

Assessing intellectual capital of a technology park

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Abstract

Technology parks are organizations that are supporting innovative entrepreneurial activity cooperating with knowledge-based institutions and using advanced technology. The main purpose of this paper is to identify the determinants of intellectual capital in technology parks. Through an analysis of current models for the assessment of intellectual capital, a preposition of a model for Croatian science and technology parks has been made. The main contribution of this paper is an intellectual capital measurement model which can be used in other existing science and technology parks, but also in research centers, entrepreneurial incubators and other entrepreneurship supporting institutions. Using the case study method, the paper identifies components of intellectual capital in a technology park, as well as the gaps between the level of development of each determinant. Data were collected through an interview with representatives of a technology park in Croatia. Results of this study can be used for strategic decision making.

Keywords: intellectual capital, intellectual capital model, technology park, science park, entrepreneurship

JEL Classification: L26, O34, L14, M13

1. Introduction

With the emergence of the interest in the concepts of high technology and knowledge-based economy (eg. in Khanmirzaee et al., 2018; Martín-de Castro et al., 2019; Zakery & Saremi, 2020), intangible assets and knowledge, as the most important factors of intellectual capital, are becoming the main resource of the company. The rapid development of information and communication technology indicates the predominance of service providers based on new knowledge. Knowledge and intellectual capital management are becoming integral parts of strategic plans (Dayan et al., 2017) of companies, but also institutions, cities, regions and nations (Matos et al., 2019; Roos, 2017). Effective knowledge sharing leads to the improvement of business processes and development of innovations. Measuring intangible assets is

more complex than measuring tangible assets, but it is inevitable in order to detect gaps, as well as to plan future investments in the form of improving the current level of intellectual capital. In this paper we focus on the connection between the intellectual capital and the technology parks.

2. Theoretical background

The theory of intellectual capital has been developed in three directions: the so-called Japanese school whose key authors are Itami, Nonaka and Takeuchi, then the theory of resources (Penrose and Barney) and finally the study of human capital as a fundamental determinant of intangible assets (Kolaković, 2002). Stewart (1991) and Sveiby (1997), were the first to define intellectual capital by the keyword knowledge, "intellectual capital is knowledge that exists in an organization that can be used to create a differential advantage," and emphasized the importance of intangible assets in creating competitive advantage.

According to Edvinsson (1997), intellectual capital is non-financial capital that serves as complementary information to financial information. Edvinsson (1997) has divided intellectual capital into human capital and structural capital, and according to the European Commission (2001), intellectual capital is composed of human capital, which includes knowledge and skills of employees, structural capital referred to routines and procedures of the organization and relational capital, which includes external relations with customers and business partners.

"Intellectual capital is determined by intangible resources that make it difficult to identify, measure, and evaluate." (Stewart 1991). In 1992, Kaplan and Norton developed a model for measuring intangible assets that served as the basis for future modified models of intellectual capital valuation. Edvinsson (1997) studied intellectual capital in the Swedish company Skandia, for the needs of which he devised the Skandia Navigator measurement model, which is the most commonly used intellectual capital assessment model today. Although intellectual capital is difficult to measure, it is undoubtedly a necessary resource for innovation, new markets, and enterprise technological development (Gately and Cunningham, 2014).

"Science and technology parks are registered legal entities established to commercialize scientific results, encourage cooperation between scientists and businessmen, and in accordance with the provisions of the law governing scientific activity and higher education" (Law on the Improvement of Entrepreneurial Infrastructure, 2018). Brunsko (1995) describes technology parks as strategic instruments of regional development because they represent a link between industry and universities. With the use of new technologies and innovative solutions, they are accelerating the commercialization of scientific research. Zekić and Bukovac (2008) say that technology parks are incubators of innovation and entrepreneurship that enable

the development of a modern economy, more efficient restructuring of industry, sustainable regional development, development of intellectual potential and reduction of unemployment.

Intellectual Capital of a Technology Park

The beginning of intellectual capital measurement was directed to the micro level and its reflection on the performance of a company. Later, the concept of intellectual capital was applied at the meso and macro level in order to assess the level of human, structural and relational capital of cities, regions, nations, research centres, technology parks and universities, and all units that accumulate knowledge. The results of the study by Ane et al. (2017) point to the positive impact of human and structural capital on entrepreneurial orientation and activity, which contributes to economic growth and competitiveness. Edvinsson, Stenfelt (1999) and Bontis (2002) are one of the pioneers of measuring intellectual capital at the macro level. The purpose of assessment of intellectual capital at meso and macro level research is to identify strengths and weaknesses of the observed entities and to take improvement actions.

