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Three learning loops. Knowledge management in hi-tech start-up companies

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ABSTRACT

Paper discusses phenomena of knowledge acquisition and management in contemporary small innovative organizations on the example of Polish hi-tech start-ups. Exploratory empirical studies have been conducted in Krakow. Ten semi-structured interviews were analyzed with employment of Grounded Theory. As a result, start-up's knowledge management model has been described, as combination of three learning loops, corresponding to three different sources of knowledge: customers, other start-up community members and investors.

Keywords: start-up, grounded theory, learning organization, new venture team

1. INTRODUCTION

Knowledge economy and innovation are becoming more and more important categories in organizational management. Contemporary organizations focus more on delivering innovative value to customers rather than generating profits. This 'paradigm shift', include dynamic self-organizing team working with iterative approach (Denning, 2013).

Technology start-ups are also important elements of economical development in eyes of Polish officials. Government institutions have developed some instruments for supporting this type of activity.

For example The Polish Agency for Enterprise Development (PARP) has initiated #StartInPoland program for supporting start-ups. It consists of several elements. One of them is ScaleUp, which enables cooperation between innovative start-ups and large companies through acceleration programs. Another example is Bridge Alfa, an instrument funded by The National Centre for Research and Development (NCBiR) for financial support of academic teams in commercialization of technological inventions.

Although topic of start-ups (sometimes, in scientific literature called ‘New Venture Teams’) is becoming more trendy and large sums of public funding is being invested in this kind of ventures, there is a limited amount of papers in this subject. Extensive literature overview revealed many gaps and fields worth further studies. One of them is mechanism of new venture team development and its learning process (Klotz, Hmieleski, Bradley, & Busenitz, 2013).

In the following two subsections start-up definition and mechanisms of learning organization will be explained, based on literature overview. Second section describes methodological issues, including introduction of Grounded Theory, which was a basic framework of empirical studies. Third section contains analysis and discussion of gathered data in the context of acquiring knowledge. Three models of knowledge management, called ‘learning loops’ are presented as an original outcome of conducted studied. Last section of this paper presents conclusions, limitations and proposals of further research.

1. 1. A new type of organization

New type of economy brings changes in organizations and ways they are managed. Ventures started ‘in garage’ and converted in billion dollar companies over a few years are becoming more and more common phenomena in modern economy. Nevertheless most of theories in field of management are based on studies of large organizations.

However Steve Blank, a well known and respected business man and professor at Stanford University said that start-up is not a smaller version of big company. Blank understands ‘start-up’ as a new type of institution and defines it as a ‘temporary organization designed to search for a repeatable and scalable business model’ (Blank, 2013). Another experienced entrepreneur defined start-up as a ‘human institution designed to deliver a new product or service under conditions of extreme uncertainty’ (Ries, 2011).

Both definitions describe start-up as a new type of organization that is conducting experiments in order to introduce a new product or service onto the market. Often it uses external resources provided by an investor. Based on previous analysis, author defines start-up as an ‘entity which uses external funding and market experiments to create a method of converting innovations into customer value which can be repeated on global scale’ (Adamczyk, 2016).

Despite of having external funding, every start-up has limited resources. Therefore it is crucial to decrease losses caused by bad business decisions. On the other hand main goal of start-up is to introduce innovative product, which involves experiments, and therefore failures. This paradox can be solved with Lean Startup methodology (Ries, 2011), which involves continuous introduction of so called ‘MVPs’ (Minimum Viable Product) to the market in order to gather information. Start-up is selling goods not to achieve simple profits, but to test the market and create the right product. Any losses are compensated by the investor.

Similar iterative approach proposes Blank. His method is called Customer Development and in contrast to Product Development, it reverses the value chain by putting customer at the beginning (when product does not yet exist) instead of building a product with hope, that someone will buy it. According to Customer Development, so called 'client discovery' precedes creation of product, which at the end should best fit customer needs (Blank, 2013).

1. 2. Start-up's learning mechanisms

Lean Startup and Customer Development are two complementary elements of the most important learning mechanism for every innovative new venture team. Both tools enable start-up to actively gather knowledge from customers and about customers. By introducing new products to different customer segments with different distribution channels, start-up acquires information that could not be obtained through any other method.

