2018-1-RO01-KA203-049510

BLOCKS - Blockchain for Entrepreneurs

- a non-traditional Industry 4.0 curriculum for Higher Education

IO1 - IN-DEPTH STUDY ON THE CURRENT STATUS OF SKILLS AND KNOWLEDGE SHORTAGES AND GAPS IN BLOCKCHAIN IN THE VARIOUS TYPES OF ACTORS OF THE ECOSYSTEM

This document was created by the team members of Erasmus+ Strategic Partnership project *"BLOCKS - Blockchain for Entrepreneurs - a non-traditional Industry 4.0 curriculum for Higher Education" - 2018-1-RO01-KA203-049510*.

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INTRODUCTION

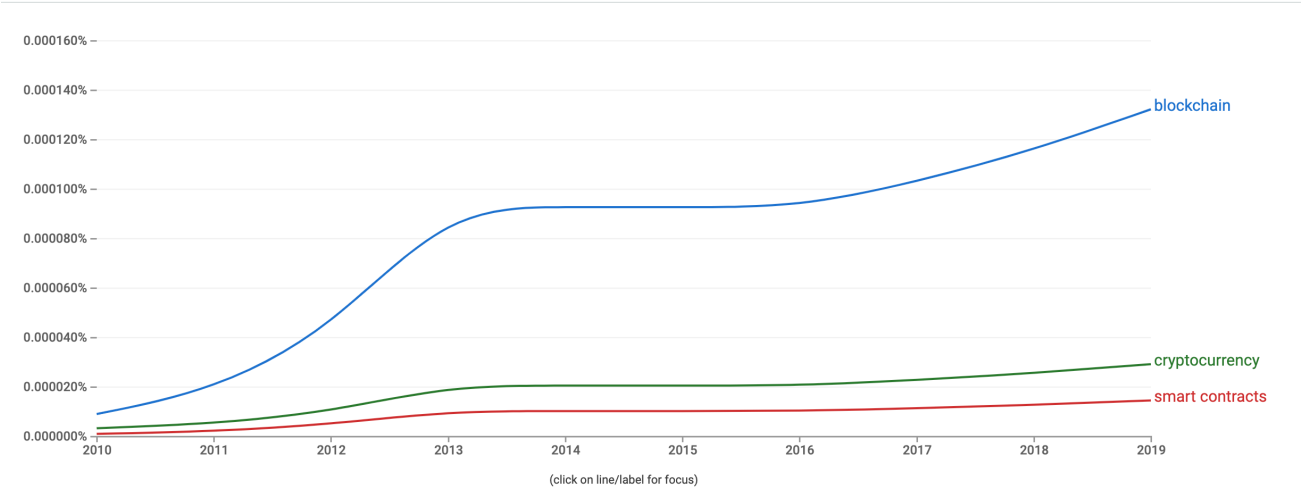
As the title of the study states, our analysis is about assessing the knowledge regarding blockchain technology in each ecosystem of the project's network countries. Therefore the scope of the research is to establish the current status of knowledge and also gaps, since among the European countries the implementation level of such a technology is extremely different.

Regarding the methodology of research used, we have proposed a survey, named "Blockchain - Knowledge Assessment for Entrepreneurs", which contains 37 questions, structured in order to obtain a feedback from target groups on level of interest in implementation and developing applications/ products that use blockchain technology.

The proposed questionnaire was distributed to three main target groups: entrepreneurs, teachers/trainers and students, as they are the target groups in the other Intellectual Outputs, but also because they are the exponents of the categories to which this technology can be delivered.

The questionnaire was distributed globally in early 2019 and had a total of 221 responses overall, from worldwide with 128 responses in English, 31 responses in Italian, 62 responses in Romanian.

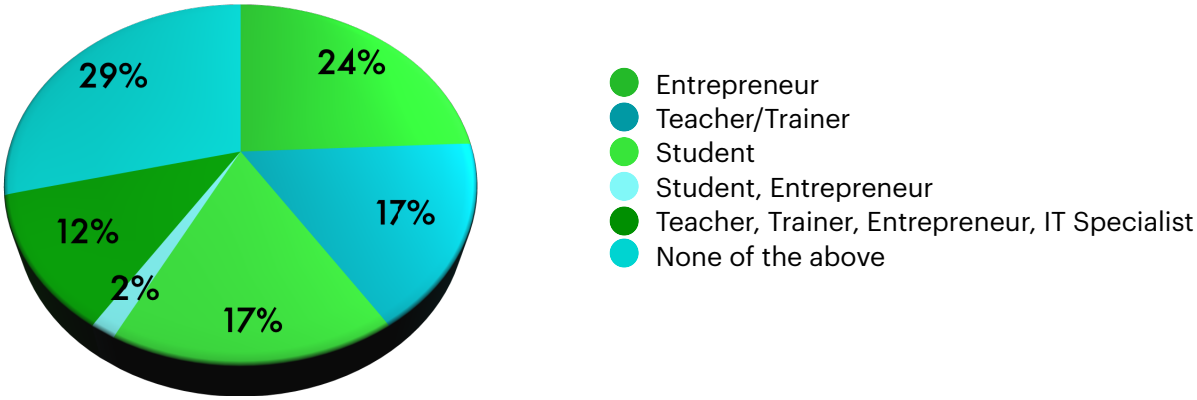
The interest has been on the rise in the business environment and academia regarding the topics proposed, as can be seen from the graph provided by Google n-gram Viewer for the period 2010-2019. "When you enter phrases into the Google Books Ngram Viewer, it displays a graph showing how those phrases have occurred in a corpus of books (e.g., "British English", "English Fiction", "French") over the selected years."



COUNTRY REPORT - ROMANIA

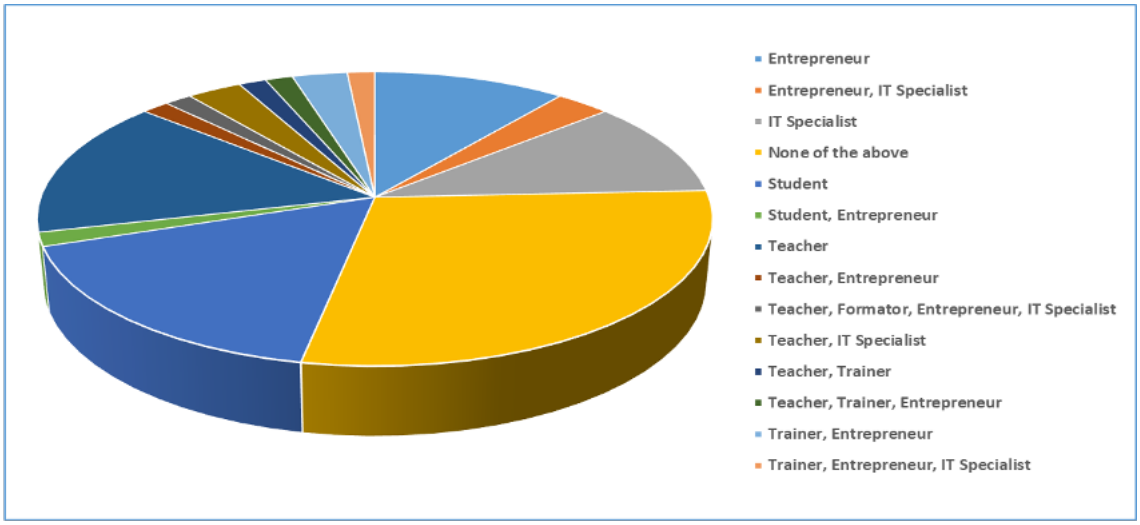
The structure of the sample in Romania was entrepreneurs (24%), teacher/trainer (17%) and students (17%), which is in line with the main objectives of the project and the Romanian consortium, which includes two universities (The Bucharest University of Economic Studies and Ovidius University of Constanta) and an IT company, Zitec. Approx. 12% of the sample could be classified in the same time into two or more categories: student-entrepreneur, teacher-trainer-entrepreneur-IT specialist. The sample allowed a balanced collection of data, considering that two of the Romanian partners are institutions of higher education (an equal number of teachers and students) and the involvement of the entire consortium in the business environment (both universities and Zitec).

Most of the respondents were entrepreneurs, due to their large interest on the subject and the continuous efforts of the universities to enhance the network between the educational system and the business environment. Among entrepreneurs questioned, a large number of respondents comes from the IT domain since they can promote and help in the implementation of blockchain technology in other fields of activity, thus making the difference in blockchain developing in Romania.



"Are you one of the following? Check all that apply" (respondents by occupation – 3 main target groups: entrepreneur, teacher/trainer, student)

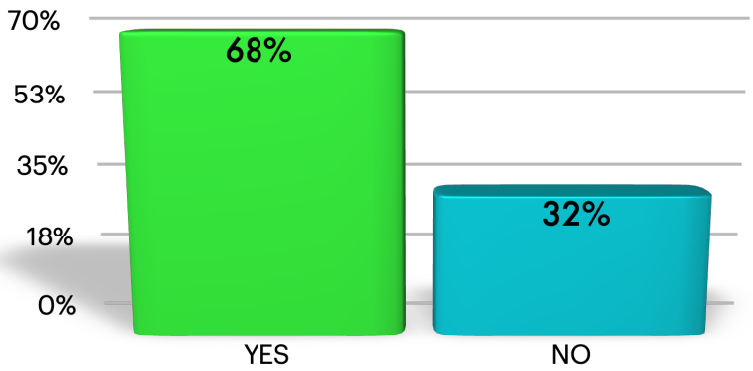
Due to the fact that some subjects could be classified into several categories, the answers were more detailed and allowed us to compare the results. Thus, the respondents were included in the following mixed categories: entrepreneur-IT specialist, student-entrepreneur, teacher-entrepreneur, teacher-trainer-entrepreneur-IT specialist, teacher-IT specialist, teacher-trainer, teacher-trainer-entrepreneur, trainer-entrepreneur, trainer-entrepreneur-IT specialist. This division of the sample allowed us a better correlation of the collected information, the subjects answering the questions from a double perspective. We mention that there are a lot of entrepreneurial influences, in general, and from the IT field, in particular.



"Are you one of the following? Check all that apply"

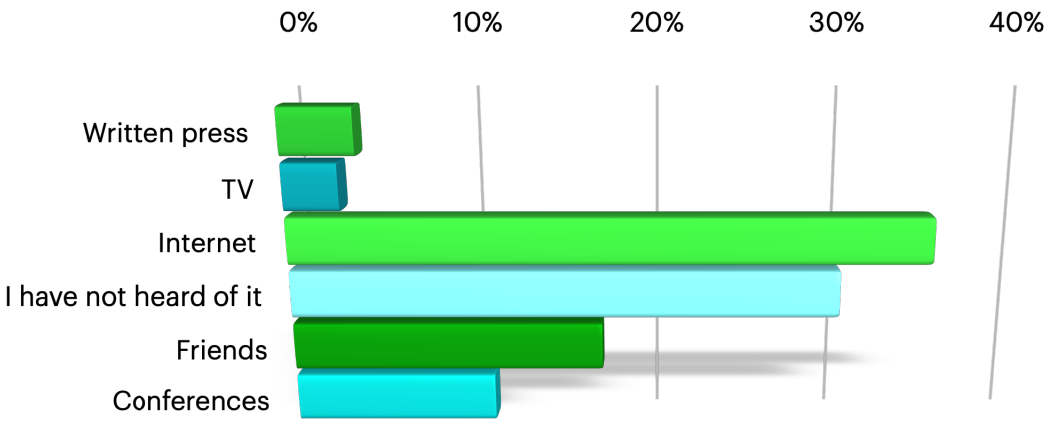
As it will be shown in the conclusions, teacher training in Romania is a first step to be taken if we want to implement this technology on a large scale. Then, training students to understand and use blockchain technology will generate in time implementation among entrepreneurs and frequent use of applications that are already present in the European and global market.

Most of the Romanian respondents have heard about the term "blockchain", which is a good sign of their interest on the subject. However, this situation also derives from their occupational profile, most of the subjects being familiar with the term because they come from the business environment and the IT sector. The situation completely changes in the case of students, where most of the answers reveal a reverse dynamics. According to the questionnaire, the students never use the blockchain term, being observed a lack of knowledge in this field.



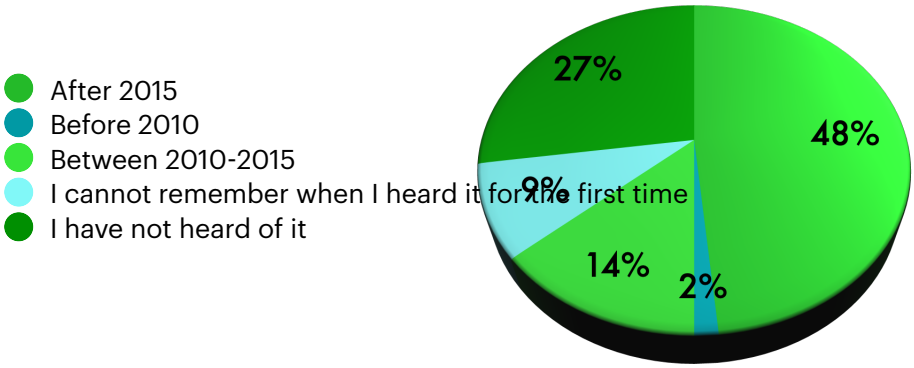
Question 1: "Have you heard about the blockchain technology?"

Next, we were interested in finding out the source of information about blockchain and we see that most of the respondents have heard about the blockchain technology from the online environment, as a direct result of the Internet usage in the world and in our country. According to the M-lab test report, Romania ranks fifth in the world by broadband internet speed for the period June 2017-May 2018, with an average of 38.6 Mbps. Surprising is the answer that approx. 17% of the analyzed sample heard about the blockchain technology from friends. The peer-to-peer network is, in this case, a functional one which and shows a quite deep penetration of the term "blockchain" in the Romanian society.



Question 2: "Where have you first heard of the term blockchain?"

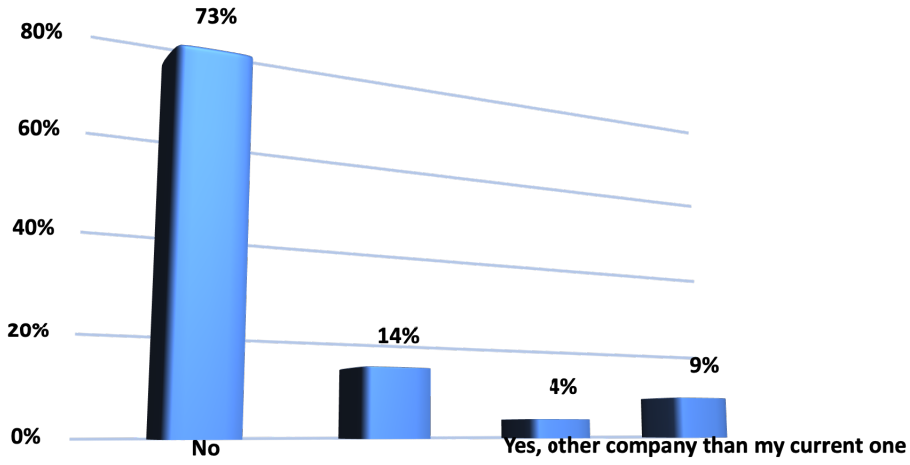
The figure below shows that the term is relatively recent accepted in our country, almost half of the respondents hearing about it after 2015. The blockchain term has entered harder in the Romanian economy and society, being driven by the cryptocurrency trends and the mirage of the investments on the Bitcoin market. The analysis reveals that only 2% of the respondents have heard the blockchain term before 2010.



Question 3: "When have you first heard the term «blockchain»?"

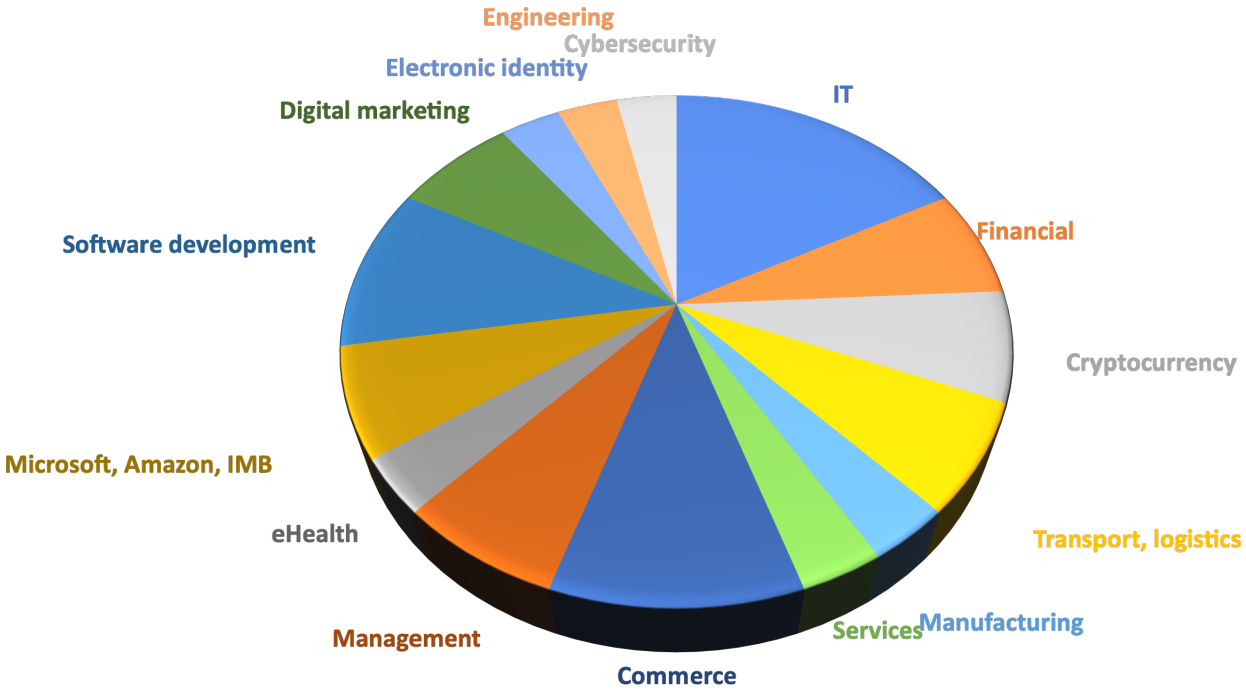
The overwhelming majority of the answers indicated the lack of knowledge regarding the implementation of the blockchain technology in Romania. In this context, the present questionnaire demonstrates the current status of blockchain revolution in our country, which is more silent. Only few

initiatives at national and international levels are organized, bringing together political, academic and entrepreneurial experts from the blockchain industry, mainly in the blockchain awareness direction. Comparing with other countries such Estonia, the Romanian companies are deficient in terms of blockchain implementation, due to the fact that there are few enterprises (mainly large companies) that use this technology.



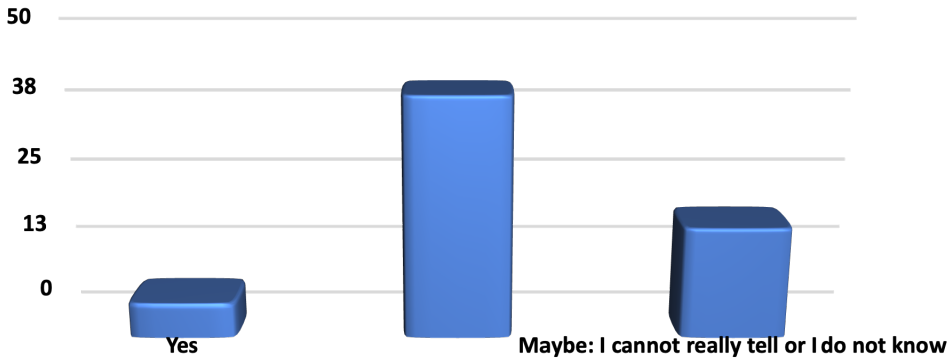
Question 4a: "Do you know any companies or organizations implementing a blockchain technology?"

Most of the responses led to the idea of the blockchain-IT association, including related business processes such as: software development, digital marketing or cybersecurity. It was also identified a strong connection with the financial system, in general, and with the cryptocurrencies, in particular. Given the limited knowledge about the blockchain topic, the discussions are mainly restricted to these two priority areas. On the other hand, there were some opinions that brought into question fields like trade, transport - logistics, ehealth, engineering or electronic identity. Moreover, large companies like Microsoft, Amazon or IBM were referred to, as a sign of the multinational domination in the field. In the management area, the emphasis was placed on the document management and the content management systems.



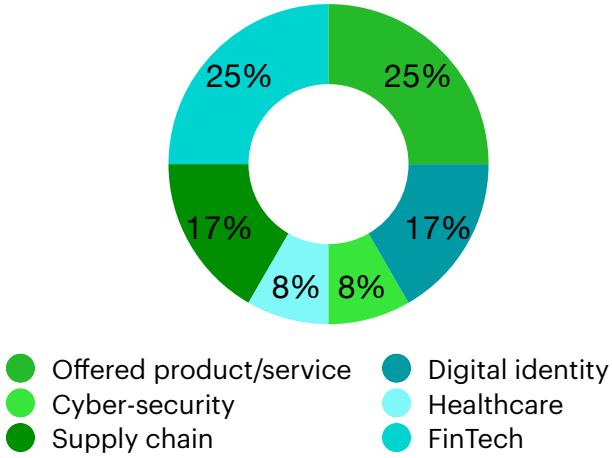
Question 4b: "If you answered «Yes» to the previous question, in which business process did you implement blockchain technologies?"

Only six respondents said they had the opportunity to use / develop applications that use blockchain, while the majority did not have this possibility or they don't know about the types of technologies used in their organizations. The positive responses are encouraging aspects of the blockchain evolution in Romania, even in its embryonic phase. We notice that most of the organizations that have the opportunity to use/develop applications that use blockchain are from the IT field.



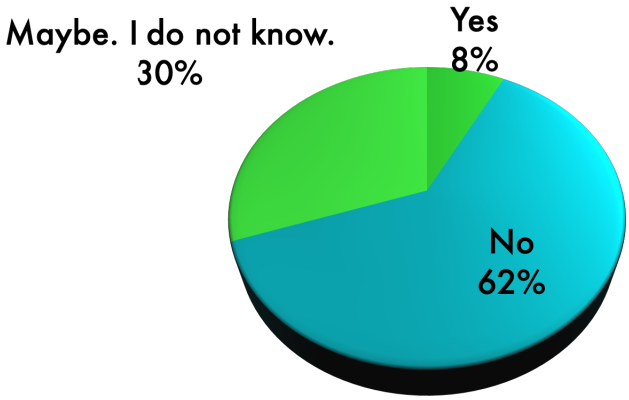
Question 5: "Did your organization have the opportunity to use/develop applications that use blockchain?"

Among the subjects who answered "Yes" to the previous question, most stated that they use this technology within the offered product / service and Fintech, followed by digital identity and supply chain. Other mentioned fields were Cyber-security and Healthcare, with 8% from total each.



Question 6: "If you answered «Yes» to the previous question, in which business process did you implement blockchain technologies?"

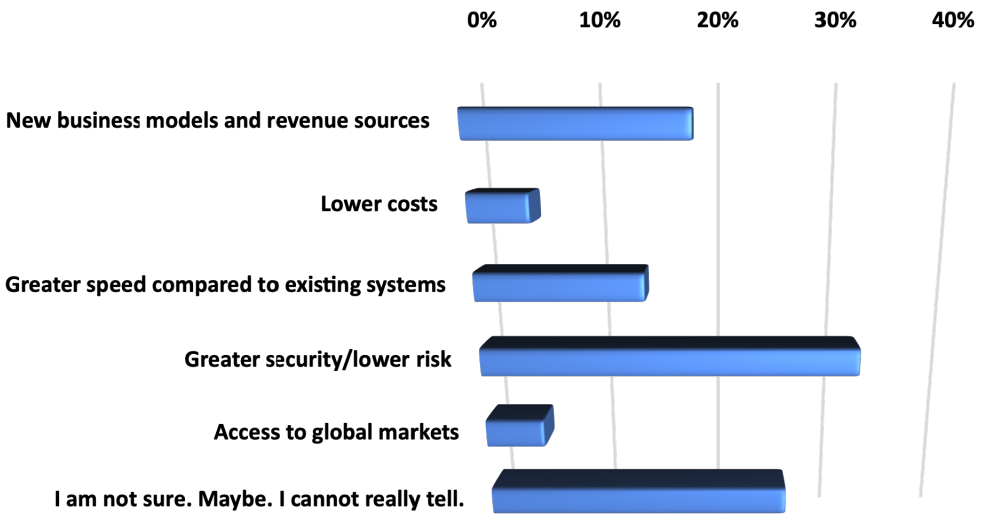
Only 8% of the respondents use a blockchain tool or blockchain related concepts in their day-to-day activities, some of them being IT specialists. The other respondents either do not use such technology in their current activities or do not know the technologies that are used in their organizations (92%). This negative point can be exploited by the BLOCKS project, considering the interest of the subjects questioned and their prior experiences with the blockchain tools, together with the main objectives of the training activities.



Question 7: "Do you use a blockchain tool or blockchain related concepts directly in your day-to-day activity?"

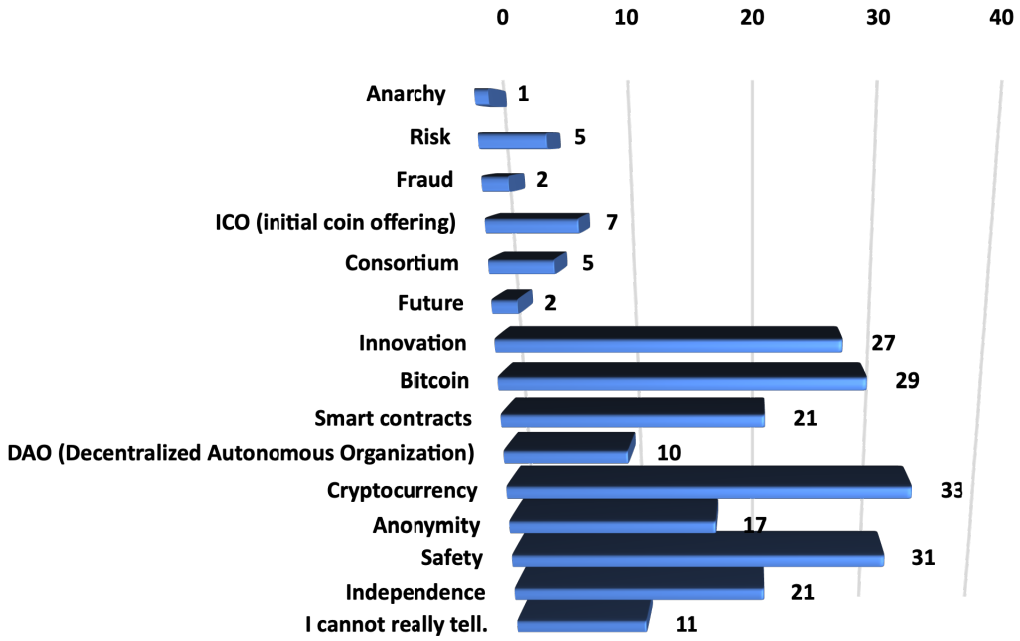
The most significant advantages, according to the respondents included in the sample, were: greater security / lower risk (32%) and new business models and revenue sources (18%). Only 5% of the respondents highlighted lower costs or access to global markets as advantages when using blockchain. Thus, blockchain is seen as a secure technology, in a world of digital risks, providing the framework for transactions of data by using cryptographic hashing functions. On the other hand, greater

security rules with higher costs, which is one of the most frequent disadvantages of the blockchain technology, especially for small companies.



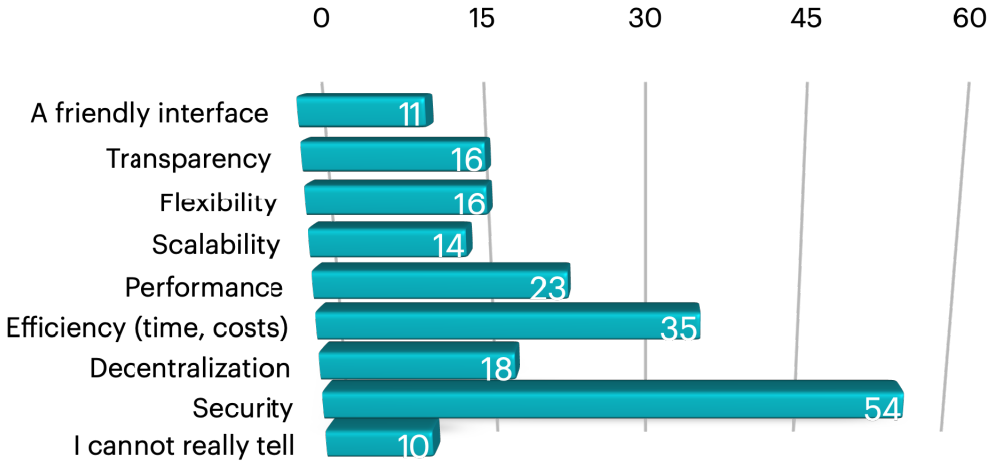
Question 8: "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry? (choose one - the most significant)"

Cryptocurrency and Bitcoin are the most frequent associations with blockchain, which is also a confusing structure for some respondents. They have to understand that blockchain is far beyond Bitcoin and cryptocurrency, being a collaborative technology that can improve many other sectors. The Romanian public, especially students, must understand the fundamental difference between blockchain and cryptocurrency, in order to speculate its potential. Once again, it was mentioned safety as a main characteristic of the blockchain system, even if there were also some negative points (reduced in number) such as: risk, fraud, anarchy. Innovation, anonymity and independence are other positive associations with the blockchain term, suggesting a open attitude of the Romanian public to the blockchain. Only few responses were turned to the specialized terms like ICO (initial coin offering) and DAO (Decentralized Autonomous Organization), being used mainly by experts from the IT sector.



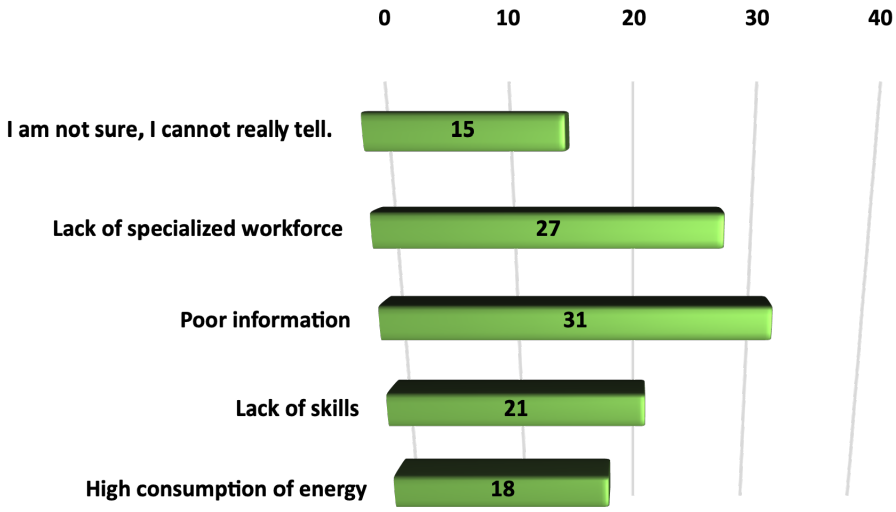
Question 9: "Which of the following do you associate with blockchain technology? (tick all options relevant to you)"

Almost all the questioned people consider security as the main attribute of a blockchain application, followed by efficiency in terms of time or costs and performance. Blockchain technology has the potential to evolve into an entirely decentralized system, using a powerful cryptography that combines public and private keys in order to secure data and validates the new blocks. However, there is a lack of friendly interface for blockchain, according to the subjects of the questionnaire. Blockchain is revolutionary in terms of security, but has serious problems in terms of popularity. The lack of knowledge regarding the functionality of the blockchain technology can damage its development in Romania.



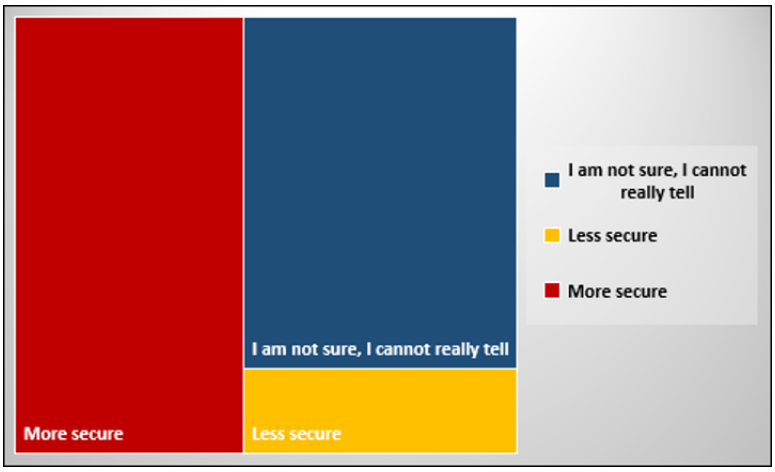
Question 10: "What do you think are the most important 3 attributes that a blockchain application must have in your vision? (check the three that apply)"

The opinions converge to the idea of a lack of specialized workforce and skills, alongside with the poor information in the field. Unfortunately, there are few basic information regarding blockchain in the educational system, mostly in the academic environment. In this context, there is necessary to provide basic and complete information to both specialized students or not, together with series of training modules on the subject to prepare the workforce for innovation.



Question 11: "What do you think would be the weaknesses of such technology?"

Approx. 45,45% of the respondents consider blockchain more secure than systems built from more conventional informational technologies, while 10,6% consider it less secure. This discrepancy can be explained by the inertia of traditional mentality, much more attached to the conventional information technologies. The answer suggests the blockchain potential in our country, which is seen as innovative technology and is frequently associated with the term "future", as resulted from the previous analysis.



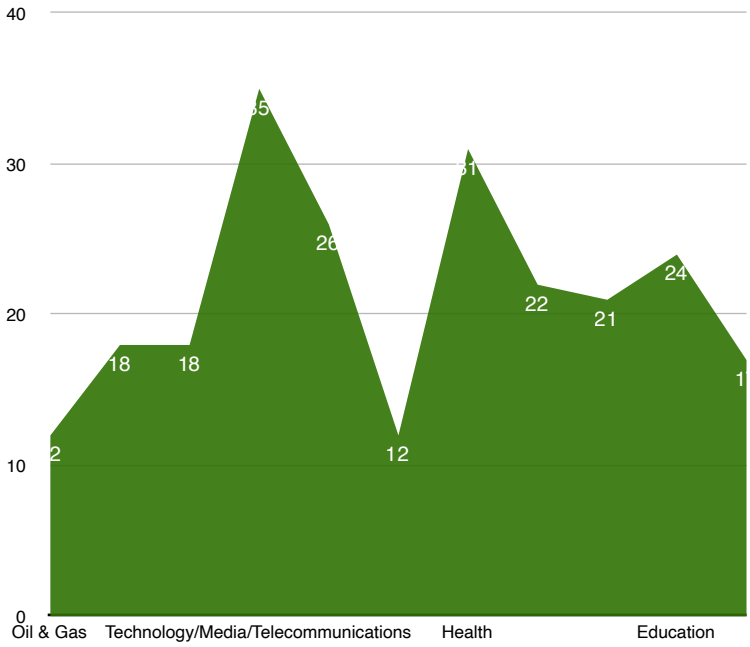
Question 12: "Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?"

The majority of respondents think that Blockchain technology is broadly scalable and will eventually achieve mainstream adoption (29 respondents), while only 2 respondents think otherwise. A double number of respondents think that suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain (24 respondents), while the answer "False" was chosen by 11respondents. The interest of the decision-makers on the blockchain subject was revealed by the responses at the statement "Executive team believes there is a compelling business case for use of blockchain technology", where the proportion was 21 responses for "Yes" and 10 responses for "No". A clear majority stated that they will lose a competitive advantage if they don't adopt blockchain technology (36,36%), suggesting that the future must be focused on the technology investing request. Only 14 respondents agree with the statement that "Blockchain technology will disrupt our industry" (14 responses), in comparison with 24 responses for the answer "False". This situation suggests a positive attitude of the Romanian people for the blockchain technology, conclusion that is reinforced by the opinion that blockchain is not overhyped (28 respondents).

Statement	No. of respondents that answered "True"	No. of respondents that answered "False"	No. of respondents that answered "I cannot really tell"
Blockchain technology is broadly scalable and will eventually achieve mainstream adoption	29	2	35
Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain	24	11	31
Executive team believes there is a compelling business case for use of blockchain technology	21	10	35
Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain	20	18	28
Will lose a competitive advantage if we don't adopt blockchain technology	24	11	31
Blockchain technology will disrupt our industry	14	24	28
Blockchain is overhyped	7	28	31

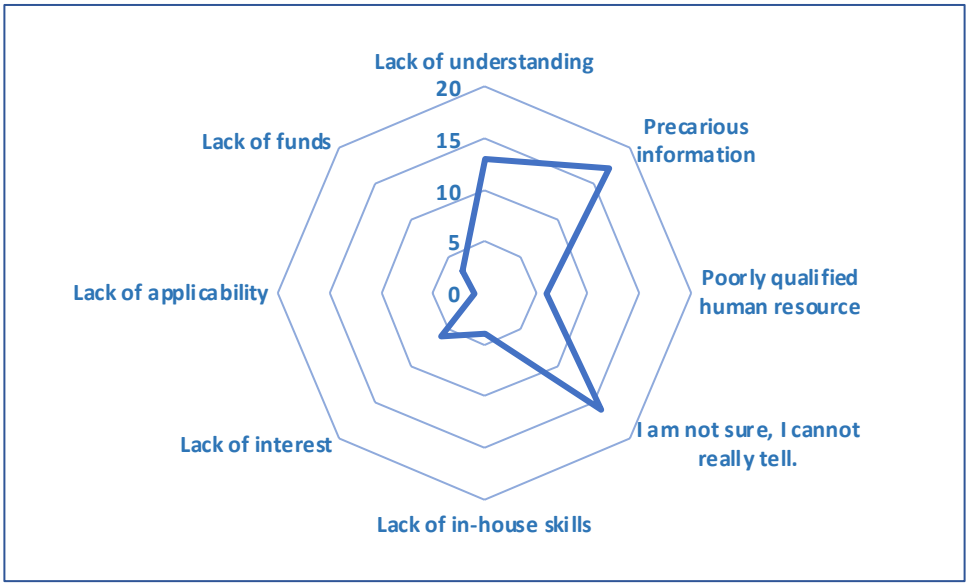
Question 13: "How can you assess, from your point of view, each of the following statements regarding blockchain technology?"

A large number of respondents consider blockchain useful in fields like: technology/media/ telecommunication (14.83%), health (13.14%), public sector (11.02%) or education (10.17%). To a large extent, we can mention also the Life Sciences (including Biotech) – 9.32% and Medical Devices and Pharma – 8.90%, while only 5.08% each are directed to the Oil & Gas sector or Consumer products & Manufacturing.



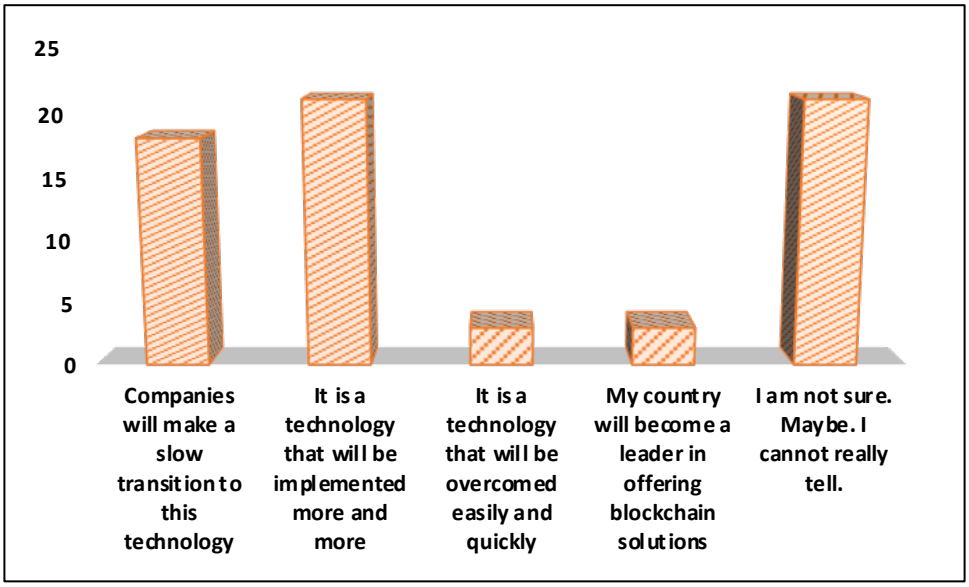
Question 14: "In what other areas do you think the use of blockchain would be useful?"

The most common barrier in using the blockchain technology in Romania is the precarious information (17 responses) and the lack of understanding of the term (13 responses). This response reveals the information gaps in our country related to the blockchain technology, situation that can be fixed by a proper campaign of blockchain awareness. The results are in line with the main objectives of the project, suggesting the urgency of covering the blockchain subject for three main types of target-groups: students, teachers and entrepreneurs. On the other hand, there are also the responses related to the human resource: poorly qualified human resource or lack of in-house skills, while only 6.06% is related to the lack of applicability or lack of funds responses.



Question 15: "Which do you think would be the main barrier in using the blockchain technology in your country?"

