

OPEN INNOVATION STRATEGIES AND BUSINESS INCUBATION SERVICE IMPACT ON THE SUCCESS OF INCUBATION

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Abstract. New ventures that generate innovation are associated with economic growth and business incubators play unique role in stimulating this growth by facilitating creation of new companies. Many researchers associate start-ups with open organisations engaged in innovation processes and call for research in the intersection between the themes of open innovation and start-ups. This study relates to the call to investigate which competencies are crucial for open innovation success by looking at open innovation competences, strategies and motivation as contributing factors. The purpose of this study is to link innovation capacity of nascent entrepreneurs with services provided by University Business Incubators and find out which factors contribute most to the success of incubation. The quantitative study of tenants of Latvian University business incubators revealed that open innovation strategies and motivation to engage in open innovation activities are positively associated with the use of incubation services. Among factors contributing to the success of incubation incubator service networking appeared to be the most important, followed by open innovation inside-out strategy and incubates age. Practical implications for the management of business incubators are related to widening the networking services.

Key words: open innovation strategy; open innovation competencies; university business incubation; start-ups

JEL code: M19, L26, M13

Introduction

Innovation and entrepreneurship are often regarded as a basis for economic growth and the wealth of nations (Maritz & Donovan, 2015). Business incubators are among initiatives that stimulate economic growth by facilitating creation of new companies (Ratinho, et al., 2011). Incubation is a support process that nurtures the development of beginning and emerging companies through a range of resources and services. Entrepreneurial process refers to the recognition or creation and exploitation of business opportunities and that requires various types of skills and competencies (Fukugawa, 2013). New business creation is frequently related to innovation and business incubators have unique position of knowledge transfers in this innovation and entrepreneurship ecosystem. Moreover, start-ups that foster innovations are the hallmark of economic renewal and progress and are also associated with greater potential returns (BarNir, 2014). Similarly Spender describes start-up companies as „powerful engine of open innovation processes“ (Spender, et al., 2017, p. 4). Open innovation (OI) is the new model of doing innovation (Chesbrough, 2003). Innovative entrepreneurship process is related to

use of open innovation strategies as, for example, inflow and outflow activities (Grassmann & Enkel, 2004) and to develop specific competencies, named open innovation competencies, which are essential for the success of open innovation (DuChatenier, et al., 2010). As the competencies in general are important for performance (Mulder, 2007; Mitchelmore & Rowley, 2010), those related to open innovation could help nascent entrepreneurs to exploit better the incubator's services and open innovation strategies, and thus influence their success inside the incubator as well as the results of incubation. In the growing context of open innovation, business incubators adapt by developing more the networking services, which are essential in the context of open innovation (Hansen, et al., 2000) still there is lack of data how efficient these services are.

The *aim of this study* is to link innovation capacity of nascent entrepreneurs with services provided by University Business Incubators and find out which factors contribute most to the success of incubation. Moreover, this study relates to the call to investigate which competencies are crucial for open innovation success (DuChatenier, et al., 2010) by looking at

open innovation competences, strategies and motivation as contributing factors.

The paper is structured as follows. The first part presents the theoretical foundations and definitions of open innovation, open innovation competencies, motivation and strategies, and briefly describes incubation and Latvian University Business Incubators. Further the variables of the research and research questions are presented. The second part describes the methodology, design of the research instrument (questionnaire) and finally presents the results and discussion leading to managerial implications.

Open innovation strategies, competencies and motivation

Open innovation is defined as "the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively" (Chesbrough, et al., 2006). Open innovation involves increasing internal innovation by involving different parties and more value creation for the business by the commercialisation of the unused technology and patents (Chesbrough, et al., 2006). Open innovation asks for specific *strategies*, such as inside-out and outside-in activities, but also some coupled activities, which suppose a combination of those two (Grassmann & Enkel, 2004). Outside-in activities are supposed to involve external and internal parties of the business to accelerate internal innovation. For example, IBM's incubator encourages incubates to work with external partners of the incubator's network to increase their performance in terms of product development. Inside-out activities include new ways of commercialising the unused technology and patents. For example, incubated start-ups from Technical University of Zurich commercialised some of their mechatronic knowledge to ABB Group (Grassmann & Enkel, 2004).

In the open innovation context, entrepreneurs need specific competencies, named open innovation competencies. Elise du Chantenier defines *open innovation competencies* as "the behavioral characteristics supporting the following activities or tasks and challenges: managing the processes of inter-organizational collaboration, managing the process of innovation, creating new knowledge in collaboration" (du Chantenier, et al., 2010). Authors categorize these competencies per the objective they serve. The profile of open innovation competencies proposed by du Chantenier includes 33 competencies, grouped in four clusters: self-management, interpersonal management, project management and content management. Except for the first category (self-management), which is a useful basic skill for other categories, each skill category is associated with a main object or activity of open innovation. As the authors pointed out, these competencies, which are all useful for open innovation, are not necessarily specific and may be necessary for other tasks as well. These competencies are important for the open innovation success since they could influence incubates' success inside and outside the incubator by affecting value creation.