Also social network is important for start-up to gain access to some resources (knowledge, customers, workers) and in the search for business opportunities. Therefore heterogeneous team is important, thus it secures access to wider range of resources. (Muñoz-Bullon, Sanchez-Bueno, & Vos-Saz, 2015). Innovative companies by working with different partners gain more opportunities for acquiring new and diverse knowledge. Founders explore their network to increase their competences (Moslehi, Linger, & Tanner, 2014). It is crucial for start-up co-founders to develop network, because in most cases they share a common skill set and background, therefore their initial social network is limited. Founders with 'extensive social networks tend to achieve superior performance' (Klotz et al., 2013). It has also been proven, that so called 'relational capability' (ability to cooperate with partners) has positive impact on company's sales and employment growth.

Investors can also be considered as an important factor in the context of learning and human development of start-ups. The potential of founding team is often more important for investor than company itself. They assume, that venture team will eventually develop the right business plan after a couple of experiments and with some business advices (Gimmon, 2008; Muñoz-Bullon et al., 2015; Vanaelst et al., 2006). Investors seek for venture teams with the right set of 'core competences' (Prahalad & Hamel, 1990).

Other studies revealed that more experienced founders prefer to cooperate with more cohesion teams (what limits their social network) and tend to ignore investors advice more often than novice (Klotz et al., 2013). It seems that learning process has its limits and at some point gathering new resources is pointless.

2. EMPIRICAL STUDIES

2. 1. Methodology

As mentioned earlier, academic literature on start-ups is still rather poor. Secondly, the purpose of this research is to explore learning mechanisms among new venture teams, what requires studies of human behavior in a specific cultural context. Therefore, to better understand knowledge management processes interpretive approach and qualitative methods has been employed.

According to Coleman and O'Connor (2008) this methodology is 'orientated towards how individuals and groups view and understand the world and construct meaning out of their experiences'.

This approach is typical for interpretive and postmodern scholars who prefer 'methodologies that provide insights, reveal meaning and acknowledge the possibility of multiple answers to problems' (Goulding, 1998).

Qualitative methods are often considered to be less objective than quantitative. To avoid any misconceptions, a Grounded Theory (GT) was used to conduct analyses. GT is a method of creating theory 'which has been systematically obtained through social research and is grounded in data' (Goulding, 1998). From a more practical aspect, the most important feature of GT is coding technique, which involves assigning meanings to specific fragments of analyzed material (mostly texts). GT enforces working on empirical data, however allows multiple sources, like 'interviews, observation of behavior and published reports' (Goulding, 1998). After empirical material is coded, relationships between codes are being established and initial theory is being generated. However, the whole research process is non-sequential and requires an iterative approach. Generated theory is 'a product of continuous interplay between data collection and analysis' (Goulding, 1998).

Tan (2010) mentions a couple of unique elements of GT that distinguish it from other qualitative methods: First of all, constructed theory emerges from collected empirical data, rather than from existing theories. Secondly, theory generation is possible during the process of systematic acquisition and analysis of data. Finally, the whole research process is 'flexible and creative'.

Coleman and O'Connor (2008) used Grounded Theory for studying phenomena of software development in IT start-ups. They gave the following reasons for choosing this approach: Lack of good integrated and established theory about the studied topic justifies the use of inductive methods. In their opinion, GT is credible, legitimate sociological methodology, which provides a well-explained set of guidelines for research on human behavior.

Also, Tan (2010) believes that GT is a good choice for creating theory about human behavior or exploring new socio-technical phenomena that don't have yet well-established theory and literature. Grounded Theory rises, however, some controversy among researchers. Most of it can be brought down to a dispute about whether GT is a methodology (a way of thinking and studying social reality) or a method (package of techniques and procedures used to conduct research projects) (Tan, 2010).

Grounded Theory was developed by two sociologists, Barney Glaser and Anselm Strauss. However, their later understanding of GT has differentiated, resulting in the creation of two separate paths of its further development. As Goulding (1998) explains, Glaser 'argues that the theory should only explain the phenomenon under study', while Strauss 'insists on excessive use of coding matrices to conceptualise beyond the immediate field of study'.

Dispute among methodologists mentioned above has a very practical dimension, because it determines interpretation and limitations of conducted studies. Is it possible to expand generated theory on a larger scale? Are the results of conducted studies just an explanation of process inside the studied subjects or can they be used to generate more general theory?