The importance of intellectual capital measurement above the micro level of the company is confirmed by the research of Lin and Edvinsson (2010), whose results indicate the connection between investment in intellectual capital and recovery from a financial crisis. More precisely, it was concluded that the macroeconomic situation can be improved by the development of human and renewable capital, as the main determinants of knowledge economy and national development in the future.

Technology parks bring together three types of knowledge: high-tech knowledge derived from innovative companies, regional knowledge, and university knowledge through collaboration with higher education institutions. Technology parks create an environment that encourages technological innovation and enables development of a knowledge based economy, derived from innovative small and medium enterprises (Zekić and Bukovac).

Existing Intellectual Capital Research of Technology Parks, Research Centers and related Institutions

As intellectual capital is the foundation of SMEs competitive advantage and innovation, science parks represent "network opportunities" (Khavandkar et al., 2016) for SMEs in a way that enables knowledge sharing, networking and better intellectual capital management. Science parks are networks that enable the circulation of intellectual capital, through intermediaries between the tenant companies and between the tenants and the park. It is important to observe which forms and levels of intellectual capital the tenants bring to the park, and which forms of intellectual capital they receive by staying in the park (Gibb, 2007).

The relationship between the level of intellectual capital and the competitive advantage of creative industry parks was explored by Dong & Gao (2012). Their research in 18 creative parks (survey questionnaire and in-depth interviews) indicates that intellectual capital is the foundation of innovation, which is a prerequisite for the competitive advantage of parks. The authors recommend for creative industry parks and state institutions to improve the communication between creative talents, raise protection of intellectual property and improve the ability to retain talents through establishing a quality knowledge exchange system. Raising awareness of the importance of creative parks is important to enable investment in R&D and to create a learning and knowledge exchange atmosphere.

Chu et al. (2006) provide a framework for reporting on the intellectual capital of the Industrial Technology Research Institute (ITRI), to identify the hidden value of ITRI. The research connects the components of intellectual capital with the value or performance of ITRI. According to the results, intellectual capital is relevant to the value creation process, so investments in intellectual capital components should not be considered as costs but rather as investments to gain added value. The level of intellectual capital should be the criterion for the amount of investment.

The Zahedi and Papoli study (2018), which links knowledge management and intellectual capital of a knowledge-based research center, found that knowledge sharing has no significant effect on human capital, and knowledge acquisition has no significant effect on structural capital. The greatest impact on the competitive advantage of a research center has the application of knowledge. Therefore, future strategies must be aimed to connect knowledge management process and intellectual capital to improve its current effect.

The connection between a successful incubation process and the intellectual capital of a business incubator was investigated by Calza et al. (2014). The authors found a new dimension to consider in order to analyse and measure the level of intellectual capital of a business incubator, the one related to the incubation process. They suggest comparing the level of intellectual capital of tenants during the incubation phases. The intellectual capital of tenants should be applied to the entire incubator during several phases of incubation. Business incubators need to design innovative and efficient incubation processes, adapted to tenants and their intellectual capital, because this is where the competence of incubators and incubated companies lays.

Gately and Cunningham (2014) emphasize in a qualitative study the importance of relational capital for incubator tenant companies. According to the analysis of in-depth interviews and business plans of entrepreneurs in the incubator, some surveyed entrepreneurs rely on their own formal education and incubator as the main sources of networking, while some respondents stressed the importance of industrial

networking and connecting with clients instead of relying on government institutions like the Chamber of Commerce. Authors conclude that knowledge networks are the key to supporting entrepreneurs who are tenants of incubators, and knowledge sharing is crucial not only within the incubator, but also outside of it, especially between incubators, high-tech knowledge based companies and higher education institutions.