Open innovation competencies can contribute to value creation and thus to new business development. For example, trust, which belongs to interpersonal management category of open innovation competencies, is a moderator of several relationships, such as the perception of the network benefits and the decision to actively collaborate inside a network (Brunetto & Farr-Whatson, 2007). Moreover, interpersonal trust is a moderator between knowledge management processes and knowledge management effectiveness (Poon, 2006). Absorptive capacity, which belongs to content management category of open innovation, helps entrepreneurs to explore and exploit internal and external sources of new knowledge by moderating the relationships between technology sourcing and

firm performance (Grama & Royer, 2013). Project management competence which belongs to project management category of open innovation competencies is considered a moderator between the motivational empowerment, which is the feeling to work competently, and the job performance (Chan, et al., 2013).

Since these competencies influence performance and are related to open innovation, it can be expected that open innovation competencies help students from University business incubators to use better incubator's services and open innovation strategies, thus have positive impact on the result of incubation process and value creation. However, competencies alone do not work without motivation to engage in innovation processes. Saraswathi defines motivation as willingness to exert high level of effort towards certain goal (Saraswathi, 2011). Consequently, open innovation motivation is willingness to exert high level of effort related to open innovation activities, such as generating new ideas, acquiring new technologies and markets, and involving partners.

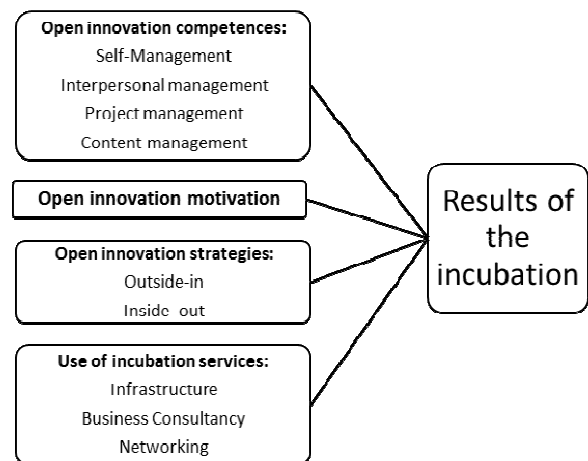
Open innovation of tenants of University Business Incubators

Many research papers demonstrate the benefits of open innovation for big companies, however, open innovation is even more important for small companies and nascent entrepreneurs since they have fewer resources. Nowadays open innovation becomes more an obligation for new firms than a choice (Lichtenthaler, 2011), and business incubators favour open innovation in their tenant firms (Grama & Royer, 2013).

Business incubators are organisations designed to accelerate the economic development, helping start-up firms in their growth and development phase (Somsuk & Laosirihongthong, 2014). The primary goal of a business incubator is to support tenants during the start-up period when they are most vulnerable, and to produce firms that will leave

the incubation program as a self-supporting enterprise (Hacket & Dilts, 2004).

There are multiple types of business incubators - private business incubators, enterprises' business incubators, business incubators for local economic development and University business incubators (Albert, et al., 2003). In Latvia since 2013 five Universities have business incubators where young entrepreneurs and start-ups can seek assistance in pre-incubation phase as well as during incubation phase. The services delivered by the University business incubators are classified in three categories: infrastructure, business support and networking services (Bergek & Norrman, 2008; Bruneel, et al., 2012). Due to the novelty of this phenomenon, there is no research done so far in Latvia about University business incubation. Still for the management of these incubators it is important to understand which services are more valuable and which factors contribute most to the success of incubation and new business creation. Moreover, for tenants it is important to know which competences and strategies in relation to which incubation services work better.



Source: authors

Fig. 1. Variables influencing the results of the incubation

The model presented in Fig. 1 shows the associations between the variables which, according to the literature, impact the success of the incubation. The following research questions are formulated:

RQ1: Which open innovation dimensions are better associated with the use of Business incubator services?

RQ2: Which services provided by the University business incubators contribute most to the results of the incubation?

RQ3: Which factors of open innovation contribute most to the results of the incubation?

Methods

To answer the research questions, the quantitative study was performed. To collect the data the questionnaire was developed with five scales related to each of the variables and 96 statements in total. All statements were measured in 7 point Likert scale where coding 1 is allocated to "completely do not agree" and coding 7 is assigned to "completely agree".