Another matter worth mentioning from an ontological perspective is data collection. When most of empirical material is based on subjective opinions gathered through interviews, is the generated theory a description of reality or merely its image created by respondents? In other words: are we studying an existing reality or the construct made by our informants? Coleman and O'Connor (2008) avoid solving this philosophical question and argue that, in any case, people base their decision not on the reality but on their perception of it.

This argument is particularly relevant in the context of studied organizations, as their core activity is searching for customer value, which is based on human perception rather than objective assessment of reality.

2. 2. Results

Empirical data was gathered in Kraków (southern Poland), which is considered one of the most important start-up centers in Central Europe. Ten interviews with representatives of 10 different start-ups were recorded, subjected to transcription, than coded and analyzed accordingly to Grounded Theory method. Each respondent was marked with Roman numbers from 'I' to 'X', so they would remain anonymous.

Material was initially gathered for the purpose of other study, however 20 months later only five of studied entities were still active. This became a good opportunity to reanalyze old empirical and enrich it with additional data. Two research questions were stated: Which characteristics distinguish both groups from each other? And how did those differences influence their failure or success?

At the time of the survey, companies marked as: I, III, VII and IX were engaged in software development, primarily for mobile devices (e.g. tablets, smart phones) or via the Internet ('Software as a Service' model). Entities marked as V and X were working on creating innovative electronic devices for monitoring of domestic and breeding animals. Companies II, IV, VI and VIII, on the other hand, developed advanced industrial devices, like 3D printers and unmanned flying vehicles.

Six of surveyed entities were team ventures, with some division of responsibilities and shared decision-making. These organizations were typical new venture teams, co-founded by a few people and managed by them. In most cases respondents declared, that they do not use any formal management methods and do not have a strict division of responsibilities or clear method of making decisions. Although, after some in-depth questions it was possible to recognize some informal structure.

I: There is no person with a decisive voice. Depending on the stage of the application, the leader changes (because he or she is a specialist in a specific field).

II. I deal with marketing, external contacts, participation in fairs, contact with the investor. [second partner] is responsible for the mechanics and equipment production, [third partner] deals with software, partly mechanics and components.

IV: We share responsibilities, but there is no strict project management. [...] I deal with management, marketing, PR.

Four other surveyed entities were run by solo-entrepreneurs. It doesn't mean that they did all the work by their own, but they managed company by themselves and hired each member of their team.

VI: The company was totally my idea. I hired an engineer, mechanic and electronics by recommendation.

IX: I was looking for a team. I have co-workers with whom I cooperate in various fields, but I manage everything on my own.

Table 1. Characteristics of the surveyed entities. (Own elaboration)

	I	II	III	IV	V	VI	VII	VIII	IX	X
Team venture	■	■	■	■	■			■		
Previous business experience			■		■				■	
Investor presence	■		■	■	■	■		■	■	
Still active venture	■	■	■	■	■					
Market experiments	■	■	■	■	■	■		■	■	■

Table 1 presents overview of studied cases. It can be seen that ventures founded and ran by teams had significant more chances of success than those established by solo-entrepreneurs. Other aspects, like presence of external funding, previous business experience or incremental methods of management (including market experiments) were less relevant to performance of the surveyed companies.

The question remains what mechanism makes team ventures more successful? More detailed analysis revealed other interesting characteristics of surveyed companies. One of the respondents asked about most important factor of success answered:

I: Most importantly, we managed to integrate the team around the project. We managed to create a culture of information flow.

Using coding techniques three sources of knowledge have been identified: customers, start-up community and investors. Each source can be associated to different model of knowledge acquisition, called ‘learning loop’. Three learning loops will be presented in the next section.

3. KNOWLEDGE MANAGEMENT MODEL

3. 1. Customer learning loop.

First element of identified knowledge management model, called ‘customer learning loop’, is presented on Figure 1. Its mechanism is very similar to Lean Startup and Customer Development methods described in the first section. We can see, that core element of start-ups strategic management framework is *business model*. It specifies what value is being delivered and to which customer segments with what distribution channels, but most importantly how is it being monetized.

Based on business model, start-up creates product or service which is introduced to the market in order to gather valuable information about customers. It is symptomatic, that selling products is not considered to be a source of income, but source of information. Based on collected data, business model can be improved and new type of product can be again introduced to the market. Start-up succeeds, when it finds the best business model.

