projected to be 12,063,870 campaigns by 2023. Last year, there were 6,455,080 worldwide crowdfunding campaigns, [12]. The number of funding campaigns starting from 2017 is presented in Fig. 6.



Fig. 6. The number of funding campaigns

Backers are very important to a crowdfunding project. They are essential. Overall, crowdfunding projects have an average of 47 backers, [13]. According to, [14] "Before you even start building your crowdfunding page, start building a crowd first". Fully funded crowdfunding projects have an average of 300 backers. The average commitment for a fully funded project is \$ 96. The average crowdfunding project pledge is \$88, [13]. The average funding per campaign from 2017 until 2023 is presented in Fig 7.

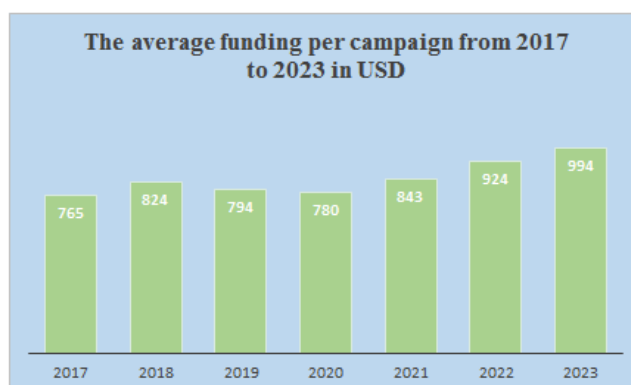


Fig. 7. The average funding per campaign

The value of crowdfunding transactions is expected to reach \$1,089.7 million in 2021. Transaction value is expected to show an annual growth rate (CAGR 2021-2025) of 2.63%, resulting in a projected total amount of US\$1,209.1 million by 2025.

The average funding per campaign in the crowdfunding segment amounts to US\$5,922 in 2021. The crowdfunding transaction value by country in 2020 is presented in Fig. 8.

The business value of social media is immeasurable. Social media spaces have become a major platform for driving various projects. In fact, most people today spend at least 30 minutes a day on social networking sites. This is an important indicator for SMEs to effectively promote their services and products. Technology entrepreneurship is a way to build links between science and business. There were identified the best funded or just about to be funded campaigns of 2021 in the

domains of Tech & Innovation and Education in order to determine the research area and the opportunities to build successful campaigns in this field.

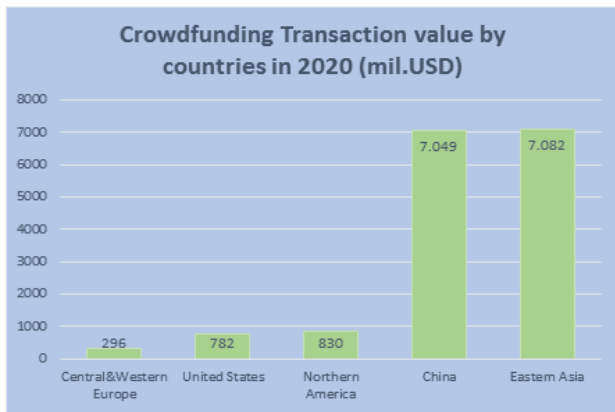


Fig. 8. Crowdfunding transaction value by countries in 2020

An important role of a social network with a crowdfunding platform in business is to connect with consumers immediately. Write a post, ask a customer a question, and give an answer in the comments. Customer reviews motivate people to develop the project, add new ones, and improve the project based on customer requests and comments. This works more efficiently than a phone with a hotline.

People between the ages of 24 and 35 are much more likely to participate in crowdfunding campaigns. People over the age of 45 are significantly less likely to support the campaign. It takes an average of 11 days to prepare for a successful crowdfunding campaign, [13]. For example, last year (2021), some statistics of the crowdfunding platforms are presented in Fig 9.