Investments in intellectual capital, according to Maltseva (2015), must become a priority of technology parks. The author proposes a structural and factor model for the evaluation of intellectual capital of a technology park, which needs to be continuously improved. It divides the structure of the technology park into nano level and micro level. The paper proposes three models of evaluation of intellectual capital of a technology park, first model is focused on access to knowledge that involves its accumulation and efficient use, second model is a value model that assesses the contribution of intellectual capital through individual stages, and the third model has a strategic method aiming the identification of key determinants of intellectual capital in order to achieve competitive advantage. In a paper from 2016, Maltseva combines possible methods of measuring the value of the intellectual capital of a technology park, dividing the methods depending on whether they are used at the tactical or strategic level. At the tactical level, the author proposes the use of value-added indicators of intellectual capital, and at the strategic level, indicators of the cost of intellectual capital are suggested.

Davoudi et al. (2017) examined science and technology park entrepreneurs to assess the interrelationship between innovation, intellectual property, and organizational performance. The results show that intellectual property rights have a positive impact on organizational performance through open innovation, which provides guidance for technology park decision makers.

A model for valuing the intangible assets of a research center was developed by Loyarte et al. (2018). The level of intellectual capital is important for the evaluation of research and development projects developed within research centers.

The results of the study by Schiavone et al. (2014) proves the positive impact of habitation in a science park on the performance of companies related to the determinants of intellectual capital, that is, park tenants have a higher level of intellectual capital than similar companies outside the park.

Brinkhoff and Kitzmann (2014) explore the role of urbanism in generating innovation through examples of technology parks. Their model shows the interdependence of the university, the public sector, the private sector and the public. They conclude that new knowledge-based urban areas need innovations in classic technology park models.

Considering the results of previous related studies, the importance of technology parks is visible in the increase of intellectual capital level of a park in general, but also of tenant companies, through mediation, cooperation and networking.

3. Methodology

This study uses single in-depth case study on a Technology Park in the Republic of Croatia. A semi-structured in-depth interview was conducted with the technology park director. 58 questions were divided into 6 sections. The introductory section had general questions about the interviewee and his role in the technology park. Second section was about intellectual capital in general. Next three sections were related to human, structural and relational capital. Questions in the last section included final questions on the perception of intellectual capital. The interview took 52 minutes. To decrease the risk of misinterpretation, authors decided to record the interview, instead of taking notes. Based on the recording of the interview, a transcript was made and it consists of 12 text pages. In order to distinguish relevant data from insignificant ones, data reduction was conducted.

When using open-ended questions, it may happen that the respondent answers too broadly and does not hold to questions that are asked, that is why such parts of the interview need to be omitted. Therefore, recordings and complete transcripts of the interview are a suitable method for re-reading and noticing irrelevant data (Hyytiä, Karvik, 2020). Other methods for data analysis purposes such as comparison and classification method, as well as thematic analysis were used. Coding technique was used to establish significant categories but also to identify patterns and relationship between answers.

Questions were conducted based on similar qualitative papers which examined intellectual capital of science parks, incubated technology firms, universities, SMEs and social service non-profit organizations (Gibb, 2007; Kong and Ramia, 2010; Hyytiä, Karvik, 2020; Loyarte et al., 2018; Gately and Cunningham, 2014).

To verify variability of data and assure the dependability, the triangulation method (Leburić, 2001) was also used in the research. Facts for the case study from the interview can further be corroborated (as suggested by the Yin, 2003) by additional documentation that analyses the embeddedness of the park in the regional economy. In the Manual of Innovative Business Parks in the SEE Region (FIDIBE, 2010) the park is used as benchmark for good organizational and management structure as well as a good practice example for relying more on own revenues and lowering the significance of local subsidies. In the reports on Croatian entrepreneurial infrastructure it is always named as one of the good practice examples. In audited operating reports of local authorities, we can see that the park's operations are slowly growing (number of tenants, their employees, revenues of the park, profit, increasing number of EU and

national development projects etc.) (RH DUR, 2014). It has been analysed in numerous students' theses, some research papers (e.g. Hunjet et al., 2018) and local and national media always show positive image and good impact of the park and its tenants on the local economy. Yearly GEM report for Croatia (Alpeza et. al., 2020) names the park's hackathon initiative as a good practice example. Hackathon "Versusvirus or Viral Action Against Virus" (17 - 19 April 2020) aimed at identifying the biggest challenges of entrepreneurs during the COVID pandemics and the contestants tried to find answers to these challenges. One of the main weaknesses of the park in this research was lack of available space, and conference space which was mitigated in February this year by opening additional space in the annex to the previous building. Today they have about 50 tenants, but their alumni tenants comprise more than 100 enterprises that exited the incubation and have left the park and most of them still collaborate with present tenants and the park itself (Viada RH, 2021.). We even found the info on one former tenant's webpage that they are proud former tenants (Orion, 2021).