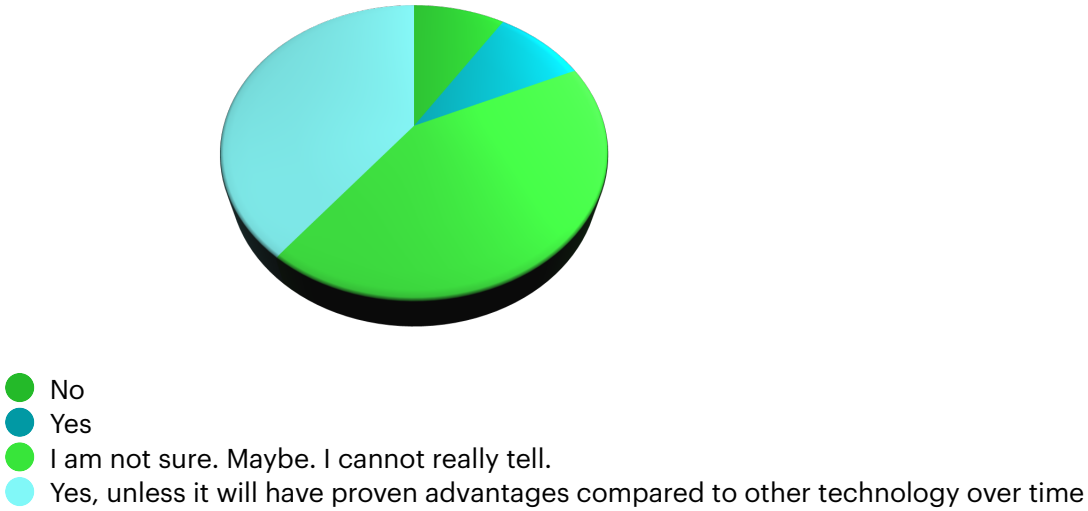
There is a quite common perspective on the blockchain progress in Romania, revealing a growing technology that will be attached by the Romanian companies in the next few years. A weak disagreement is related to the rapidity of this process, with a slow domination of those considering it a dynamic evolution ("It is a technology that will be implemented more and more") towards those considering that "companies will make a slow transition to this technology".



Question 16: "How do you see the blockchain progress in your country?"

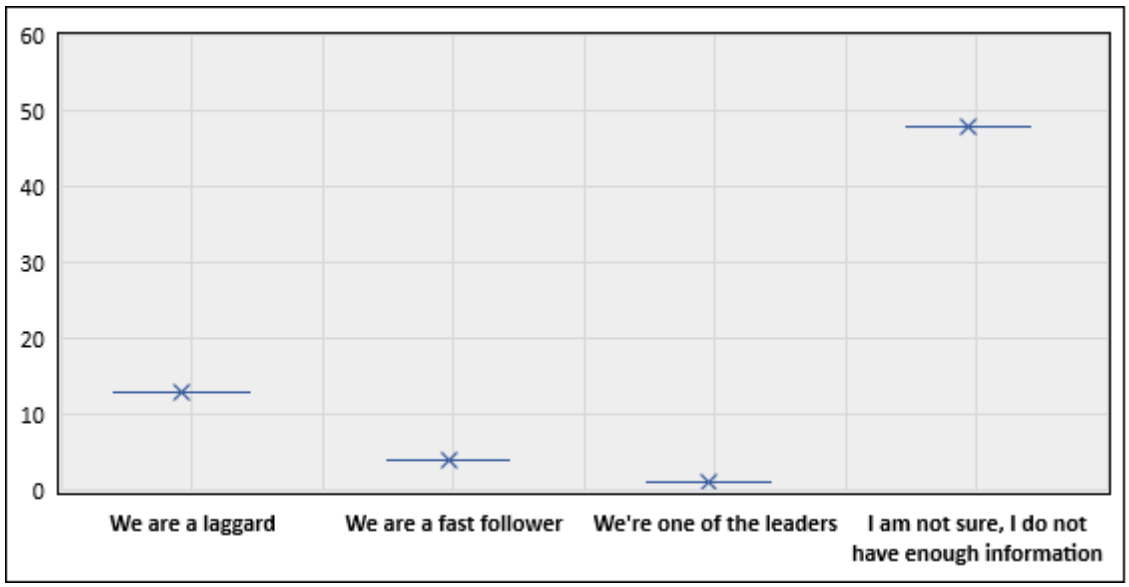
The response to the question "Would you choose blockchain as a solution to your problems at the expense of other solutions?" is quite safe, considering the balance between those who answered "Yes" and those who answered "No". However, there is a clear positive response conditioned by the proven

advantages compared to other technology over time. In this context, we mention the general attitude towards blockchain in Romania: reluctance, based on both lack of information and specific skills.



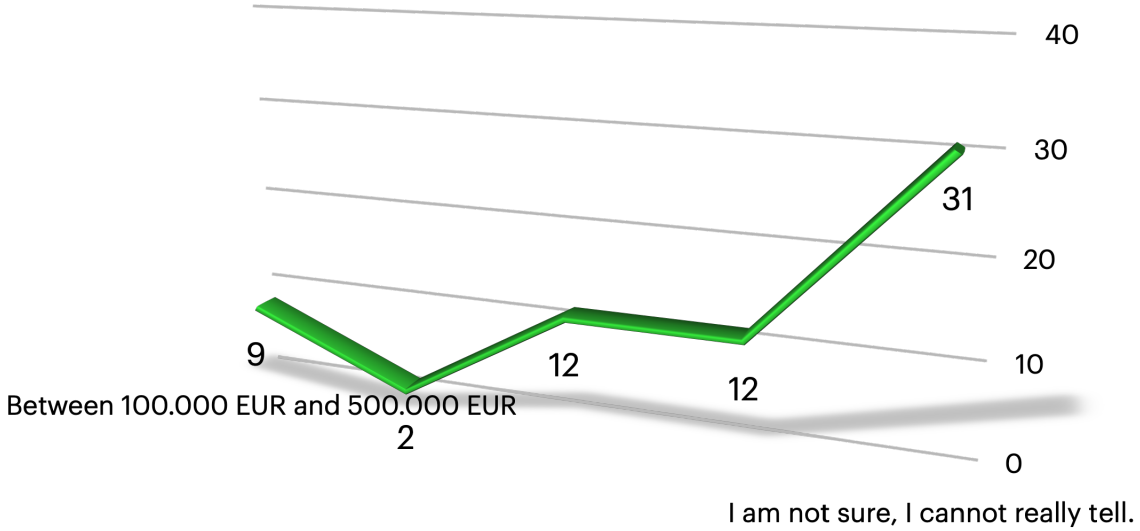
Question 17: "Would you choose blockchain as a solution to your problems at the expense of other solutions?"

The analysis suggests an expectative status of the Romanian people in the blockchain transformation and a lot of understanding deficiencies. People do not know their position comparing to that of their competitors (72.73%) or they do not sufficiently understand the process, making it much harder to measure. Only one person considers that its company is one of the leader, while 6.06% respondents think that they are a fast followers and 19.70% are in the laggard category.



Question 18: "How does your organization's current adoption of blockchain compare to that of your direct competitors?"

The construction of the sample was well balanced, 13.63% being framed into the 100.000 EUR – 500.000 EUR category, 18.19% being under 100.000 EUR and the same percentage for more than 1 million EUR. Only two respondents represent companies with total revenues between 500.000 EUR and 1 million EUR.



Question 19: "What is the total revenue of your organization in 2018?"

Approx. 76% of the respondents say that they are not sure about the future investing in blockchain technology. The lack of such information is a direct consequence of employees' involvement in the planning strategy and the overall lack of information regarding this issue. Approx. 15% of the people questioned do not plan to invest in blockchain in the near future, while only 9% of respondents declare that their companies are planning to invest in blockchain technology.

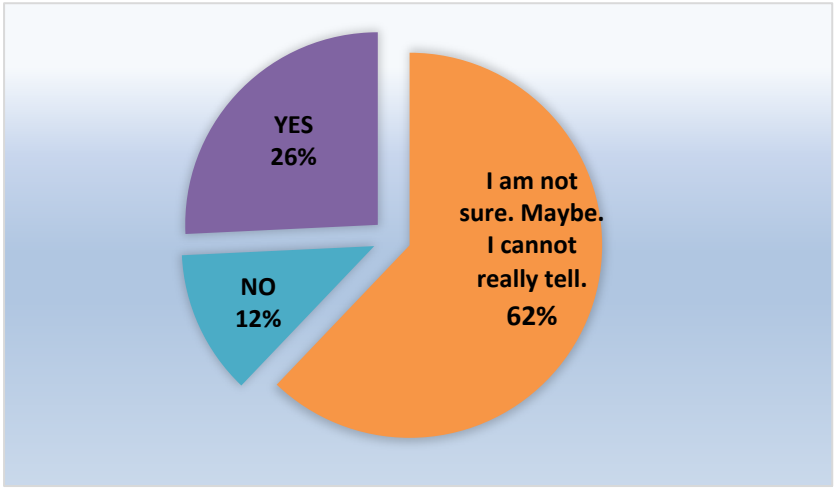
Question 20: "Is your organization planning to invest in blockchain technology?"

Approx. 45% of respondents are not sure or do not know if their company is planning to invest in hiring staff with blockchain experience, while 23% chose the option "we have not decide". Only 9% of respondents said their company is hiring staff with blockchain experience and another 15% think their company will start investing. Also, only 8% of the respondents said their companies are not planning to invest in hiring staff with experience in blockchain.

Survey responses	Answers	Percent
Currently investing	6	9%
I am not sure. Maybe. I cannot really tell.	30	45%
We have not decided	15	23%
We will not be investing	5	8%
Will begin investing	10	15%
Total		100%

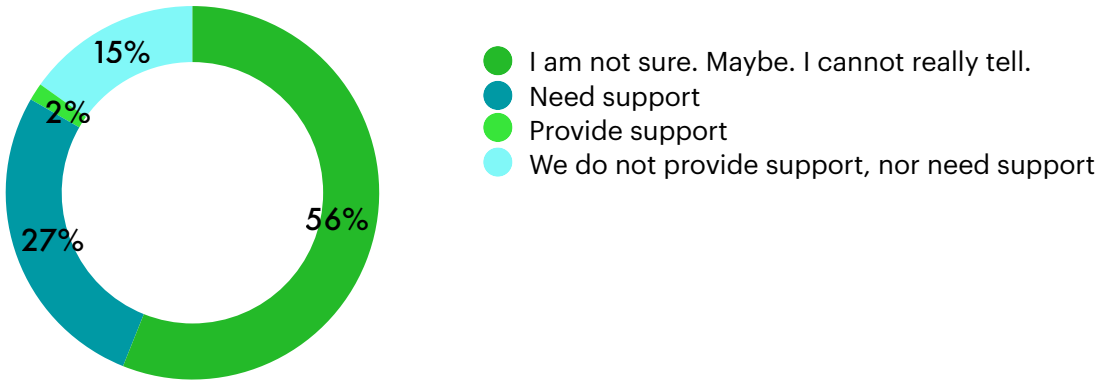
Question 22: "Is your organization investing in hiring staff with blockchain experience now and in the future?"

Most of the respondents (62%) do not know if their company is planning to train existing staff to use blockchain technology now or in the future. 26% of respondents said their company already plan to train staff in the use of blockchain technologies and only 12% of respondents think their company don't train existing staff in this direction in the future. The low number of negative answers show us a positive attitude regarding the adoption of this technology in the future.



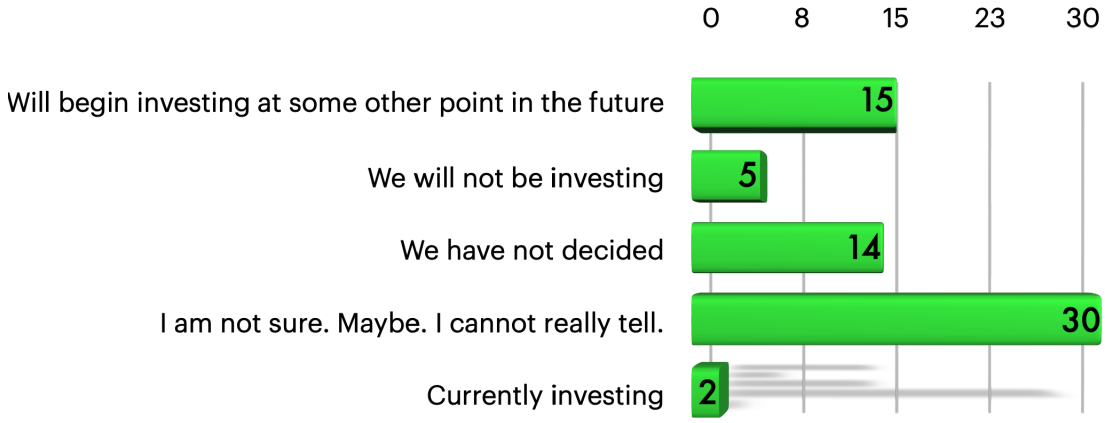
Question 23: "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future?"

More than half of respondents of our survey (56%) are not sure and cannot tell if their company nead support in implementing a blockchain based application. Approx. 27% of the respondents think their company need support in this direction and 2% said their company already provide support to others.



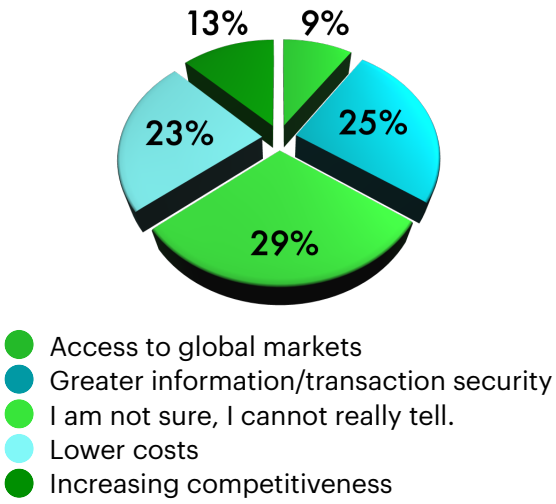
Question 24: "Can your organization provide/need support in implementing a blockchain-based application?"

Approx. 45% of respondents are not aware if their organization investing in replacing parts of their systems with blockchain-based enhancements. Maybe their position in the company does not give them access to this kind of knowledge about future company's investments. Only 3% of respondents said their company already invest in this and 8% are convinced otherwise: their company will not invest in replacing parts of their systems with blockchain-based enhancements.



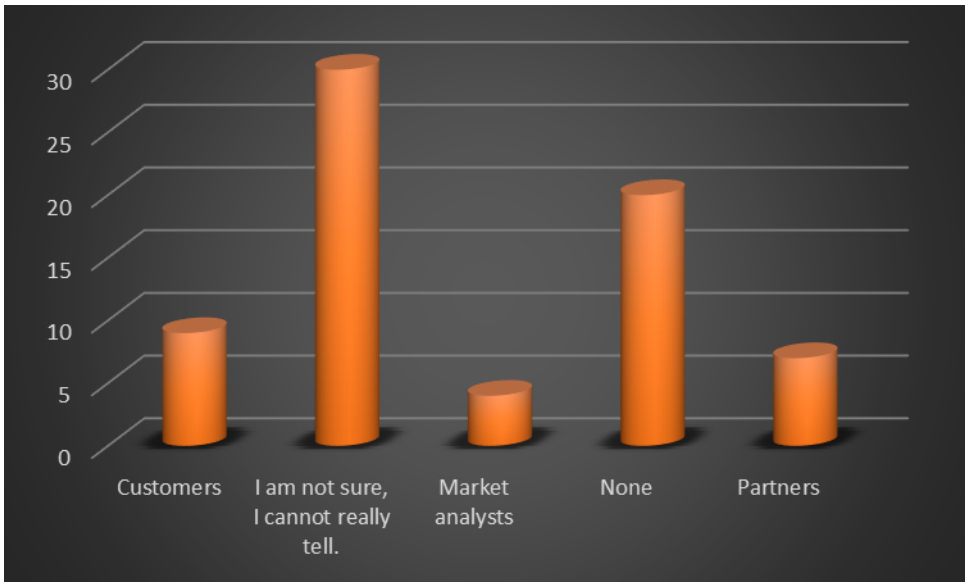
Question 25: "Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?"

Almost half of respondents (48%) consider lower costs and greater information/ transaction security as the main benefits blockchain might bring to their company. Other 13% said blockchain will be increasing competitiveness and 10% think they will benefit from access to global markets. The fact that 29% of respondents are not sure about the benefit could be because they do not know enough about blockchain and what this technology can bring to their company.



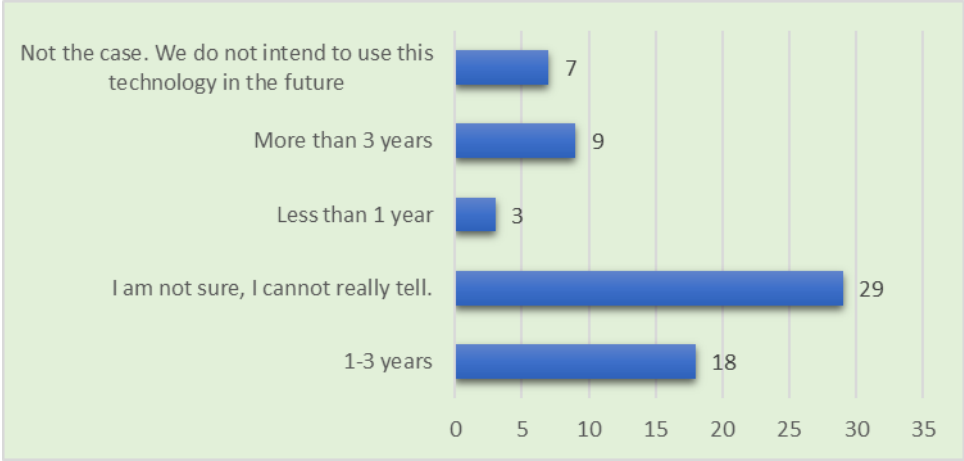
Question 26: "Please specify how the use of blockchain would or might bring benefits to your organization."

In order to see if there is any interest in Romanian market, we asked our respondents if there are any requests in developing applications based on blockchain. The result was that customers and partners, probably of IT firms, are engaging in discussions about blockchain. The remaining respondents, most of them do not know, or deny the presence of such requests.



Question 27: "Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?"

Most of the respondents (29) are not sure if blockchain will impact their organisation. This percentage is so high because of the lack of information about blockchain technology in general. They don't really know what blockchain is and how it can affect their organization.



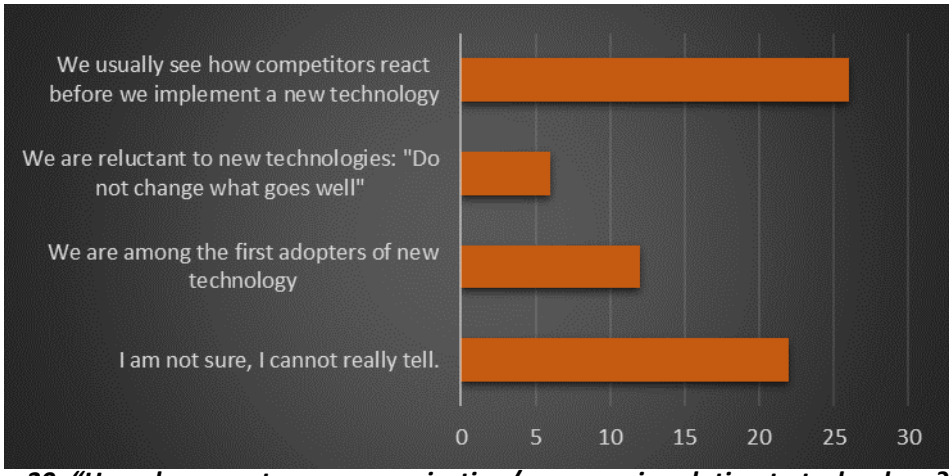
Question 28: "How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?"

Almost every respondents confirm that their company use dedicated email and file sharing platforms, and many also use cloud services, and integrated CRM/ERP system. Only 9 respondents are not sure what technologies use their organisation.

Survey responses	Answers
Dedicated e-mail	46
Communication platforms	23
Cloud services	24
File sharing platforms	43
Integrated ERP system	12
Integrated CRM system	11
I am not sure, I cannot really tell.	9
Total	

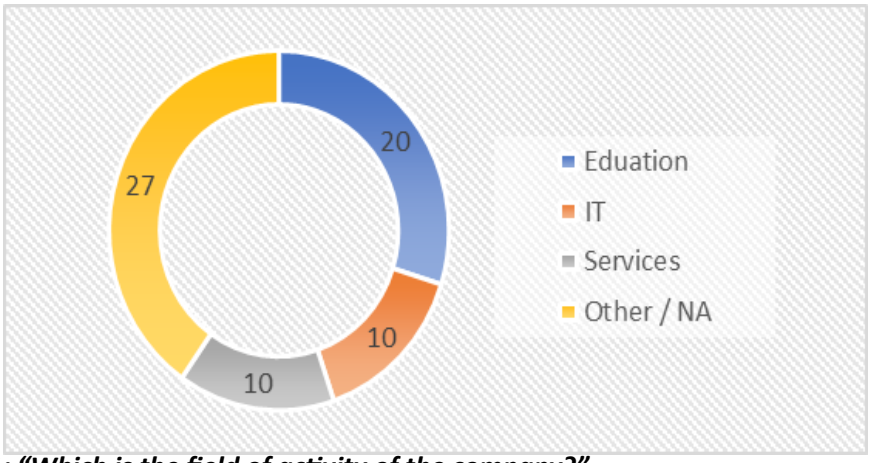
Question 29: "What types of technologies do you use in your organization/company?"

The majority of respondents at 30th question (40%) said their organization will implement new technology only if their competitors do this first. Maybe some high-quality materials and informations about blockchain and its advantages could make these company to be more proactive, and implement new technology much faster. Only 18% of respondent sait their company is among the first adopters and willing to make investments in technology that can make them more competitive in the market.



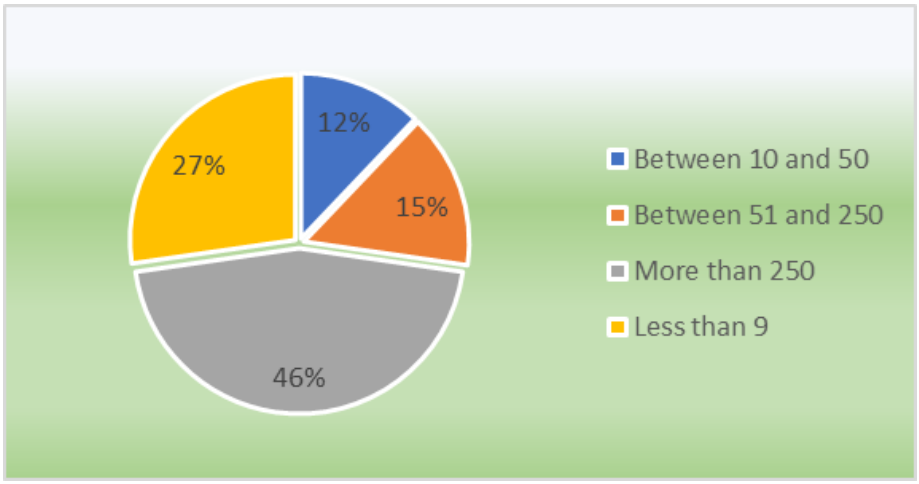
Question 30: "How do you rate your organization/company in relation to technology?"

The respondents in our survey said they are are employed by IT company or working in Education or Services. However we also find respondents from public administration or sales.



Question 31: "Which is the field of activity of the company?"

As for the number of employees, almost half of respondents (46%) work in large company, with number of employees over 250. On the other hand, 27% of respondents are in small company, with less than 9 employees. Other 15% of respondents workin companies where total number of employees are between 51 and 250.

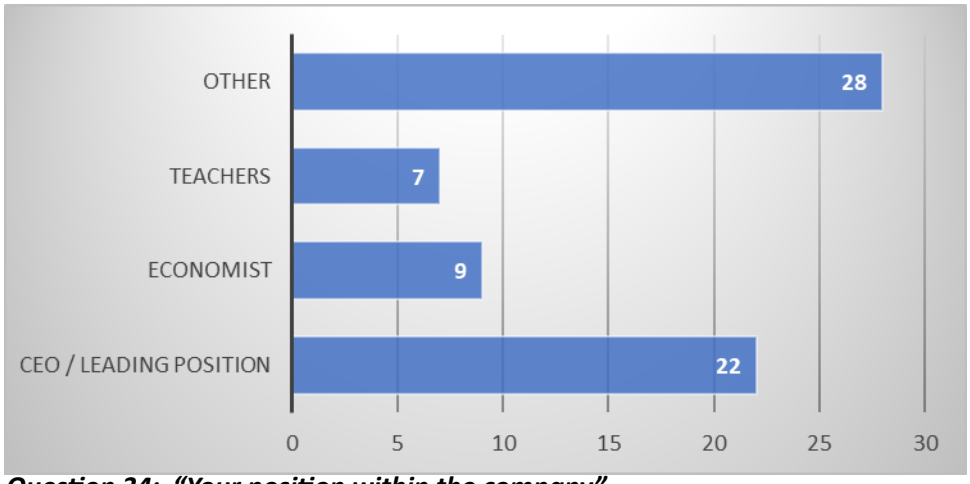


Question 32: "Number of employees"

36% of respondents work in companies works in relatively new companies, founded between 2000-2010. Only 15% of respondents work in company with more than 30 years since they were founded. Other 18% are employed by companies established in the last few years, being founded after the year 2010.

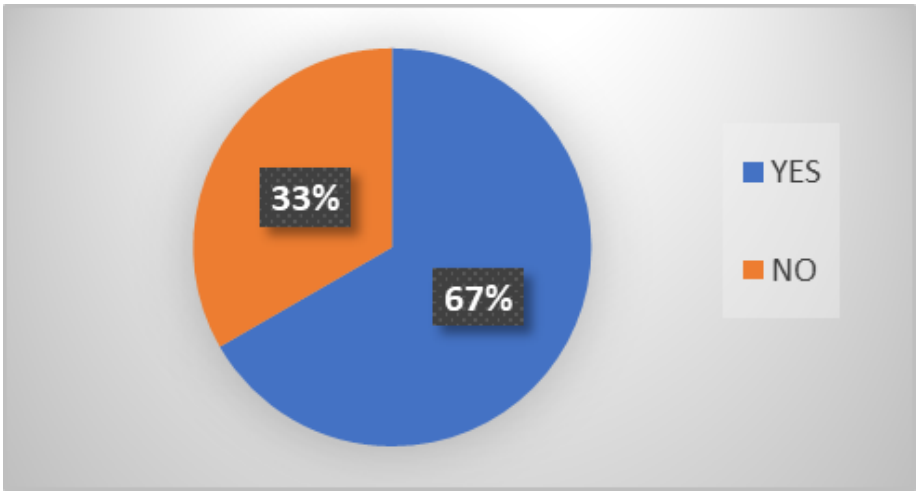
Question 33: "When was your company established?"

Regarding the position of respondents in their company we see that 33% of respondents are in top management but we also have teachers or economists.



Question 34: "Your position within the company"

Regarding the desire to continue receiving information we notice that 67% is interested in obtaining more information about blockchain technology. This outcome is a good sign, since we were looking for establishing the climate within our ecosystem regarding the interest for improving existing knowledge.



Question 36: "Are you interested in getting more information about blockchain and possible apps for your business?"

As we said in the introduction, our research is focused on the feedback given by these 3 categories of respondents - students, teachers/trainers and entrepreneurs- since they are the main actors in implementing blockchain at a larger scale in Romania.

STUDENTS

The situation of the students' knowledge of blockchain technology initially seems somewhat satisfactory considering that just over half of them (57,14%) say they have heard about it. But by looking more closely at all the answers it is noted that the present questionnaire determined the students to use the internet to search for information for the first time on blockchain technology.

The answers sent later demonstrate a poor knowledge of blockchain technology based on internet interaction and information from acquaintances, as stated by 40% of all respondents (or 69% of those who heard about it). Most of them also heard about blockchain after 2015 (75%), which was expected considering the age of the respondents. Almost none of the students know of companies that have implemented blockchain technology, the few who have recognized the knowledge of such companies have placed them in the IT area, for the most well-known global companies.

Thus, the influence of information via the internet through specialized indefinite searches, has led students to consider that the most important advantages of using blockchain technology (BCT) are access to global markets and new business models and revenue sources, which disregards the other advantages of BCT. Also, the most associated element with BCT is cryptocurrency (60%) followed by independence, security being the most important feature.

The lack of knowledge about BCT, caused the students to consider that the weakness of BCT is the lack of information about it, thus linking the situation in the Romanian education system, the knowledge about BCT being transmitted only in a few university centres too few to awaken students' interest. This lack of knowledge drives equality of opinion of those who believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies

Given that students, for the most part, do not have complex experiences regarding the situation of BCT implementation in companies, their answers mostly revealed the absence of information.

Regarding the difficulties of applying the BCT in Romania, the students consider that the most important problems are lack of understanding and precarious information, considerations related again to the received

information and their transmission. Even if the students consider that BCT will be implemented more and more, this will be slow in Romania and more than half of them would adopt BCT only if it proves more advantageous than the other technologies.

Regarding the desire to continue receiving information about BCT, only half of the students were interested (53%). This percentage was again accounted for by the lack of information and by the way the information was presented in the sources to which the students had access.

There is a need to increase the amount of information included in the curriculum in the form of courses and examples that will present widely the BCT, covering all the areas of application of the BCT, as well as the possible advantages and positive influences on the economic and social aspects. One of the directions to be pursued should be the transmission of mass information to students and adults alike, based on real examples.

TEACHERS

Regarding the teachers, the premises of the analysis considered a knowledge of BCT based mainly on information obtained through educational networks, conferences or exchanges of experience. These sources should provide much more in-depth information, with specific and specialized content that will easily and efficiently convey what it represents and how BCT can be used. Unfortunately, considering the answers provided by the teachers, things seem to have the same information problems as for the students. Almost half of the teachers (43%) learned about BCT from the Internet, while less than a quarter of them (21%) obtained information from the conferences they attended. This shows either that there are too few events to popularise the BCT or that the interest for the domain is low and this happens even when they stated that the information about BCT was obtained after 2015.

Thus, although links with the business environment are necessary in a modern educational system, only a quarter of the teachers know organizations or companies that implement BCT and all have been classified in the fields of IT, cybersecurity and banking. At the same time only one of the respondents stated that their organization had the opportunity to use / develop BCT in the field of cybersecurity.

In these conditions, the responding teachers considered that the greatest advantage of using BCT is greater security / lower risk (47%) and acknowledged that the features associated with BCT are security and cryptocurrency (63%).

Again, this seems to be the result of the quality and comprehension of the information transmitted on the Internet. The disadvantages of using BCT were considered by half of the teachers as high energy consumption and lack of specialized workforce, as is usually found in BCT presentations online, but 74% of them consider that its use is safer than systems built from more conventional information.

Regarding the difficulties of implementing BCT in Romania, teachers scored 56%, as expected, features close to the educational field: poorly qualified human resource and little information on the subject, but a transition to the BTC is inevitable.

Aside from the lack of information about possible BTC applications, 63% of respondents do not know if their organization is in the situation of implementing BTC, which means that in most cases a BTC strategy of the organization was not transmitted to the organization. But if the organization they come from would use BTC it would gain benefits such as lower costs, greater information / transaction security, increasing competitiveness, access to global markets, as half of the teachers consider, and its implementation would take 1 to 3 years. Unfortunately, the educational organizations of which the respondents belong, have the first tendency to wait to adopt the new technologies following the direct competitors.

Fortunately, three quarters of the teachers (74%) were interested in learning more about BCT in the future.

Searches regarding educational initiatives have hardly determined the finding of curricula containing the blockchain topic, suggesting the conclusion that BCT is still at the beginning of the road in Romania. The hope

is found in the personal initiatives of the different teachers who transmit the information they seek and record personally, but also more and more in national and international projects, whose aim is to promote the BTC and the advantages of its application in various fields.

ENTREPRENEURS

The companies represented by the respondents have different fields of activity, among which IT, communication, etc., and the representatives are mostly CEOs and top managers.

At the beginning of the analysis of the answers of the entrepreneurs, it was supposed a closer approximation of the representatives of the companies to the knowledge of BCT. This is confirmed by the large number of responses regarding BCT knowledge, 74% of the respondents confirmed that they heard about it, which resulted in a positive feeling considering that BCT knowledge by the business environment can certainly be an engine of promotion.

Unfortunately, the sources of knowledge are not competition sources or internal to the organizations they belong to, but again the internet for more than half of the entrepreneurs (64%) or friends for 21% of them (10% of the total respondents). Another problem of the lack of information regarding the organizations that use BCT was the field in which they operate, none of the areas proposed by the questionnaire was highlighted, and the answers were very brief, limited to only two domains recognized by each respondent.

Of all the companies represented only 15% had the opportunity to use / develop applications that use blockchain, in just a few areas such as: offered product / service, digital identity, cyber-security, healthcare and payments. Only 26% of responding entrepreneurs at one time used BCT (including cryptocurrencies) and 42% of respondents considered the most important benefits: greater security / lower risk and new business models and revenue sources (again considering cryptocurrencies).

Cryptocurrencies and security are the first features, in proportion of 69%, to which the respondents think when they are reminded of BCT, security being considered the main feature by 68% of them.

Regarding the application of BCT, 78% of entrepreneurs considered, largely as expected, that the lack of specialized workforce is the biggest problem.

Assessing the BCT the entrepreneurs considered the following:

- Blockchain technology is broadly scalable and will eventually achieve mainstream adoption – TRUE – 63%;
- Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain – TRUE – 53%;
- Executive team believes there is a compelling business case for use of blockchain technology – TRUE – 53%;
- Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain – TRUE – 47%;
- Will lose a competitive advantage if we don't adopt blockchain technology – TRUE – 47%;
- Blockchain technology will disrupt our industry – TRUE – 21%;
- Blockchain is overhyped – TRUE – 16%.

From these answers we can recognize a positive attitude regarding the future of BCT application and its adoption by entrepreneurs. However, a cautious approach is needed since the above answers are mostly based on accurate information as quantity and / or from heterogeneous sources.

Regarding the application of BCT technology in Romania, half of the respondents consider that companies will make a slow transition to this technology, this answer being very interesting coming from those who should be one of the engines of BCT implementation in Romania.

For the most part, the Firms whose representatives were questioned have revenues that allow the adoption, application or research of blockchain technology, however only 21% consider the BCT approach, but no respondent could confirm a plan or financial estimate for this thing.

Fortunately, a start seems to be taking off, considering that 47% of organizations want to train their employees in BTC, even though 93% of them think they will need support in this regard. Also exciting is the fact that 42% of entrepreneurs say they will invest in BCT (half of them in the next year), especially considering that this way they will reduce their costs and even if this would last 3 or more years (53%).

Finally, 84% of the respondents confirmed that they want more information about BCT.

Among the entrepreneurs, a special level of interest is present at IT SPECIALISTS. For IT Specialists, 83% of them know what blockchain technology means, 67% find out about BCT from the internet, mostly after 2015, as expected in their field of activity. Unfortunately, only 8% of the IT specialist is using BCT.

All respondents believe that BCT has as its main characteristic security, and as its main disadvantages high consumption of energy and lack of specialized workforce. The main causes of implementation difficulties considered by IT specialists are precarious information and lack of understanding and in Romania the companies will make a slow transition to this technology.

75% of IT specialists said they want to know more about BCT.

Main conclusions for Romanian study:

1. The big problem is the lack of information and those who use BTC.

2. A sustained campaign is needed to promote blockchain technology and build a viable online source to ensure the accuracy of information and a sufficient amount of information to be used in the interest of promoting BTC.

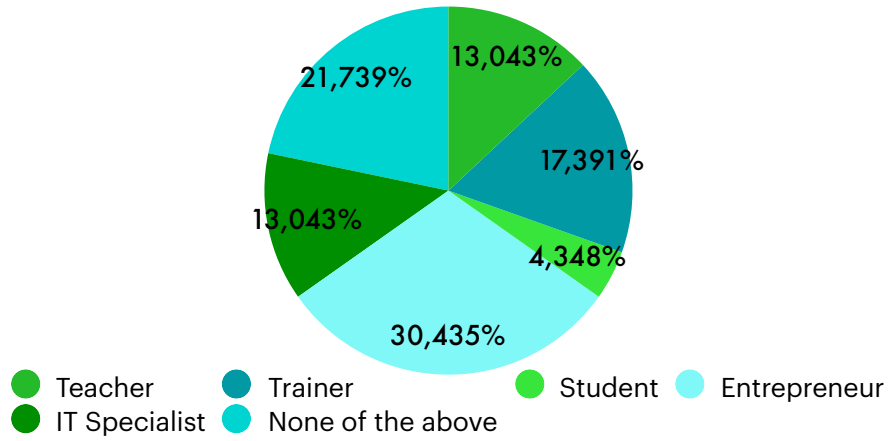
3. Involving as many actors from different fields of activity to become BTC supporters and agents.

4. A training program in blockchain technology is required and maybe a BTC learning and research funding program.

COUNTRY REPORT - LATVIA

Survey "Blockchain - Knowledge Assessment for Entrepreneurs" was distributed to the company's "Baltic Computer Academy" Ltd. clients and partners between May 11 and June 26, 2019. It was necessary to understand the knowledge gaps before creating study materials about blockchain technology and developing courses that will be offered to company's clients.

The total number of respondents from Latvia for survey – 22. Respondents represented various sectors such as information and communications technology (IT), cosmetics, education, legal sector, healthcare. Respondents represented companies that were mainly established between year 1990 and 2000 (more than 50%) and has more than 10 employees (73% of the respondents).



Respondents by occupation (question 1 – "Are you one of the following? Check all that apply")

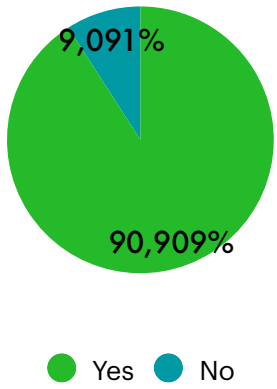
Among the respondents were lawyers, entrepreneurs, students, marketing specialists, researchers, IT specialists, trainers, project managers.

Latvia together with other Baltic countries has expressed its support of the development of blockchain or distributed ledger technologies. In 2018 Ministry of Economics of Latvia has published an informative report about the current use of blockchain technology, prospects and further actions that must be taken in order of development of blockchain in Latvia. In this report there is mentioned there are 25 startups in Latvia working in blockchain industry (for example, "BitFury" that is the world's leading full-service blockchain technology company, "PowerMining" that offers crypto mining containers that can be set up with different options and others). Also, the "Latvia's Blockchain Association" was registered in March 2017. The association a brings together 5 organizations that are related to blockchain technology and enthusiasts of cryptocurrency.

Great role of blockchain's ecosystem in Latvia takes platforms and support centers that provides information regarding use of different blockchain-based solutions. For example, "CryptoLab" trains and provides a variety of consultations regarding use of cryptocurrencies and investment opportunities in cryptocurrencies. "Blockvis" is a company of IT blockchain professionals that develops blockchain-based applications in the field of smart contracts and aims to educate society about it.

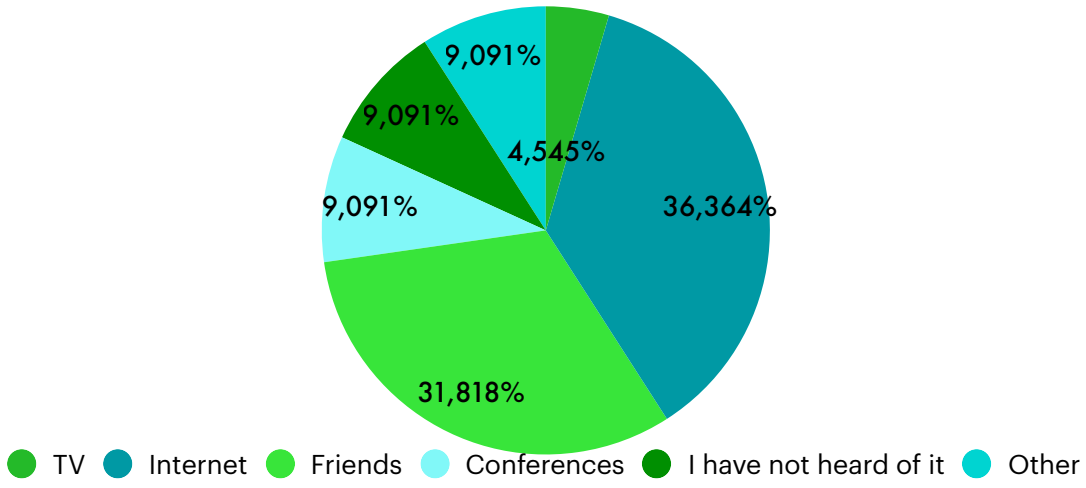
There are also conferences, discussions and networking activities, such as "RIGA COMM", organized by public and private organizations in order to educate society and IT professionals.

Despite of these facts and amount of IT experts in Latvia, society is still not fully introduced to this technology and do not have enough knowledge about benefits this technology can offer. Survey results below prove this statement.