III: *Of course, we have changed the path of development along the way. For us collecting information from the market is a continuous process. [...] We test different places and distribution channels.[...] We are constantly tracking the market.*

IV: *Contact with the customer helps. Customer gives feed-back about what is missing, what standards are not met. [...] Every customer has different expectations - from this we drew conclusions. While looking for a new customer, we use the same equipment, but each customer has different needs.*

V: *The whole trick is to penetrate the customer environment. You need to speak their language, understand their problems. [our product] is to help people.*

Respondent marked as ‘VII’ blames lack of knowledge about the customers for his failure.

VII: *Both my projects have failed because I did not have the market tested before I started working on them.*

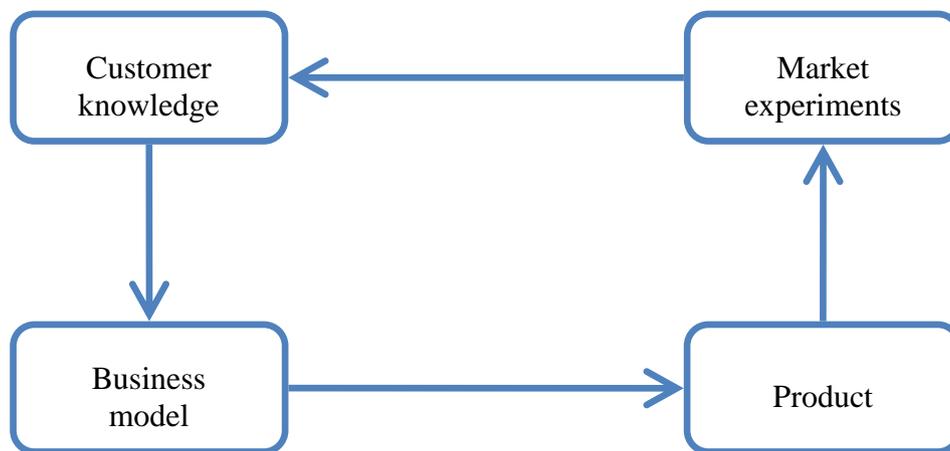


Figure 1. Customer learning loop. (Own elaboration)

3. 2. Community learning loop

Another element of knowledge management is community learning loop, presented in Figure 2. Start-up community (sometimes called ‘ecosystem’) consists of entrepreneurs, investors, universities, governmental and non-governmental institutions focused on supporting innovative entrepreneurship. Start-up community is very open, unlike other business organizations and its boundaries aren’t strongly defined. Therefore, some students, employees of corporations and so called ‘wanna be’ (people willing to start their own start-up in the future) are also considered part of the community. Core values of start-up culture are openness and willingness to share knowledge.

VII: *In the startup environment everyone knows each other. You can talk to anyone. We can meet on tea or beer and talk about business.*

The biggest challenge in gaining knowledge from the startup community is to know who to ask. Despite of general openness, good relations in startup community are crucial to

identify the right person and receive good answer. As presented at Figure 2: Good relations in startup community can result in upgrading business competences and better business competences gives ability to acquire new relations. Also gaining community knowledge leads to increases number of potential contacts.

V: *When I was starting [my business] I appreciated opinions of the people wiser than me, I still do. There are many of them [wiser people in start-up community] [...] If you want, they are accessible to you. If I need help, I can just meet and talk to someone*

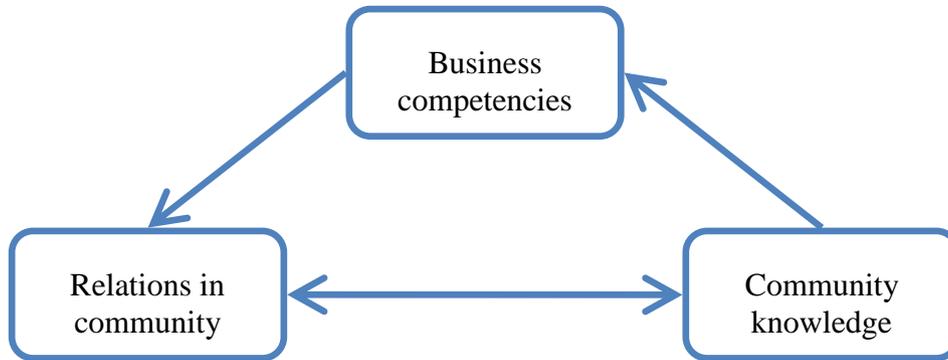


Figure 2. Community learning loop. (Own elaboration)

3. 3. Investor learning loop.