For the purpose of this study, a research question was proposed: In what forms is intellectual capital present in the technology park and is there a connection between the identified determinants of intellectual capital? The research also examined which form of intellectual capital is most important in a technology park.

4. Results

The results are presented by interpretation of the interview answers, and the conclusions are supported by real quotes from the respondent. In addition to identifying the main factors of intellectual capital in the technology park and explaining their links, models of intellectual capital assessment in the technology park were designed, based on the obtained answers.

Human Capital

Human capital is most visible in the parks system of values, tenant competencies, growth and progress, education programs and platforms for the realization of tenants interests, recognition and application of good practices and knowledge exchange. The park seeks to ensure growth through a platform which adapts to individuals depending on their affinities and areas of interest, but within the park program. The learning by doing approach is applied in the park. However, employees are not always motivated for progress: "Sometimes I wish they might be a little more motivated than they are. Well, they are in some segment, but honestly they should be even more."

Tenant progress is necessary and encouraged, and it is most visible in the communication, presentation, negotiation skills of tenants and in general in entrepreneurial way of acting. From the perspective of companies, progress is visible

in growth and networking. Tenants are in some aspects of skills (presentation, negotiation, communication) better than competitors.

When asked how additional investment in tenants' knowledge and skills can have a positive effect on the park, the answer was that the positive effect is visible through development and innovation, with smart investment and application of good practices while maintaining originality. Innovative individuals will then grow and develop, and their originality will attract other companies.

Growth enables the realization of entrepreneurial affinities of individuals, business stability, and later cooperation with other tenants: "As for companies, ..., they have segments to which they turn to strategically, ... but once they grow ... they outsource this segment which they previously covered, and that outsourcing they do mostly and always target primarily companies which are in the Technology Park Synergistic effect." In this answer, a combination of human (tenant experience), relational (networking and company cooperation) and structural capital (sets of services arranged by segments, outsourcing) is visible.

The importance of park's experience is noticed: "So, if a company grows fast enough, it employs individuals who have some entrepreneurial affinities, so they also move towards self-employment, and companies founded by these people are actually the most stable and have the greatest chance of success. We have recognized that through these 15 years of business and it really works." The knowledge, competencies and experience of tenants are connected with the innovations of the park, they enable dynamism, which affects park's performance.

"The last few companies which came to the Technology Park were just established in such a way that individuals who worked in some other companies were already preparing the ground for their companies and for entrepreneurship, because they examined clients and the market, ..., so that the risk is minimized. We are not a classic start up incubator, but I would say that more stable companies are maturing in our park, here and there someone is born who is a little braver and maybe even younger, while embarking on these slightly riskier ventures, but there is no fear for them, after such an experience, they can always in some way move on and get on their feet."

Overall conclusion is that the human capital is crucial for a technology park: "It is crucial in fact, because these are all knowledge-based companies, there are very few companies that make some tangible products, now it is a new direction we are turning to, but knowledge is actually crucial because these are services and products based on that. ... It [knowledge exchange] is actually the essence of the technology park's business".

Structural Capital

The park is conducting a process of getting to know the company, that is potential tenants present a three-year plan with specific elements, and the technology park decides according to a set of criteria, whether the company is adequate for incubation or not: "Based on the presentations of three-year plans of potential tenants, the park assesses the affinity of the company and accordingly determines potential compatible partners who are also tenants of the park, after which they meet and network."

Service-based companies usually operate dynamically and adapt to customers. According to the park's experience, the existence of a certain defined structure and process is important when the company grows up to 15 employees, because it facilitates the process of including new employees, but companies in this phase of growth are already on the way out of the technology park, because they have completed the incubation process. This is an example of a relationship between experience (human capital) and innovation (structural capital). The future business plan includes the construction of an infrastructure intended for scale up companies, in order to maintain cooperation even after the first phase of growth, after incubation.