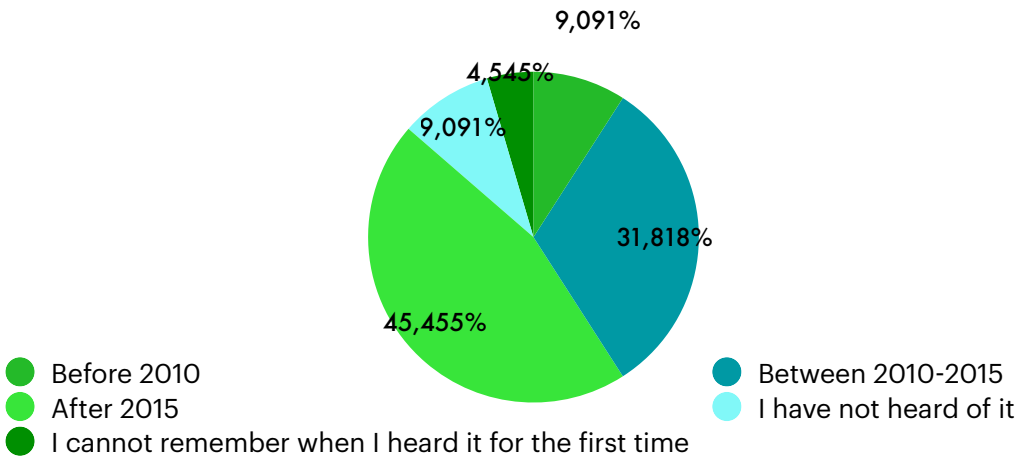
Awareness of the blockchain technology among respondents
(question No.2 "Have you heard about the blockchain technology?")

Survey results show that respondents are aware of blockchain technology and have heard of it (91% of respondents). 9% of the respondents have never heard of blockchain technology or not fully aware of it and its impact.



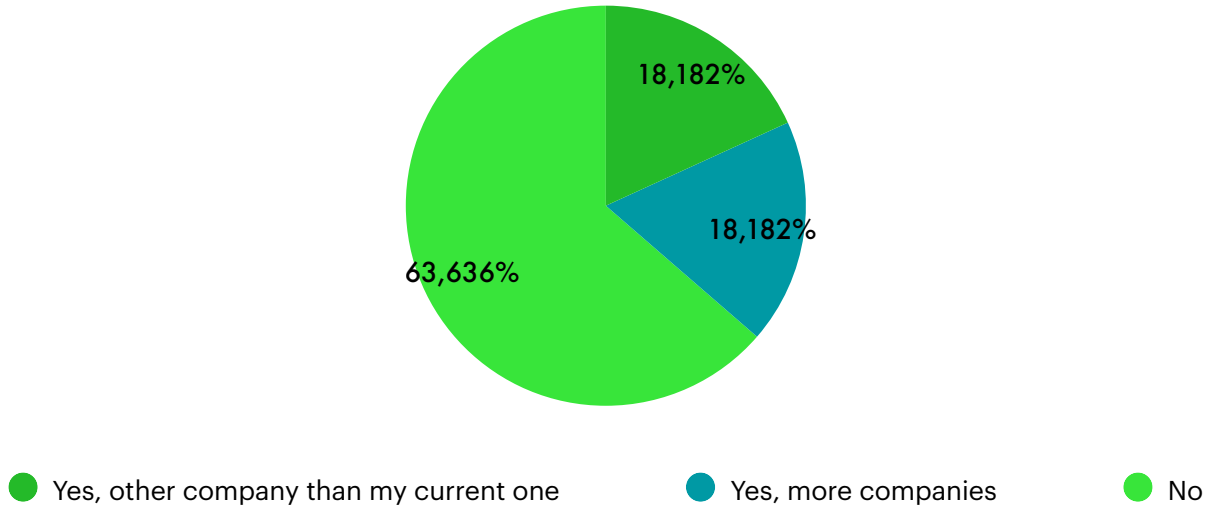
Resources providing information about blockchain technology
(question No. 3 "Where have you first heard of the term blockchain?")

Majority of respondents have read about blockchain or have seen the videos about it on the internet (36%) or have heard about it from their friends (32%) which could be the sign of blockchain knowledge disparity among society.



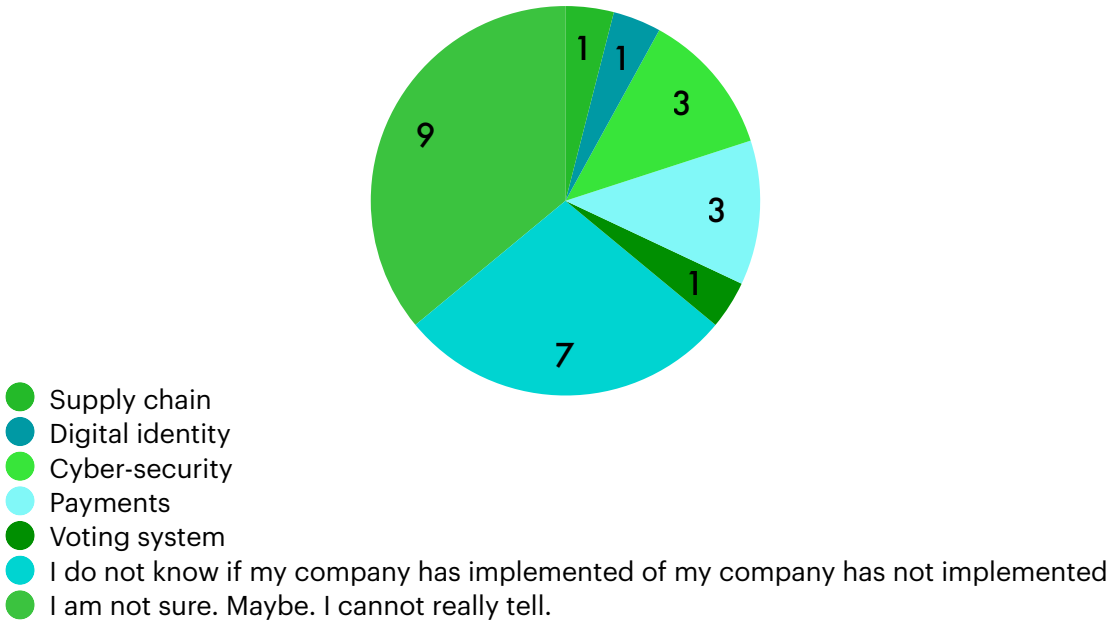
Time period respondents first heard about term "blockchain"
(question No. 4 "When have you first heard the term "blockchain"?")

Majority of respondents have heard the term "blockchain" after 2010 (77%). Only 5% of respondents have heard the term "blockchain" before 2010.



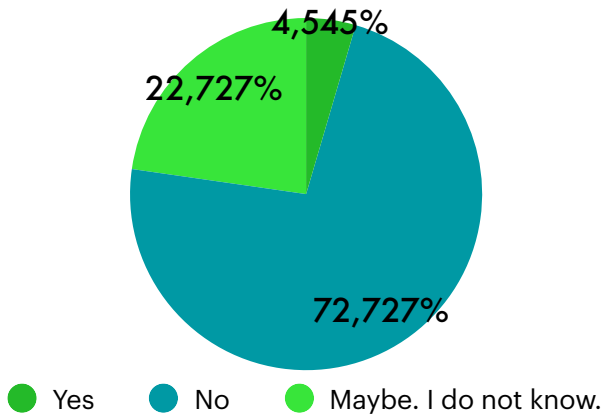
Knowledge about companies that implement blockchain technology
(question No.5 "Do you know any companies or organizations implementing a blockchain technology?")

Majority of respondents (64%) do not know any companies or organizations that are implementing a blockchain technology, however 36% of respondents acknowledged they do know companies or are working in one of the companies that implements blockchain technology in their processes or products.



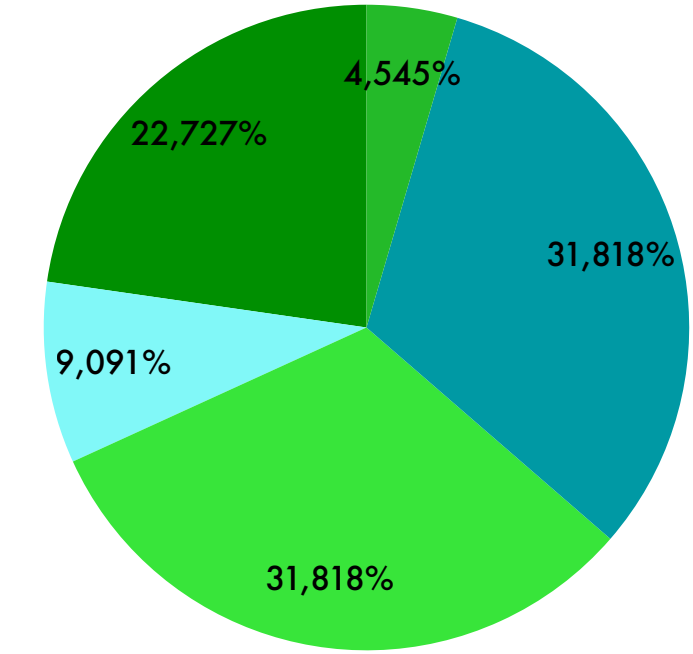
Business processes where blockchain technology is used
(question No.6 "If you answered "Yes" to the previous question, in which business process did you implement blockchain technologies?")

Majority of respondents do not know if and in which business processes within their company blockchain technology is used. However, positive is that some companies use blockchain technology-based solutions in payment processing, cyber-security and supply chain processes, voting system, digital identity.



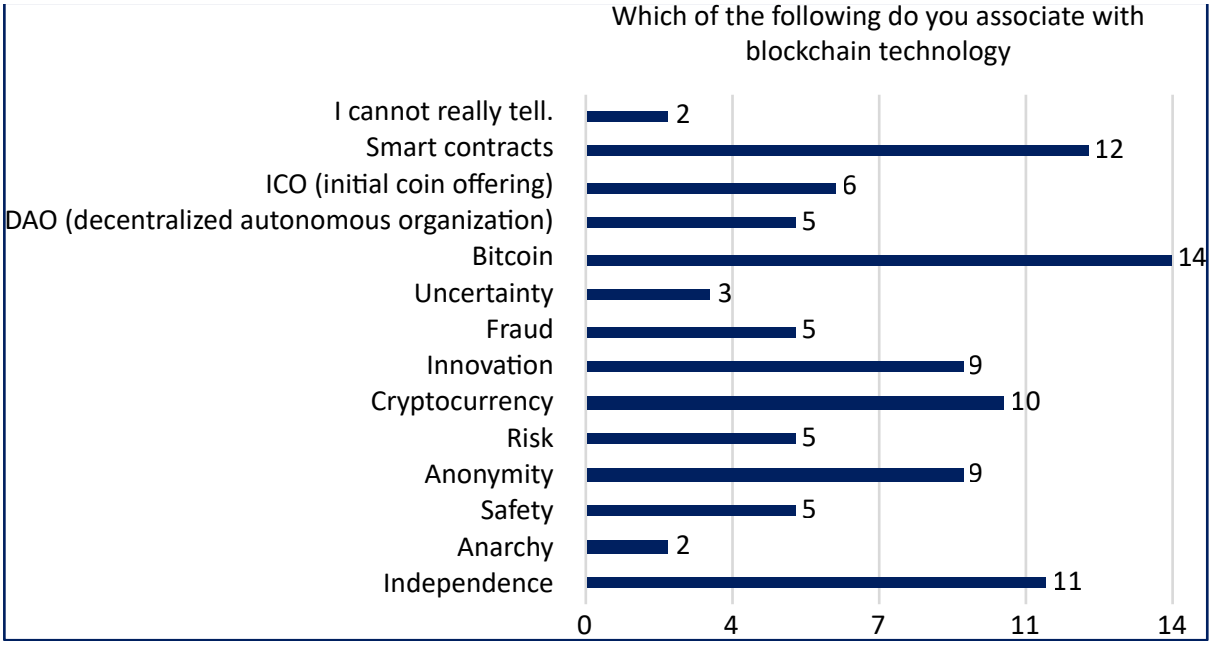
Use of blockchain in day-to-day activities
(question No.7 "Do you use a blockchain tool or blockchain related concepts directly in your day-to-day activity?")

Only 5% of respondents have deep knowledge in blockchain technology as they are using it in their day-to-day activities. Majority of respondents (73%) do not use a blockchain related concepts directly in their day-to-day activities so their knowledge about this technology could be not so advanced.



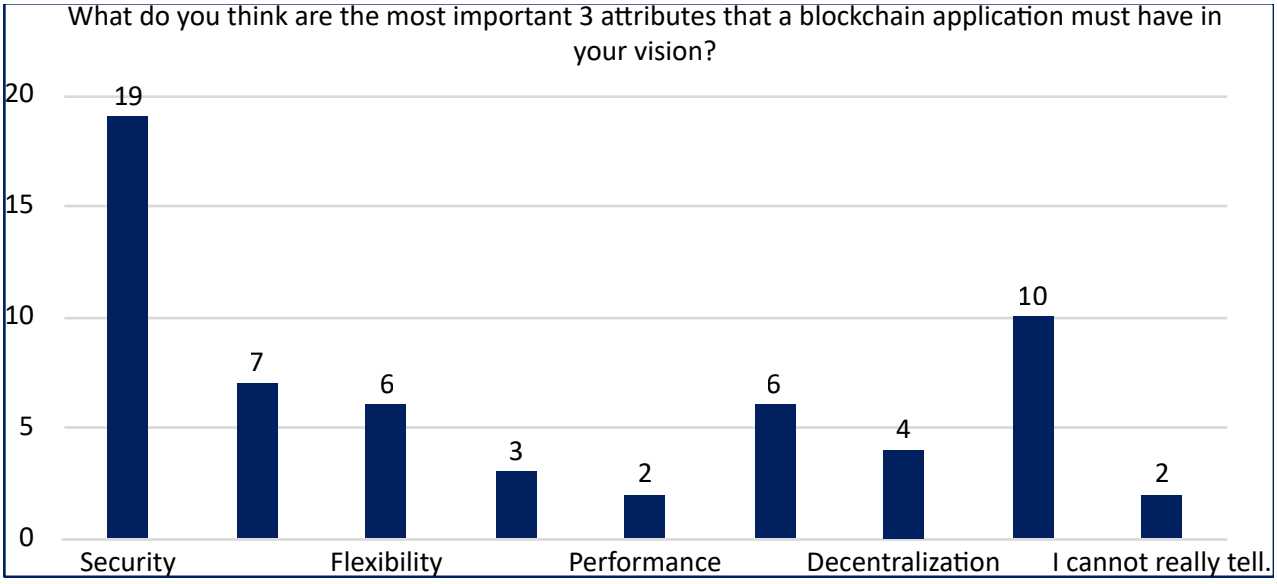
The biggest advantage blockchain provides
(question No. 8 "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry")

32% of respondents consider blockchain as a tool that can be used creating new business models and make new revenue sources. The same number of respondents (32%) consider blockchain's biggest advantage is greater security level it can provide. 5% of respondents think that blockchain can provide greater speed to company's existing systems, but 23% of respondents are not sure what is the blockchain's biggest advantage.



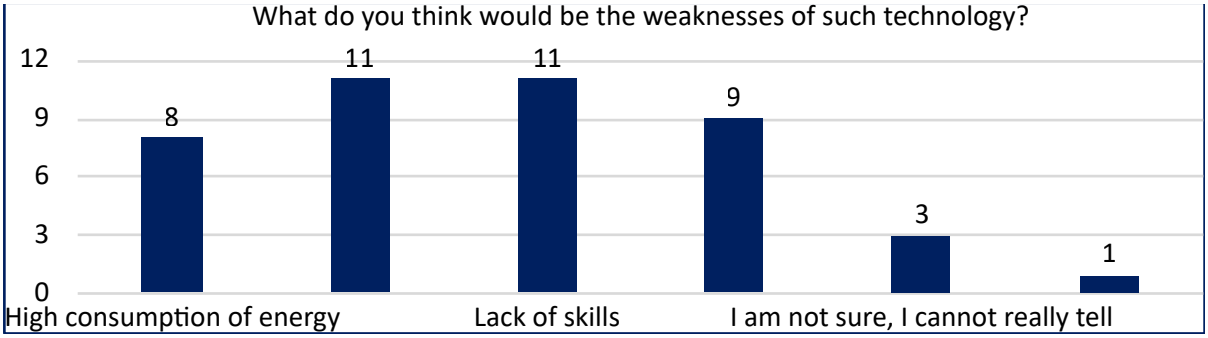
Associations with blockchain technology
(question No. 9 "Which of the following do you associate with blockchain technology?")

Respondents mostly associate blockchain technology with cryptocurrencies (also bitcoin, ICO, smart contracts). Independence and innovation are one of the most common answers to this question that means people do trust this technology and see prospects in it. Some respondents do associate blockchain with fraud, risk that means there is a knowledge gap in society about blockchain technology.



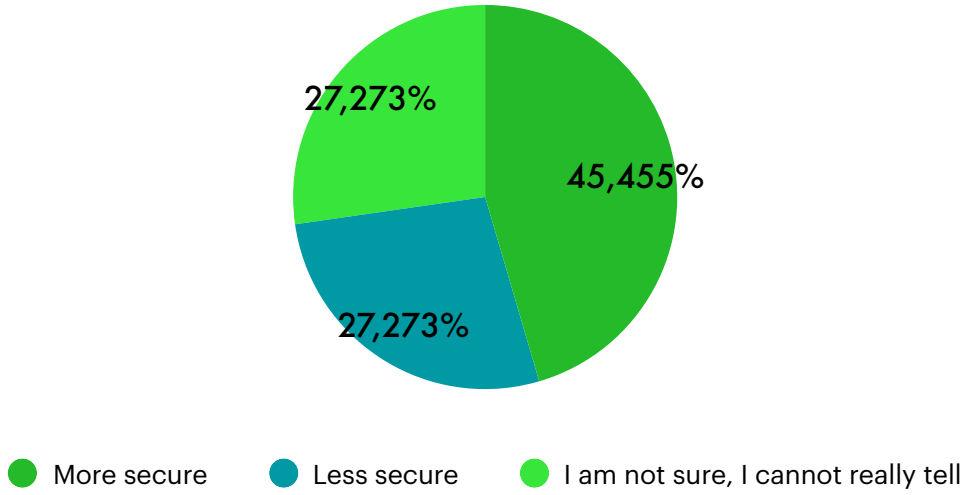
3 most important attributes that blockchain has
(question No. 10 "What do you think are the most important 3 attributes that a blockchain application must have in your vision?")

Most of the respondents consider blockchain as secure, efficient and scalable. Flexibility and transparency were also considered as one of the important attributes blockchain technology has.



Weaknesses of blockchain technology
(question No. 11 "What do you think would be the weaknesses of such technology?")

Majority of respondents says the biggest weakness of blockchain technology is that there is a lack of specialized workforce, lack of skills in the market and poor information is provided so companies cannot implement this technology in their processes. Few respondents said that the greatest weakness of blockchain technology is its high consumption of energy which means people most likely have heard about high electricity consumption of bitcoin.



Blockchain-based solution in comparison to other technologies regarding security level
(question No. 12 "Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?")

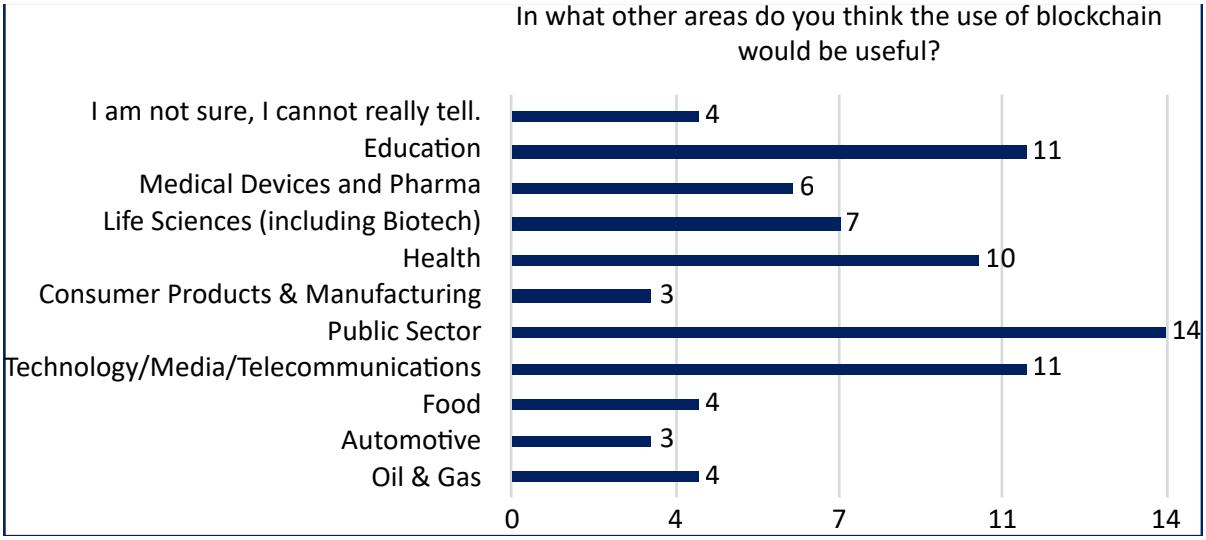
Almost half of the respondents says that blockchain-based solution is more secure than any other technology provided solutions. 27% of respondents think that blockchain-based solution is less secure than other technology provided solutions. This could be related to the fact that Latvian society is quite pragmatic – uncertainty and avoidance level in society is high so people tend to use methods they have used for a long time and are not so open to changes.

Table "Assessment of statements about blockchain technology"
(question No. 13 "How can you assess, from your point of view, each of the following statements regarding blockchain technology?")

Statement	No. of respondents that answered "True"	No. of respondents that answered "False"	No. of respondents that answered "I cannot really tell"
Blockchain technology is broadly scalable and will eventually achieve mainstream adoption	14	2	6
Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain	12	2	8
Executive team believes there is a compelling business case for use of blockchain technology	9	4	9
Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain	5	9	8
Will lose a competitive advantage if we don't adopt blockchain technology	3	9	10
Blockchain technology will disrupt our industry	2	10	10
Blockchain is overhyped	8	3	11

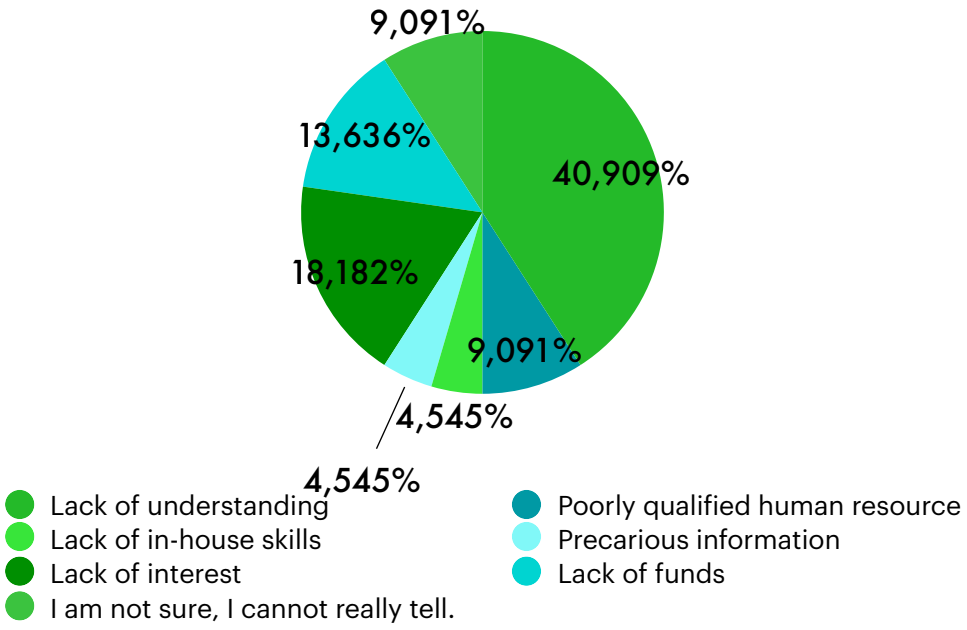
Majority of respondents think that blockchain technology is scalable and will eventually achieve mainstream adoption (14). Many respondents see the prospects blockchain technology can provide as 9 of the respondents says their executive team believes there is a compelling business case for use of blockchain technology. Moreover, more than a half of respondents (12) say their suppliers, customers and/or competitors are discussing or working on blockchain solutions to address their challenges in the value chain which means people see the various ways on how blockchain technology can be beneficial to companies.

Table shows that many respondents are lacking knowledge about blockchain technology overall as many of them are not sure, cannot tell which of statements is true and/or false (more than 6 respondents for each question). 9 of the respondents do not think blockchain technology have an impact on their business as they do not think they will lose competitive advantage if blockchain technology won't be adapted in their systems. Almost half of the respondents do not think blockchain technology will disrupt industry they are working in (10 respondents). However, 2 respondents are concerned about an impact of blockchain technology to their company as they see that they could lose a competitive advantage in the market if company won't adopt blockchain technology in their processes. 8 of the respondents think that blockchain is overhyped.



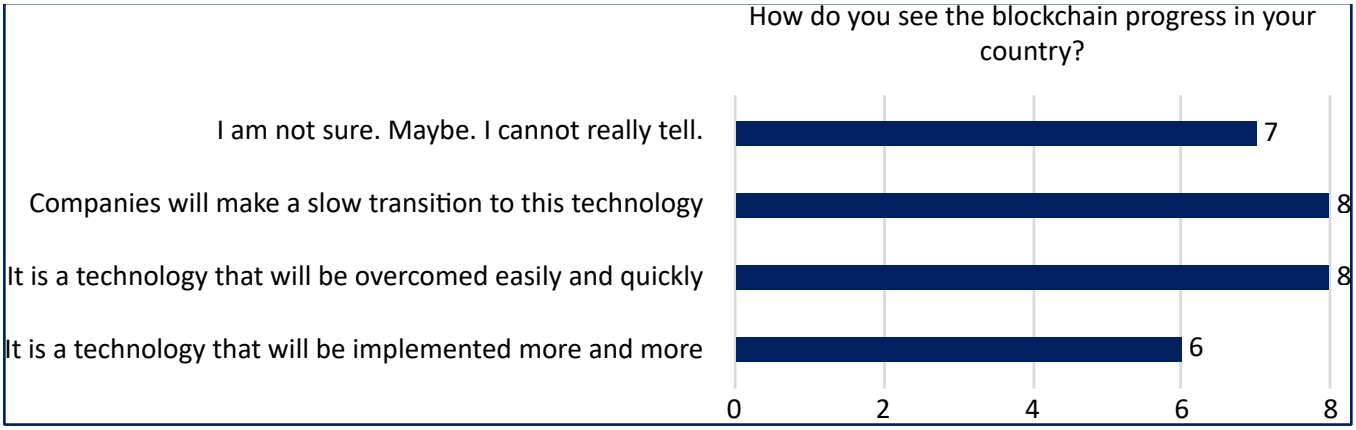
Areas blockchain could be useful
(question No.14 "In what other areas do you think the use of blockchain would be useful?")

Majority of respondents see blockchain adaption in education, heath and public sectors, media and telecommunications. Only 3 respondents see blockchain-based solutions in consumer products & manufacturing and automotive sector.



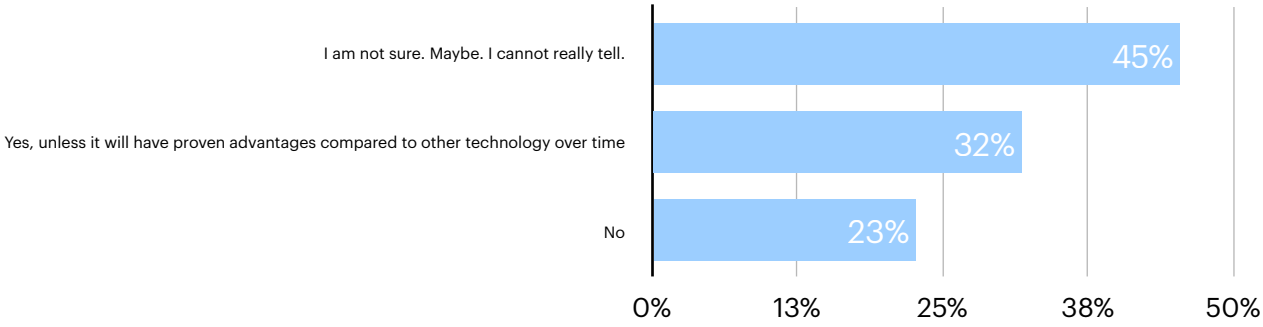
Barriers for using blockchain technology in Latvia
(question No. 15 "Which do you think would be the main barrier in using the blockchain technology in your country?")

Majority of respondents (50%) think that the main barrier for using blockchain technology in Latvia is lack of understanding blockchain technology by itself (41%) and poorly qualified human resource (9%). Mentioned barriers could be minimized by providing courses about blockchain technology and integrating these courses in higher education programs. 14% of respondents think that blockchain is expensive so the main barrier in their opinion is lack of funds, however there are funding opportunities available for companies in Latvia in order to implement blockchain-based solutions in their products, processes and internal systems.



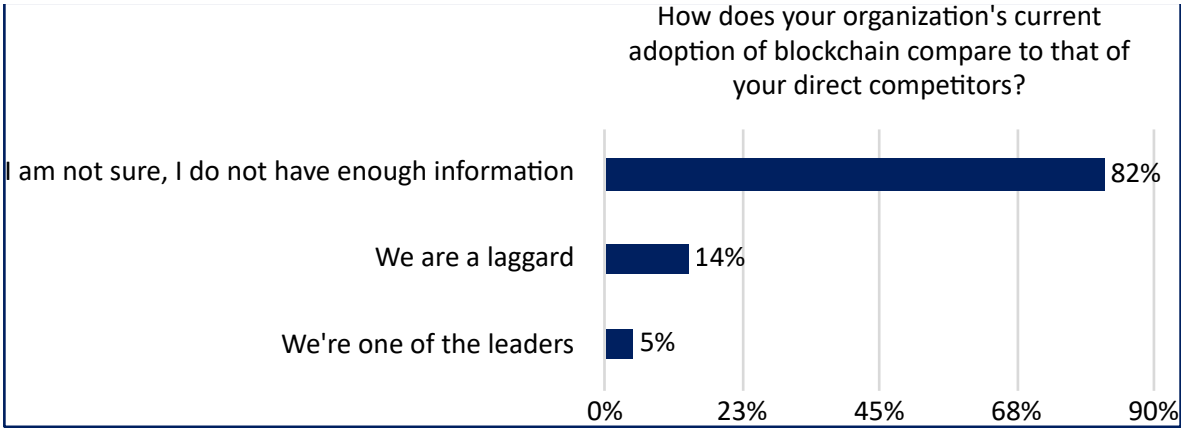
Blockchain progress in Latvia
(question No. 16 "How do you see the blockchain progress in your country?")

Respondents do not have a common vision of blockchain progress in Latvia as some of them say companies in Latvia will make a slow transition to this technologies and others – that blockchain technology companies will overcome easily and quickly.



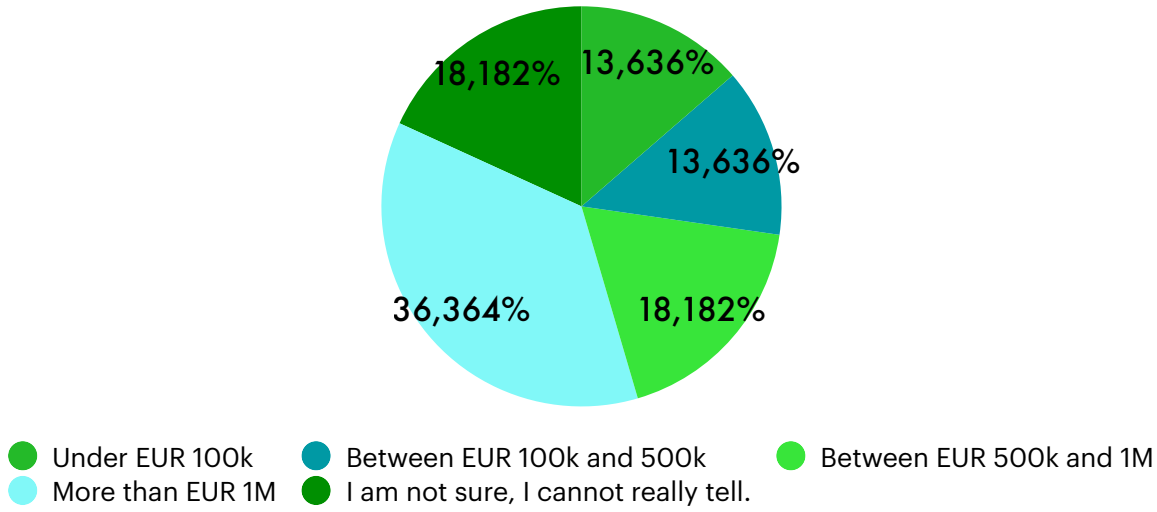
Trust in blockchain technologies over other solutions
(question No. 17 "Would you choose blockchain as a solution to your problems at the expense of other solutions?")

None of the respondents said that they would choose blockchain as the primary solution to their problems at the expense of other solutions. 32% of the respondents say they would only choose blockchain-based solutions if they would see proven advantages over other technologies. 23% of the respondents would not choose blockchain over other solutions. This answer could be the result of lack of knowledge about blockchain technology and its advantages.



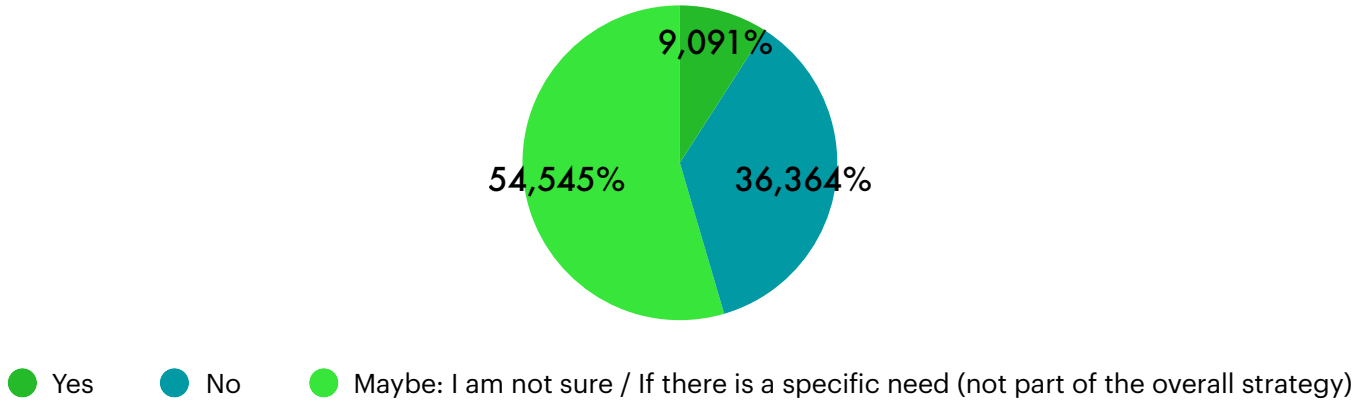
Organization's current adoption of blockchain in comparison to competitors
(question No.18 "How does your organization's current adoption of blockchain compare to that of your direct competitors?")

Majority of the respondents (82%) do not have the knowledge about their company's current adoption of blockchain technology in comparison to their competitors. 5% of respondents consider their companies as the leaders in adaption of blockchain technology in comparison to their competitors. 14% of respondents say their companies are laggards in adaption of blockchain technologies in comparison to their competitors.



Revenue of respondent's company in 2018
(question No. 19 "What is the total revenue of your organization in 2018?")

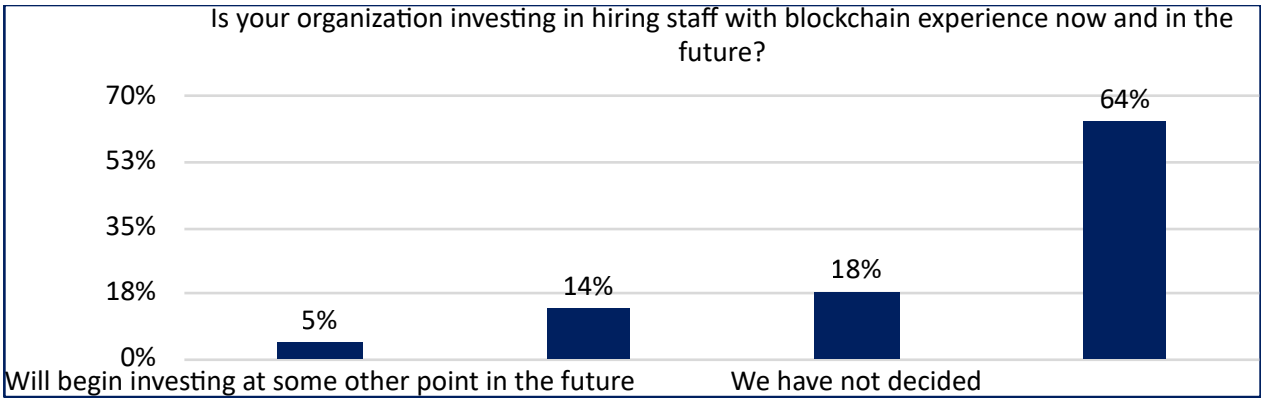
36% of respondents represent companies whose revenue in 2018 was more than EUR 1M. 14% of respondents are employed by companies with revenue between EUR 100k and 500k in 2018. These results represent the need for learning materials of blockchain technology that could bring benefits to big and medium size companies in order to make them more profitable.



Readiness of investment in blockchain technology
(question No.20 "Is your organization planning to invest in blockchain technology?")

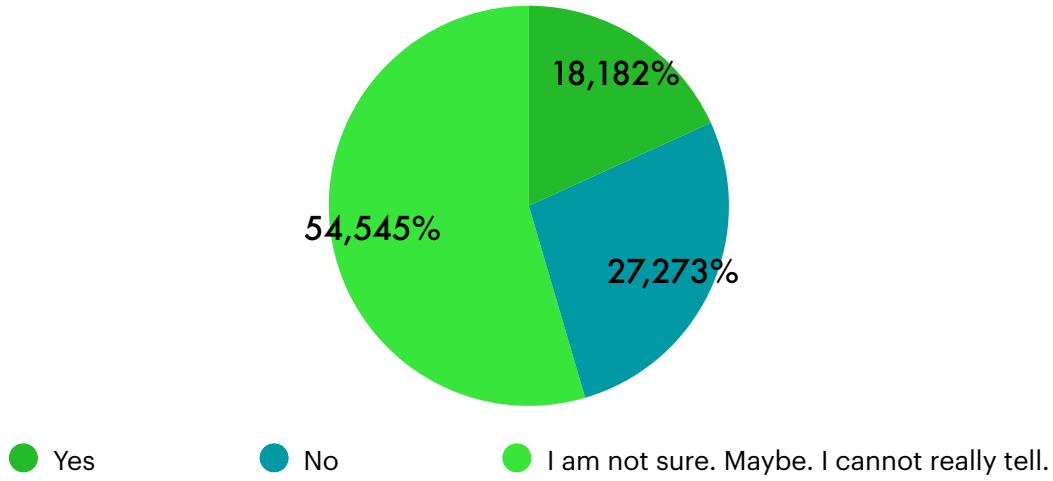
More than a half of respondents (55%) do not have the knowledge about their company's investment plans in the future. That means company's in Latvia should more involve their employees in company's strategy planning. Company's in Latvia should improve the internal communication and information flows within the company. 36% of the respondents said their company is not planning to invest in blockchain technology, but 9% of respondents said their company is planning to invest.

9% of the respondents who said their companies are planning to invest in blockchain technology, specified the amount of planned investment is between EUR 100k and 300k.



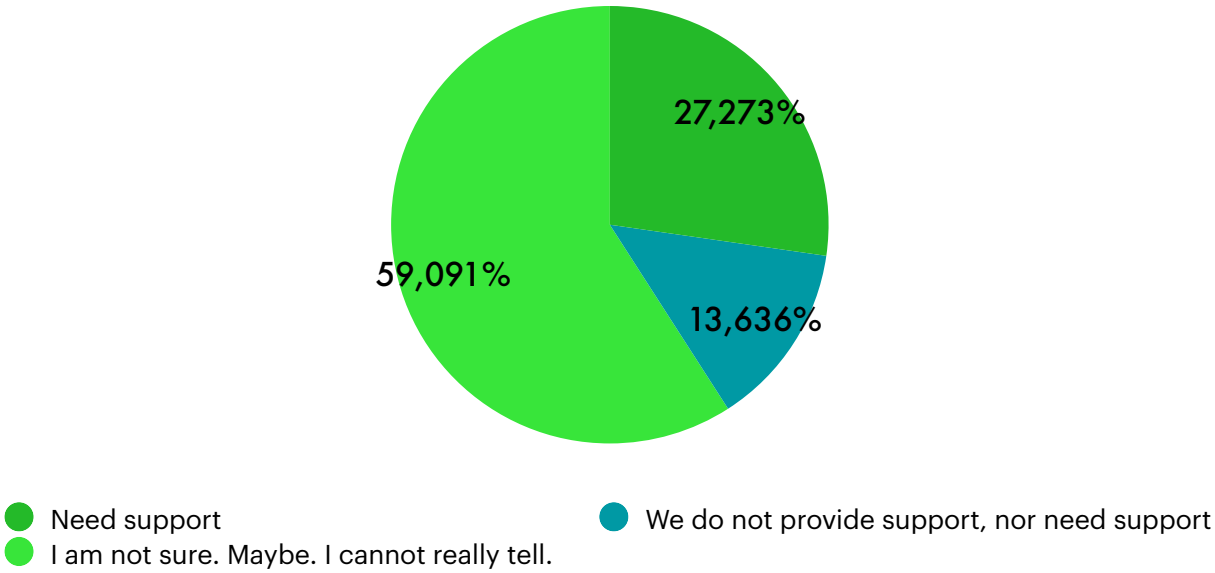
Investment in staff with blockchain experience
(question No. 22 "Is your organization investing in hiring staff with blockchain experience now and in the future?")