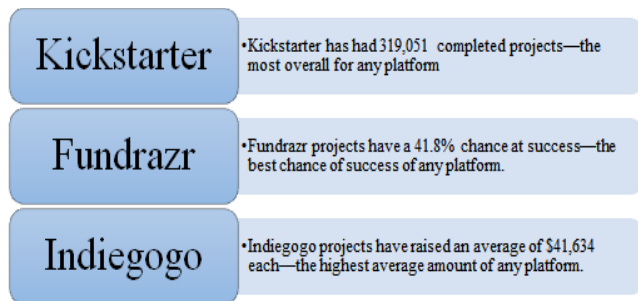


Fig. 9. Crowdfunding statistics for 2021

Maintaining proper social network pages creates great competition for already well-known manufacturers. An important role of social networks in business is to connect with consumers immediately. Therefore, based on 2021 statistics:

- 53% of the email share of crowdfunding campaigns will be converted into donations;
- 12% of Facebook shares will be converted into donations;
- 3% of Twitter's share will be converted into donations.

IV. CROWDFUNDING IN HIGHER EDUCATION

Practice shows that today, not only groups of enthusiastic scientists but also large universities are able to attract

donations on crowdfunding platforms. There is a list of some universities that run a private crowdfunding platform for student projects and are very successful: Arizona State University, University of California, Los Angeles, Boston University, University of California, Santa Cruz, University of California, San Francisco, Haas School of Business, Pepperdine University, University of Texas, San Antonio, University of Maryland, Pitzer College, Central Michigan University, Cornell University, Furman University, Georgia Institute of Technology, Middlebury College, Michigan Technological University, Pace University, Rollins College, University of Vermont, University of Virginia, and Vassar College.

As technology and social media pave the way for digital fundraising innovations in HE, the growing trend of crowdfunding provides exciting opportunities to increase engagement and participation.

Many universities in the UK and Europe now have their own crowdfunding projects (University of Oxford, University of Manchester, University of Essex, etc.). Some of these projects have been running for some time, so 2022 will be the year when crowdfunding matures from an exciting pilot opportunity to a major fundraising component. Questions about best practices, donor retention, and integration with major campaigns still exist, but now many questions have been answered by early adopters.

Participatory funding has resulted in a large number of new donors and the participation of accepted donors. The University of Essex launched the Click crowdfunding platform in 2015. Within a year, Click raised £40,000 in 37 crowdfunding projects, and the total number of donors almost quadrupled in the process.

Nevertheless, Romanian universities are still far from crowdfunding. The most advanced of them are still mastering fundraising. In this field, UBB can boast of the largest amount. Gradually, other universities are also resorting to this method of attracting investment. Danubius University of Galați is another example of a university with a crowdfunding platform. Example of successful projects conducted by university platforms in Romania are presented in Fig. 10.

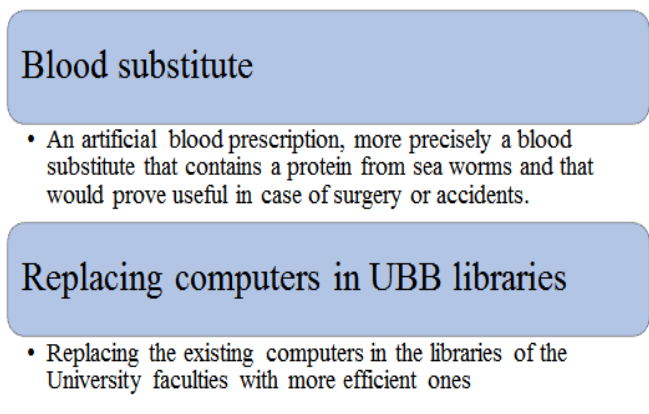


Fig. 10. Successful projects conducted by university platforms in Romania

Most universities do not have a system to support and develop entrepreneurship and skills. At the same time, in a situation where a company has little innovation activity, the innovative infrastructure created and emerging in the region, such as physical and financial factors, is rarely used for its intended purpose.

It is used to support college and graduate projects, secure some of the region's most ambitious and qualified youth, and successfully integrate these youth into the labor market and integrate them into the local economy. Opportunity to expand experience in implementing unique projects according to national development priorities.