There is a work specialization in the park, there are segments covered by a particular employee, and there are also common areas, such as event organizing. The events are focused on new trends aimed at tenant companies. The event organization is carried out through cooperation with companies in the park as well as with former tenants, and their goal is to expand and maintain the community: "..., These are some formal-informal gatherings that are very important for maintaining the community, for it to be productive, for networking." This is a visible connection of structural, relational and human capital through cooperation and networking, meeting new potential tenants, public reputation, but also the dissemination of good practices and acquired knowledge through park's processes.

Regarding routines and processes as determinants of intellectual capital, there are informal routines in terms of once a week socializing of employees and formal routines which include event organizing and the incubation process in the technology park. Although individual processes such as the incubation process are defined, the park is to some extent adapted to companies using many years of business experience, which is also a link between the determinants of structural and human capital. The processes of individual companies are defined by the tenants themselves, so the park is not included in that part.

At a national level, the examined park is one of the first technology parks established in Croatia therefore they have their own set of users and even insufficient infrastructure according to demand, which makes them leaders in their expertise. At the European level, compared to the parks of the Eastern part of Europe, the park is more advanced, while the technology parks of the western part of Europe, despite

similar problems they face, are more advanced primarily due to earlier business movements: "... we may be a little behind the west, we are trying to copy it from the west and see how they work, however, they started earlier so that they had dealt with all these problems they had earlier [than us], and what is typical is that everyone has the same set of problems. I talk to a lot of colleagues out there, they face the same problems as us, but like I said, they started earlier, so maybe they are ahead of us."

In the near future, the park is trying to start new trends related to public-private partnerships and the integration of scale up companies into the system, thus encouraging other technology parks to follow. The link between structural, human and relational capital is visible in the adaptation of good practices and new knowledge from technology parks in other countries, through the creation of innovation in the business structure.

The park is innovative thanks to its abilities and experience in recognizing good opportunities and adapting to its own climate: "Actually, that's how most companies in the Technology Park work, but also in the region and if you look, it's actually about recognizing opportunities, recognizing what someone else did one way, and you make it either better than that, or good enough to work for you."

Human capital in the form of experience and knowledge, relational capital in the form of communication with international entrepreneurial support institutions and adaptation of international practices to the environment and business of the park, contributed to structural capital, which is seen in process innovation: "... Experience and learning from your own and other's mistakes is very important. ... But that part taught us that we can recognize those things that have the ability to function and those that have less ability to function. ... You can't accept every one of them [entrepreneurial ideas], ... a win-win situation has to be found there."

The development of implemented projects depends on the dynamics of published national tenders, and the implementation of international projects is available thanks to international networks and partnerships, which indicates the development of structural capital with the help of relational. Further business development is planned through public-private partnerships and greater involvement of the private sector, in order to speed up implementation and enable more financial resources, and is in line with the guidelines of the European Union for the period to 2030.

The conclusion is that the structural capital of the observed park is at a satisfactory level, the incubation process is successful because the park cooperates with most former tenant companies, which are now at a higher level of development than they were during their stay in the park. From the perspective of the park director, there is room for improvement and he strives to achieve greater community involvement. Structure is important for the park because it attracts companies to come. Simplicity of communication and clarity of procedures are also important.

Relational Capital

The information exchange in the park takes place in a formal way through official communication channels, but also in informal gatherings of tenants, where the combination of human, through the exchange of knowledge, experience and good practices and relational capital (networking and cooperation) is visible again.

According to the respondent, relational capital is very important for the technology park. The recommendations of good partners can add value and trust to the park, that can later be used for projects and other forms of cooperation.

"Experience, market presence has enabled us to choose quality and reliable business partners. ... We have some more consistent methods by which we assess whether a business partner is fit for us or not. I think that it brought experience, I would say some mistakes and good practices", which again indicates the connection between human, structural and relational capital.

A very good cooperation with business partners, but also with clients, i.e. tenants is visible: "... We have more or less daily communication with them [clients], we also have some satisfaction surveys that we had periodically, that they give us some feedback. It was always on us that we asked them to give us praise and criticism and we always left room for criticism, a place for some of their ideas, ... We implemented a lot of things [tenant suggestions and ideas]. ... Feedback is very important."