Depended variable of this study is related to the results of the incubation process. The tenants were asked to evaluate their performance as value created at the end of incubation period. Value creation is measured based on the scales proposed by Hughes and colleagues who proposed to measure it in terms of innovation and competitiveness (Hughes, et al., 2007). They adopted from the literature three innovation scales measuring: radical innovation (6 items); technical innovation (2 items); process innovation (3 items). They also adopted a competitiveness's scale named competitive ability (4 items) (Hansen, et al., 2000; Kambil, et al., 2000) and proposed to add competitive performance (2 items) (Hughes et al., 2007). Students were asked: "In order evaluate the performance of your business in terms of innovation and competitiveness, please indicate your level of agreement with the following statements". The scale included in total seventeen statements.

Independent variables of this research are open innovation competencies, open innovation motivation, open innovation strategies and use of services provided by University business incubators.

The *open innovation strategies* are related to inside-out, outside-in and coupled activities (Grassmann & Enkel, 2004). These open innovation strategies are related to: problem solving with experts; design of a new product thanks to crowdsourcing; internal idea challenges; enterprise social network or continuous suggestion box; product test/service test in a client community; open data and data sharing; start-ups scouting and partnerships; intrapreneurship programs; investments in innovative companies; patents. The two additional strategies added are related to commercialization of the scientific work and new product development using crowdfunding. Students were asked: "How often do you use these open innovation approaches?" The scale included in total twelve items, eight for outside-in and four for inside-out strategies.

Open innovation competencies include 33 items proposed by du Chatenier et al. (2010) and are grouped in 4 clusters corresponding to interpersonal management (9 items), project management (10 items), content management (9 items), and self-management (5 items). Students were asked: "What level do you consider to have for the following capabilities of open innovation?"

Open innovation motivation is measured with 8 statements and respondents were asked: "Please evaluate your motivation to do the following". Statements are related to idea generation, customer research, searching for access to new technologies and markets, development of intellectual property like patents and trademarks.

The list of *incubator services* delivered by Latvian University business incubators is built upon the literature (Bergek & Norrman, 2008; Bruneel, et al., 2012). They are classified in 3 categories: infrastructure (4 items), business consultancy (8 items) and networking services (14 items). The students were asked: "In what extent are you using the following services of the incubator?"

Table 1

Cronbah`s Alpha, mean values and standard deviations of dimensions

	Cronbah`s Alpha	Mean	SD
Result of the incubation	0.82	3.97	1.21
OI Competences (Self-Management)	0.73	5.69	0.77
OI Competences (Interpersonal Management)	0.85	5.89	0.69
OI Competences (Project Management)	0.85	5.66	0.73
OI Competences (Content Management)	0.80	5.61	0.72
Incubator service use (Business consultancy)	0.81	3.73	1.64
Incubator service use (Networking)	0.91	3.30	1.64
Incubator service use (Infrastructure)	0.68	3.62	1.69
OI strategy (outside-in)	0.84	3.44	1.31
OI strategy (inside-out)	0.62	4.44	1.37
OI motivation	0.80	5.64	1.19
Stage of the business idea	-	2.42	1.73
Gender	-	1.46	0.5
Age	-	21.58	0.66

Source: author's calculations based on research data

Control variables were included to understand whether they have any effect on dependent variable. Five control variables were included: the incubator; stage of business idea at the start, where "just an idea" was coded as 1 whereas "already have sales or provide service" was coded as 7. Demographic variables included was respondent`s age, gender, and educational status (student or not).

The survey of University business incubators' tenants was launched to reach the tenants of three incubation sessions during 2013-2016. The incubation session corresponds with the academic year cycle. Thus, the population for this research is those tenants who had finished the incubation and may reflect on the overall incubation cycle and the total number is 121 persons or tenants during incubation sessions in 2013-2016. Five Business Incubators – RISEBA University, TURIBA University, Latvia University, Riga Technical University, BA Scholl of Business and Finance were involved. The data collection was launched in June 2016 until October 2016 via online survey platform Webropool. In total 69 replies were collected. Majority of the respondents (57 %) were students.

Research results and discussion

The data was analysed using SPSS 21 statistical package. First, the internal consistency reliability of all scales was checked by means of Cronbach's alpha coefficients. All scales show satisfactory to good internal consistency reliability, except Incubator service use (Infrastructure) and OI strategy (outside-in) show weak reliability (see Table 1). This can be explained with small number of items (four) in those scales. K-S test showed normally distributed data (all p values are in between .29 to .99), so the sample can be considered as representative.