64% of the respondents do not know if their company is planning to invest in hiring staff with blockchain experience. 18% of respondents said their company has not decided if they will invest, but 5% said their company will begin investing in hiring staff with blockchain experience in the future. 14% of the respondents said their companies are not planning to invest in hiring staff with blockchain experience.



Company's plan of investment for staff knowledge about blockchain technology (question No.23 "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future")

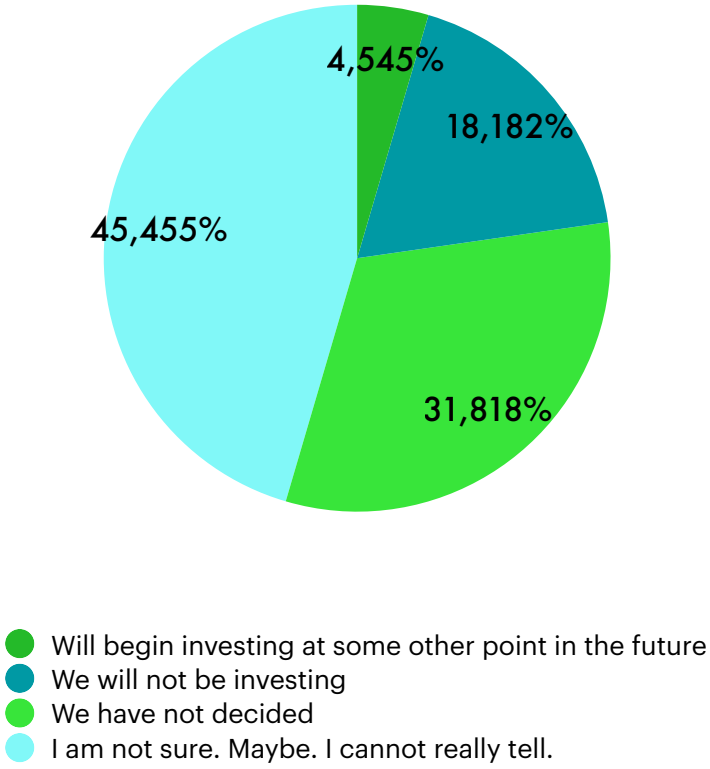
More than a half of respondents (55%) are not aware if their company is planning to train existing staff in the use and/or implementation of blockchain technology. 18% of respondents say their company is planning to train staff in the use/implementation of blockchain technology in the future. It means companies see the prospects in the use of blockchain technology within internal systems and processes.



Readiness of companies for development of blockchain-based applications (question No.24 "Can your organization provide/need support in implementing a blockchain-based application?")

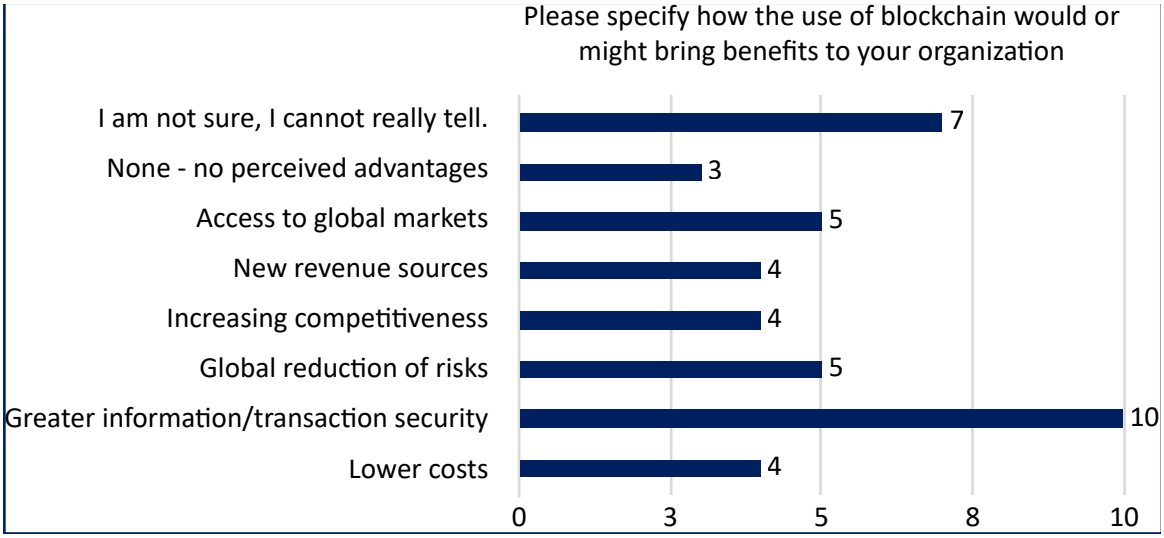
Respondents of this survey are working in different fields so question regarding implementation of blockchain-based application was more applicable to those who were working at companies in IT sector. Most of the respondents could not answer to this question (59%) – the reason could be the lack of

knowledge about competences of employees at their current company. 27% respondents said their organization could implement blockchain-based application if they would have support in this process.



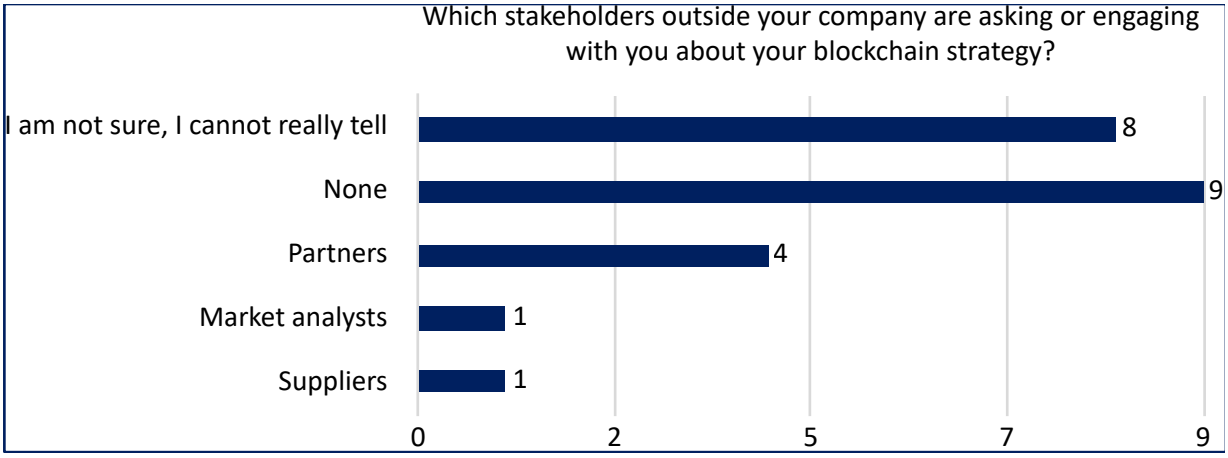
Investment of blockchain-based enhancements in company's existing systems
(question No. 25 "Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?")

45% of respondents have not been introduced to their company's investment plans as they could not answer to question about investment of blockchain-based solution development in company's existing systems and processes. 32% of respondents said their company have not decided yet if they will be investing in blockchain-based enhancement implementation in their systems. 18% of respondents said their company is not planning to invest in blockchain-based enhancements but 5% - company will begin investing at some point in the future. No one of respondents said their company is currently investing in blockchain-based enhancements in their existing systems. The main reason companies are not investing or are not considering doing an investment in order to implement blockchain-based enhancements in their existing systems could be that these companies do not know the advantages this technology can bring and how it would help to make their work systems and processes more effective.



Benefits blockchain can bring to the company
(question No.26 "Please specify how the use of blockchain would or might bring benefits to your organization")

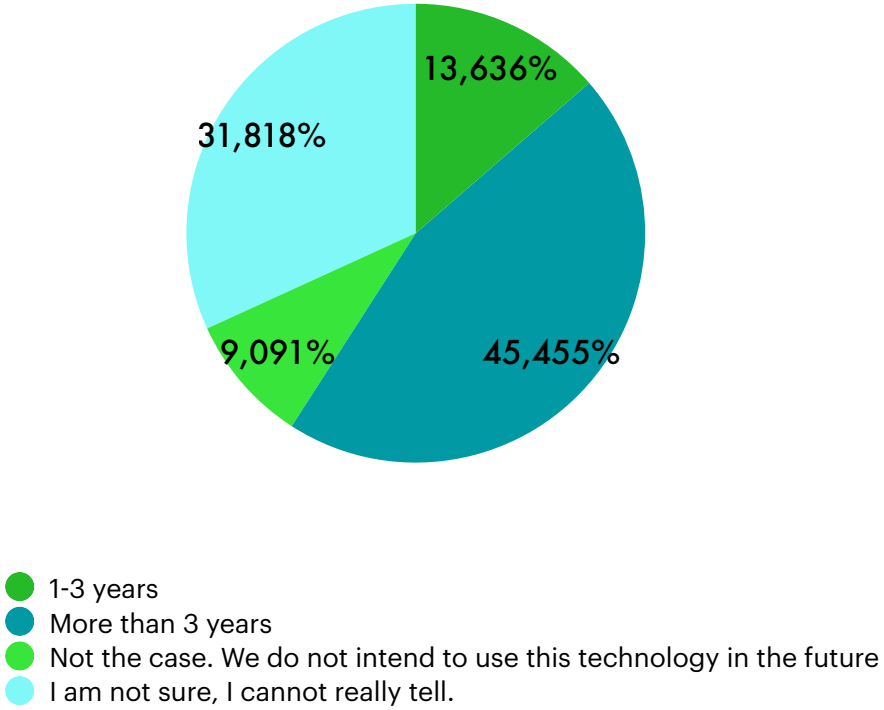
As the main benefits blockchain might bring to the companies, respondents consider greater information and transaction security (10), access to global markets (5) and global reduction of risks. Respondents also said use of blockchain could create new revenue sources, help to increase their competitiveness and lower the costs.



Stakeholders asking or engaging about blockchain strategy
(question No. 27 "Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?")

8 of the respondents are not informed about demand of their customer, partner or other interested party side regarding implementation of blockchain-based solutions in company's existing processes or provided products. 5 respondents said their partners (4) or suppliers (1) are asking or engaging about blockchain strategy within their company. 1 respondent said market analysts are asking or engaging about company's blockchain strategy which could be a sign that this specific company is in the industry that is more affected by blockchain-based solution development. 9 of the respondents said no one is asking or engaging their company about blockchain strategy which could mean blockchain impact to industry company is in is not so

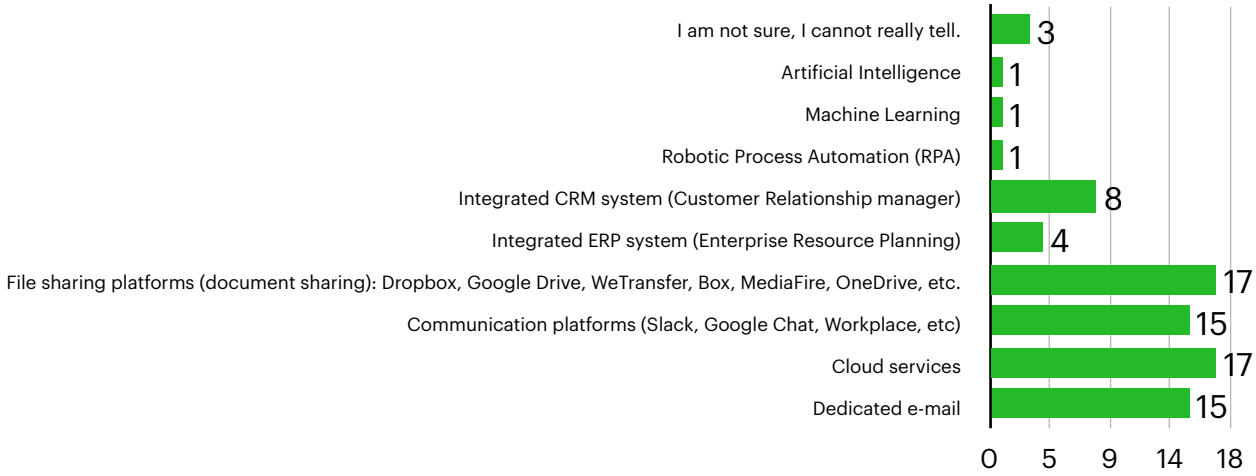
great yet. However, those companies could potentially be the leaders of their industries and increase their competitiveness if they would start to implement blockchain-based solutions in their internal systems or products.



Time period blockchain will make a significant impact to organization
(question No. 28: "How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?")

14% of the respondents said blockchain will make a significant impact to their organization between 1 and 3 years. 45% of respondents think blockchain will make an impact to their organization in more than 3 years but 32% of the respondents are not sure if blockchain will have an impact to their organization at all. 9% of the respondents think blockchain will not affect their organization so they do not intend to use this technology in the future.

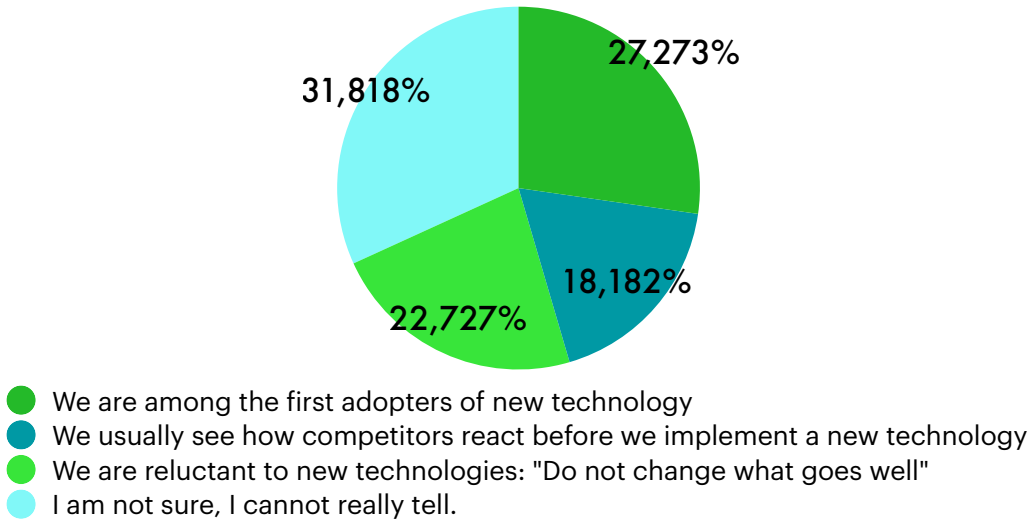
Blockchain could transform more than 50 big industries in the future including banking, voting, IT, logistics, marketing, education etc. so those respondents who think that blockchain will not make any impact to their company are not well informed about the impact of blockchain technology overall. Qualitative and learning materials about blockchain technology are needed in order to inform society about this technology, its impact and advantages.



Technologies used in companies of Latvia
(question No. 29 "What types of technologies do you use in your organization/company?")

Most of the companies in Latvia use file sharing platforms, communication platforms, cloud services, dedicated e-mails or integrated CRM systems. Only 1 respondent said robotic process automation is used at his or her company which means this company is investing in order to reduce manual processes in the company.

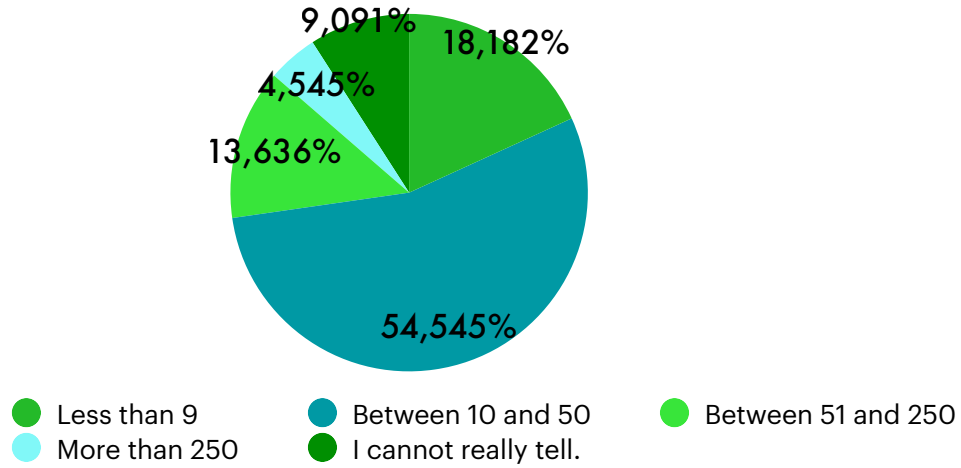
Investment of RPA also means company is interested of increasing their existing employee competences so they could do more advanced tasks. In Latvia there are many shared services companies located and many of them nowadays invest in RPA which allows them to automatize many processes, and in the result – significantly reduce costs (for example, in article written by Bill Cline on 2017 was said that process automation would help financial companies to reduce costs by more than 70%).



Organization's readiness of implementation of new technology
(question No. 30 "How do you rate your organization/company in relation to technology?")

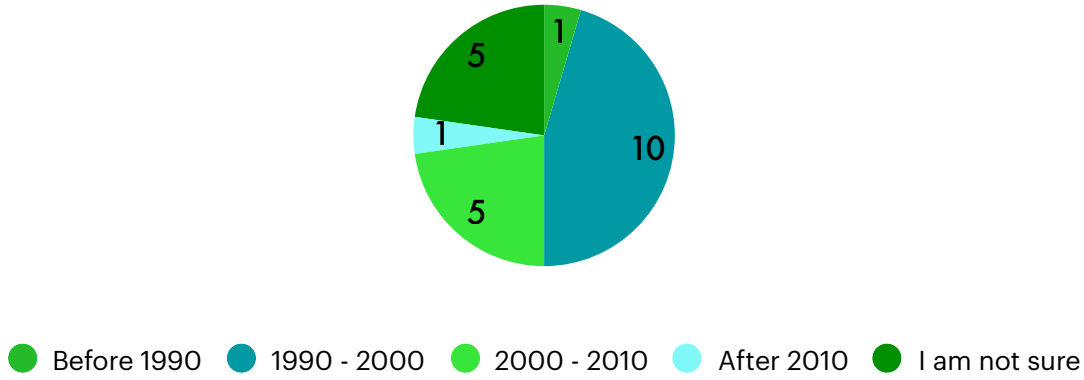
27% of the respondents said their organization/company is among the first adopters of new technology which means these companies are open and willing to invest in technologies that could be beneficiary for them. Increasing level of knowledge about blockchain technology could accelerate implementation of blockchain-based solutions within these companies. 18% of the respondents said they are only implementing new technologies in their company when they see their competitors do so in order to remain competitive in the market. 23% of the respondents said their company is reluctant to new technologies. Awareness of benefits blockchain solutions brings could make these companies to be more open about implementation of these technologies.

Field of activity of the companies
(question No. 31 "Which is the field of activity of the company?")
Majority of the respondents are employed by companies in education and IT field. There were also respondents from sectors as cosmetics, healthcare, law, marketing and research.



Number of employees
(question No.32 "Number of employees")

Majority of the respondents work in companies with number of employees between 10 and 50 (55%). 18% of respondents work in companies where total number of employees is less than 9. 14% of respondents work in companies where the total number of employees is between 51 and 250, but 5% - in companies where the total number of employees is more than 250.



Year of establishment of the company
(question No. 33 "When was your company established?")

10 of respondents own or are employed by companies established between 1990 and 2000. 6 respondents represent companies established after 2000. Only 1 respondent represents company established before 1990.

Respondent's position within the company
(question No. 34 "Your position within the company")
Respondents of this survey were trainers, entrepreneurs, lawyers, project managers, researchers and advertising strategists.

Main conclusions of the survey results:

1. Survey results showed that society in Latvia does not have a deep knowledge about blockchain technology despite the fact Latvia is located right next to the country that is one of the world's leaders in adaption of blockchain technology (Estonia).
2. Term "blockchain" by itself has spread among society in Latvia after 2010. Unfortunately, survey results showed that this term most likely has not spread together with the qualitative and detailed information about this technology, benefits it could bring to organizations as respondents of the survey were not able to provide an answer to many of the questions. Development of study materials about blockchain technology is necessary in order to increase the level of knowledge about blockchain technology within the society of Latvia.
3. Majority of the respondents associate term "blockchain" with cryptocurrency.
4. Respondents consider blockchain's biggest advantages are it can be used as a tool for creating new business models and make new revenue sources, blockchain can bring greater security level.
5. Majority of respondents see blockchain adaption in education, health and public sectors, media and telecommunications.
6. Society in Latvia is lacking the detailed information about blockchain technology, various ways it can be used and advantages it can bring.
7. As the main benefits blockchain might bring to the companies, respondents consider greater information and transaction security, access to global markets and global reduction of risks.
8. Almost third part of the respondents said their organization/company is among the first adopters of new technology which means these companies are open and willing to invest in technologies that could be beneficiary for them. However, no one of respondents said their company is not currently

investing in blockchain-based enhancements in their existing systems and 18% of respondents said their company is not planning to invest in this technology at all.

9. There are funding opportunities available for companies in Latvia in order to implement blockchain-based solutions in their products, processes and internal systems so main barriers of blockchain implementation among respondents were considered lack of understanding of blockchain technology by itself and poorly qualified human resource.

COUNTRY REPORT - ITALY

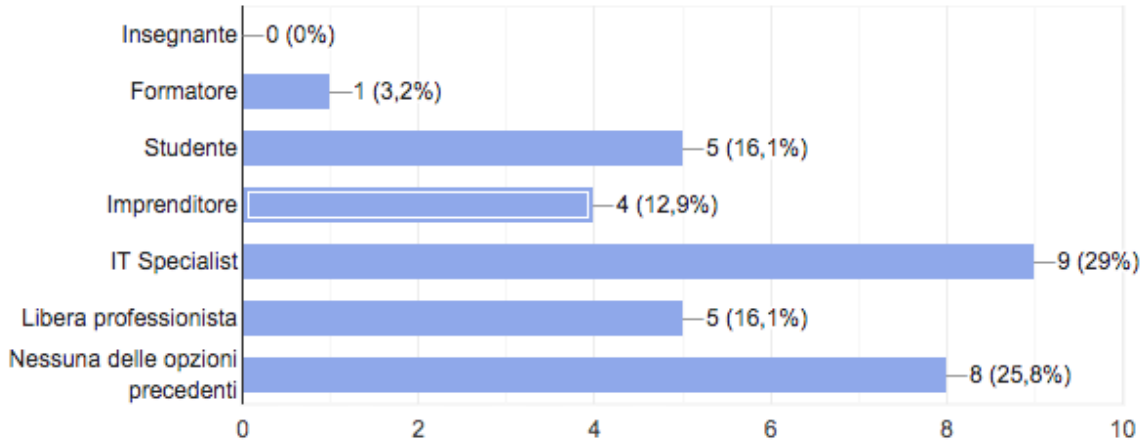
As the title of the study states, our analysis is about assessing the knowledge regarding blockchain technology in each ecosystem of the project's network countries. Therefore the scope of the research is to establish the current status of knowledge and also gaps, since among the European countries the implementation level of such a technology is extremely different.

Regarding the methodology of research used, we have proposed a survey, named "Blockchain - Knowledge Assessment for Entrepreneurs", which contains 37 questions, structured in order to obtain a feedback from target groups on level of interest in implementation and developing applications/ products that use blockchain technology.

The proposed questionnaire was distributed to several target groups to which this technology can be delivered.

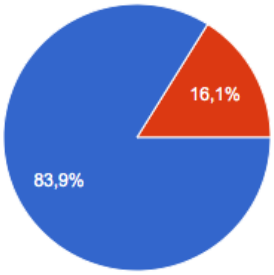
Going more in depth, the structure of the sample in Italy (31 respondents) was IT Specialists (29%), students and free lance professionals (both 16%), entrepreneurs (13%) and a trainer. Even if the majority of the sample is aligned with the main targets and objectives of the project, considering also that VITECO, the Italian partner of the consortium, deals with web technology solutions, we have to consider that the 25% of the sample has not a specific definition. Moreover, when we consider the percentage of students (16%), we are focusing mainly on students of computer engineering who already have some knowledge concerning Blockchain applications and solutions. Because of this, a low percentage could be also classified in the same time into more categories, such as student-entrepreneur-IT specialist.

Most of the respondents were IT Specialists, due to their large interest on the subject and among entrepreneurs questioned, part of respondents comes from the IT domain since they can promote and help in the implementation of blockchain technology in other fields of activity and in its development in Italy.



"Are you one of the following? Check all that apply" (respondents by occupation – 3 main target groups: IT specialist, students, free lance professionals)

Most of the Italian respondents have heard about the term “Blockchain”, which is a good sign of their interest on the subject. However, this situation also derives from their profile, most of the subjects being familiar with the term because they come from computer engineering University, business environment and the IT sector.

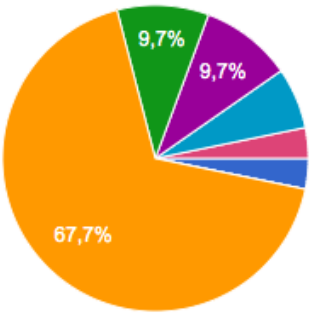


Yes – No

Question 1: “Have you heard about the blockchain technology?”

From a general point of view, in Italy only 4% of managers have never heard of blockchain: a surprising fact in many ways, which bodes well for the acceleration of this technology. In companies, therefore, the theme is known but this does not mean that they are ready to pass from knowledge to application. Meanwhile, as it is easy to imagine, the most informed are the company technology, the IT area, and therefore the opportunity has not always already reached the decision-making and strategic levels of the companies.

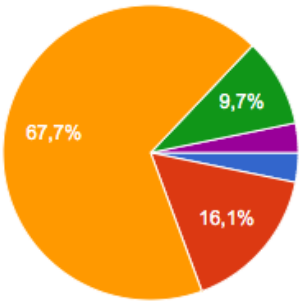
Next, we were interested in finding out the source of information about blockchain and we see that most of the respondents have heard about the blockchain technology from the online environment, as a direct result of the Internet usage in the world and in our country. Surprising is the answer that almost 10% of the analyzed sample heard about the blockchain technology from friends. Another interesting data is the almost 10% get information about blockchain during conferences. Indeed, despite the general underdeveloped knowledge about blockchain in Italy, IT Specialists are used to organize conferences to talk about the importance of this new technology.



Internet Friends Conferences

Question 2: “Where have you first heard of the term blockchain?”

The figure below shows that the term is relatively recent accepted in our country, almost 70% of the respondents hearing about it after 2015. The analysis reveals that less than 3% of the respondents have heard the blockchain term before 2010. This high percentage of people who heard about blockchain only after 2015 is mainly caused by two main barriers: the lack of competencies and the difficulty in evaluating the benefits deriving from the application of blockchain. The Italian scenario is governed by investments in blockchain only from large companies; only few startups invest in this technology.

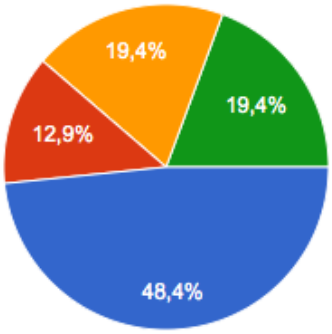


After 2015 Between 2010 and 2015 Not heard of it

Question 3: "When have you first heard the term «blockchain»?"

Directly correlated to this, there is the lack of knowledge regarding Italian companies that operate in blockchain field. In fact, almost 50% of respondents said that never heard about companies operating in blockchain technology. Conversely, almost 20% of respondents know companies that invested in blockchain but, with high probability, they are IT Specialists who know the market and companies operating inside it. It's interesting to notice that 4 respondents out of 31 pointed out that their current company is actually investing of this new technology.

From a general point of view, especially after 2017 some Italian big companies and medium enterprises started investing in blockchain technology and these investments echoed in Italian media as well. Moreover, In 2018 the companies of our country have invested in projects related to the blockchain altogether 15 million euros in 150 projects that range from training and strategic consulting to consultancy to learn about platforms and develop pilot projects.

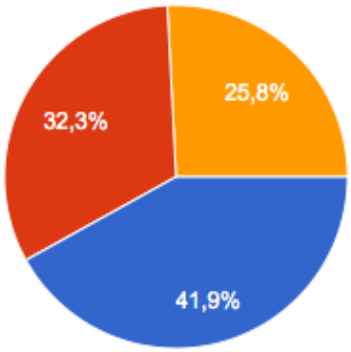


No Yes, but not my company, Yes my company, Yes more companies

Question 4: "Do you know any companies or organizations implementing a blockchain technology?"

In order to go deeper into the analysis, we asked our respondents if their companies have the chances to apply and develop blockchain technology. A good 40% answered yes, meaning that companies are becoming conscious about the great opportunity deriving from the application of blockchain technology. On the other hand, more than 30% said that their companies have no chance to implement blockchain technology. In this

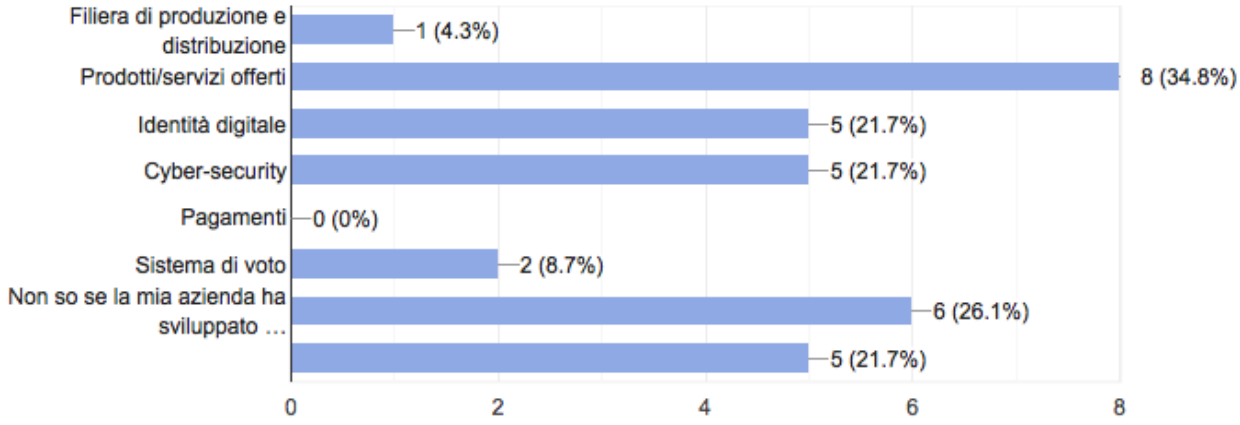
frame, in Italy the investments barriers are represented by the lack of competencies, the difficulty in evaluating the benefits and the lack of available resources. In fact, in Italy the 30% of companies have a budget of less than 100 thousand euros, 7% have budgeted resources between 100 thousand and 500 thousand euros and only 4% invested more than 500 thousand euros.



Yes No Maybe

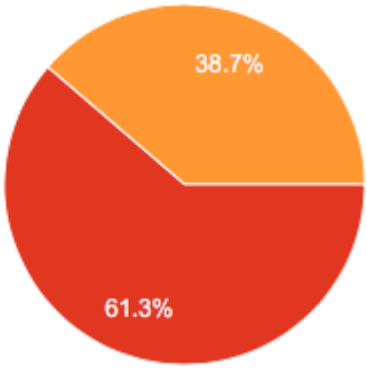
Question 5: "Did your organization have the opportunity to use/develop applications that use blockchain?"

Among the subjects who answered "Yes" to the previous question, most stated that they use this technology within the offered product (34,8%), followed by digital identity and cyber-security. Other mentioned fields were supply chain (4,3%) and voting system (8,7%).



Question 6: "If you answered «Yes» to the previous question, in which business process did you implement blockchain technologies?"

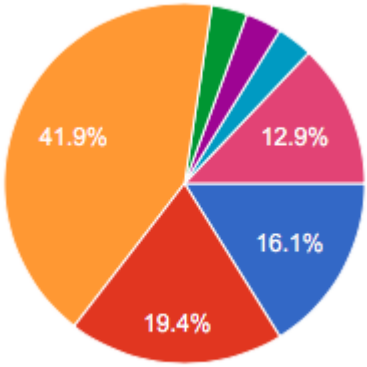
The majority of respondents do not use such technology in their current activities and a large part do not know the technologies that are used in their organizations. This negative point can be exploited by the BLOCKS project, considering the interest of the subjects questioned and their prior experiences with the blockchain tools, together with the main objectives of the training activities.



No Maybe. I don't know

Question 7: "Do you use a blockchain tool or blockchain related concepts directly in your day-to-day activity?"

The most significant advantages, according to the respondents included in the sample, were: greater security / lower risk (41,9%) and new business models and revenue sources (19,4%). Following, respondents pointed out greater speed compared to existing systems (16%). Only 3,2% of the respondents highlighted lower costs or access to global markets as advantages when using blockchain. Thus, blockchain is seen as a secure technology, in a world of digital risks, providing the framework for transactions of data by using cryptographic hashing functions. On the other hand, greater security rules with higher costs, which is one of the most frequent disadvantages of the blockchain technology, especially for small companies.

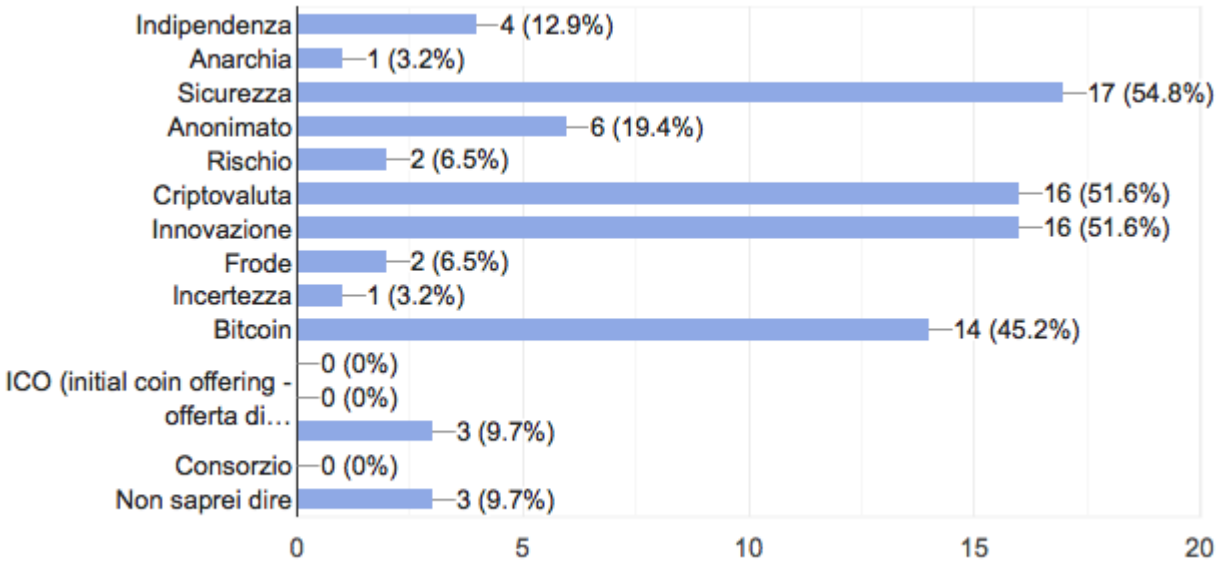


Greater security/lower risk New business models and revenue sources Greater speed

Question 8: "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry? (choose one - the most significant)"

For Italian respondents the most frequent association with blockchain is safety (54,8%), followed by the associations related to cryptocurrency and innovation (51,6%). The other large association made by Italiam respondents is about bitcoin (45,2%). In this frame, they have to understand that blockchain is far beyond

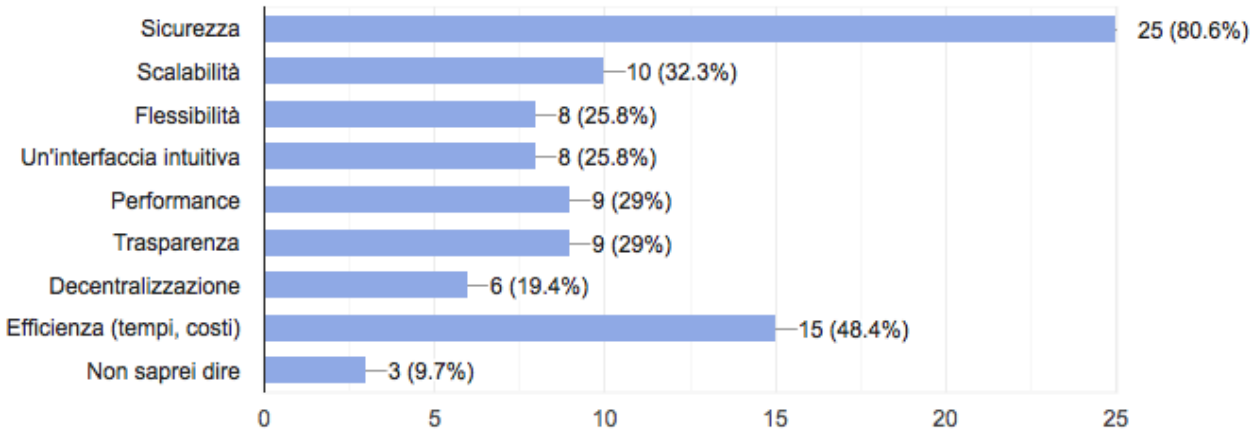
cryptocurrency and bitcoin, being a collaborative technology that can improve many other sectors. Moreover, even if safety is mentioned as a main characteristic of the blockchain system, there were also some negative points expressed in very low percentages such as: risk and fraud (6,5%), anarchy and uncertainty (3,2%). Innovation, anonymity (19,4%) and independence (12,9%) are other positive associations with the blockchain term, suggesting a open attitude of the Italian public to the blockchain.



Question 9: "Which of the following do you associate with blockchain technology? (tick all options relevant to you)"

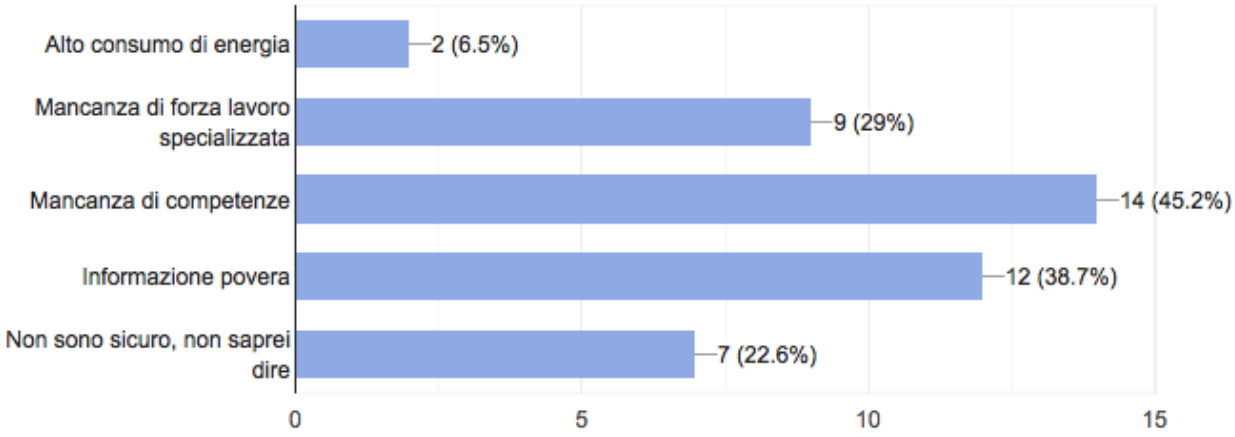
Almost all the questioned people consider security (80,6%) as the main attribute of a blockchain application, followed by efficiency in terms of time or costs and performance (48,4%). Scalability (32,3%), performance and transparency (29%) are the other blockchain's attributes perceived as meaningful. By the way, decentralization (19,4%) that is one of the most important characteristic of this technology is behind in terms of respondents' awareness.

In general, in Italy the perception of managers about possible applications of blockchain is related to product traceability, document management, supply chain management and finance. Logistics is one of those fields that aims to be investigated as well.



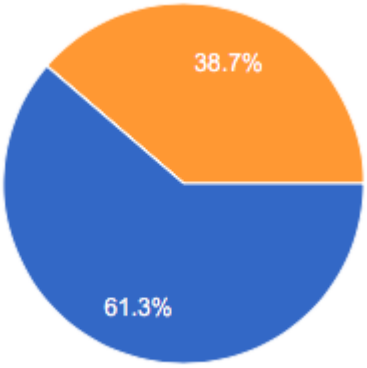
Question 10: "What do you think are the most important 3 attributes that a blockchain application must have in your vision? (check the three that apply)"

The opinions converge to the idea of a lack of skills (45,2%), poor information (38,7%) and lack of specialized workforce and skills (29%). Unfortunately, there are few basic information regarding blockchain in the educational system, mostly in the academic environment. In this context, there is necessary to provide basic and complete information to both specialized students or not, together with series of training modules on the subject to prepare the workforce for innovation.



Question 11: "What do you think would be the weaknesses of such technology?"