Business relationships of the park are long lasting and clients are loyal: "Those companies that leave the Technology Park are still in good relations and intensive contacts and we have had a lot of cooperation with such companies, in terms of participation in our events, in terms of applications for some tenders, so we cooperate with them. Even now, I said this public-private partnership, it is a kind of giving back culture that we are now going to develop more intensively, meaning companies that have gained some value in the technology park, ... they now know how to appreciate and value it after many years, it is that intangible capital, and now that they have grown, they have the possibility of co-financing, that is, financing some of our programs, [returning the service]."

The cooperation with public institutions is sometimes difficult: "From communication with parks in the region, the same problems of entrepreneurial support institutions outside were observed. ... Our role as such institutions, ... is exactly that, to "reconcile" the public and private sectors, to find a common language, And then, building trust with both the public sector and the private sector, I would say that this is actually the most demanding part of this business. But we have experiences and some methods that we apply there, which could work more and more.", but this is also an example where structural capital is visible through the role of relational capital, that

is networks and cooperation can bring new projects and financial funds for innovation and process development.

There is a frequent public perception that the park is responsible for the overall development of companies, which is impossible with 50 current companies and 100 alumni companies, the entrepreneur has the initiative, and the park is a support. Regardless, the overall perception of the park is good, which is visible according to existing news about the park in the media. The plan of the park for relational capital development is a greater presence in the media. New projects will include the presentation of good practices of tenant companies to increase public awareness of the park's business.

Good cooperation with faculty and students is a great value for the park: "... Students who come for internships are a very, very valuable intellectual resource for us... we have benefited a lot by being actively involved in student internships, and then we involve students in our active projects."

The park is well networked nationally and internationally: "... Intensive exchange of good and bad practices that is equally important... that reputation we have is our starting point for the future."

Important determinants of the development of relational capital of the park are adaptation to the community and inclusiveness, but also respect for the values of all participants. According to the respondent, relational capital is very important for the operation of the park. The community, which includes networks, relations, business relationships and mutual communication, is the greatest value of the park.

Model of intellectual capital forms, their connection and conversion in a Technology park

Earlier mentioned Brinkhoff and Kitzmann Quadruple model (2014) is showing the interrelationships between the four pillars: the private sector, universities and research center, public administration and society. The role of the university is to generate knowledge, the public sector is in charge of funding and public infrastructure, and the society creates new requirements that are followed by innovative and creative solutions.

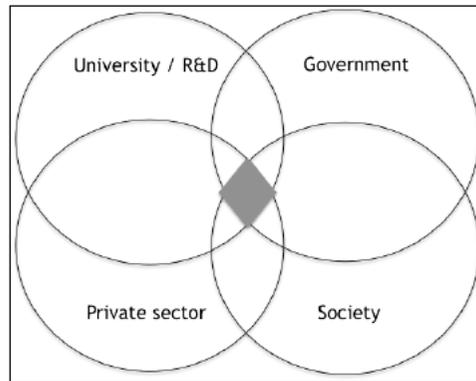


Figure 1: Quadruple helix model by Brinkhoff and Kitzmann (2014), according to Carayannis and Campbell 2009, Leydesdorff 2012

Based on previous research and data collected from the interviewee for this study, a theoretical intellectual capital assessment model for Croatian science and technology parks has been made.

According to the results of the interview, the designed model takes into account the technology park as a central element, surrounded by the main actors with whom it cooperates. The park together with the actors influences the creation of all types of capital from which the main outputs regarding park's business and cooperation arise.

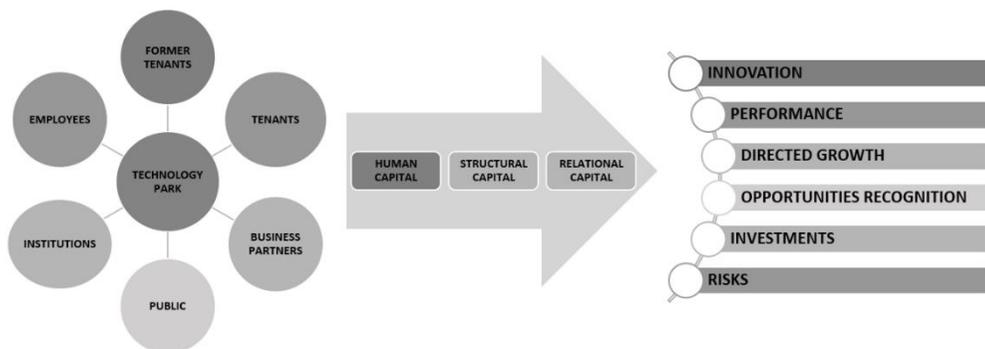


Figure 2: Intellectual capital assessment model of a technology park, author's work

Transcript analysis and coding of relevant data resulted in the significant factors that have been identified as the main factors of intellectual capital of the technology park. According to the division into human, structural, and relational, they are shown in the schematic representation below.