Not every project is successful. A number of research studies [15], [16], [17], have suggested 17 main reasons for the failure of a startup on a crowdfunding platform, which can be seen in Fig. 11.

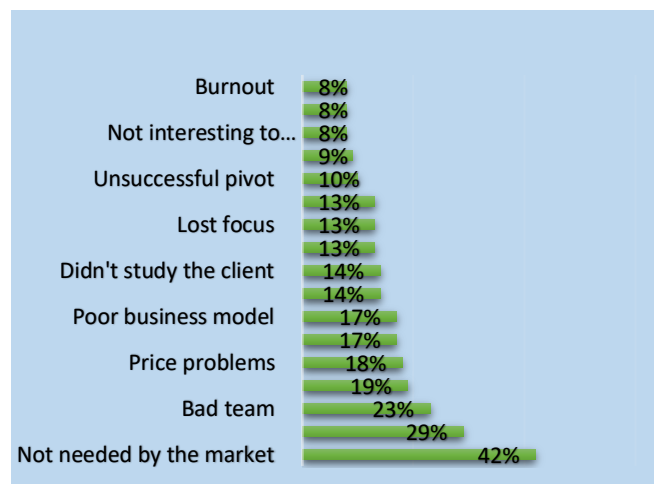


Fig. 11. The most common reasons for the failure of a crowdfunding project

Aspiring startups often do a poor job of researching market demand. When a new product or service is launched, it turns out that it is not in demand by the consumer.

For the implementation of new projects, the teams may not have enough money, and it is difficult for startups to find investors.

Startup founders have problems with recruiting, starting a business launch, and often face a lack of experience.

In many ways, the fate of the project depends on the competition in the market. The higher the competition, the fewer chances there are to stay and develop in the market.

The ability to attract the attention of the target audience and convert it into potential and, ultimately, real customers is one of the most important skills of a successful business. Failure to do this will lead to startup failure.

Entrepreneurs who can see opportunities and take advantage of them are more likely to find profitable new business opportunities and stay in sync with the company's vision. This encourages entrepreneurs to behave in digital-based businesses in line with current business model changes, [18].

Ignoring consumer product reviews is a big mistake for most startups.

If the product is released too early, without finishing even the smallest details, consumers may not accept it and give it a bad rating. It will be difficult to return a modified product to the market since the first opinion about it will be negative.

Disagreements with investors can lead to big problems, especially financial ones.

If a startup is developing successfully, then changing its focus in order to test some new direction of development will be a big mistake.

A startup idea may be good, but if the organizer is not sufficiently interested in this area or has little information, then this can lead to failure.

Another reason for the failure of the project is the inability to fully use its capabilities on the Internet.

The founder of a startup often, while working hard on a project, forgets about his personal life and other activities. This can often lead to burnout.

After analyzing the most common reasons for the failure of a project, it can be concluded that each startup needs to assess their strengths before starting the implementation of their project. It is important to develop the basis necessary for bringing the project to life, as well as to appreciate the possible risks and resources that may arise during work.

V. INSIDES OF THE INNOVATIONAL PROJECTS OF THE UNIVERSITY OF PETROSANI

A. Searching for Success Through Crowdfunding

In order to pave our way to success, we started with the evaluation of the accessibility of crowdfunding platforms in Romania. The synthetic data are presented in Table I.

TABLE I. CROWDFUNDING PLATFORMS WITH ACCESS FOR ROMANIA

Platform	Country	Eligible for Romania/ access for Romania	Website
GoGetFunding	UK	v	https://gogetfunding.com/
WhyDonate	Netherlands	v	https://whydonate.nl/
Ulule	France	v	https://www.ulule.com/
Seedrs	UK	v	https://www.seedrs.com/
Betterplace	Germany	v	https://www.betterplace.org/en
Patreon	U.S.	v	https://www.patreon.com/
Indiegogo*	U.S.	v	https://www.indiegogo.com/
Eureeca	UK, UAE, Malaysia	v	https://eureeca.com/Default.aspx
Republic*	U.S.	v	https://republic.co/
SeedBlink	Romania	v	https://seedblink.com/
MultiFinantare	Romania	v	http://multiinantare.ro/
Startarium	Romania	v	https://startarium.ro/

GoGetFunding - a 'keep-it-all' personal crowdfunding site, meaning that even if it does not reach the fundraising goal, the author still keeps all of the funds raised (minus low industry fees). It's completely free to start a fundraiser. They charge a competitive 6.9% fee on funds raised, 2.9% of which is a payment processing fee, [19].