61,3% of the respondents consider blockchain more secure than systems built from more conventional informational technologies. This high percentage is coherent with the other previous replies (see questions 9 and 10) in which safety has been perceived as the main trait of this technology and this is confirmed by the absence of respondents who think blockchain is a technology less secure. By the way, a still meaningful percentage (38,7%) states to not be sure about its security, due to the fact that in Italy there is not a solid awareness about blockchain.



More secure I am not sure

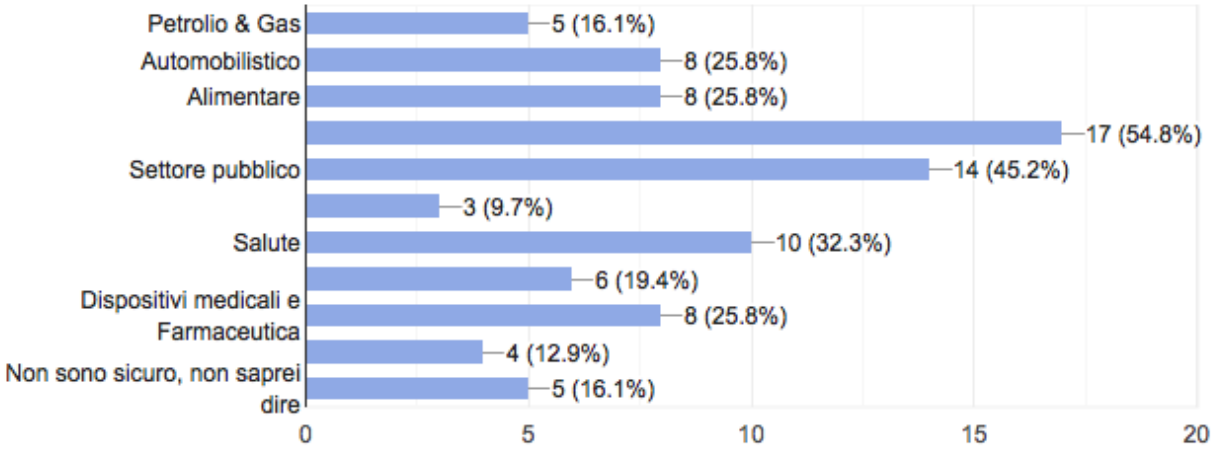
Question 12: "Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?"

The majority of respondents think that Blockchain technology is broadly scalable and will eventually achieve mainstream adoption (17 respondents). 14 respondents think that suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain, while the answer "False" was chosen just by 2 respondents. The interest of the decision-makers on the blockchain subject was revealed by the responses at the statement "Executive team believes there is a compelling business case for use of blockchain technology", where the proportion was 15 responses for "Yes" and just 1 response for "No". A clear majority stated that they will lose a competitive advantage if they don't adopt blockchain technology (14 respondents), suggesting that the future must be focused on the technology investing request. None of the respondents agreed with the statement that "Blockchain technology will disrupt our industry", in comparison with 19 responses for the answer "False". This situation suggests a positive attitude of the Italian people for the blockchain technology, conclusion that is reinforced by the opinion that blockchain is not overhyped (0 respondents). By the way, on average the 50% of Italian respondents have not a precise opinion about blockchain, by answering "I cannot really tell".

Statement	No. of respondents that answered "True"	No. of respondents that answered "False"	No. of respondents that answered "I cannot really tell"
Blockchain technology is broadly scalable and will eventually achieve mainstream adoption	17	0	14
Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain	14	2	15
Executive team believes there is a compelling business case for use of blockchain technology	15	1	15
Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain	16	3	12
Will lose a competitive advantage if we don't adopt blockchain technology	14	4	13
Blockchain technology will disrupt our industry	0	19	12
Blockchain is overhyped	0	0	0

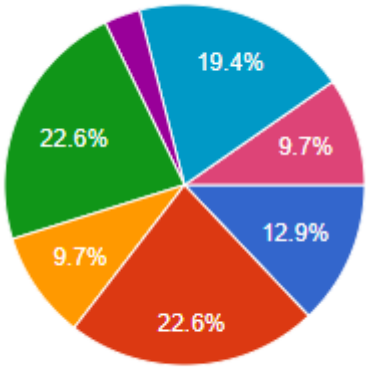
Question 13: "How can you assess, from your point of view, each of the following statements regarding blockchain technology?"

The majority of respondents consider blockchain useful in fields like: Technology/Media/ Telecommunications (54,8%), followed by public sector (45,2%), health (32,3%) and food - automotive - medical devices and pharma (25,8%). The lowest percentages are represented by education (12,9%) and consumer products & manufacturing (9,7%).



Question 14: "In what other areas do you think the use of blockchain would be useful?"

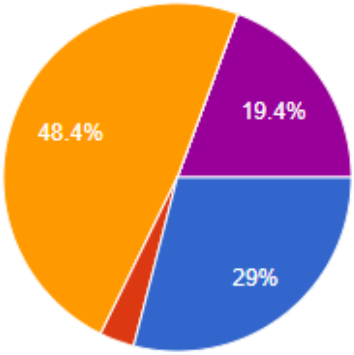
According to respondents, the most common barrier in using the blockchain technology in Italy is the low qualified human resources and the precarious information (22,6% - 7 respondents). These data are coherent with the information we have collected so far in the previous questions, that is the perception in Italy of a low awareness related to this technology, situation that can be fixed by a proper campaign of information. In fact, the following percentage is related to the lack of understanding (12,9%) that is an important obstacle for the blockchain diffusion. In this frame, the results are in line with the main objectives of the project, suggesting the urgency of covering the blockchain subject for three main types of target-groups: students, teachers and entrepreneurs.



Poorly qualified human resource Precarious information Lack of funds

Question 15: "Which do you think would be the main barrier in using the blockchain technology in your country?"

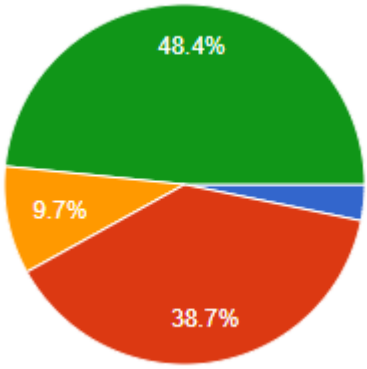
The main perception about the progress of blockchain in Italy is that companies will make a slow transition to this technology (48,4% - 15 respondents), even though a good percentage reveals that it is a technology that will be implemented more and more (29% - 9 respondents). The following percentage contains those respondents who do not even make a forecast about that (I am not sure. Maybe. I cannot really tell - 19,4%).



Companies will make a slow transition It will be implemented more and more I am not sure. Maybe

Question 16: "How do you see the blockchain progress in your country?"

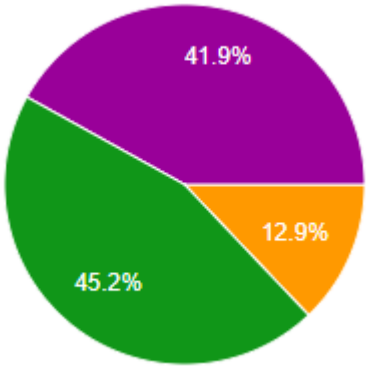
In this answer, Italian respondents continue showing their lack of information and awareness already expressed in the previous questions. However, there is a clear positive response conditioned by the proven advantages compared to other technology over time (38,7%) and the certainty of its effectiveness (9,7%). Just one respondent up to 31 answered "No".



I am not sure. Maybe Yes, unless it will have proven advantages Yes

Question 17: "Would you choose blockchain as a solution to your problems at the expense of other solutions?"

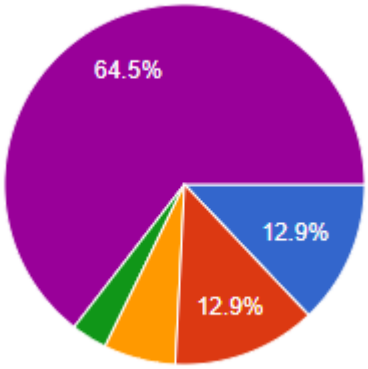
Even though Italian respondents have not a solid cognition about blockchain, they recognize that we are late in its adoption in comparison to other countries. People do not know their position comparing to that of their competitors (41,9%) or they do not sufficiently understand the process. By the way, as for the previous questions, there is always a percentage that trust on this technology and its development (12,9%).



We are a laggard I am not sure, I do not have enough information We are a fast follower

Question 18: "How does your organization's current adoption of blockchain compare to that of your direct competitors?"

The majority of the sample can not provide information concerning this topic (64,5%). The following percentages are related to revenues of between 100.000 and 500.000 Euro and under 100.000 Euro (both 12,9% of the respondents). Just 2 respondents answered between 500.000 Eur and 1 Million Eur and only one specified more than 1 Million Eur as total revenue. These replies confirm the general analysis about the Italian panorama that has scarce resources to invest on this technology.

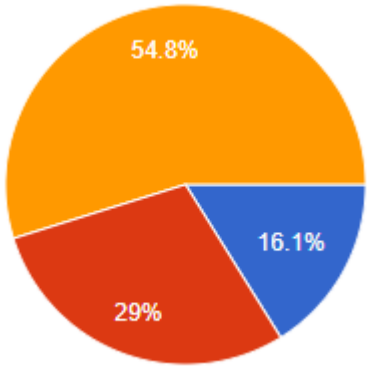


I am not sure, I cannot really tell Under 100.000 Eur Between 100.000 and 500.000 Eur

Question 19: "What is the total revenue of your organization in 2018?"

More than 50% of the respondents say that they are not sure about the future investing in blockchain technology. The lack of such information is a direct consequence of the missing involvement of employees in the planning strategy and the overall lack of information regarding this issue. 29% of the people questioned

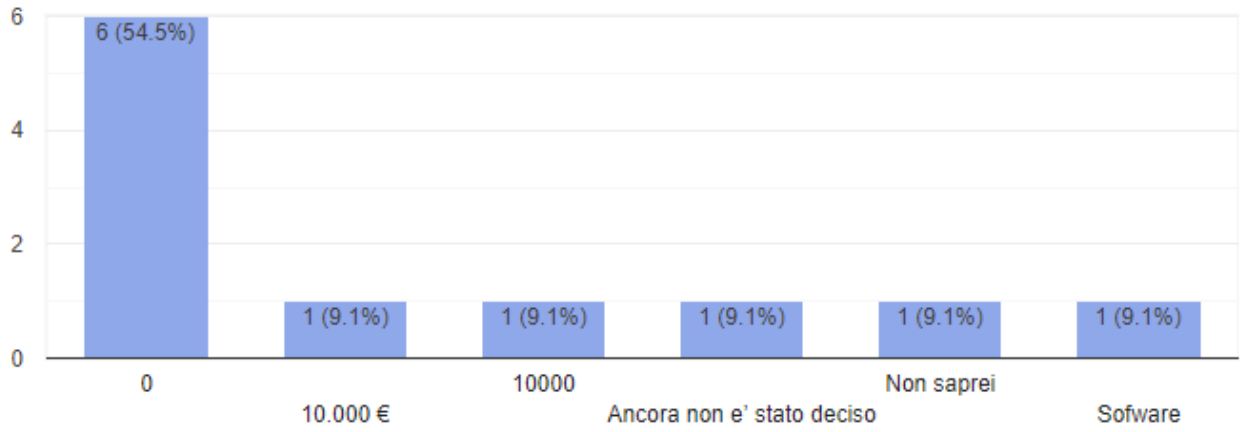
do not plan to invest in blockchain in the near future, while the 16% of respondents (5 people up to 31) declare that their companies are planning to invest in blockchain technology.



Maybe: I am not sure No Yes

Question 20: "Is your organization planning to invest in blockchain technology?"

Among those who have answered "Yes" to the previous question, 2 respondents replied that their organization aim to invest on blockchain 10000 Euro for the next 2 years. While one respondent specified that "It has not been decided yet" and another one "I don't know".



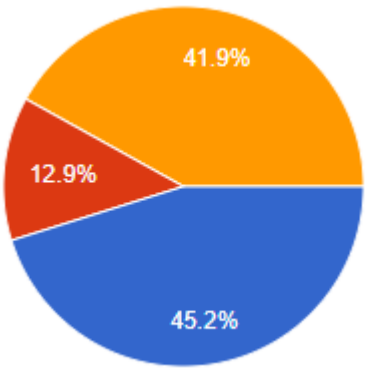
21. If you answered "Yes" to question No.20, specify how much is your organization planning to invest in blockchain technology during the next 2 years? Write your answer below. (If you answered no, just write 0)

Approx. 42% of respondents are not sure or do not know if their company is planning to invest in hiring staff with blockchain experience, while 16% chose the option "we have not decided". On average the 13% of respondents said their company is hiring staff with blockchain experience and another 16% think their company will start investing. Also, only 3,2% of the respondents said their companies are not planning to invest in hiring staff with experience in blockchain.

Survey responses	Answers	Percent
Currently investing	4	12,9%
I am not sure. Maybe. I cannot really tell	13	41,9%
We have not decided	5	16,1%
We will not be investing	1	3,2%
Will begin investing	5	16,1%
Total		100%

Question 22: "Is your organization investing in hiring staff with blockchain experience now and in the future?"

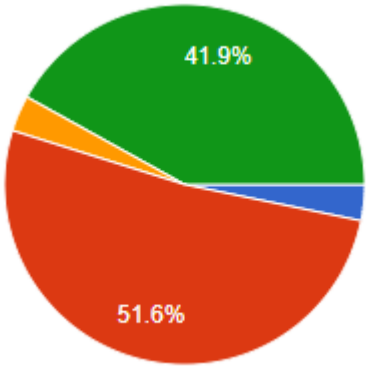
A large part of respondents (45,2%) is sure about the future investments of their companies to train existing staff to blockchain. On the other hand, almost the 42% do not know if their company is planning to train existing staff to use blockchain technology now or in the future. Only 13% of respondents think their company don't train existing staff in this direction in the future, and this percentage generally shows a positive attitude regarding the adoption of this technology in the future.



Yes No I am not sure. Maybe. I cannot really tell

Question 23: "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future?"

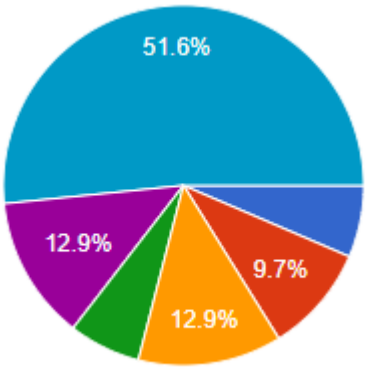
More than half of respondents of our survey (51,6%) specified that they need support in implementing blockchain technology. Almost the other half of respondents are not sure and cannot tell if their company need support in implementing a blockchain based application. The interesting data is that just one respondent (3,2%) specified to be able to provide support in the implementation of this technology. The last 3,2 % stated that they do not provide support, nor need support.



Need support I am not sure. Maybe. I cannot really tell.

Question 24: "Can your organization provide/need support in implementing a blockchain-based application?"

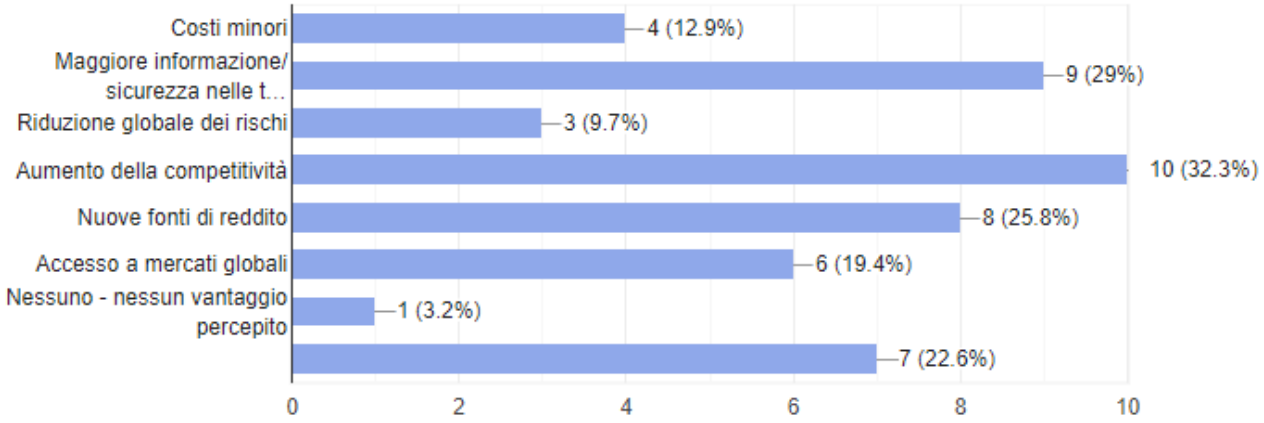
More than the 50% of respondents are not aware if their organization investing in replacing parts of their systems with blockchain-based enhancements. Maybe their position in the company does not give them access to this kind of knowledge about future company's investments. Instead, the 12,9% stated that they have not decided yet, giving an impression of stronger awareness about the topic. The other 12,9% is sure that in the future their organizations will invest on blockchain-based enhancements and the 6,5% (2 respondents) replied that they are actually investing on them. A very low percentage (6,5%) is sure that their companies won't invest on blockchain.



I am not sure. Maybe We have not decided Will begin investing in the future

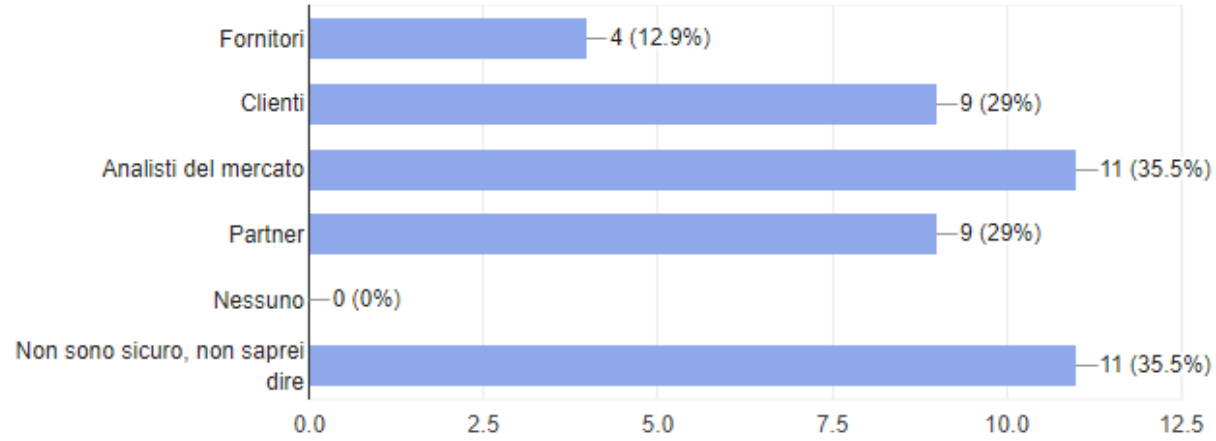
Question 25: "Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?"

10 respondents up to 31 are sure that blockchain would bring benefits in increasing competitiveness (32,3%), followed by those respondents who confirmed that the benefits would be in terms of greater information/transaction security (29%), as already specified in several previous questions. In order of percentage, the other perceived benefits are the possibility of new revenue sources (25,8%), of accessing to global markets (19,4%), of having lower costs (12,9%) and global reduction of risks (9,7%). Just one respondent does not perceive any advantages concerning blockchain (3,2%). The fact that 22,6% of respondents are not sure about its benefits could be because they do not know enough about blockchain and what this technology can bring to their company.



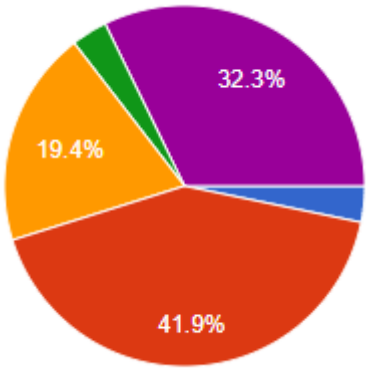
Question 26: "Please specify how the use of blockchain would or might bring benefits to your organization."

In relation to the stakeholders' interest about blockchain, a large part of respondents (35,5%) revealed that market analysts are engaging with companies in this field. The following results were that customers and partners (both 29%), probably of IT firms, are engaging in discussions about blockchain. Just the 12,9% pointed out the suppliers' interest. By the way, a large respondents do not know (35,5%) and that is probably related to the lack of awareness about the topic or a scarce involvement in their company business strategy.



Question 27: "Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?"

Most of the respondents (13 people - 41,9%) estimate that within 1-3 years their company will be impacted by blockchain technology. A lower percentage (6 people - 19,4%) believes that this will happen in more than 3 years. Just one respondent is sure that this process will be reached in less than 1 year, while another respondent states that they do not intend to use this technology in the future.
In coherence with the previous answers, a large percentage of the total (32,3%) is not able to provide a meaningful estimation about blockchain impact on their organization.



1-3 years I am not sure, I cannot really tell More than 3 years

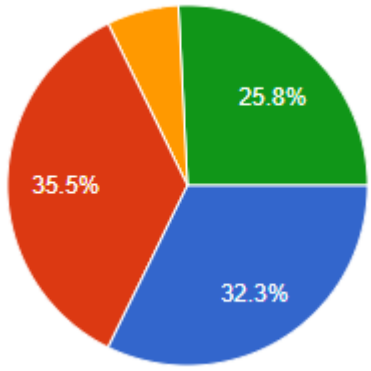
Question 28: "How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?"

A large number of respondents confirm that their company use cloud services, dedicated email and file sharing platforms, and many also use integrated CRM system and communication platforms. Only 6 respondents mentioned the use of integrated ERP system and just 4 respondents are not sure what technologies use their organisation.

Survey responses	Answers
Dedicated e-mail	18
Communication platforms	10
Cloud services	21
File sharing platforms	18
Integrated ERP system	6
Integrated CRM system	16
I am not sure, I cannot really tell.	4
Total	

Question 29: "What types of technologies do you use in your organization/company?"

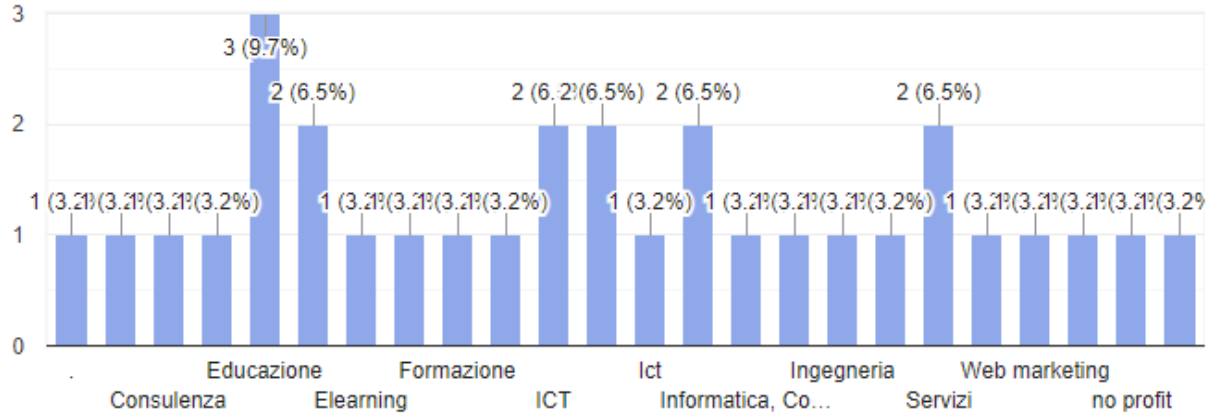
The majority of respondents at 30th question (35,5%) said their organization will implement new technology only if their competitors do this first. Maybe some high-quality materials and informations about blockchain and its advantages could make these company to be more proactive, and implement new technology much faster. The 32,3% of respondents said their company is among the first adopters and willing to make investments in technology that can make them more competitive in the market. Just 2 respondents (6,5%) stated that their companies are reluctant to new technologies.
However, a good percentage of respondents is not able to provide a rate about their company technological development (25,8%).



We usually see how competitors react before we implement a new technology
We are among the first adopters of new technology
I am not sure, I cannot really tell

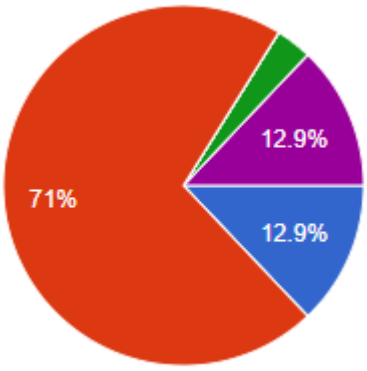
Question 30: "How do you rate your organization/company in relation to technology?"

The Italian respondents specified they are employed in Education, ICT, Services and Consulting fields. However we also find respondents from Finance, Engineering, Marketing and Food and Beverage.



Question 31: "Which is the field of activity of the company?"

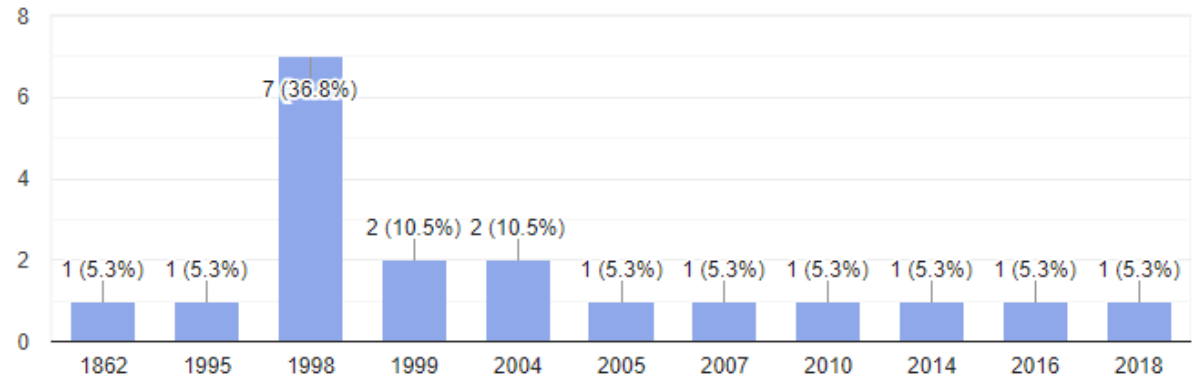
As for the number of employees, the majority of respondents (22 - 71%) work in medium size company, with number of employees between 10 and 50. 4 respondents (12,9%) work in small company with less than 9 employees. Just one respondent works in a company with more than 250 employees. Finally 4 people are not able to provide this information.



Between 10 and 50 I cannot really tell Less than 9 More than 250

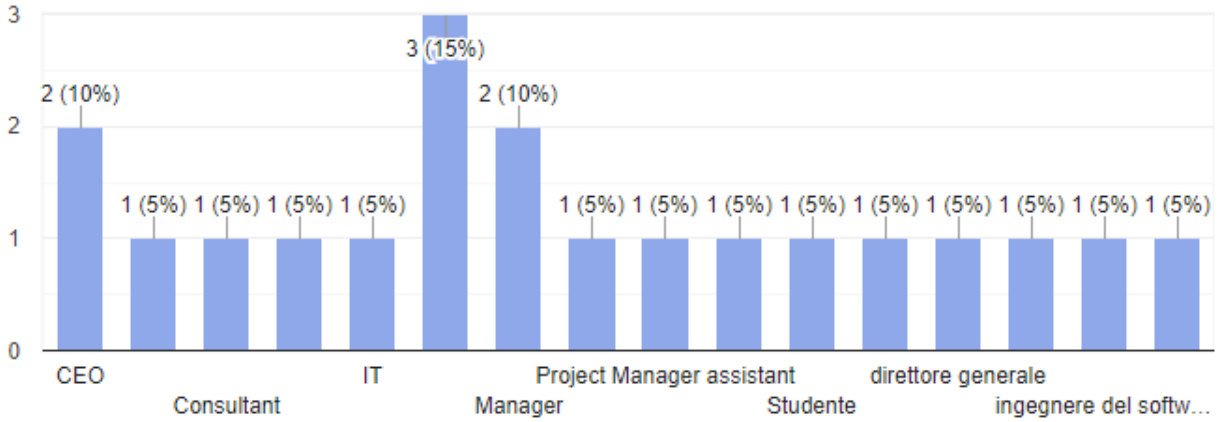
Question 32: "Number of employees"

8 respondents up to 19 work in relatively new companies, founded between 2004-2018. More than the 50% of the respondents (10) work in company founded in the Nineties. Just one person work in a very a old company.

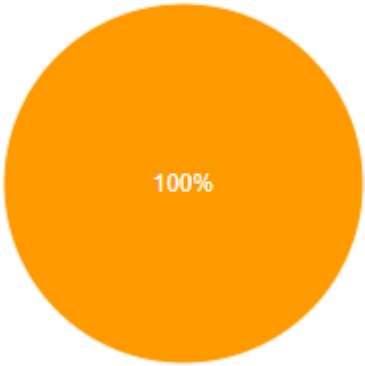


Question 33: "When was your company established?"

Regarding the position of respondents in their company we see that the majority of respondents (6 up to 20) have a management position, 4 are employees and 2 are CEOs. Moreover, 3 are IT specialists and 2 are consultants. A student, an intern and an editor are the other professional roles specified.



Question 34: "Your position within the company"

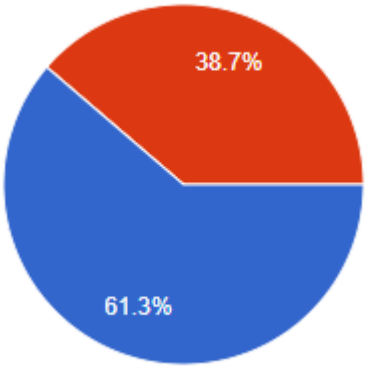


Italy

Question 35. Where is your organization / university/ company located? (HQ - main residence)

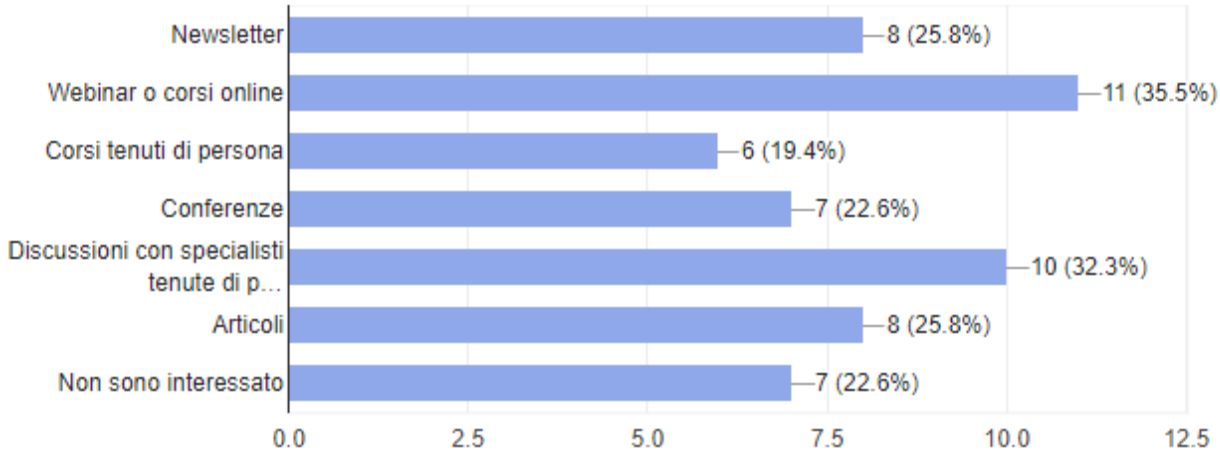
Regarding the desire to continue receiving information we notice that 67% is interested in obtaining more information about blockchain technology. This outcome is a good sign, since we were looking for esteablishing the climate within our ecosystem regarding the interest for improving existing knowledge.

Regarding the desire to continue receiving information we notice that 61,3% is interested in obtaining more information about blockchain technology. This outcome is a good sign, since we were looking for establishing the climate within our ecosystem regarding the interest for improving existing knowledge.



Question 36: "Are you interested in getting more information about blockchain and possible apps for your business?"

It's interesting to notice that the largest part of respondents (31) would like to receive "direct" form of information, such as webinars or online trainings (35,5%), face to face discussions with specialists / workshops (32,3%), conferences (22,6%) and face-to-face trainings (19,4%). Also written information have received preferences, such as newsletters and articles (both 25,8%). By the way, the 22,6% is not interested in receiving information about blockchain.



Question 37. If you answered "Yes" to the previous question, what is the form under which you prefer to receive blockchain information? (check all that apply)

As we said in the introduction, the structure of the sample in Italy (31 respondents) was IT Specialists (29%), students and free lance professionals (both 16%), entrepreneurs (13%) and a trainer. Even if the majority of the sample is aligned with the main targets and objectives of the project, considering also that VITECO, the

Italian partner of the consortium, deals with web technology solutions, we have to consider that the 25% of the sample has not a specific definition. Moreover, when we consider the percentage of students (16%), we are focusing mainly on students of computer engineering who already have some knowledge concerning Blockchain applications and solutions. Because of this, a low percentage could be also classified in the same time into more categories, such as student-entrepreneur-IT specialist.

Most of the respondents were IT Specialists, due to their large interest on the subject and among entrepreneurs questioned, part of respondents comes from the IT domain since they can promote and help in the implementation of blockchain technology in other fields of activity and in its development in Italy.

What is clear from a general overview of the answers is that the Italian society is not well informed about blockchain, its fields of application and its solutions. That is clear for all the respondents' categories, also for those who are closer to the field, such as IT specialists. In fact, if we consider question n.2. "Where have you first heard the term blockchain?", the majority of respondents from the internet, so it means that the respondents search on their own some information concerning this technology.

Starting from this lack of information and knowledge, however it's clear from the answers provided that exists a perception of the blockchain as an innovative and important domain that could be developed and implemented in several fields. Considering, for example, question 8. "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry", the majority of respondents are aware that blockchain guarantees a greater security/lower risk (41,9%).

Even though blockchain is perceived as important and innovative, and even if the main characteristics of these technologies are acknowledged by the respondents, however the funds and resources are scarce, especially in the business environment. In fact, taking into account question 15. "Which do you think would be the main barrier in using the blockchain technology in your country?", Italian respondents specified in order precarious information, poorly qualified human resources (both 22,6%) and lack of funds (19,4%).

Probably because of this reason, both managers and employees are not able to provide meaningful forecasts about blockchain future business investments and applications. That is quite clear in question 22. "Is your organization investing in hiring staff with blockchain experience now and in the future?", in which 41,9% of respondents is not able to provide a clear answer about the topic.

Moreover, going more in depth in the business environment, these are interesting results to take into account (question 13):

- Blockchain technology is broadly scalable and will eventually achieve mainstream adoption – TRUE – 17 respondents up to 31;
- Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain – TRUE – 14 respondents up to 31;
- Executive team believes there is a compelling business case for use of blockchain technology – TRUE – 15 respondents up to 31;
- Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain – TRUE – 16 respondents up to 31;
- Will lose a competitive advantage if we don't adopt blockchain technology – TRUE – 14 respondents up to 31;
- Blockchain technology will disrupt our industry – FALSE – 19 respondents up to 31;
- Blockchain is overhyped – 0 respondents.

From these answers we can recognize a positive attitude of the business environment towards blockchain.

In this sense, regarding the application of blockchain technology in Italy, it seems that something is moving on, as expressed in question n. 23. "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future", in which 45,2% answered "Yes".

Main conclusions for Italian study:

1. The big problem is the lack of information and knowledge concerning the blockchain technology.

2. A sustained campaign is needed to promote blockchain technology to be used in the interest of promoting it.

3. Involving as many actors from different fields of activity to become blockchain supporters and agents.

4. A training program in blockchain technology is required and maybe a blockchain learning and research funding program.

COUNTRY REPORT - GREECE

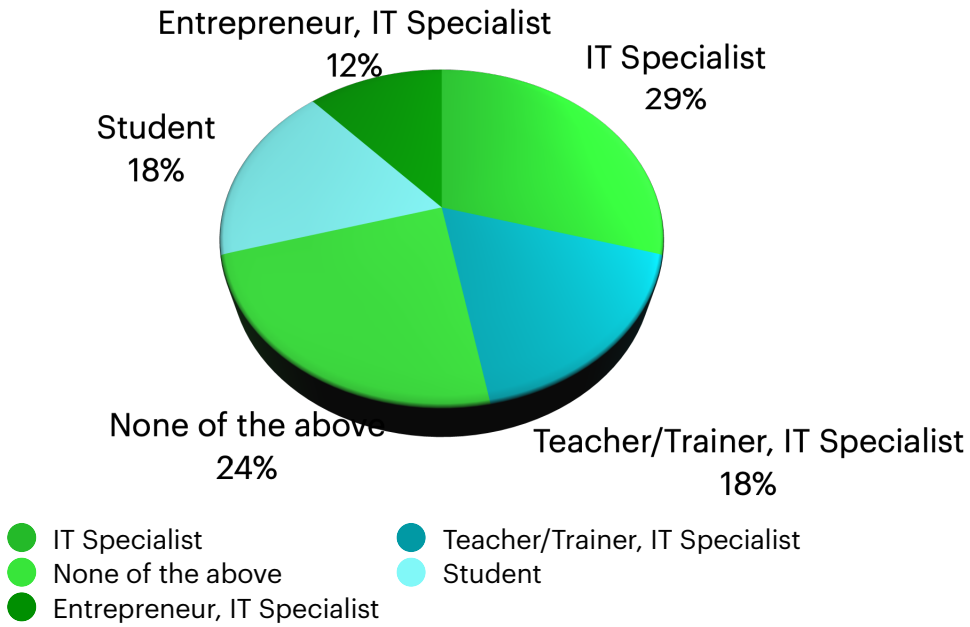
This research aims to gain greater insights into the overall attitudes and investments on blockchain technology in Greece. Specifically, this report investigates the current status of skills and knowledge shortages and gaps in blockchain in the various types of actors of the ecosystem in order to create a blended learning curriculum for all interested parties.

In the context of BLOCKS project, a survey was designed and distributed among the project countries (Romania, Greece, Italy, Latvia, Estonia), in order to investigate the feasibility, challenges, benefits and risks of blockchain technology in both the academic and the corporate sector. In fact, this exploratory study is aimed at a non-specialist audience and the policy makers.

Regarding the methodology of this research, an online survey named "Blockchain - Knowledge Assessment for Entrepreneurs" was conducted, which contains 37 structured questions, in order to obtain feedback from target groups on the level of interest in implementing and developing applications/products that use blockchain technology. The three main target groups of this study include entrepreneurs, teachers/trainers and students. The aforementioned parties represent the intended audience of this study.

The following section provides an in-depth analysis of the sample in Greece.

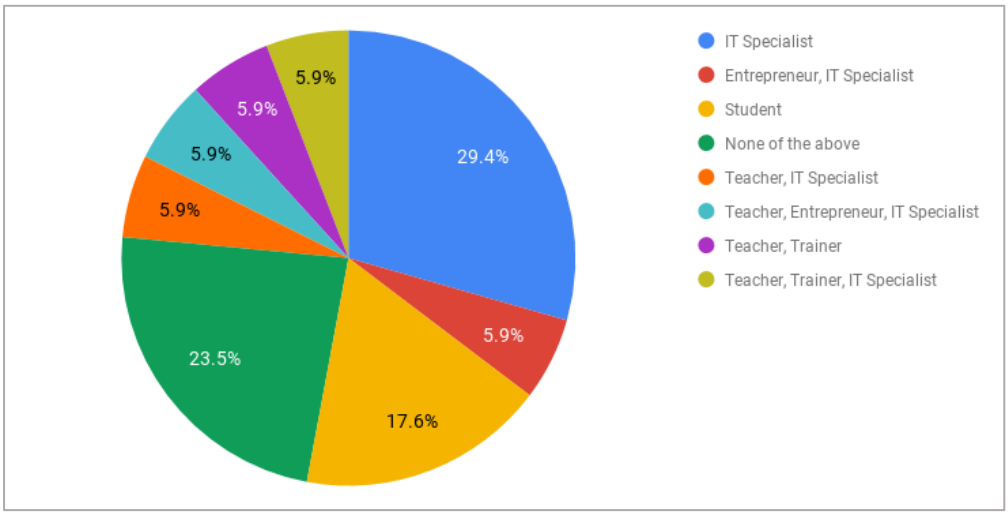
The structure of the sample in Greece (17 subjects) consisted of IT specialists (29%), Entrepreneurs-IT specialists (12%), Students (18%), Teachers-Trainer-IT specialists (18%) as well as 23% of the sample did not fall into none of the above categories.



"Are you one of the following? Check all that apply"

(respondents by occupation)

The above figure clearly shows that most of the subjects come from the IT domain. It is also interesting that almost 30% of the sample could be further classified into more than one category. As such, if we analyse respondents' answers by unique profiles the following mixed categories occur: Entrepreneur-IT Specialist (5.9%), Teacher-Entrepreneur-IT Specialist (5.9%), Teacher-IT Specialist (5.9%), Teacher-Trainer-IT Specialist (5.9%) and Teacher-Trainer (5.9%).