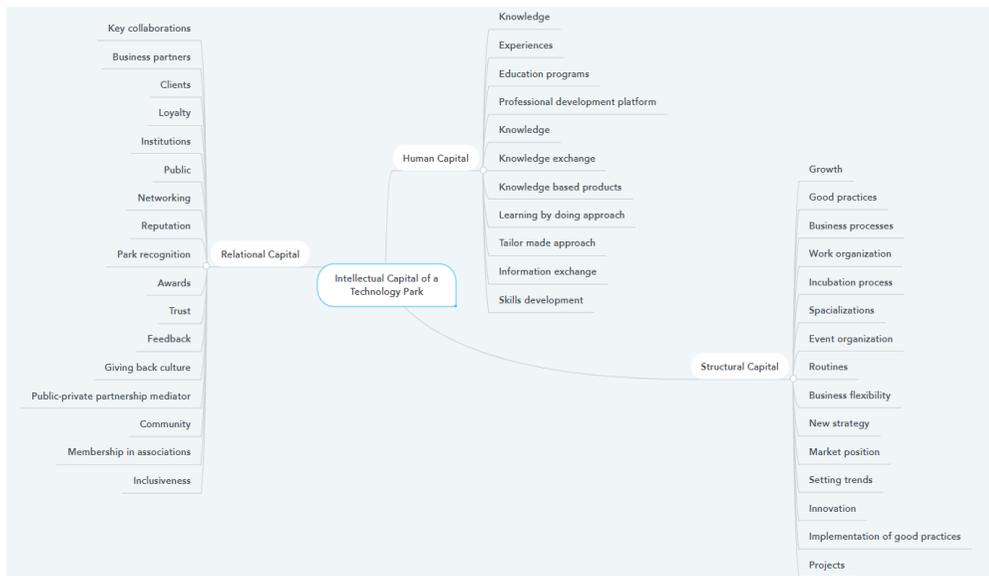


Figure 3: Identified factors of the intellectual capital of a technology park, author's work

Since there are many actors, inside and outside the park, who influence the park's business and are connected to the park due to some kind of collaboration, they are shown in the model below. In addition to the actors, the outputs of the park that arise from cooperation with the actors, but also from their own progress, are also important. From the analysis of the interview, numerous connections of actors, outputs and the technology park itself were revealed, repetitive notions and transformations of one form of capital into another were also identified, and those relationships are shown in the model below.