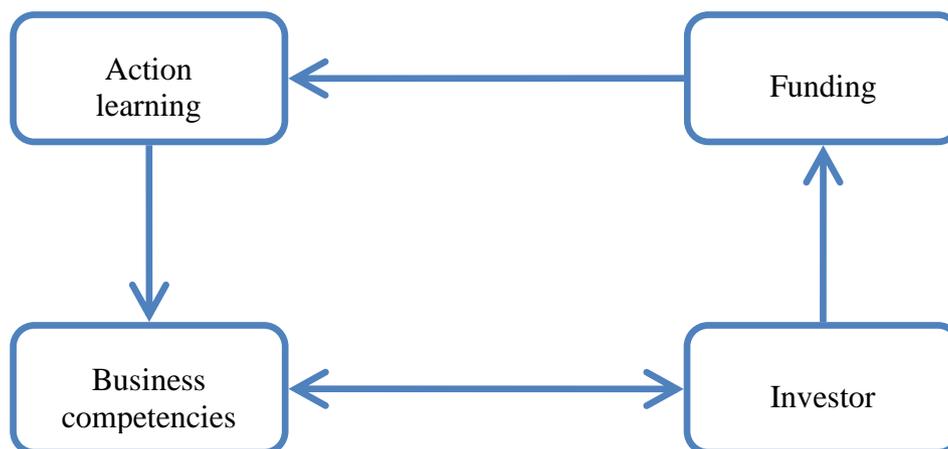


Figure 3. Investor learning loop. (Own elaboration)

As mentioned previously start-up does not focus on getting profits by selling goods, like typical business. Therefore necessary financial resources need to be provided by an external

institution, like seed fund or business angel. These institutions acquire a minority shares in the venture, counting on multiple increase of companies value, when the right business model is discovered. This type of activity is very risky, but in return allows investors to achieve relatively high profits. For this kind of activity to be successful, investor must have sufficient financial resources to support few parallel ventures and necessary business knowledge to choose the right ones. Given the fact that start-up development is in best interest of investor, venture team can expect from investor not only funds but also valuable business advices. This kind of investment is often characterized as ‘smart money’.

Therefore acquiring investor could be a good choice even if team initially has necessary financial resources. Iterative model of start-up development makes it very hard to estimate total costs of venture. Making a classical business plan is impossible in case of start-up, as it doesn’t have a clear business model. Start-up makes experiments and it is difficult to predict how long will they last.

II: If I were to start today, I would look for money earlier, e.g. a year ago, maybe we could go on. [...] We did not spend a lot of money on development, but we have downtime because if we had money 3-4 months earlier it would have been faster. It was a mistake. We try to fix it.

Once an investment agreement is settled, venture team can focus on running their company and learn how to do business. Only three out of ten investigated start-ups could depend on previous experience of its founders. On five ‘successful’ start-ups in three cases co-founders had no business experience. As shown in Figure 3, if start-up team has sufficient resources to fully engage in their venture, over time they acquire necessary competencies. This mechanism has been called ‘action learning’, as the team learns how to run a business by actually running it. Business competences are then used to properly manage investor relations and to acquire new investment. However insufficient business knowledge can cause situation, when investor has bad influence on the project.

IV: I regret to the investor that he forced us to provide services when we wanted to sell products. [Investor] said that providing services has more potential. [...] We followed his instructions but finally realized that it was a mistake. The investor admitted that and changed his mind about products, but only after two years. We wasted a little time and money, but we learned a lot.

VI: The biggest challenges are definitely negotiations of the investment agreement. If you do not survive it, you will never be prepared for it. It was a very chaotic stage. Now I would be more prepared to talk to an investor like to a partner.

Start-up can also acquire knowledge form investors, who didn’t decide to support their venture. Investor can be treated similarly to customer. While investors are interested in the specific project, start-up team knows (or can assume) that they are on the right track. And on the other hand, when business model seems to be positively verified by the customers, but still no investor is willing to put his money in it, this could suggest need to rethink the model. Investor may for example suspect that targeted market is too small or revenue stream is unstable.