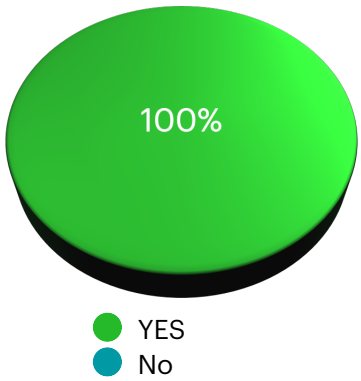


"Are you one of the following? Check all that apply"

(respondents by occupation – unique profiles)

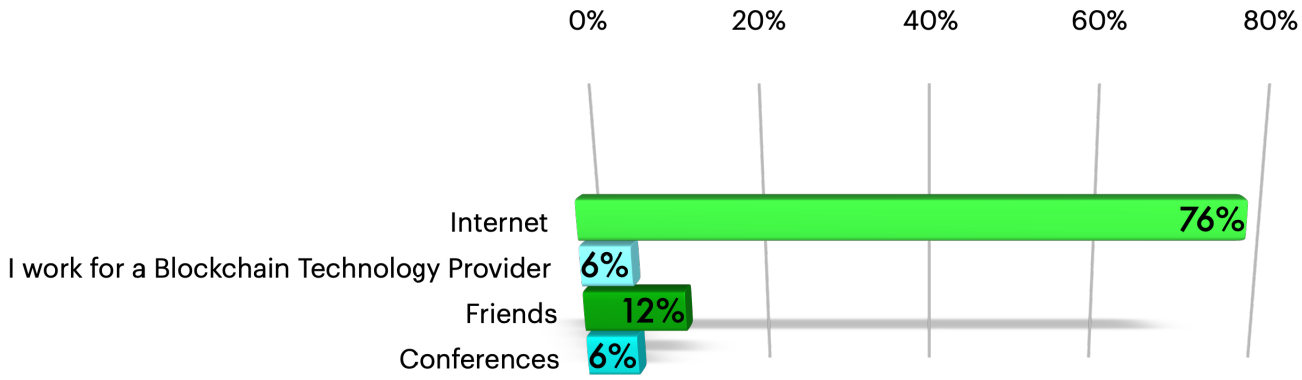
This division of the sample allowed us a better correlation of the collected information as the subjects answered the questions from a double perspective. Further assumptions that can extracted from this analysis, is that most of the Entrepreneurs and the Teacher/Trainers participated in the survey have also an IT background.

All the Greek respondents have heard about the term "blockchain technology". This may derive mainly from their occupational profile as most of the subjects have an IT background as outlined above.



Question 1: "Have you heard about the blockchain technology?"

Regarding their source of information about blockchain technology, 76% of the respondents said that they first heard about blockchain from the Internet. This may derive mainly from the respondents' personas (profile, habits and preferences) but also from the fact that the Internet usage in Greek households reached 78.5% in 2019 (Elstat, 2019). Another 12% of the analysed sample heard about blockchain from friends. The peer-to-peer network in this case, shows a medium penetration of the term "blockchain" in the Greek society. Finally, 12% of the respondents stated that they either work for a Blockchain Technology Provider or they have heard about blockchain in conferences. Although, this percentage is relatively small it clearly shows that part of the Greek sample was highly specialized IT professionals or researchers which is an encouraging sign for the future of blockchain in the Greek society.

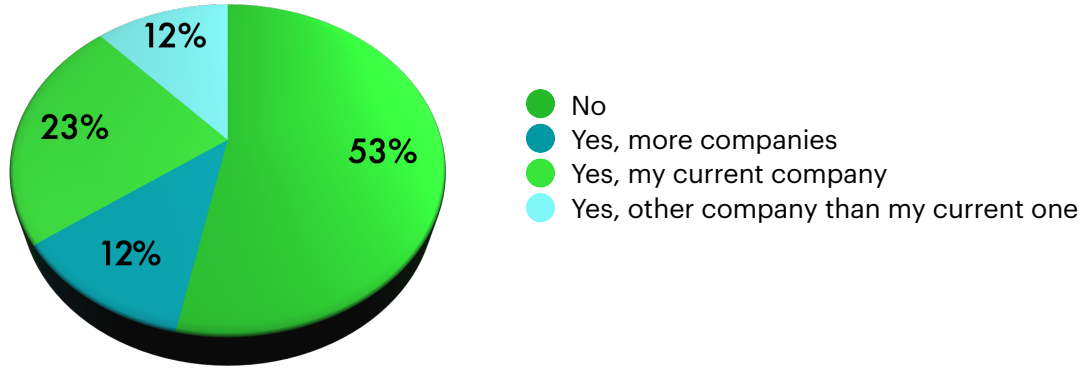


Question 2: "Where have you first heard of the term blockchain?"

The figure below shows that blockchain has been recently introduced to the Greek audience, as 59% of the respondents first heard about it after 2015. In the case of Greece, the blockchain term has entered harder in the Greek economy and society in the light of the financial crisis, as Bitcoin was identified as an alternative way of trading quickly and bypassing residency-based measures, such as capital controls (Zamani & Babatsikos, 2017). This captured the interest of both the Greek businesses and the consumers and Bitcoins begun being used for funds transfer across borders and general payments (Bouoiyour & Selmi, 2019). The analysis also reveals that 35% of the respondents have first heard about blockchain between 2010-2015 and only 2% have heard about it before 2010.

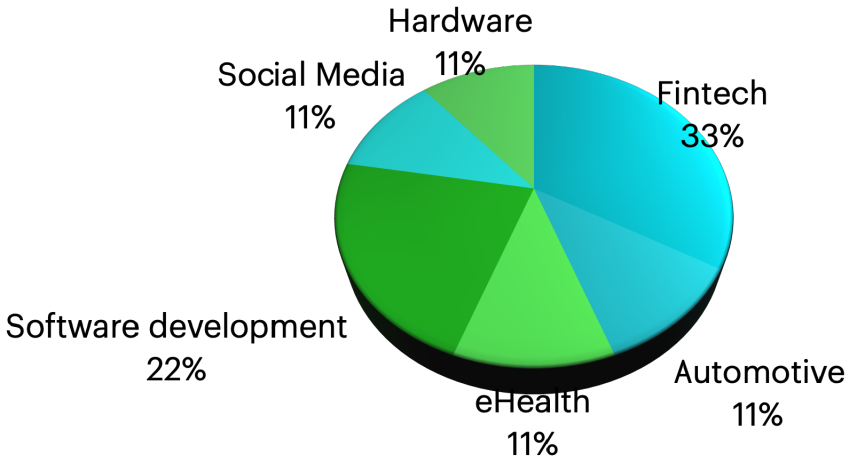
Question 3: "When have you first heard the term «blockchain»?"

Regarding respondents' awareness about companies or organizations that implement blockchain technology, the answers were almost equally splitted. 53% of the sample stated that they were not aware of companies that implement blockchain technology while 24% were aware of companies that use blockchain technology. Surprisingly, 23% of the sample said that the companies they currently work use blockchain technology.



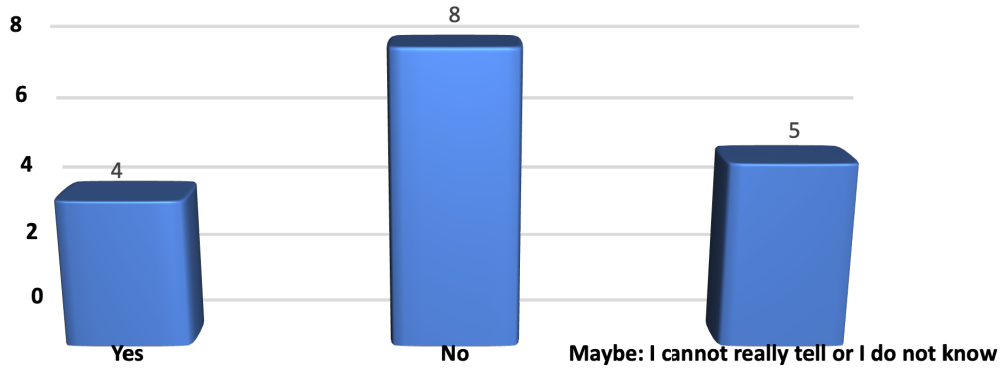
Question 4a: "Do you know any companies or organizations implementing a blockchain technology?"

The respondents who were aware of companies or organizations that implement blockchain technologies were also asked to describe the field of activity of those companies. Most of the responses were related to Fintech (34%). In Greece, most of the companies operating in the FinTech ecosystem, focus on payment services. Given the existing difficulties in Greek financial system combined with the mass adoption of e-banking and online payment instruments by the Greek audience after 2015, it seems that FinTech services have a critical mass of early adopters in Greece. On the other hand, other blockchain-related fields that were mentioned by the participants, were software development (22%), social media (11%), hardware (11%), eHealth (11%) and automotive (11%).



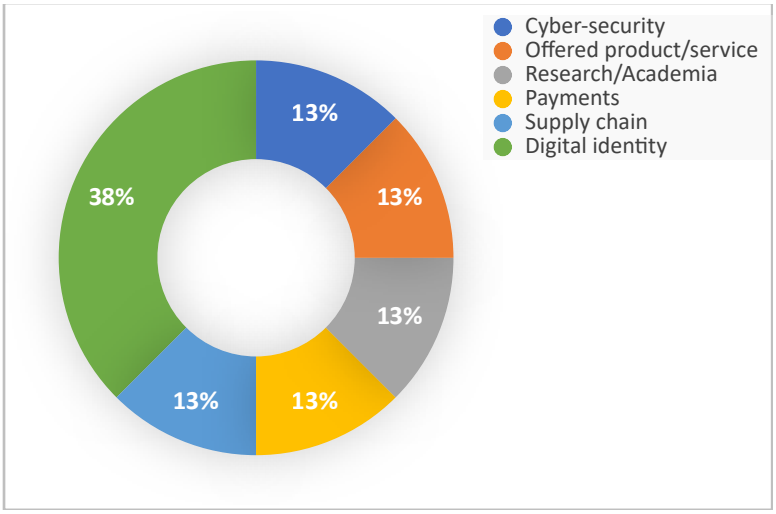
Question 4b: "If you answered «Yes» to the previous question, in which business process did you implement blockchain technologies?"

Respondents were also asked if their organizations/companies have or had the opportunity to use/develop applications that use blockchain. Only four respondents answered positively while the rest of the sample either did not have opportunity to use blockchain applications or did not know about the types of technologies used in their organizations. The positive responses are encouraging aspects of the blockchain evolution in Greece, even in its embryonic phase. It was also noticed that most of the organizations that already use/develop blockchain-based application are mainly from the IT field.



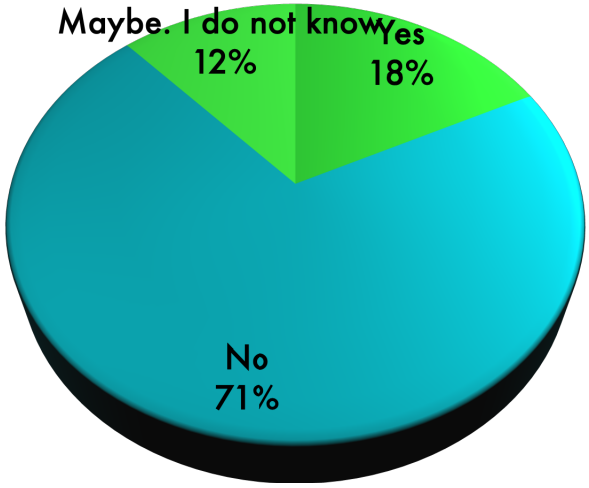
Question 5: "Did your organization have the opportunity to use/develop applications that use blockchain?"

Among the subjects who answered "Yes" to the previous question, 38% stated that they use Blockchain as a solution to Digital Identity Management. Other fields mentioned by few participants were Cyber-security, Payments, Supply Chain, Offered product/service and Research with almost 12% each.



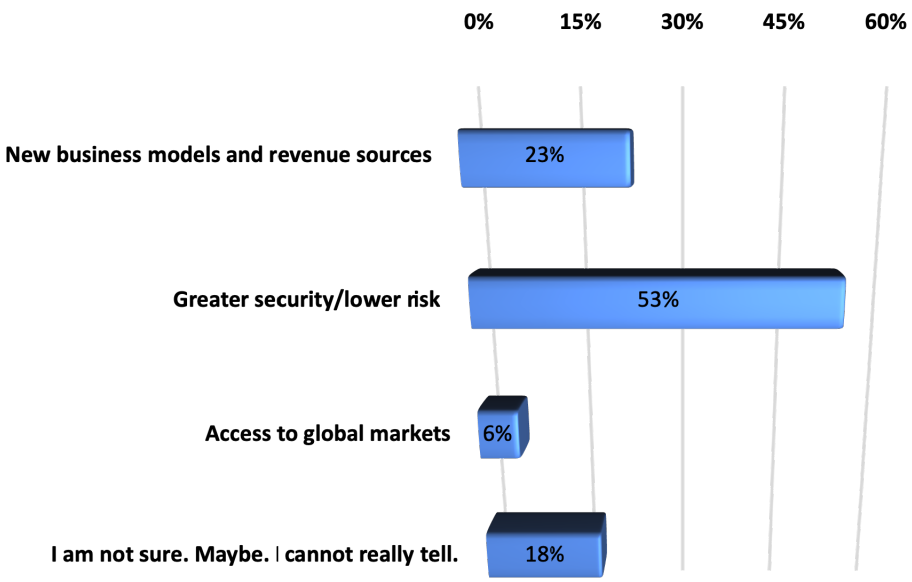
Question 6: "If you answered «Yes» to the previous question, in which business process did you implement blockchain technologies?"

18% of the respondents stated that they use a blockchain tool or blockchain related concepts in their day-to-day activities. The rest of the sample stated that either do not use such technology (70%) or they were uncertain if and how use such technologies in their daily activities (12%).



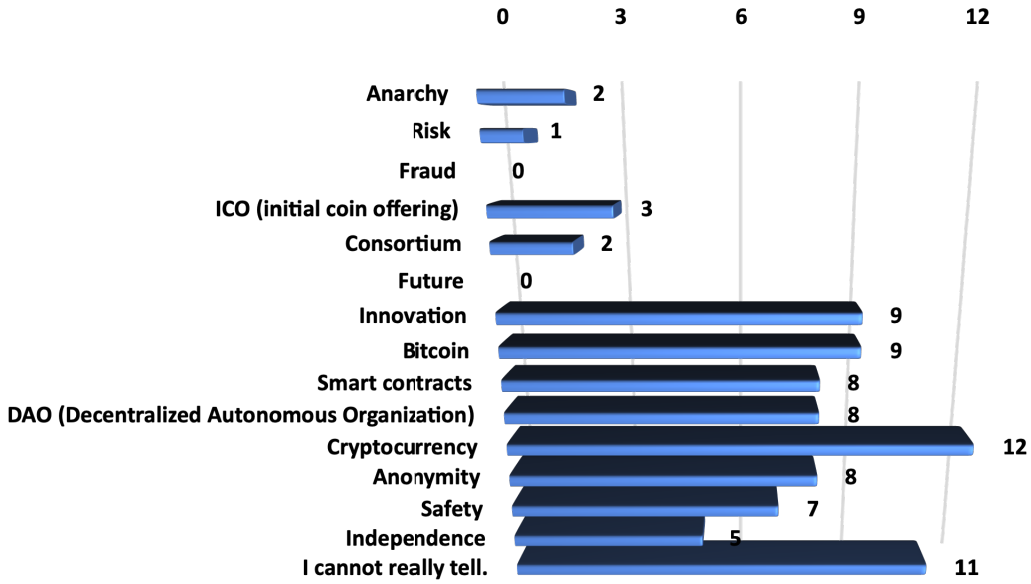
Question 7: "Do you use a blockchain tool or blockchain related concepts directly in your day-to-day activity?"

Respondents see greater security/lower risk (53%) as a key advantage of blockchain technology over existing systems. Other advantages of blockchain mentioned by the respondents were: new business models and revenue sources (23%) and access to global markets (6%). Finally, 18% of the respondents were not aware of the advantages of blockchain.



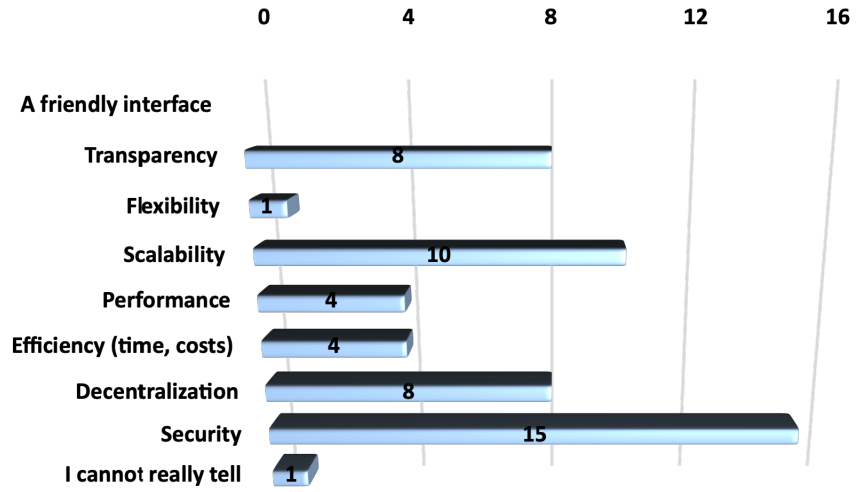
Question 8: "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry? (choose one - the most significant)"

Respondents were also asked which terms they associate with blockchain technology. "Cryptocurrency" and "Bitcoin" are the most frequent associations with blockchain. It should be clarified that blockchain is the technology that enables the existence of cryptocurrency (among other things) but it goes far beyond bitcoin and cryptocurrency. Blockchain promises to change the way industries as diverse as supply chain, healthcare, entertainment, financial services, and more, conduct business and execute transactions. Greek respondents seem to have realized that to a certain extent, as they also mentioned "Innovation". Other more specialized terms were also frequently used such as "Smart Contracts" and "DAO" (Decentralized Autonomous Organization), fact that shows a relatively high level of familiarization mainly by IT professionals. Once again, it was mentioned "Safety", "Anonymity" and "Independence" as main characteristics of the blockchain system, even if there were also some negative associations (reduced in number) such as "Risk" and "Anarchy".



Question 9: "Which of the following do you associate with blockchain technology? (tick all options relevant to you)"

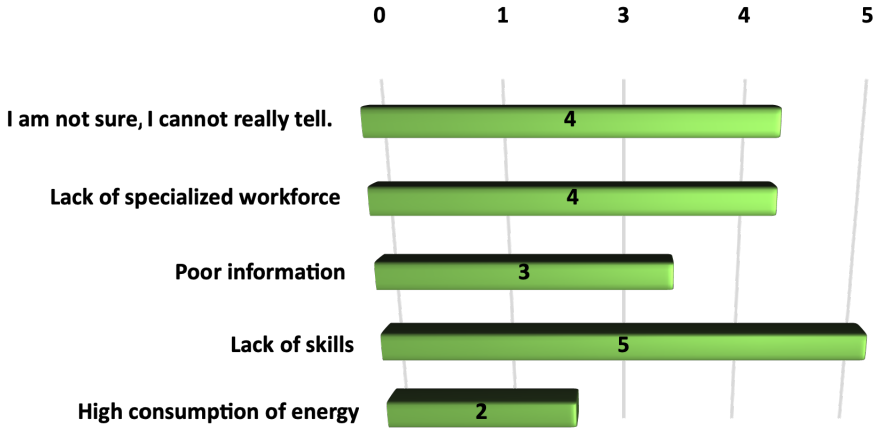
Almost all the questioned people consider "Security" as the main attribute of a blockchain application, followed by "Scalability", "Transparency" and "Decentralization". Blockchain seems to be a good fit for the Greek mentality as it promotes decentralization and transparency, directions that have the potential to transform both the public and the private sector in terms of their services. Fewer respondents consider "Performance", "Efficiency" and "Flexibility" as important attributes of blockchain.



Question 10: "What do you think are the most important 3 attributes that a blockchain application must have in your vision? (check the three that apply)"

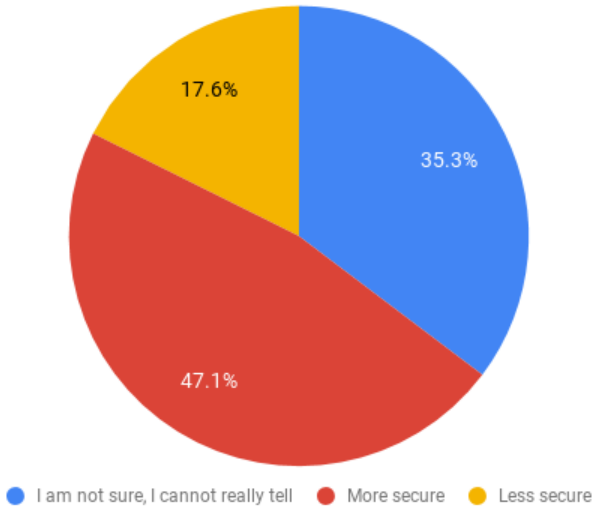
Regarding the weaknesses of blockchain technology, most of the respondents believe that lack of skills along with the lack of specialized workforce may be the most significant barriers to adoption. The opinions converge with the lack of information thus, it is considered crucial to provide reliable and credible

sources of information on blockchain together with series of training modules on the subject to prepare the workforce for innovation.



Question 11: "What do you think would be the weaknesses of such technology?"

47.1% of the respondents feel that blockchain-based solutions provide greater security than systems built from more conventional information technologies, while 17.6% consider it less secure. This discrepancy could be related to the fact that Greek society is extremely tired and highly sceptical about solutions that seem to be overpromising. In this regard, Greek people appear to have doubts about the immutability of blockchain. A still meaningful percentage (35.3%) feel uncertain about blockchain security, fact that shows there is not a solid awareness about blockchain in Greece.



Question 12: "Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?"

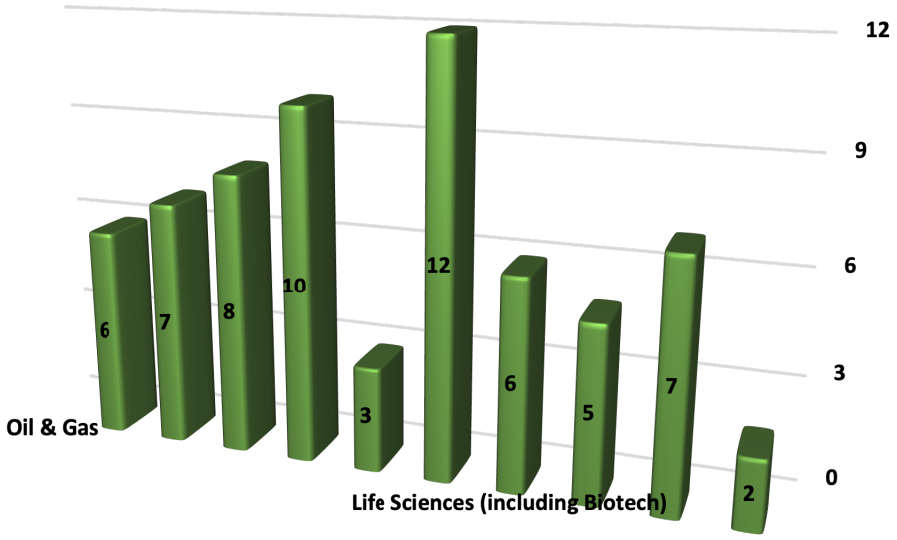
Most respondents think that Blockchain technology is broadly scalable and will eventually achieve mainstream adoption (11 respondents), while only 2 respondents think otherwise. Regarding the statement that suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain, 9 of the respondents answered "True" while only one answered "False". The interest of the decision-makers on the blockchain subject was revealed by the responses at the statement "Executive team believes there is a compelling business case for use of blockchain technology", where the

proportion was 9 responses for “Yes” and 3 responses for “No”. As for their intention to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain, 6 respondents stated that they are planning proceed, while 5 respondents stated that they are not eager to do it. When the respondents were asked if they feel that they will lose a competitive advantage if they don't adopt blockchain technology, the answers were similar to the previous question (6 “True” and 5 “False”). Finally, only 4 respondents believe that “Blockchain technology will disrupt their industry”, while 9 respondents do not state the same for their Industries. This view is further reinforced as most of the respondents believe that blockchain is overhyped (8 “True” and 5 “False”).

Statement	No. of respondents that answered “True”	No. of respondents that answered “False”	No. of respondents that answered “I cannot really tell”
Blockchain technology is broadly scalable and will eventually achieve mainstream adoption	11	2	4
Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain	9	1	7
Executive team believes there is a compelling business case for use of blockchain technology	9	3	5
Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain	6	5	6
Will lose a competitive advantage if we don't adopt blockchain technology	6	5	6
Blockchain technology will disrupt our industry	4	9	4
Blockchain is overhyped	8	5	4

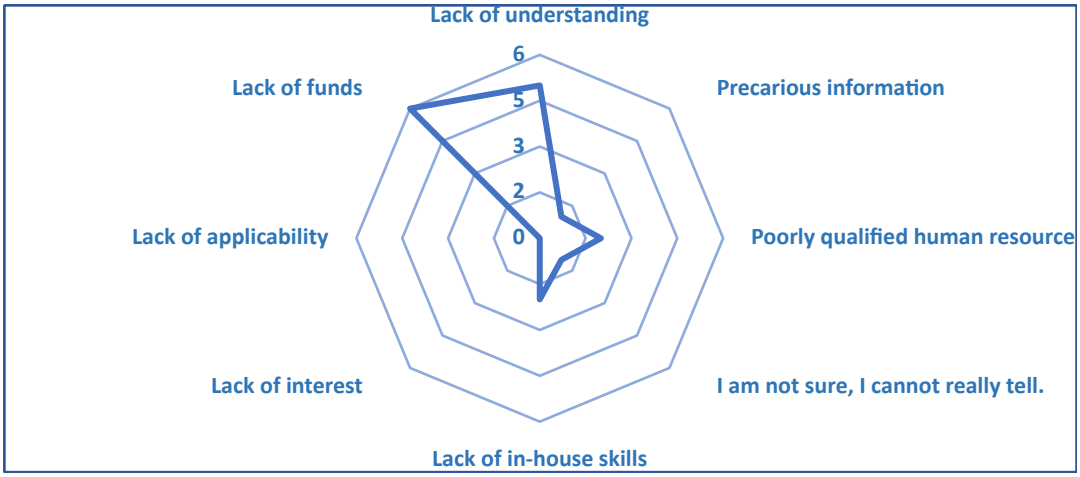
Question 13: “How can you assess, from your point of view, each of the following statements regarding blockchain technology?”

Many respondents consider blockchain useful in the fields of Health (12 responses), Public sector (10 responses) and Technology/media/telecommunication (8 responses). Some of the respondents also mentioned the fields of Food and Education (7 responses each), as well as Life Sciences (including Biotech) and Automotive (6 responses each). The sectors that were identified as less important in terms of blockchain usefulness were Medical Devices and Pharma (5 responses) and Consumer products & Manufacturing (3 responses).



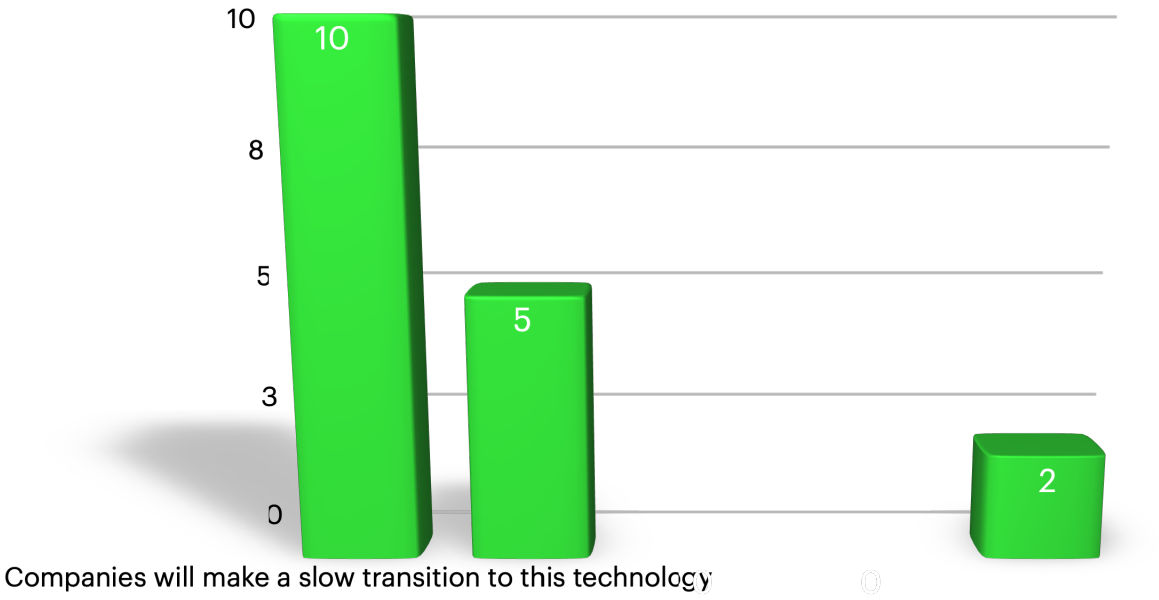
Question 14: "In what other areas do you think the use of blockchain would be useful?"

The most common barriers in using the blockchain technology in Greece are the lack of funds and (6 responses) and the lack of understanding of the term (5 responses). These responses sound quite reasonable as the years of austerity in Greece imposed very few funding opportunities for both the public and the corporate sector. Regarding the lack of understanding about blockchain there were not any coordinated efforts in a national level towards this direction. Other barriers mentioned by some respondents were Lack of in-house skills (2 responses), Poorly qualified human resource (2 responses) and Precarious information (1 response).



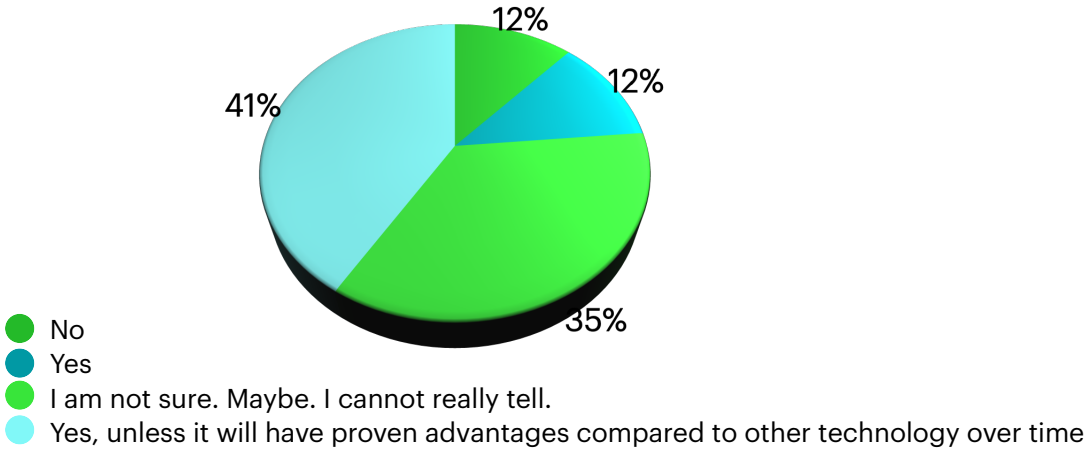
Question 15: "Which do you think would be the main barrier in using the blockchain technology in your country?"

For all the reasons outlined above, respondents feel that blockchain progress in Greece will be slow. Most of them believe that companies will make a slow transition to this technology (10 responses) while some of them appear to be slightly more optimistic that this technology will be implemented more and more (5 responses).



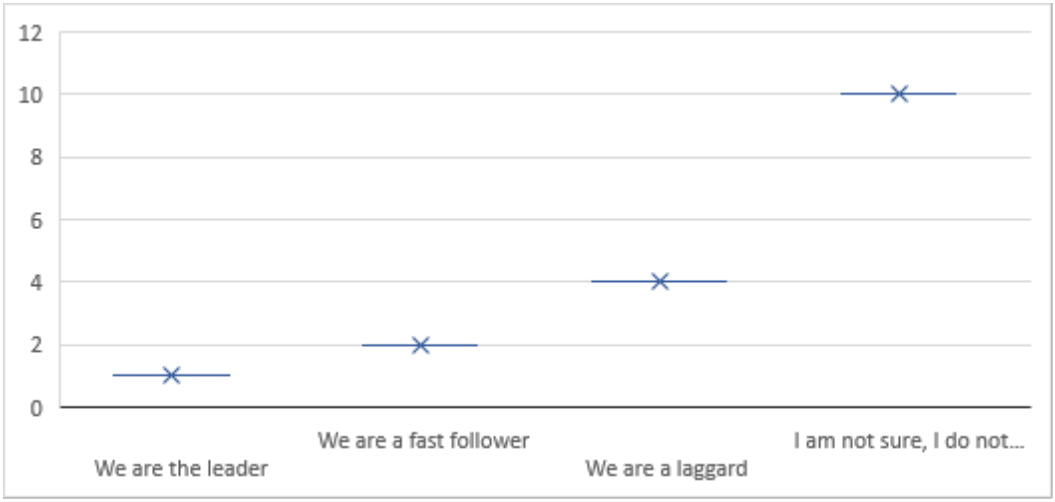
Question 16: "How do you see the blockchain progress in your country?"

Greek respondents were also asked if they would you choose blockchain as a solution to their problems at the expense of other solutions. Only 12% of the sample answered "Yes" with confidence while 41% answered "Yes, under conditions. This percentage clearly shows that Greek audience is open to change but not totally convinced of its superiority over other technologies. This assumption is further supported by other 35% of the respondents that were uncertain but not negative to this option. Finally, the remaining 12% stated that they would not choose blockchain as a solution to their problems.



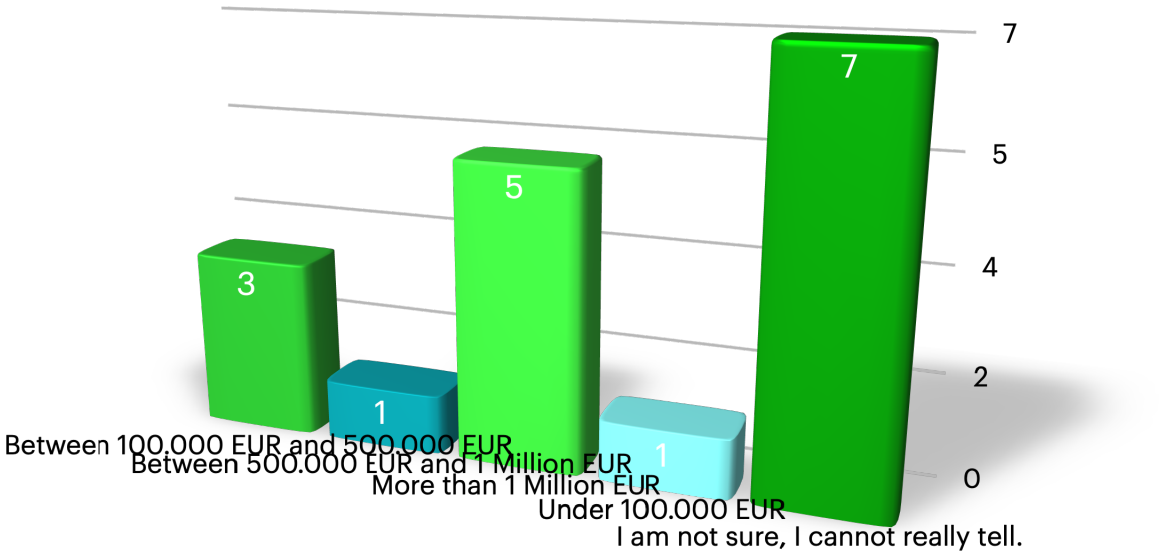
Question 17: "Would you choose blockchain as a solution to your problems at the expense of other solutions?"

In the terms of blockchain level of adoption respondents were asked to classify their organizations according to the Diffusion of innovation model (Rogers 1962). According to the analysis, 10 respondents did not know their position comparing to that of their competitors or do not sufficiently understand the process, making it much harder to classify their organization. 2 respondents stated that they are fast followers while 1 of the respondents consider his company be the leader. Finally, 4 respondents classify their organization in the laggard category.



Question 18: "How does your organization's current adoption of blockchain compare to that of your direct competitors?"

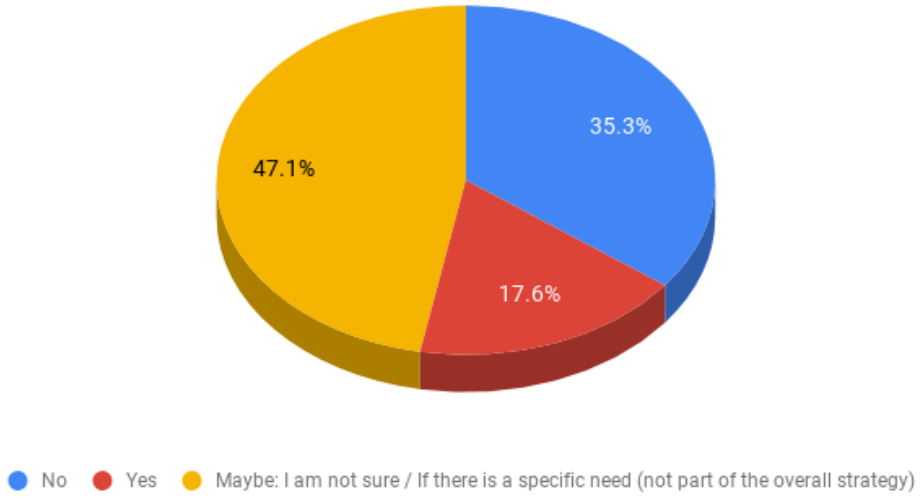
Concerning the total revenue of participants' organizations in 2018, 5 responses being framed into the "more than 1 million EUR" category, 3 responses being framed into the "100.000 EUR and 500.000 EUR" category, 1 response being between "500.000 and 1 million EUR" and 1 response being "under 100.000 EUR". These results shows that almost 30% of the Greek sample comes from large enterprises.



Question 19: "What is the total revenue of your organization in 2018?"

47.1% of the respondents stated that they are not sure if their organizations planning to invest in blockchain technology. The lack of such information is a direct consequence of employees' involvement in

the planning strategy and the overall lack of information regarding this issue. 35.3% of the people questioned, said their organizations do not plan to invest in blockchain soon, while only 17.6% of respondents declare that their companies are planning to invest in blockchain technology. Those respondents whose companies planning to invest in blockchain, were also asked to specify the budget for this investment. The responses were 100.000 EUR, 10% of the total revenue and I don't know.



Question 20: "Is your organization planning to invest in blockchain technology?"

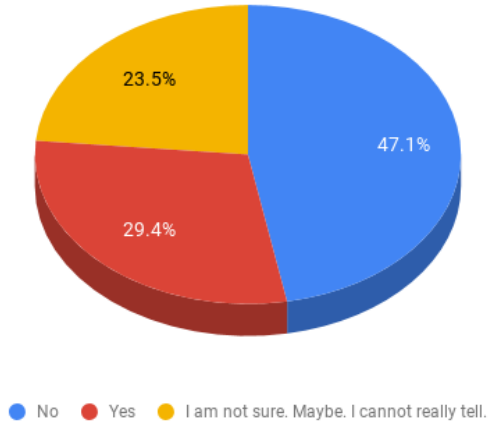
When the respondents were asked if their organization investing in hiring staff with blockchain experience now or in the future, 36% of respondents were not sure or do not know if their organization is interested in hiring this kind of staff, while 6% said "we have not decided". 24% of respondents said their company is currently recruiting staff with blockchain experience and 15% that they will begin investing in the next calendar year or other point in the future. Finally, 6% of the respondents said their companies are not interested in such investment.

Survey responses	Answers	Percent
Currently investing	4	24%
I am not sure. Maybe. I cannot really tell.	6	36%
We have not decided	1	6%
We will not be investing	1	6%
Will begin investing	5	28%
Total		100%

Question 22: "Is your organization investing in hiring staff with blockchain experience now and in the future?"

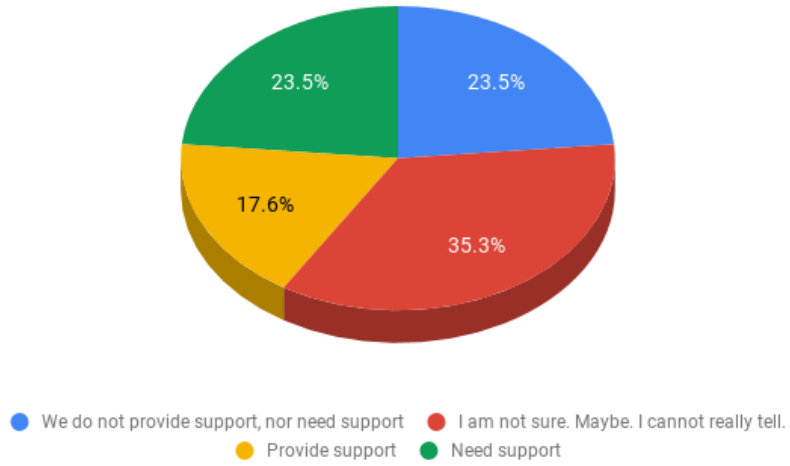
In the question "Your organization aims to train existing staff in the use/implementation of blockchain technology now or in the future", 47.1% of the respondents said "No" while 29.4% said "Yes".

Taking into consideration the results of the previous question, it seems that the percentage of negative answers is rather high. This may be due to the lack of digital skills of the current workforce. The rest of the sample 23.5% do not know if their company is planning to train existing staff to use blockchain technology.



Question 23: "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future?"