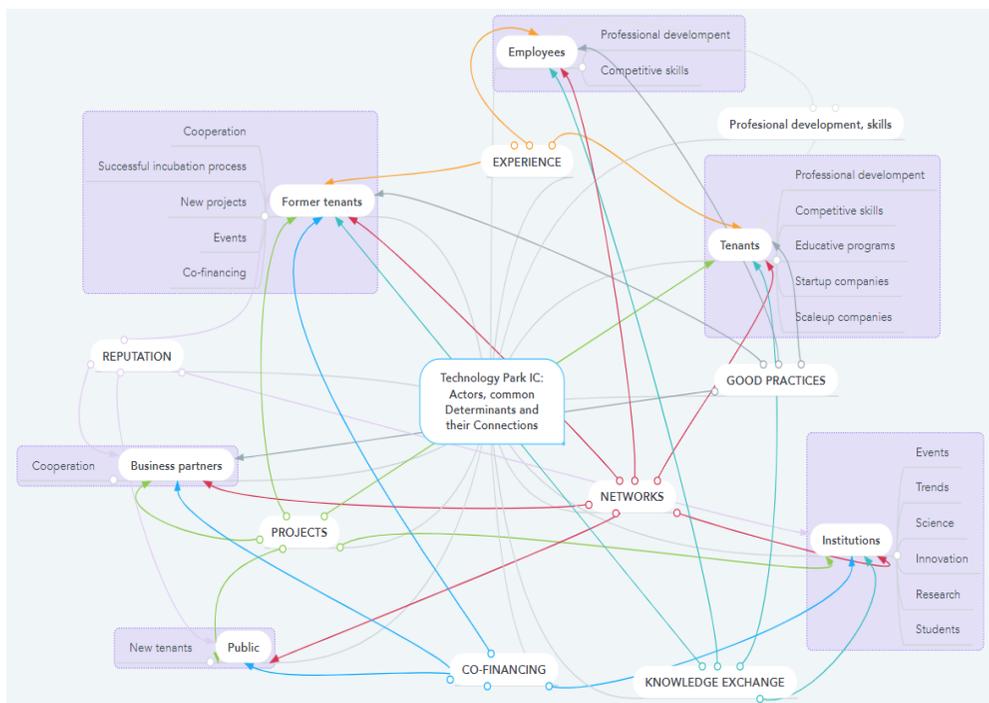


Figure 4: Connection between the technology park, related actors and their common determinants, author's work

For example, good practices are an output of human capital which is noticed when discussing tenants, employees, former tenants, and business partners. There is a clear relationship between human capital and relational capital in the form of good practices.

These models are representing key determinants of technology park's intellectual capital, which are connected to cooperating actors of a park as well as with outputs. The models can be starting points for measuring the impact of one or more identified intellectual capital variables on another variable, or the impact on technology park outputs. Since the connection of the described determinants and the conversion of different types of capital was confirmed by the interview, this model can be a basis for quantitative analysis.

5. Conclusion

The role of a technology park is to advise and motivate tenants, but the success of these companies is not possible without their own involvement. Park is an

intermediary that infiltrates new companies and connects them with existing ones, based on which the community develops.

According to the results of the interview, intangible assets and tangible assets of a technology park are related, and each form of intellectual capital is connected to each other. All forms are important for the business of the park, and for parks' innovation and performance, so it is necessary to invest in each form: "We should invest in human resources because through new programs (educational) ..., we should invest in structural ones because I think it should simply be improved and simplified, and relational, it should be worked on, systematically, if we do not work on it [relations], then there are none [relations]."

Human resources are the determinant most often mentioned in the technology park in the context of intellectual capital. Knowledge, competencies and experience of tenants are connected with the innovations of the park, they enable dynamism, but they are also related to the performance of the park. From the perspective of the technology park director, human capital is crucial for a technology park, while knowledge exchange is the most important determinant of human capital: "It [Knowledge exchange] is actually the essence of the technology park's business".

The research provided an answer to the question of which form of intellectual capital is the most important in a technology park - human capital: experts, knowledge exchange; structural capital: incubation process; relational capital: community. "The greatest strength of human capital is that there is a good core of experts who are there, from whom you can learn how to do something and how not to. The greatest strength of structural capital is that there is a certain structure that attracts people to come here, but of course it can be improved, and the greatest strength of relational capital is the community, definitely ... we always say that the community is the greatest value of the Technology Park, as soon as you mention the community, it automatically implies relationships and personal relationships and mutual communication."

Contribution and recommendations

There has been no existing research on the intellectual capital of a technology park in the Republic of Croatia. This study had identified the determinants of intellectual capital in a technology park, but also identified most important factors of intellectual capital. A model of intellectual capital in a technology park has been made and it includes all the determinants and their connections. The parts of intellectual capital that need improvement and progress have also been identified regarding tenant motivation, structural process innovation and community expansion. This study can, due to the identification of most important factors of intellectual capital, serve as a basis for other research on the intellectual capital of technology parks, research centers and related institutions.

One of the directions for future research is to include a larger number of respondents, i.e. to expand the sample to the national or international regional level, in order to compare the technology parks of a country or a geographical region. Another direction of future research is to examine awareness and perception of intellectual capital from the perspective of technology park tenants with a quantitative research approach. From the respondents' answers, it was concluded that the determinants of human and relational capital have the greatest impact on the park's innovations and that all types of intellectual capital affect park's performance. Therefore, future research could assess the quantitative effect of intellectual capital variables on innovation and performance.

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