Ulule - only receives commission on the amounts collected for successful projects. If a project does not meet its goal, funds are returned to contributors and no commission is charged. For projects that collect funds in a currency other than the euro, the Ulule commission, regardless of the amount collected, is 6.67% excluding tax (HT) for funds collected by bank card and 4.17 % HT for funds collected by check or transfer. For projects that collect funds in euros, the Ulule commission for funds raised below 100,000 € is: 6.67% excluding tax (HT) for funds collected by bank card, and 4.17% excluding tax for funds collected by check or transfer, [20].

Ulule has 38301 successful funded projects with 225.517.607 EUR collected.

In 2021, Ulule has a success rate of 79 %.

Seedrs - charge campaigners a 6% success fee plus a 0.5% payment processing fee. There is also a £2,500 completion fee

(excluding VAT). Seedrs operates on an all-or-nothing basis, meaning that if the business does not raise the minimum target sought in the campaign, it gets nothing and investors receive funds back into their Seedrs Investment Account.

In 2020, Seedrs had 265 funded deals with 293 million EUR invested in campaigns and a 85 % funding success rate.

Indiegogo - charges a five percent (5%) platform fee on all funds raised for the campaign. Indiegogo is unique in that the campaign owner can choose whether or not to go with all or nothing funding. Two plans (flexible and fixed) allow the user to decide how this works.

Eureeca - using an all-or-nothing funding model, campaigners need to reach their target funding amount over a 90-day campaign period. If the campaign is successful, Eureeca will charge a success fee of 7.25% of the proceeds, [21].

Seedblink - charges startups a success fee of 6-7% of the total amount raised through crowdfunding, [22].

SeedBlink is Europe's fastest growing investment platform, specializing in the sourcing, screening, financing, and scaling of tech startups from across the continent.

SeedBlink.com is the first equity crowdfunding platform developed in Romania, primarily focusing on small investments in startups' local ecosystems.

This positions Romania on the European alternative financial map. Currently, there are 58 funding campaigns with a total investment of over €35.3 million.

B. Present and Perspectives of the Innovation Projects from the University of Petrosani

Project activities carried out as part of the educational process at Petrosani University are mainly oriented on innovative projects.

These projects are aimed at achieving a useful result and require monetary costs. Innovative and educational projects are actions targeted at improving the quality of life but requiring financial investments.

When implementing an educational and technological project, a student needs to find a resource with which he can start implementing his project.

Each university student is interested in the implementation of not only his own project but also participating in the projects of other students.

Thus, seeing all the projects, the student can choose the ones he likes and help in achieving the final result by providing financial support. Thus, projects that aroused interest among other students of the University of Petrosani, but requiring large financial investments, will not remain in the long box.

In decision making of the most useful platform for each of the university projects was used through multiple-criteria decision analysis.

The criteria utilized were: TRL level, accessibility, eligibility, success probability, and funding limit.


In Table II there are presented the data, expressed as utilities, used in the multicriteria analysis resulting from the evaluation based on the main criteria for choosing a platform.





TABLE II. THE MULTIPLE CRITERIA DECISION ANALYSIS RESULTS


	BCalm	Smart Buggy	UPets	Xware	Huggy Bear	Jaggy Cart
P1 Indiegogo	0,896	0,918	0,804	0,873	0,816	0,884
P2 Kickstarter	0,898	0,840	0,819	0,886	0,773	0,874
P3 Ulule	0,603	0,580	0,830	0,614	0,864	0,671
P4 Seedrs	0,241	0,304	0,362	0,264	0,284	0,469
P5 Seed Blink	0,430	0,475	0,377	0,396	0,343	0,188
P6 Eureeca	0,052	0,130	0,148	0,075	0,173	0,260
P7 GoGet Funding	0,339	0,219	0,172	0,328	0,214	0,120

In Table III are described the ongoing innovational projects that were taken into consideration for crowdfunding.