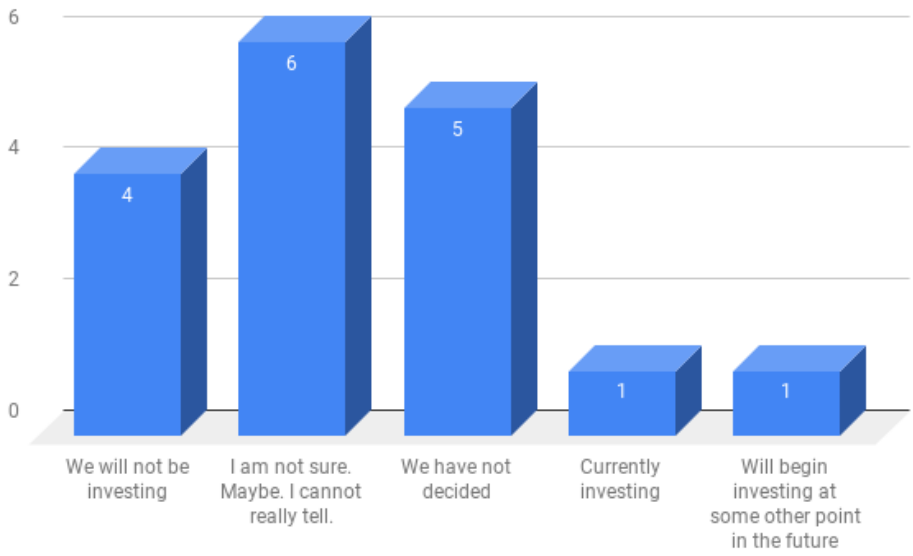
When participants were asked if their organizations can provide or need support in implementing a blockchain-based application, 23.5% stated that need support while 17.6% said they provide support. 35.3 % of the respondents were not sure if their company need support in implementing blockchain. The rest 23.5% stated they do not provide support, nor need support.



Question 24: "Can your organization provide/need support in implementing a blockchain-based application?"

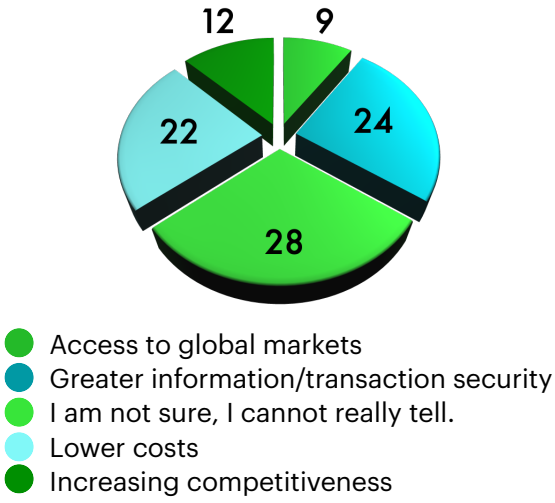
35.3% of respondents are not aware if their organization investing in replacing parts of their systems with blockchain-based enhancements. Maybe their position in the company does not give them access to this kind of knowledge about future company's investments. Another 29.4% responded that they do not have decided yet. Only 11.8 of respondents stated their company already invest in replacing existing systems

with blockchain technologies or will begin to invest while 23,5% stated their company does not have such intention.



Question 25: "Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?"

As for the benefits blockchain may bring in their organizations, 25% of respondents consider greater information/transaction security a big plus followed by lower costs (23%). Other benefits mentioned are increasing competitiveness (13%) and access to global markets (10%). The fact that 29% of respondents could not specify any benefits, could be because they do not know enough about blockchain and what this technology can bring to their company.



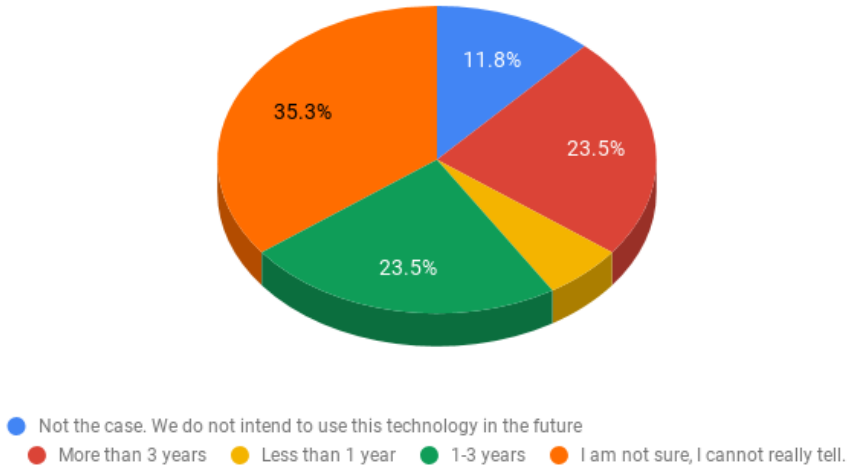
Question 26: "Please specify how the use of blockchain would or might bring benefits to your organization."

In order to see if there is interest in the Greek ecosystem, we asked respondents if there are any requests from stakeholders outside their companies in engaging in a blockchain solution or strategy. The

results showed that mainly partners, probably of IT firms, are engaging in discussions about blockchain more than customers, suppliers or market analysts. Other external stakeholders that mentioned were start-ups and students which may have a more in-depth knowledge on blockchain. The rest of the sample stated that either they did not know, or do not have such requests.

Question 27: "Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?"

Almost on third of the respondents (35.3%) were not sure if and how blockchain will impact their organisation and therefore they could not give a time estimation for its potential impact. 23.5% of the sample believe that blockchain's impact would be observable in 1-3 years while an equal percentage (23.5%) believe that it would take more than three years. Very few respondents anticipate seeing a significant impact in their organization in less than one year or clearly do not intend to use blockchain.



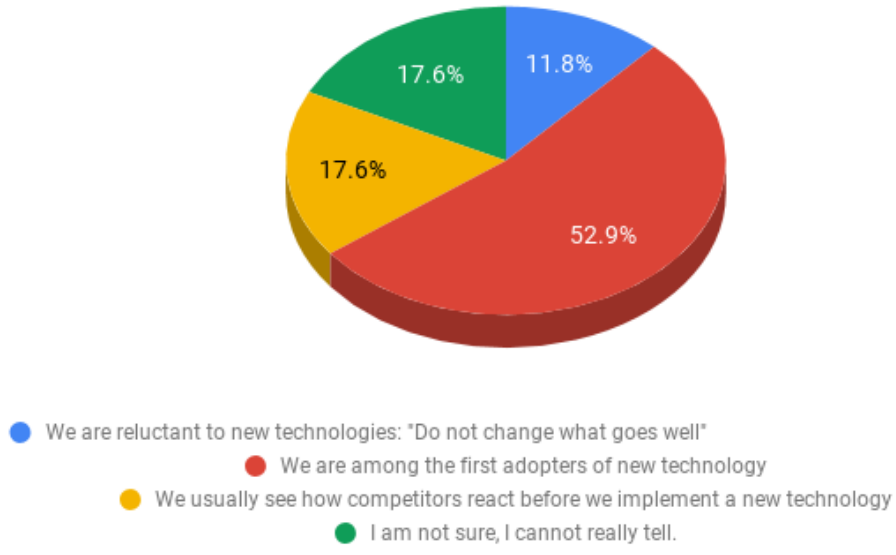
Question 28: "How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?"

Most respondents confirmed that their companies currently use dedicated email, file sharing and communication platforms and cloud services. A smaller percentage stated they use machine learning, artificial intelligence and integrated CRM/ERP systems.

Survey responses	Answers
Dedicated e-mail	13
Communication platforms	12
Cloud services	12
File sharing platforms	13
Integrated ERP system	5
Integrated CRM system	5
Machine Learning	7
Artificial Intelligence	7
I am not sure, I cannot really tell.	0
Total	

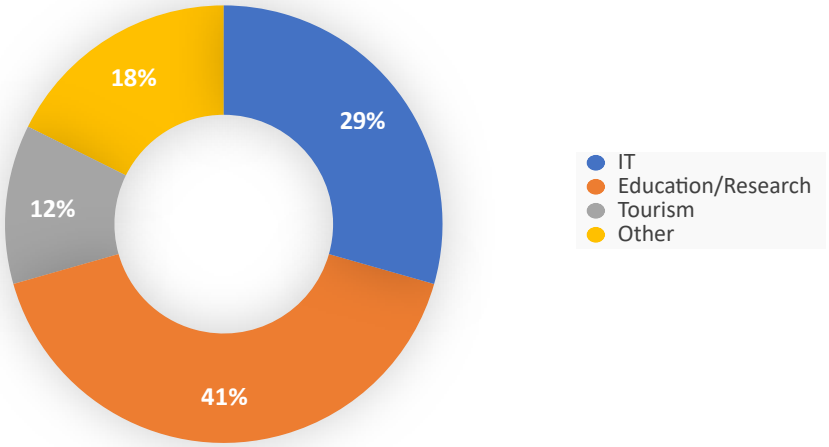
Question 29: "What types of technologies do you use in your organization/company?"

When respondents were asked to rate their organization in relation to technology, almost half of respondents (52.9%) believe their company is among the first adopters. This is a positive sign on the future of blockchain in Greece. 17.6% said they implement new technology only if their competitors do this first and 11.8% stated reluctant to new technologies. Another 17.6% did not rate their organization.



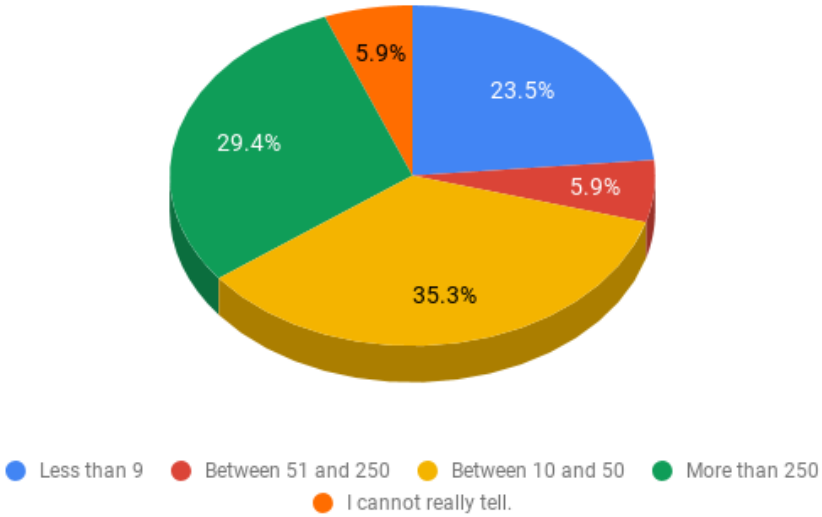
Question 30: "How do you rate your organization/company in relation to technology?"

Respondents were also asked to name the field of activity their companies/organizations operate. %), IT (29%) and Tourism (12%).



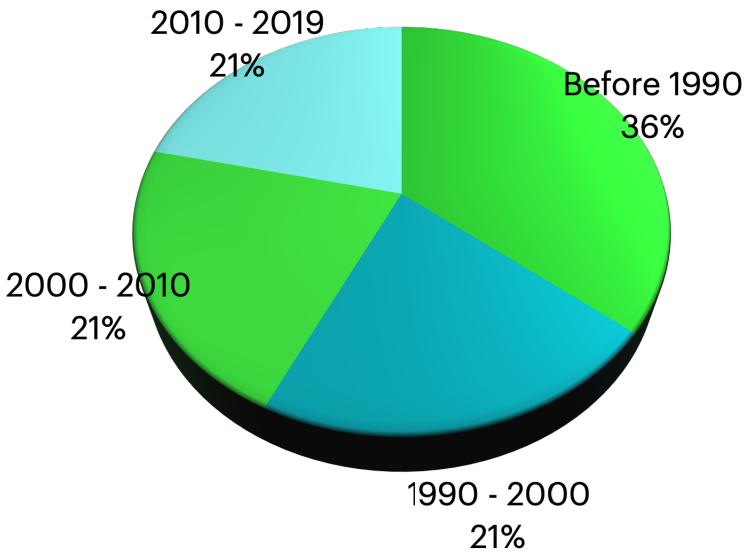
Question 31: "Which is the field of activity of the company?"

As for the number of employees in their companies, 29.4% of respondents stated that they work in large companies (over 250 employees), 5.9% in medium-sized companies (51-250 employees), 35.3% in small-sized companies (10-50 employees) and 23.5% in very small companies (less than 9 employees).



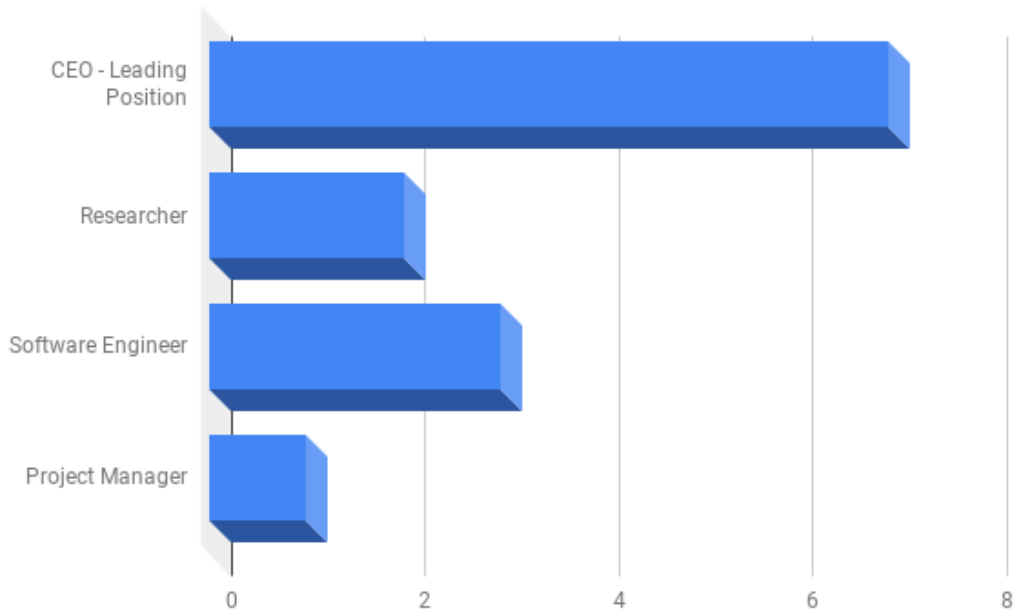
Question 32: "Number of employees"

36% of respondents work in companies founded before 1990 and 22% in companies established between 1990-2000. Similarly, 21% work in companies established between 2000-2010 and 21% in companies established between 2010-2019.



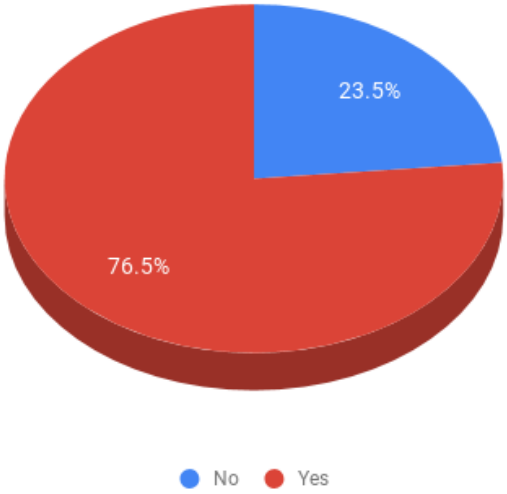
Question 33: "When was your company established?"

Regarding the position of respondents in their company, 41% of respondents are in top management, 17.6% work as software engineers while the rest of the sample work either as researchers or project managers.



Question 34: "Your position within the company"

Regarding their interest in receiving information about blockchain, 76.5% of the sample is interested in obtaining information while 23.5% is not interested.



Question 36: "Are you interested in getting more information about blockchain and possible apps for your business?"

The main conclusions of the survey results regarding the state of blockchain in Greece are summarized below:

The Greek audience is quite informed of blockchain technology

All survey respondents (100%) were aware of blockchain technology. 59% of the respondents first heard about blockchain after 2015 while 35% have heard about it between 2010-2015. The latter represent a more mature audience as they probably follow blockchain developments for over 5 years now.

The Greek audience recognize companies that use already blockchain technology

47% of the sample stated that they were aware of companies that use blockchain technologies. Most of the companies mentioned by the participants were related to Fintech (34%). In Greece, most of the companies operating in the FinTech ecosystem, focus on payment services.

A small number of Greek companies/organizations have started to use blockchain applications

23.5% of the respondents stated that they use/develop blockchain-based applications in the organizations they are currently employed. 38% of them stated that they use Blockchain as a solution to Digital Identity Management.

The Greek audience has not yet started to use blockchain in their daily activities

70% of the sample stated that they do not use blockchain technology in their daily activities. This shows that although they are already aware of blockchain technologies, they do not have enough knowledge on how to use it or they hesitate to us it.

The Greek audience is quite informed of blockchain advantages

53% of the respondents see greater security/lower risk as a key advantage of blockchain technology over existing systems. Also 25% of respondents consider that blockchain may provide greater information/ transaction security in their organizations and may also decrease costs (23%).

The Greek audience is quite informed of blockchain applications and terminology

“Cryptocurrency”, “Bitcoin” and “Innovation” are the most frequent terms associated with blockchain, as quoted by the Greek respondents. Other more specialized terms such as “Smart Contracts” and “DAO” (Decentralized Autonomous Organization) were also frequently used, fact that shows a relatively high level of familiarization with the subject.

The Greek audience is quite informed of blockchain attributes

Almost all the questioned people consider “Security” as the main attribute of a blockchain application, followed by “Scalability”, “Transparency” and “Decentralization”. 47.1% of the respondents believe that blockchain-based solutions provide greater security than systems built from more conventional information technologies.

The Greek audience acknowledge the value of blockchain and believe that it will eventually achieve mainstream adoption

64.7% of the respondents think that Blockchain technology is broadly scalable and will eventually achieve mainstream adoption. 52.9% states that suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain. Also, 52.9% argue that their executive team believes there is a compelling business case for use of blockchain technology. In addition, 23.5% of the sample believe that blockchain’s impact in their organizations would be observable in 1-3 years while an equal percentage (23.5%) believe that it would take more than three years.

The Greek audience identify areas that blockchain could be implemented

Most respondents consider blockchain useful in the fields of Health, Public sector and Technology/media/ telecommunication. Regarding public sector, Greeks seem to recognise blockchain’s potential to simplify bureaucratic procedures and to ensure transparency.

The Greek audience identify barriers that will obscured blockchain adoption in Greece

The most common barriers in using the blockchain technology in Greece as quoted by the participants, are the lack of funds and the lack of understanding. Lack of skills along with lack of specialized workforce may also be significant barriers to adoption. In this context, respondents feel that blockchain progress in Greece will be slow.

The Greek audience is not ready yet to replace existing solutions with blockchain solutions

Only 12% of the sample answered that they would choose blockchain as a solution to their problems at the expense of other solutions while 41% answered that it would do it under conditions. This percentage clearly

shows that Greek audience is open to change but still hesitant. 11.8 of respondents also stated their company already invest or begin to invest in replacing existing systems with blockchain technologies.

The Greek organizations still cannot rate their blockchain adoption state in comparison to their competitors.

According to the analysis, 58.8% respondents were not aware of their organization's current adoption of blockchain comparing to that of their competitors or do not sufficiently understand the process, making it much harder to classify their organization. Also, 47.1% of the respondents stated that they are not sure if their organizations planning to invest in blockchain technology.

A small number of Greek companies/organizations started to invest in blockchain technologies

17.6% of respondents stated that their companies are planning to invest in blockchain. In addition, 52% stated that their companies currently investing or will begin investing in hiring staff with blockchain experience. Also, 29.4% stated that their organization aims to train existing staff in the use/implementation of blockchain technology. Finally, 23.5% of the sample stated that need support in implementing blockchain.

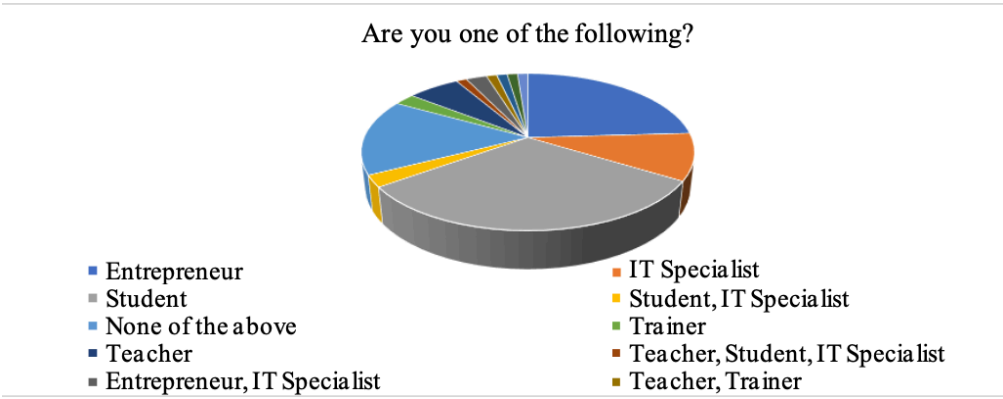
COUNTRY REPORT - ESTONIA

(INCLUDES GLOBAL ANALYSIS)

Survey "Blockchain - Knowledge Assessment for Entrepreneurs" was distributed among the students, entrepreneurs and teachers in various parts of the world between April and June 2019. The purpose of the survey is to analyse and assess the knowledge of blockchain among students, entrepreneurs and teachers.

The data collection plan was based on convenience sampling. The survey including a link to online form, was advertised to the target population through various communication channels such as personal email, various groups on social media websites for Pakistani and Estonian university students and teachers and University mailing lists. Blockchain, IT, banking, consulting and auditing companies were shortlisted. Their contact details were gathered from their websites and then survey was sent to them. The analysis of data is done through statistical analysis based on Excel spreadsheet and google form.

The total number of respondents for the survey were 83. Most of the respondents were from Estonia, Pakistan, United Kingdom, Australia, Belgium and Luxemburg. They have expertise in various sectors and they range from business to IT. Data was gathered from entrepreneurs, IT specialists, students and trainers as shown in the graph below.

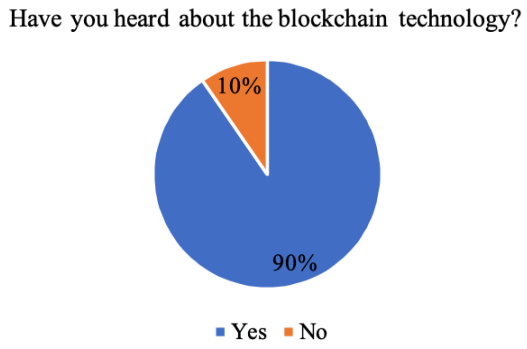


Respondents by occupation (question 1 – "Are you one of the following? Check all that apply")

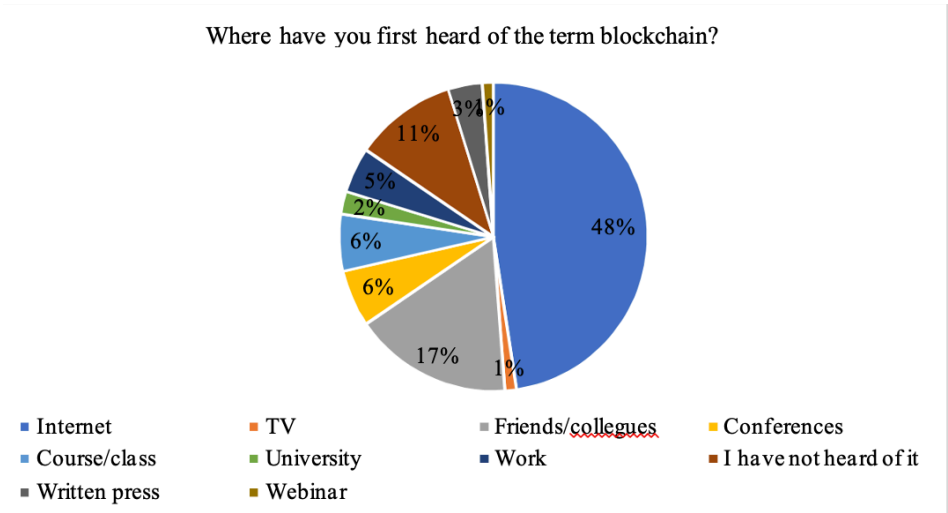
Estonian society is very advanced regarding the awareness of blockchain technology. Genuinely digital society [1] is a phrase that best describes Estonia. Even the government has employed the blockchain technology in the electronic ID card which is used in the Estonian e-health record to reduce discrepancies and to ensure data integrity. Estonia also has 'Guard Time' which is the worldś largest blockchain platform company in the world by revenue. On the contrary Pakistan is a developing country that is struggling to build a modern, efficient and democratic state. Blockchain is just in its infancy phase in Pakistan. Whereas a private Company "Telenor" has launched this technology in Remittance services. This is the first time in Pakistan where a company has employed Blockchain technology for cross border remittance services from Malaysia to Pakistan. An online payment platform "Alipay" has developed the blockchain based technology for Telenor.

Telenor considers this initiative as the litmus test for the future deployment of blockchain in the financial sector of a country [2]. Despite this fact and large amount of IT specialists in Pakistan, society is not fully aware of this technology and do not have enough knowledge about the advantages like transparency etc. which this technology can offer. Hence the rate of graduation process of Blockchain technology from pioneering stage of lifecycle in a world varies from country to country but the process has begun in every part of the world. As it is also evident from the results of the survey.

Awareness of the blockchain technology among respondents (question No.2 "Have you heard about the blockchain technology?")



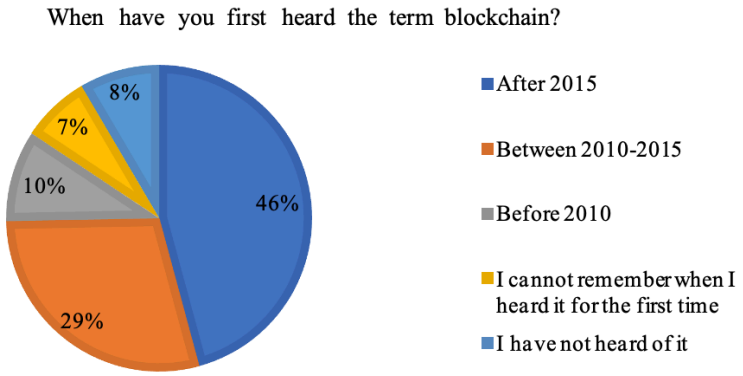
The figure above shows that most of the respondents are aware of the blockchain technology. Only 7 participants haven't heard about the blockchain technology or are not fully aware of the influence of Blockchain technology.



Resources providing information about blockchain technology (question No. 3 "Where have you first heard of the term blockchain?")

The quantitative data about awareness of Blockchain technology is measured by three main indicators

Social and Mass media (internet, TV and written press), 2) word of mouth (friends, family, colleagues etc.) 3) Educational Courses (course, classes, conferences). It is revealed that most of the participants got awareness about Blockchain technology through social and mass media. Only 8% in total got the information about the blockchain technology through educational courses and conferences.



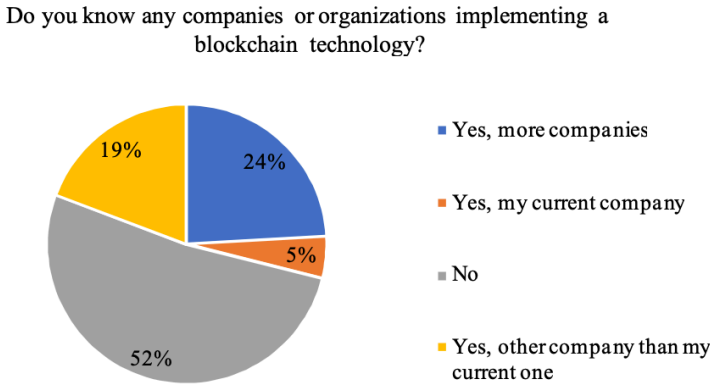
Time period respondents first heard about term "blockchain"

(question No. 4 "When have you first heard the term "blockchain"?")

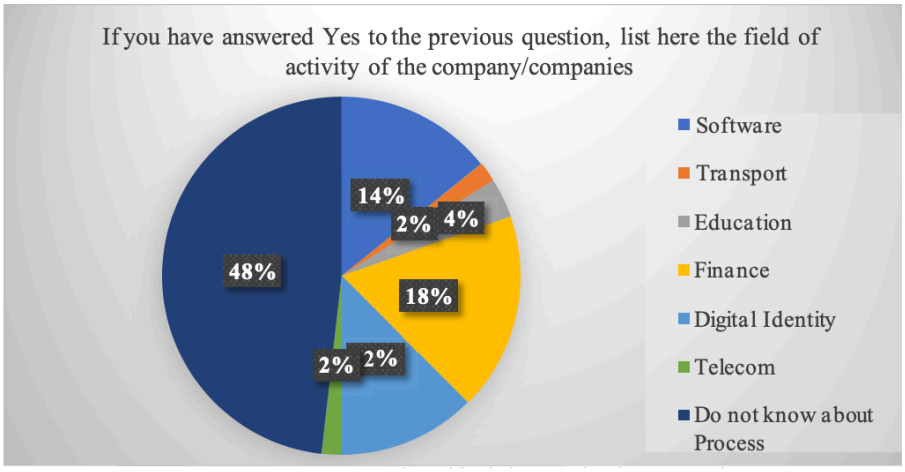
However, the next question asked to the participants is about the time period respondents first heard about the blockchain and it is found that majority of the participants heard the term "blockchain" after 2015.

Knowledge about companies that implement blockchain technology

(question No.5 "Do you know any companies or organizations implementing a blockchain technology?")



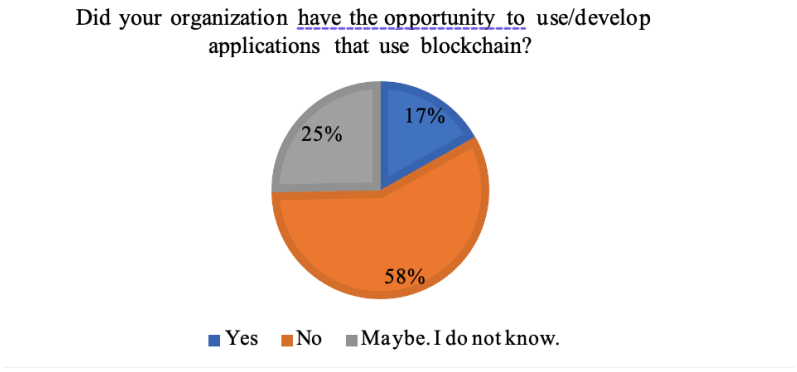
As it can be seen from the results that 52% of the respondents do not know if any company is employing the blockchain technology in order to upgrade its infrastructure. Whereas the other half is significantly aware of the companies that carved out their niche in the exiting market by using the blockchain technology.



Business processes where blockchain technology is used

(question No.6 "If you answered "Yes" to the previous question, in which business process did you implement blockchain technologies?")

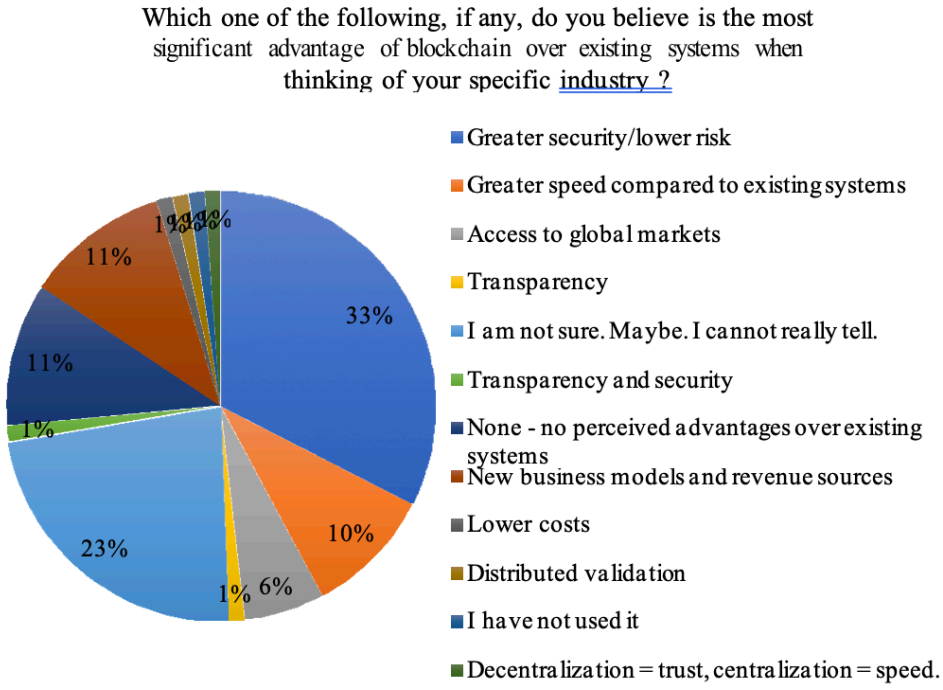
Most of the respondents do not have idea in which process the blockchain technology is being used in different companies. 18% percent of the people think that this technology is used in financial sector. However, there is also a trend of using Blockchain based solutions in software, transport, education, telecom and digital Identity Processes.



Use of blockchain in day-to-day activities

(question No.7 "Did your organization have the opportunity to use/develop applications that use blockchain?")

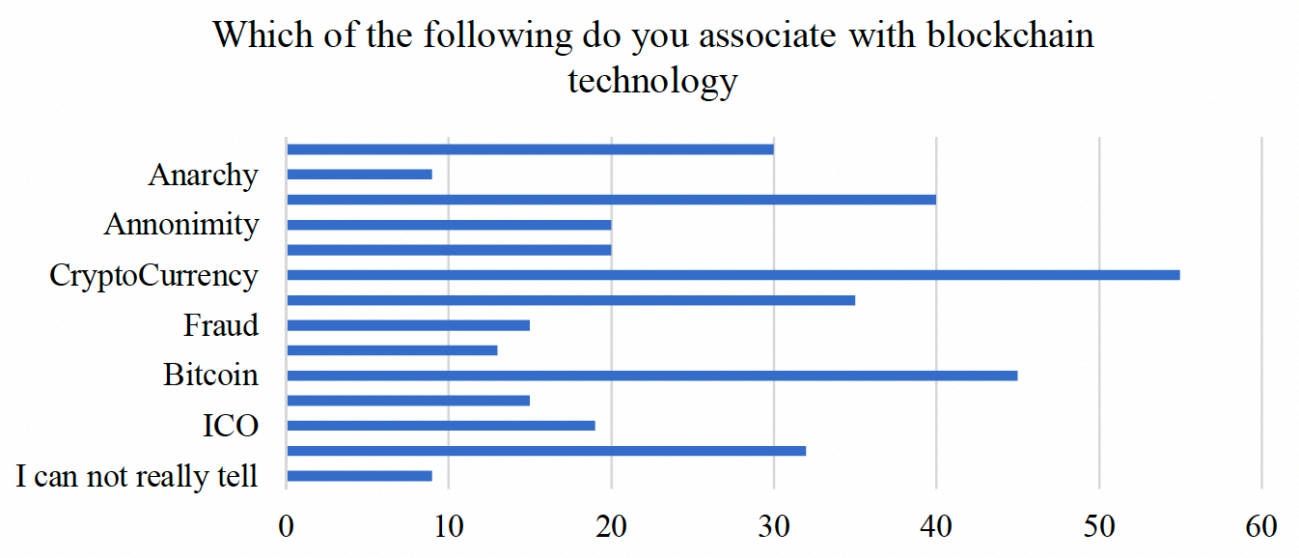
Only 17% of the respondents have the in-depth knowledge of usage of blockchain technology in their daily life. Whereas there is a huge chunk of population across the world which is not fully aware of the pragmatic solutions Blockchain is offering to business problems across industries and use cases.



The biggest advantage blockchain provides

(question No. 8 "Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry")

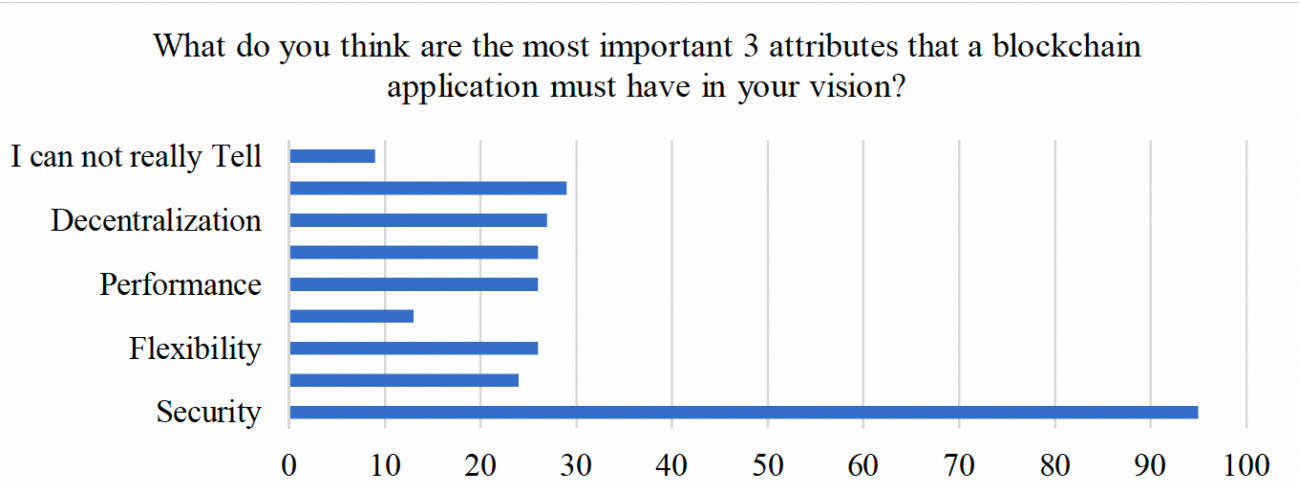
32% of the respondents have come to see the larger, transformational importance of blockchain technology in security and low risk. 12% of the participants are confident that this evolving technology will explore new business models and revenue sources whereas 10% of the respondents consider this technology as game changer in providing greater speed as compared to the existing systems. But there are 23% of the participants who are ignorant or wary of advantages of blockchain based solutions.



Associations with blockchain technology

(question No. 9 "Which of the following do you associate with blockchain technology?")

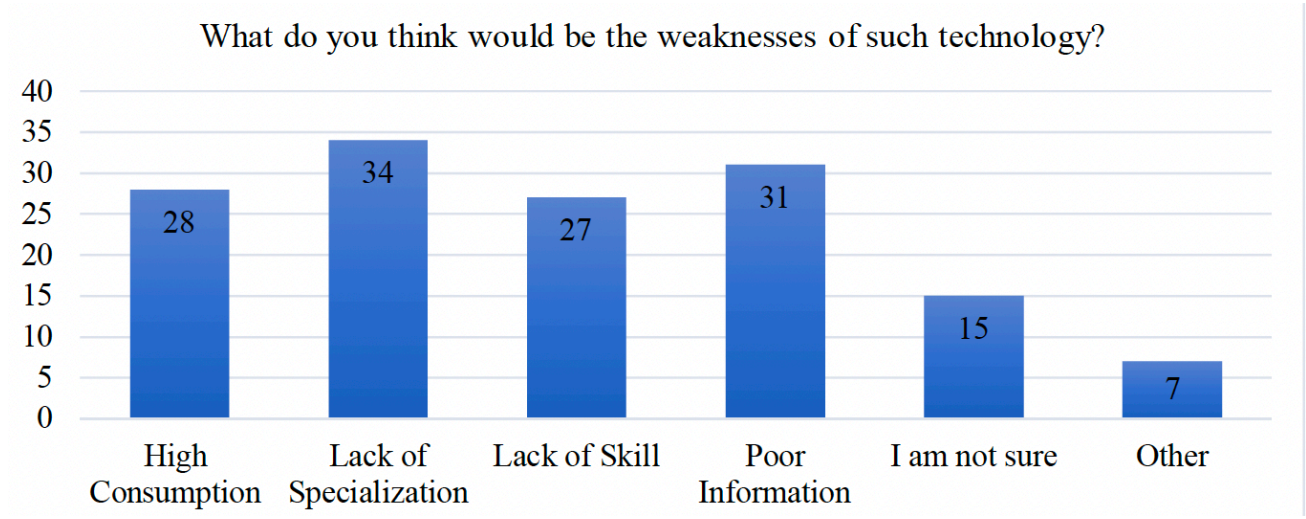
Respondents mostly associated blockchain with cryptocurrencies ,bitcoins and smart contracts. Though Blockchain has not reached its full potential there is significant number of respondents who see blockchain technology as platform which will ensure safety, independence and innovation. There are some Respondents from various parts of world who associated this technology with anarchy, risk and fraud as shown in the graph above.



3 most important attributes that blockchain has

(question No. 10 "What do you think are the most important 3 attributes that a blockchain application must have in your vision?")