III: Each [investment] round works as validation. Getting a higher capital round means positive validation of project.

4. CONCLUSIONS

Start-up as a new type of organization has been described. It has been defined as a company that is conducting market experiments to find the best business model. Start-ups use external investment as a source of its liquidity, because it is not focused on gaining profits but on acquiring knowledge from the market. It uses iterative methods of strategic management, called Lean Startup and Customer Development. Thus knowledge becomes the main resource and mean of production for start-up. Its core competence is ability to acquire, manage and convert knowledge into business value. Start-up can therefore be considered an example of contemporary organization operating in the paradigm of knowledge economy.

Qualitative research based on semi-structured interviews conducted in Kraków was presented and discussed. Grounded Theory approach was used to analyze knowledge management processes occurring in studied entities. Three mechanisms, called 'learning loops' were presented as an original outcome of conducted research. Usage of Grounded Theory causes obvious limitations, as GT allows creation of 'middle range' theory. Therefore results of conducted analysis may not be applicable in different cultures. However, obtained results seem to be consistent with analyzed literature.

Presented models have been called 'loops', as they contain feedback mechanisms. This is a typical phenomenon in the incremental management paradigm (similar to Lean Startup methodology). Knowledge and competences are at the same time resources and means of production. They can be also considered as 'inputs' and 'mediators' in so called IMO (input-mediator-output) framework (Klotz et al., 2013).

Conducted research can also have a practical application. Although business competences and learning mechanism are crucial for every innovative start-up, founders do not necessarily must have them from the beginning. Properly built team can acquire missing resource over the team, if it can stay operational long enough.

Further research could be aimed to determine the influence of individual competences, experiences and characteristics of start-up co-founders on knowledge management. Also division of responsibilities is an interesting research area. Undoubtedly, both issues are strongly linked together.

References

- [1] Adamczyk, M. (2016). An attempt to define the concept of start-up company based on inductive research. In QUAERE 2016 : reviewed proceedings of the interdisciplinary scientific international conference for PhD students and assistants (pp. 67–74). Retrieved from http://www.vedeckekonference.cz/library/proceedings/quaere_2016.pdf
- [2] Blank, S. G. (2013). *The four steps to the epiphany: Successful strategies for products that win* (Fifth edition). California.
- [3] Coleman, G., & O'Connor, R. V. (2008). An investigation into software development process formation in software start-ups. *Journal of Enterprise Information Management*, 21(6), 633-648.
- [4] Denning, S. (2013). The management revolution's growing army of rebel voices. *Strategy & Leadership*, 41(5), 23-33.

- [5] Gimmon, E. (2008). Entrepreneurial team-starts and teamwork: Taking the investors' perspective. *Team Performance Management: An International Journal*, 14(7/8), 327-339.
- [6] Goulding, C. (1998). Grounded theory: The missing methodology on the interpretivist agenda. *Qualitative Market Research: An International Journal*, 1(1), 50-57.
- [7] Klotz, A. C., Hmieleski, K. M., Bradley, B. H., & Busenitz, L. W. (2013). New Venture Teams: A Review of the Literature and Roadmap for Future Research. *Journal of Management*, 40(1), 226-255.
- [8] Moslehi, A., Linger, H., & Tanner, K. (2014). Diversity of knowledge in patent co-authorship networks – case studies in the Victorian biotechnology industry. *VINE*, 44(4), 496-518.
- [9] Munoz-Bullon, F., Sanchez-Bueno, M. J., & Vos-Saz, A. (2015). Startup team contributions and new firm creation: The role of founding team experience. *Entrepreneurship & Regional Development*, 27(1-2), 80-105.
- [10] Prahalad, C., & Hamel, G. (1990). The core competence of the corporation. *Harvard Business Review*.
- [11] Ries, E. (2011). *The lean startup: How today's entrepreneurs use continuous innovation to create radically successful businesses*. New York: Crown Publishing Group.
- [12] Tan, J. (2010). Grounded theory in practice: Issues and discussion for new qualitative researchers. *Journal of Documentation*, 66(1), 93-112.
- [13] Vanaelst, I., Clarysse, B., Wright, M., Lockett, A., Moray, N., & S'Jegers, R. (2006). Entrepreneurial Team Development in Academic Spinouts: An Examination of Team Heterogeneity. *Entrepreneurship Theory and Practice*, 30(2), 249-271.

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