TABLE III. ONGOING INNOVATIONAL PROJECTS

No	Name, Logo; TRL	Description	Funding needed
1	BCalm [23]	A bracelet that lights up based on a color code to gently signal a stress state. This is part of a wearable device for alarming the burnout state using an application that we develop, that estimates this state based on a personal profile, taking into account the physiological and the organizational climate parameters.	Cost of prototype = 30 Euro Crowdfunding platform: Kickstarter
			
	TRL 4: Small Scale Prototype MVP (prototype) in testing: Techsylvania 2022		
2	SmartBuggy [24]	Small electric car with two	Cost of prototype

	 TRL 5: Large Scale Prototype MVP (prototype) tested: Innovation Labs 2022, Techsylvania 2022	seats side-by-side, usable on various types of terrain, like parks or urban centers, to reduce pollution by using alternative sources such as regenerative braking and solar energy panels to power the motor.	SmartBuggy S = 3000 Euro SmartBuggy XL = 12000 Euro Crowdfunding platform: Indiegogo
3	UPets [25]  TRL 4: Small Scale Prototype MVP (prototype) in testing: Techsylvania 2022	Spider robots designed to walk through extreme environments as tide spaces where humans are not able to access, explosive or radioactive locations.	Cost of prototype = 500 Euro Crowdfunding platform: Ulule
4	Xware [26]  TRL 4: Small Scale Prototype MVP (prototype) in testing: Techsylvania 2022	Customized wearable devices for quality-of-life improvement for people with low mobility of the upper limb. The problem that we address is related to medical conditions due to upper limb impairments with main cause strokes, but also accidents or genetic disorders.	Cost of prototype = 1000 Euro Crowdfunding platform: Kickstarter
5	HuggyBear  TRL 5: Large Scale Prototype MVP (prototype) in testing: Techsylvania 2022	Interactive Teddy Bear, offering emotional interaction for children, that responds to a hug initiated by the kid. The prototype is further developing by adding artificial intelligence elements.	Cost of prototype = 300 Euro Crowdfunding platform: Ulule

6	JaggyCart 	Electric mini cart that can drive on different types of surfaces having front wheels with a mechanism inspired by the cats' claws in order to be able to deal with challenging terrain textures. The mini cart can act as a platform to build upon.	Cost of prototype = 500 Euro Crowdfunding platform: Indiegogo
	TRL 3: Applied Research MVP (prototype) in testing: Techsylvania 2022		

VI. CONCLUSIONS

It is widely claimed that entrepreneurs in Romania, in general, have skepticism about whether people support projects. Possibly in Romania, crowdfunding did not take root right away: the existence of jokes about "crowd-something-there" or accusations of volunteers wanting to live on other people's money. In the world now, it has become the usual way to start a project.

From presenting innovative ideas to debating some of the most important issues that arise when business meets technology, the use of these funding platforms can be the key to the community movement.

Crowdfunding can help achieve unthinkable things, but for every university project, it is important to read the rules of the chosen platform carefully so as not to run out of money. What is certain is that some of them follow a policy of all or nothing.

Even if the project is hosted on a platform that does not impose such restrictions, it is necessary to independently assess the chances of success of the stated objective. We are talking about those projects that involve rewards or reimbursements to supporters.

The paper highlights the usefulness of finding out how long the chosen platform has existed, what its reputation is, and how many successful projects have already been implemented.

All these things guide us in exploring the most effective crowdfunding opportunities for HE innovative projects carried out by teams of students from the University of Petroșani.

We believe that in order for these projects to go from invention to innovation, the present research takes an important step at this moment in the new product development life cycle. The limitations of the application of a simple multi-criteria method of choosing the platform are assumed and open the perspective of new research through the application of predictive models that include machine learning.

Nowadays, technology is not just a hobby. For some, it may be a profession, but for some, it is the meaning of life.

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