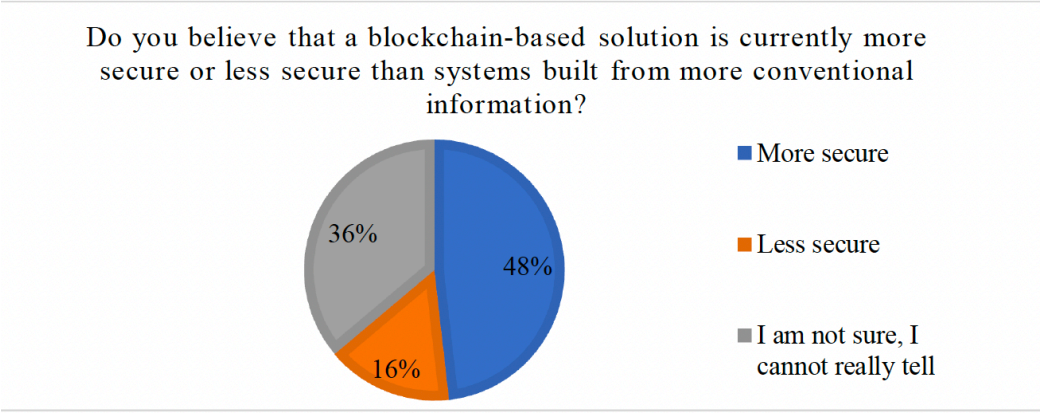
20% of the respondents consider blockchain secure while 12% of the respondents report it to be a transparent and a decentralized platform.11% believe that blockchain will boost the performance of the process in which it will be used.



Weaknesses of blockchain technology

(question No. 11 "What do you think would be the weaknesses of such technology?")

Majority of the participants argue that the biggest weakness of blockchain is that there are not enough specialists in the field of Blockchain. Lack of information and lack of skill are also reported as one of the major weaknesses by the respondents. 28 respondents believe competing miners and giant mining farms burn a disproportionate amount of electricity when compared to the outcome. In a world where current energy generation is a climate issue, blockchain processing doesn't make much sense.



Blockchain-based solution in comparison to other technologies regarding security level (question No. 12 "Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?")

Almost half of the participants believe that blockchain based solutions are more secure than the existing technology as it will be an open source and data on this platform cannot be forged by anyone whereas 36 percent reports to be not sure or cannot exactly tell if it can be perceived as secure or not.

Table "Assessment of statements about blockchain technology"

(question No. 13 "How can you assess, from your point of view, each of the following statements regarding blockchain technology?")

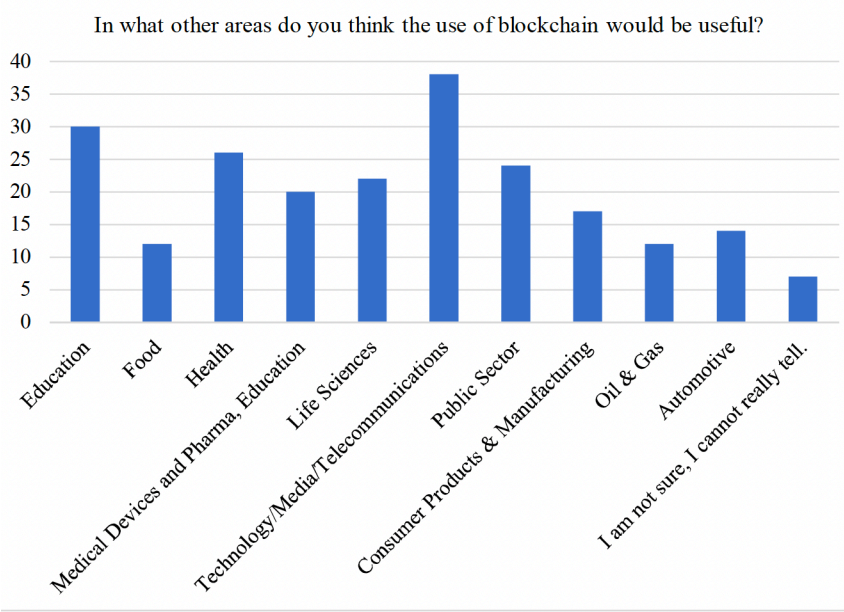
Statement	No. of respondents that answered "True"	No. of respondents that answered "False"	No. of respondents that answered, "I cannot really tell"
Blockchain technology is broadly scalable and will eventually achieve mainstream adoption	40	10	33
Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain	40	10	33
Executive team believes there is a compelling business case for use of blockchain technology	34	12	37
Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain	30	18	35
Will lose a competitive advantage if we don't adopt blockchain technology	23	27	33
Blockchain technology will disrupt our industry	24	24	35
Blockchain is overhyped	29	23	31

Table illustrated above shows that among the 83 participants, 40 participants believe that blockchain technology is scalable and will eventually achieve mainstream adoption. The frequency of respondents who think that their executive team believes that there is a compelling business case for use of block chain technology is 30. Same no. of respondents say that they are planning to replace current systems of record with blockchain. On the contrary 33 respondents are not sure either they will lose the competitive edge or not if they don't accept the blockchain technology.

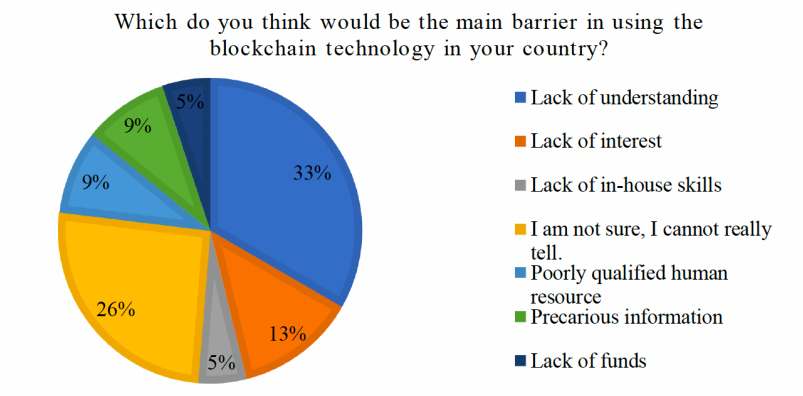
Moreover, it can be seen from the results that 35 respondents do not have enough knowledge that either blockchain technology will disrupt or not the industry they are working on. However only 29 participants were of view that blockchain is overhyped.

Areas blockchain could be useful

(question No.14 "In what other areas do you think the use of blockchain would be useful?")



Performance expectancy is one of the major measures to estimate the perceived usefulness by the users about certain service. It is revealed from the results that most of the participants reported to have seen the blockchain solutions in technology, media and telecommunication, education and health while there are only few who have seen the usage of blockchain technology in consumer products, food and oil.

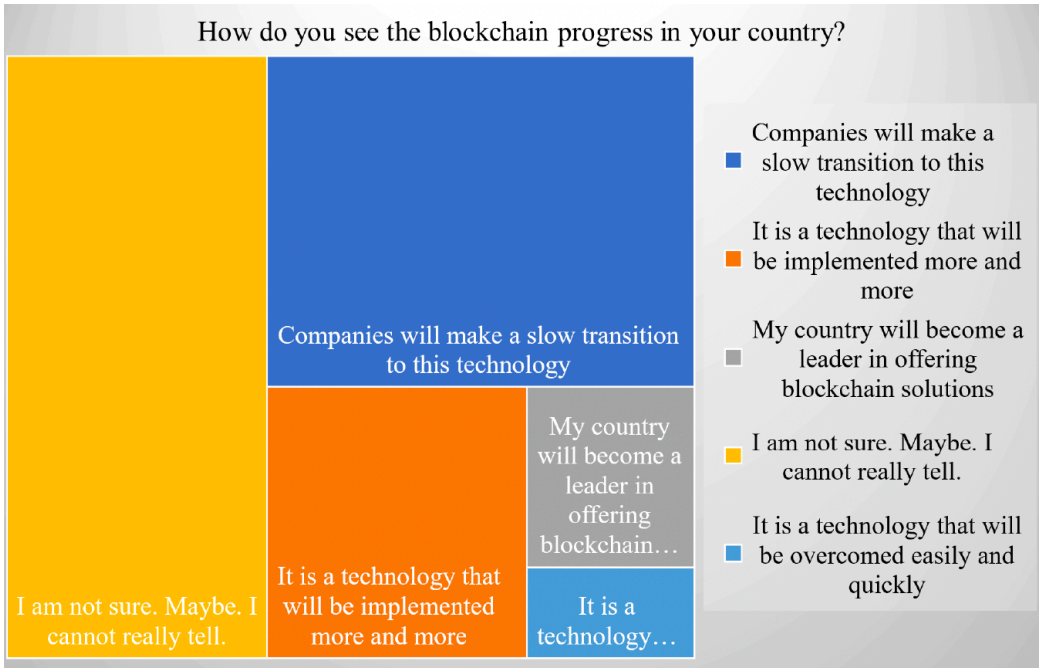


Barriers for using blockchain technology

(question No. 15 "Which do you think would be the main barrier in using the blockchain technology in your country?")

33% of the participants associated lack of understanding as one of the main barrier for using blockchain technology. 26% are not even sure about the reason that are hampering the acceptance blockchain

technology among the individuals. Only 5% of the individuals believe that lack of funds and lack of inhouse skills are the causes behind the slower investments and exploration of ideas in blockchain solutions.



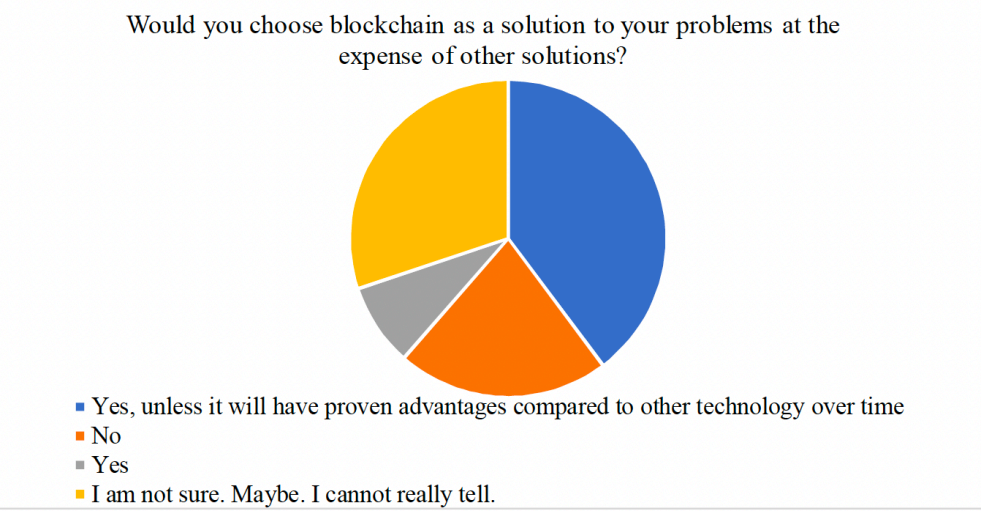
Blockchain progress

(question No. 16 "How do you see the blockchain progress in your country?")

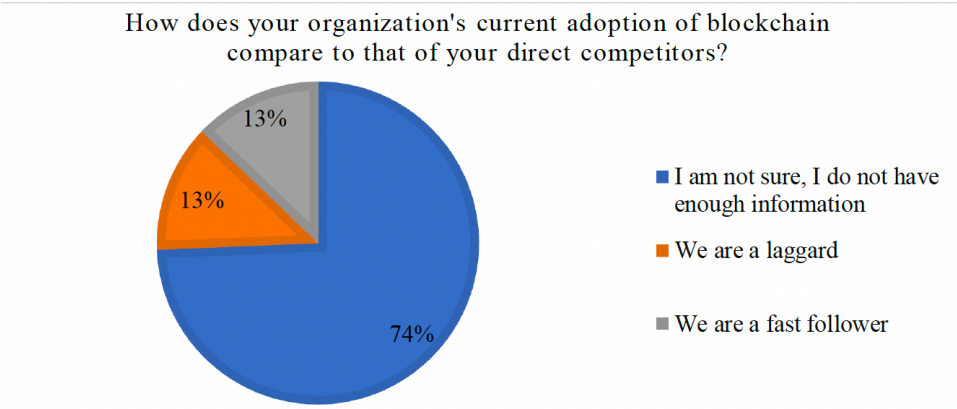
Participants are not mostly sure about the blockchain progress in the country. Around the same no. of participants think that companies will make a slow transition to this technology. Only 6 participants believe that their country will take a lead in implementing the technology in a country.

Trust in blockchain technologies over other solutions

(question No. 17 "Would you choose blockchain as a solution to your problems at the expense of other solutions?")



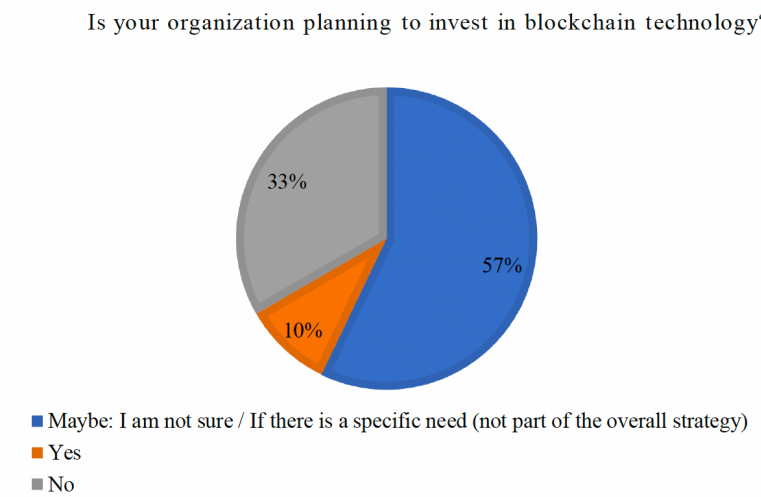
This analysis suggests that mostly people will only use blockchain solutions to their problem when blockchain proves its advantages. 30% of the people who responded are not sure or can not tell really if they would trust the blockchain technology over other solutions to solve their problems. This indicates the principal challenge of lack of knowledge among the masses.



Organization's current adoption of blockchain in comparison to competitors

(question No.18 "How does your organization's current adoption of blockchain compare to that of your direct competitors?")

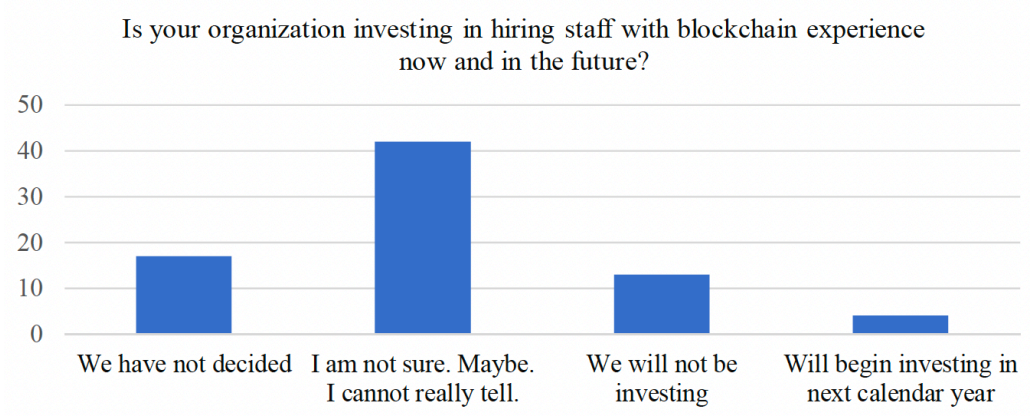
The results of the quantitative analysis show that 74% people are not aware about their company ś pace of adopting blockchain technology. Only 13% of people consider their companies as followers of this technology.



Readiness of investment in blockchain technology

(question No.20 "Is your organization planning to invest in blockchain technology?")

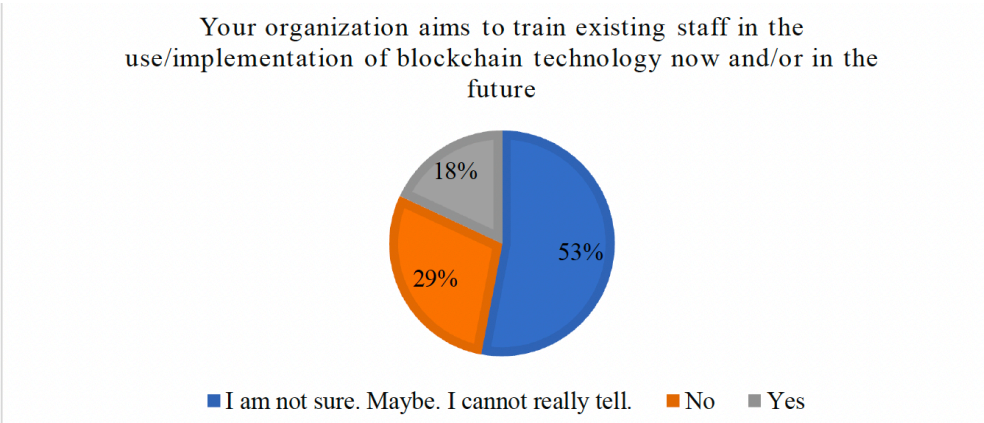
More than half of the respondents are not sure about their organizations plan to invest in blockchain technology. Only 10% believes that their company is planning to invest in blockchain.



Investment in staff with blockchain experience

(question No. 22 "Is your organization investing in hiring staff with blockchain experience now and in the future?")

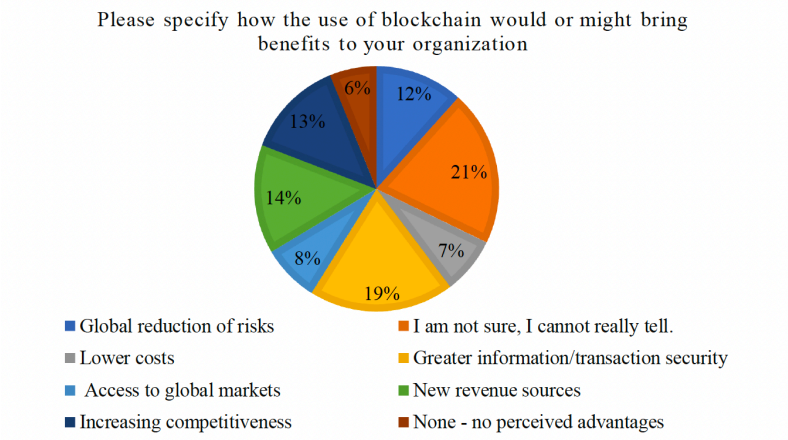
Majority of the respondents do not know if their company is planning to invest or not in hiring staff with blockchain experience or not. It means the companies around the world should involve their employees in decision making. Only 4 participants responded affirmatively that they will begin investing in next calendar year.



Company's plan of investment for staff knowledge about blockchain technology

(question No.23 "Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future")

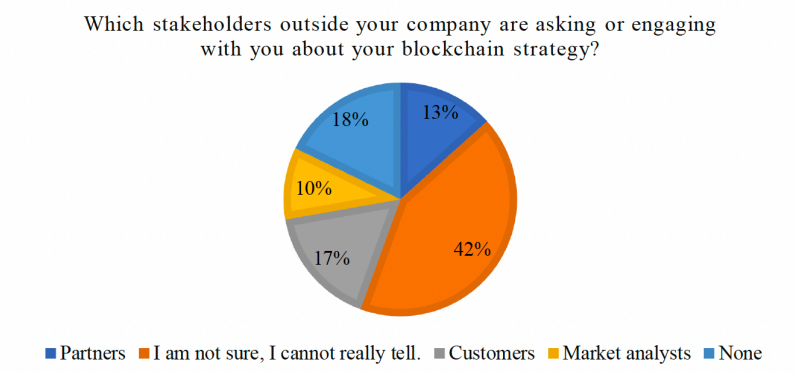
More than half of the respondents don not have knowledge if their company is planning to invest in training the existing staff in the implementation of blockchain technology. Only 18% of the respondents have reported to have said that their companies are planning to train the existing employees in the implementation of blockchain technology.



Benefits blockchain can bring to the company

(question No.26 "Please specify how the use of blockchain would or might bring benefits to your organization")

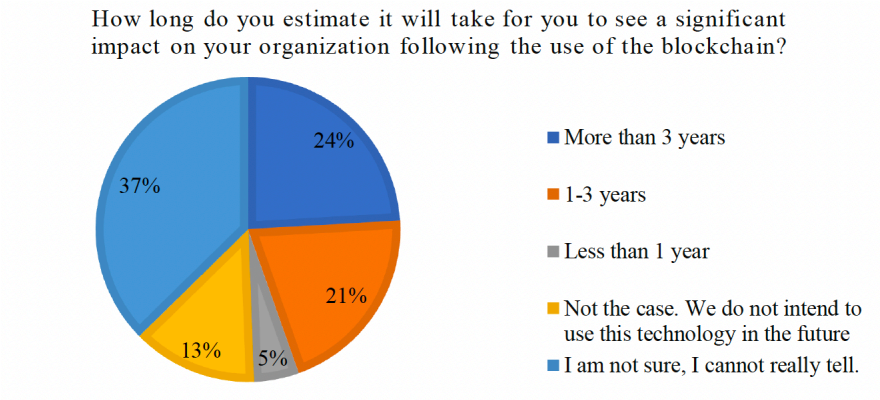
Service expectation is a measure to understand the experience of user and the future behavior for the adaptation of certain service. In this regard, in the questionnaire, the question regarding the benefits of the blockchain solutions are asked to participants. Majority of the respondents lack the basic knowledge about the benefits to use blockchain to disrupt and transform the existing business models. 19% of the respondents believe that blockchain provides significant benefits in providing more information and greater transaction security. Only 8% respondents have seen the advantages of blockchain in accessing the global markets.



Stakeholders asking or engaging about blockchain strategy

(question No. 27 "Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?")

From the state of the art and qualitative analysis, it is found that stakeholders outside the company plays a pivotal role in shaping the policies of companies and influence the companies to adopt new technologies in order to gain the competitive edge. However Almost half of the respondents reported to have no idea about the stakeholders outside their company which are influencing their blockchain strategy. Only 17% reported to have said that customers are influencing their companies towards a technology which is a type of distributed ledger where all network participants share the same documentation as opposed to individual copies. Hence which increases transparency and benefit the customers.

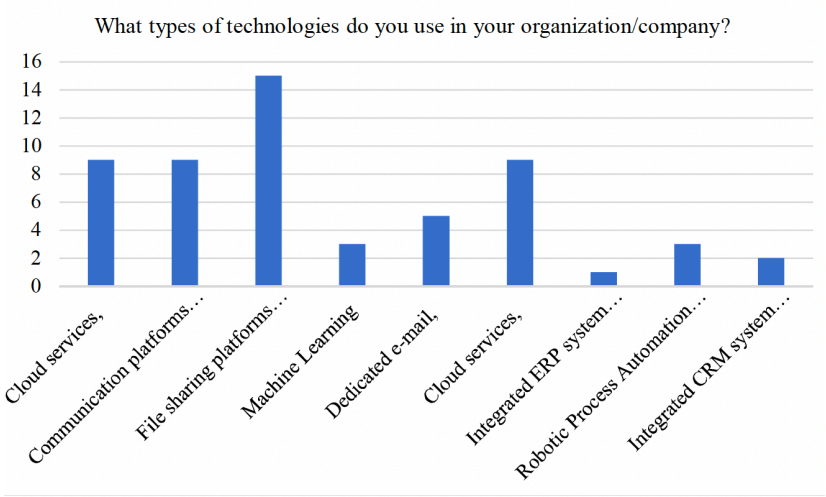


Time period blockchain will make a significant impact to organization

(question No. 28: "How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?")

13% of the respondents do not intend to use this technology at all in their organizations in the near future.24% of the respondents have intended to use this technology and the estimated to see the significant impact of technology in their business process is more than 3years.There is a stark lack of understanding about blockchain solutions and its impact at all levels of organization and educational institutions. It is evident from the response of 37% of the participants who are not sure if blockchain will have an impact on their organization at all.

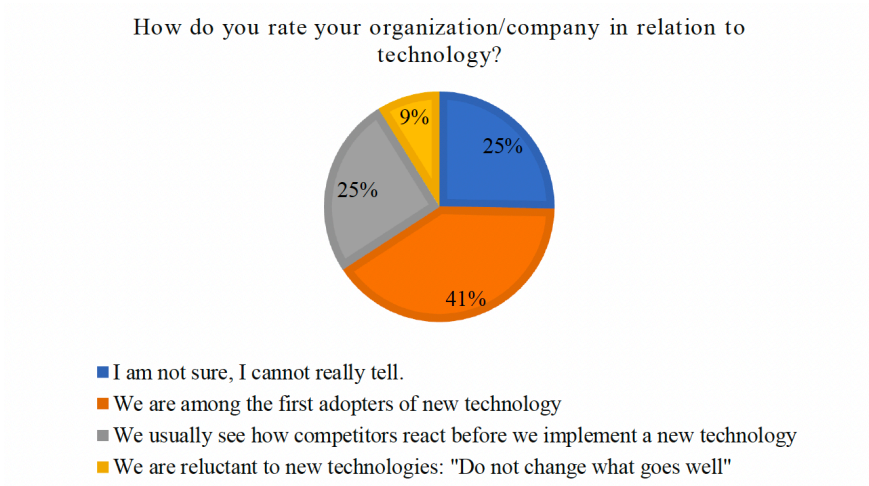
There is a dire need of learning platforms and materials in the market to inform and educate people of industry and academia about the blockchain which is more accurate, consistent and transparent than the other existing technologies. Above quantitative data analysis depicts the need of awareness in the society regarding how an industry where a sensitive data is crucial can be revolutionized by the use of blockchain technology.



Technologies used in your companies

(question No. 29 "What types of technologies do you use in your organization/company?")

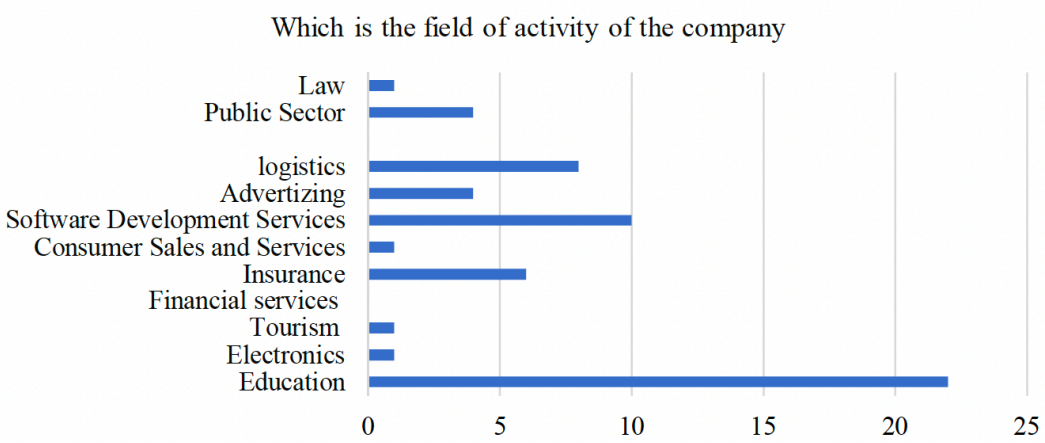
In the modern era of 4th industrial revolution in which disruptive technologies like IoT, AI and Virtual reality are changing the way we live and work, it is revealed by the qualitative analysis that progress in the use of robotic processes and machine learning has begun. It will spread at an exponential rate with the provided increased connectivity, instant communication and better technological infrastructure. Hence the potential of the acceptance and progress of blockchain solution is also high. However, the technologies which are most common among the individuals and companies across the world are file sharing platforms, communication platforms and cloud services.



Organization's readiness of implementation of new technology

(question No. 30 "How do you rate your organization/company in relation to technology?")

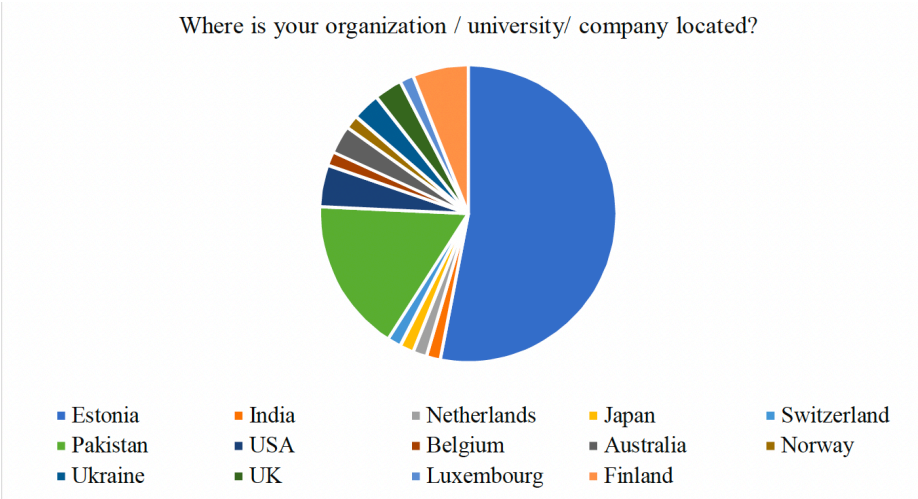
41% of the respondents believe that their companies are among the first adopters of new technology which means that companies are connected, fast acting and not reluctant to adopt new technologies that can quickly transform their processes for better.25% of the participants said their companies see how their competitors react before they implement a new technology.



Field of activity of the companies

(question No. 31 "Which is the field of activity of the company?")

The data is collected from companies of different fields. It includes education, software development services, tourism electronics, logistics, financial services, insurance, consumer sales and services etc.



Region of company of respondent

(question No. 35"Where is your organization / university/ company located? (HQ - main residence)")

The sample data is collected from not only companies based in developed high tech countries like Estonia but also from companies based in under developed countries like Pakistan. The data collected is sound and diverse enough to give us the overall picture of awareness regarding the blockchain solutions across the globe.

Survey results showed that people across the globe does not have in depth knowledge about blockchain and it is not wrong to say that it is high time to highlight the shared consensus that blockchain is real and it can serve as pragmatic solution to business problems across industries and use cases. Governments around the world are starting to explore the potential benefits and concerns of integrating blockchain based applications into the public-sector organizations [3]. It is believed that blockchain has great potential benefits even for the government such as data integrity, data quality, transparency, avoidance of fraud and manipulation, reducing corruption, and enhancing trust, security, and privacy [4]. These potential benefits attracted the attention of governments in many countries to improve transparency and to eliminate corruption. Several countries such as the USA, the United Kingdom, the Netherlands, the United Arab Emirates, Estonia, Sweden and China announced blockchain initiatives to actively explore its uses in the public-sector [5]. Despite the abundant potential benefits and application areas of blockchain technologies, the survey presents the need for awareness among masses and business leaders.

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QUALITATIVE INSIGHTS

There were two interviews with specialists in the blockchain that helped validate the survey. The following are the insights obtained after those interviews.

Interview Qs.For Entrepreneurs

1. Field of Activity of the company
2. In which business process did you implement blockchain technologies?
3. significant advantages of blockchain over existing systems when thinking of your specific industry
4. How Blockchain can help your sector. What do you need to learn more about technology,economic implications mechanism trading etc
5. skills you need to understand, Training gap regarding blockchain in your company training topics you think can improve day to day operations
6. How do you see blockchain progress in your country
7. Are you planning to invest in blockchain.
8. Any suggestions that the curriculum must have for teachers entrepreneurs and students.

Takeaway from Interview 1.

I took the interview from the **CEO OF V2X Networks** . company is using blockchain technology in vehicles.

Country's laws and regulations

At the moment there is nothing that favour us or that is against us

Skills

1)When it comes to blockchain I would say it really depends on your Use case. There are different algorithms and different standards. Not all the blockchain Technologies are applicable to all the use cases but the bases for all these Technologies and algorithms are same. If I am looking for someone then I will choose the person who has in depth knowledge of what this technology means not just the definitions of decentrilization and centralization. How this technology is applicable and can be applied. And what are the key advantages. There is a need to educate people that blockchain necessarily is not the best solution to every use case. There is need to educate what is decentralization and impacts of decentralization. What are the right use cases or scenarios where we can use this technology.

2) which blockchain technology is the right selection for your use case. There is need to educate people about different protocols available and different standards available. There is a proof of consensus among different blockchain technolgies. Lots of engineers know there is proof of consensus but they do not know how this proof of consensus Works and what does it mean. You can not apply without häving the in depth knowledge of proof of consus

3) how to merge different blockchain Technologies. As there is no understand.we have not any person who knows how to merge different Technologies

4) clock in the blockchain technology

5) how much a person is interested or häving an IT or software science background . In the end it is mathematics , programming and development, a person should have the capacity to learn on his own.

Competition

In our car manufacturing industry,car manufacturers made a consortium on using blockchain technology . so the competition is really high.

Focus more on the basics of technology ,clarifying the basics of technology, how technology can be used. Comparrison between different blockchain technology and standard. And then give in depth knowledge of proof of consensus, alogrithims etc if you want to make your own proof of consensus how it can be done.

Takeaway from Interview 2 with CTO (Chief Technical Officer) of V2X

Intro of the company

Our company is basically a startup . we are making actually a car data sharing platform by leveraging the concepts of Blockchain . We are making a decentralized platform for car data sharing. We are creating a value chain of data sharing among users, car owners, car manufacturers, OEMs and third party developers

Skills

The position of CTO is completely technical. First you need to have a strong computer science and mathematics background and then he or she should have the core concepts of blockchain. How different platforms of Blockchain works . How the transactions are done and how the consensus work. What are oracles. Scalability Ratios of BlockChain and For which part business process you can use blockchain. Like if I say I will store everything on blockchain but I can't do that because storage on blockchain is very expensive. As CTO you should also have to plan which business process should be on chain and off chain And how to manage these two together. These skills are important if one has to become a blockchain developer But if you want to become a business architect these skills are not necessary. If a person wants to be a business architect in a blockchain. It is not mandatory he should have the knowledge of Technicalities. But he should know how smart contracts work. How the transactions are made.etc

Main training workshops :

1. How bitcoin network works. Because I think if a person knows about the working of bitcoin network. He or she can work on any blockchain technology.
2. What are smart contracts and their applications.
3. Privacy and Governance of blockchain. How blockchain works for specific use.
4. Cryptographic Networks. How peer to peer networks work.
5. Risks and Challenges of Blockchain. This is not a golden egg.
6. Explore Latest Trends in blockchain.

Advantage of BlockChain

The existing technologies are more scalable and we find more support. Blockchain Technology is very young so it is very important to analyse in which business process we can use the technology. Like it is very useful where there is trust deficit among the partners and to increase the trust we can use this technology to achieve our goal.

Countryś laws

In Germany we haven't seen any restriction in pursuing our business idea. It vary from business to business.

Competition

Industry is responsive but it is only using blockchain where they find it useful.I will not put all of the company’s data on blockchain just because its' new and I have. I will first analyse the process. Like in IBM Munich they are using it where they have multiple partners and large number of users. They want to increase the trust among the partners.

THE SURVEY

1. **Have you heard about the blockchain technology?**

a) Yes b) No

2. **Where have you first heard the term blockchain?**

a) TV
b) Written press
c) Internet
d) Friends
e) Conferences
f) Others _____

3. **When have you first heard the term blockchain?**

a) Before 2010 b) Between 2010-2015 c) After 2015

4. **Do you know any companies or organisations implementing a blockchain technology?**

a) No
b) Yes, my current company
c) Yes, other company than my current one
d) Yes, more companies

If affirmative, list the field of activity of the company/companies
_____

5. Did your organization have the opportunity to use/develop applications that use blockchain?

a) No b) Yes c)I don't know

6. If you answered "Yes" to the previous question, in which business process did you implement blockchain technologies?

a. Supply chain
b. Offered product/service
c. Digital identity
d. Cyber-security
e. Payments
f. Voting system
g. Others. **Which? _____**

7. Which one of the following, if any, do you believe is the most significant advantage of blockchain over existing systems when thinking of your specific industry:

a) Greater speed compared to existing systems
b) New business models and revenue sources
c) Greater security/lower risk
d) Lower costs
e) None - no perceived advantages over existing systems
f) Access to global markets
g) Other/not sure _____

8. Which of the following do you associate with blockchain technology (tick all options relevant to you):

a) Independence
b) Anarchy
c) Safety
d) Anonymity
e) Risk
f) Cryptocurrency
g) Innovation
h) Fraud
i) Uncertainty
j) Bitcoin
k) DAO (decentralized autonomous organization)
l) ICO (initial coin offering)
m) Smart contracts
n) Consortium

9. What do you think are the most important 3 attributes that a blockchain application must have in your vision?

a) Security
b) Scalability
c) Flexibility
d) A friendly interface
e) Performance
f) Transparency
g) Decentralization
h) Efficiency (time, costs)
i) Others _____

10. What do you think would be the weaknesses of such technology?

a) High consumption of energy
b) Lack of specialized workforce
c) Lack of skills
d) Poor information
e) Others _____

11. Do you believe that a blockchain-based solution is currently more secure or less secure than systems built from more conventional information technologies?

a) Unsure b) Less secure c) More secure

12. What is your level of agreement or disagreement with each of the following statements regarding blockchain technology?

I. Blockchain technology is broadly scalable and will eventually achieve mainstream adoption.

a) True b) False c) I don't know

II. Suppliers, customers, and/or competitors are discussing or working on blockchain solutions to address challenges in the value chain.

a) True b) False c) I don't know

III. Executive team believes there is a compelling business case for use of blockchain technology.

a) True b) False c) I don't know

IV. Planning to replace current systems of record (e.g., financial ledgers, CRM and ERP modules, inventory tracking systems, etc.) with blockchain.

a) True b) False c) I don't know

V. Will lose a competitive advantage if we don't adopt blockchain technology.

a) True b) False c) I don't know

VI. Blockchain technology will disrupt our industry.

a) True b) False c) I don't know

VII. Blockchain is overhyped.

a) True b) False c) I don't know

13. In what other areas do you think the use of blockchain would be useful?

a) Oil & Gas b) Automotive c) Food
d) Technology/Media/Telecommunications e) Public Sector
f) Consumer Products & Manufacturing g) Health
h) Life Sciences (including Biotech)
i) Medical Devices and Pharma
j) Education k) Other_____

14. Which do you think would be the main barriers in using the blockchain technology in Romania?

a) Lack of understanding
b) Poorly qualified human resource
c) Lack of in-house skills
d) Precarious information
e) Lack of interest
f) Lack of funds
g) Other _____

15. How do you see the blockchain progress in your country?

a. It is a technology that will be implemented more and more
b. It is a technology that will be overcomed easily and quickly
c. Companies will make a slow transition to this technology
d. My country will become a leader in offering blockchain solutions

16. Would you choose blockchain as a solution to your problems at the expense of other solutions?

a. No
b. Yes, unless it will have proven advantages compared to other technology over time
c. Yes

17. How does your organization's current adoption of blockchain compare to that of your direct competitors?

a) We are the leader b) We're one of the leaders
c) We are a fast follower d) We are a laggard
e) Not sure

18. What is the total revenue of your organization in 2018? Write answer below.

(open question)

19. Is your organization planning to invest in blockchain technology?

a) Yes
b) No
c) Not sure

20. If you answered "Yes" to question No.19, specify how much is your organization planning to invest in blockchain technology during the next 2 years? Write your answer below.

(open question)

21. Is your organization investing in hiring staff with blockchain experience now and in the future?

a) Currently investing
b) Will begin investing in next calendar year
c) Will begin investing at some other point in the future
d) We will not be investing e) We have not decided f) Unsure

22. Your organization aims to train existing staff in the use/implementation of blockchain technology now and/or in the future:

a) No b) Yes

23. Can your organization provide/need support in implementing a blockchain-based application?

a) No b) Yes

24. Is your organization investing in replacing parts or all of your existing systems with blockchain-based enhancements now or in the future?

a) Currently investing
b) Will begin investing in next calendar year
c) Will begin investing at some other point in the future
d) We will not be investing e) We have not decided f) Unsure

25. Please specify how the use of blockchain (would) bring benefits to your organization (check all that apply)

a. Lower costs
b. Greater information/transaction security
c. Global reduction of risks
d. Increasing competitiveness
e. New revenue sources
f. Access to global markets
g. None - no perceived advantages
h. Other. Which?

26. Which stakeholders outside your company are asking or engaging with you about your blockchain strategy?

a) Suppliers b) Customers c) Market analysts
d) Partners e) None
f) Other/unsure_____

27. How long do you estimate it will take for you to see a significant impact on your organization following the use of the blockchain?

a. Less than 1 year
b. 1-3 years
c. More than 3 years
d. Not the case. We do not intend to use this technology in the future

28. What types of technologies do you use in your organization/company? (check all that apply)

a. Dedicated e-mail
b. Cloud services
c. Communication platforms (Slack, Google Chat, Workplace, etc)
d. File sharing platforms (document sharing): Dropbox, Google Drive, WeTransfer, Box, MediaFire, OneDrive, etc.
e. Integrated ERP system (Enterprise Resource Planning)
f. Integrated CRM system (Customer Relationship manager)
g. Robotic Process Automation (RPA)
h. Machine Learning
i. Artificial Intelligence
j. Other. Which?

29. How do you rate your organization/company in relation to technology?

a. We are among the first adopters of new technology
b. We usually see how competitors react before we implement a new technology
c. We are reluctant to new technologies: "Do not change what goes well"

30. Are you interested in getting more information about blockchain and possible apps for your business?

a) No b) Yes

31 If you answered "Yes" to the previous question, what is the form under which you prefer to receive blockchain information? (check all that apply)

a. Newsletter
b. Webinars or Online trainings
c. Face-to-face trainings
d. Conferences
e. Face to face discussions with specialists / workshop
f. Articles
g. Other. Which? _____
h. I'm not interested.

Position within the company: _____

Field of activity of the company: _____

Number of employees: Less than 9, 9-50, 51-250, more than 250

Year of establishment of the company:_____

Country
Romania
Estonia
Italy
Greece
Latvia
Other