One way ANOVA was used to determine whether there are significant differences between the results of tenants in the five business incubators. ANOVA indicated that statistically significant differences does not exist ($F=1.89$; $p=.12>.05$), so the results can be equally attributed to all University business incubators. Independent sample t-test for equality of means for gender groups does not indicate significant differences related to results of incubation ($t=-1.65$; $p=.11>.05$). Moreover, the stage of the business idea at the starting point appeared to have no significant relationship with any of the constructs.

To answer RQ1 and to find out which open innovation dimensions are better associated with the use of business incubator services, Pearson correlation analysis is used and results are presented in the Table 2.

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Pearson correlation coefficients

Open innovation competences, strategies and motivation	Incubator service use (Business consultancy)	Incubator service use (Networking)	Incubator service use (Infrastructure)	Result of the incubation
OI Competences (Self-Management)	0.10	0.15	0.11	0.16
OI Competences (Interpersonal Management)	0.08	0.12	0.01	0.19
OI Competences (Project Management)	0.12	0.05	0.10	0.16
OI Competences (Content Management)	0.19	0.12	0.22*	0.17
OI strategy (outside-in)	0.38*	0.40**	0.38**	0.40**
OI strategy (inside-out)	0.24*	0.32**	0.32**	0.45**
OI motivation	0.35**	0.28*	0.09	0.40**

Note: The level of significance: ** $p < .01$; * $p < .05$.
Source: author's calculations based on the research data

The correlation results show that open innovation competencies are not related to the use of incubation services, except content management competencies indicate statistically significant, however, weak correlation with incubator service infrastructure. Moreover, open innovation competencies are not associated with the results of the incubation. However, open innovation strategies are significantly related to use of all services provided by business incubators as well as to the results of the incubation. This finding is in line with (Grassmann & Enkel, 2004) research. Open innovation motivation is significantly related to the use of networking and consultancy services as well as the results of the incubation.

To answer RQ2 and RQ3 and to find out to what extent open innovation strategies, competencies, motivation and business incubators' services are associated with results of the incubation, multiple regression analysis was performed. It indicates how much of the variation in the dependent variable can be explained with the aid of the independent variables and how much variation remains unexplained (Stock & Watson, 2012). Multiple linear regression analysis with forward method of variable selection was performed to determine the dimensions that have the most significant

impact on the dependent variable (result of the incubation). Summary of the analysis is presented in the Table 3.

Table 3

Multiple linear regression results

Model	Variables	Adjusted R²	B	SE	t
1	Incubator service use (Networking)	0.32	0.42	0.07	5.70**
2	Incubator service use (Networking)	0.39	0.35	0.07	4.76**
	OI strategy (inside-out)		0.26	0.09	2.94*
3	Incubator service use (Networking)	0.42	0.30	0.08	3.96**
	OI strategy (inside-out)		0.31	0.09	3.45**
	Age		0.39	0.18	2.18*

Note: The level of significance: ** $p < .01$; * $p < .05$.
Source: author's calculations based on the research data

The regression results show that only three variables have significant impact on the results of the incubation, they are incubators' service networking, use of open innovation strategy inside-out and incubates' age. Based on the regression model summary it can be concluded that 32 % (adjusted $R^2 = .32$) of dependent variable – result of incubation is determined by

the incubation service use networking. When two additional predictors open innovation strategy (inside-out) and age are included in the model the model determines 42 % of the result ($R^2=.42$).

Conclusions and recommendations

The results provide the answers on the research questions.

- 1) Open innovation dimensions that are better associated with the use of business incubator services are the use of open innovation strategies. The research did not show relationship between open innovation competencies and the results of incubation, however, use of open innovation strategies could be improved by the open innovation competencies.
- 2) Among services provided by the University business incubators, networking contributes most to the results of the incubation. This finding suggests that the management teams of business incubators should propose more networking events and training programs to help new entrepreneurs to adapt open innovation strategies and increase motivation.
- 3) Factors of open innovation that contribute most to the results of the incubation appeared to be incubator service networking, open

innovation strategy outside-in and tenants' age. Thus, when selecting tenants, their age could be taken into consideration.

- 4) The results of this study can motivate tenants to use open innovation strategies, especially inside-out strategy, as these strategies may help them to better use services provide by business incubators and achieve better results.
- 5) This research has certain limitations and implications for future research. The most important limitation is the size of the sample. Future research should be carried out and answers from more respondents collected. Other limitation is related to the generalizability of the findings, since, respondents represent only University business incubators, and data from other types of incubators would enrich the findings. Moreover, certain limitation is related to the relationships between open innovation competencies, motivation, use of strategies and services, which certainly are more complex. More research should be done to explore these relationships with more sophisticated methodologies as structural equation modelling, for example. Still the present findings could be used as the basis for future investigations.

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