Technopreneurial Development: Why Ecosystem Approach is Unsustainable in Case of Low Competition?

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ABSTRACT

The paper evaluates the influence of ecosystem development on technopreneurial activity rates by dividing this activity to the cases of high and low competitive environments. The study reveals that in case of low competition the soft factors, which come from entrepreneurial ecosystem and have significant positive influence on business development, do not have an important impact –and about ¾ of the impact are driven by hard entrepreneurial development factors which are not benefiting from entrepreneurial ecosystem development. The quantitative research presented in the paper indicates, that different tools are necessary to foster technopreneurial development in the environments with low and high competition levels, and ecosystem approach will be sustainable in case of relatively high level of competition. The testing of the stated hypothesis was performed by means of statistical analysis using SPSS Statistics 22.0.
Keywords: technology entrepreneurship, entrepreneurial development, competition, ecosystem.

1. INTRODUCTION

The majority of researchers studying entrepreneurial development, agree that related ecosystem plays important role in creating stimulus for business [1, 7, 8, 11, 16], and suggest a number of examples to prove the thesis with Silicon Valley in the first place, especially in case of technology start-up creation. Since the success of Palo Alto entrepreneurial cluster, a number of territories tried to copy the approach and build up entrepreneurial ecosystems, which were in many cases quite successful (MIT ecosystem, University of Cambridge, Alto university ecosystem, etc.), but none of them reached the benchmark set by Silicon Valley. Still, the researchers agree that entrepreneurial ecosystems become important factor for technology entrepreneurs motivation, and the majority of government-sponsored programs designed to support start-ups make significant efforts to create entrepreneurial ecosystem.

In this paper we argue that in order to ensure efficiency of the ecosystem and its influence on entrepreneurial development, it is not enough to create the spaces and bring up those who can benefit from start-up creation and development; on the contrary, this approach leads to opposite results in a few cases. In case of non-competitive environments creation of entrepreneurial ecosystems which try to copy Silicon Valley, the creators (in most cases – the government, which finances ecosystem) face high but relatively short interest to the developed environment, which does not lead to any sustainable changes in entrepreneurial development. Thus in this

paper we propose that the key factor which defines efficiency of ecosystem approach in development of technology entrepreneurs, is the level of competition; in case the level is low, development of ecosystem will not lead to technopreneurship growth with high probability.

2. LITERATURE OVERVIEW

Traditionally, entrepreneurial development ecosystems appear on the basis of university campuses - one can find examples of entrepreneurial centers which are either university-based or are located near universities and henceforth use their resources. At the same time, creation of entrepreneurial centers in developing countries where competitive environment is distorted due to underdeveloped institutions, in many cases do not lead to any scalable results (for example, technology park on the basis of Moscow State University in Russia exists for over ten years, but had produced only a two scalable companies, which changed legislation to enter international market). Thus, at the initial stage of our research we have evaluated existing literature to define factors of entrepreneurship environment success.

Detailed analysis of technology and science parks success was undertaken by Broadherst [3] who indicated that technology or science park can succeed if it has access to university resources as university ecosystem produces innovative ideas and also educates employees who are able to develop innovative ideas to prototypes and later commercialize the results. The factor of success can be a bit different: i.e., location, access to venture capital and reputation (Stanford University), preliminary stage consulting for start-ups (Massachusetts Institute of Technology), provision of the necessary to knowledge to launch a start-up (Cambridge University) [17] and so on. Besides that all of those university based entrepreneurial ecosystems the participants gain access to university social network [10] and intellectual property protection services. In most cases entrepreneurship centers at the universities, especially the ones located outside the US, see their primary mission in entrepreneurial education [23].

Survey of university-based ecosystems in developing countries indicates appearance of both similarities and differences. First, universities are acting as networking agents but there is an important difference: elite of developing countries tends to send their children to leading world's universities, so local universities do provide network but usually only for middle-class. This phenomena leads to further segregation of developing countries' society and to increased distance of the power. On the contrary, a university in developing country and a university in developed country are both acting as expert societies and provide networks to their alumni, but in developed countries this network will include members of elites, while in developing countries it might not. Second, universities in developed countries consult their students on the issues of intellectual property within the developed entrepreneurial ecosystem. Third, developed countries' universities pay significant attention to entrepreneurial education and provide a certain amount of courses which can be useful for entrepreneurs – for example, special educational programs are provided in Argentina, Chile, India, Kazakhstan, Russia, South Africa etc. Those programs aim to deliver knowledge and skills in specific areas of enterprises' development (financial management, business planning, human resources management) to entrepreneurs during early stages of development – again, as a part of entrepreneurial ecosystem. Finally, both in developing and developed countries universities are acting as experts in the process of legislation and government programs development for regulation and stimulation of entrepreneurial activity.

At the same time there is significant difference in the role universities should play in entrepreneurial development in developed and developing countries, which differ in the fist place by the level of competition in the economy in general, and in entrepreneurial ecosystems in particular. In developed countries university-based entrepreneurial ecosystems promote entrepreneurship as a career path, to spread the spirit of entrepreneurship by encouraging people to try themselves as business launchers and owners. For example, in MIT Martin Trust Center "people … cultivate and nourish a thriving network that unifies academic, government, and industry leaders around the vision of entrepreneurial success. These efforts strengthen the entrepreneurial community and build momentum for emerging ventures through interactions among MIT students, faculty, recent alums, and other stakeholders. In this way, we try to spread the entrepreneurial virus" (MIT Entrepreneurship center mission, 2012), and similar goals are set by other entrepreneurship ecosystems. At the same time in developing countries it is not necessary to promote spirit of enterprise: according to GEM report [6] 74% of respondents in factor-driven economies see entrepreneurship as a good career path which is 35% higher than average rate of such career path in innovation-driven economies. Entrepreneurial intentions in factor-driven and efficiency-driven economies are correspondingly 26% and 25% while in innovation-driven economies this rate is only 10% which is 2.5 times lower. Henceforth it can be assumed the people in developing countries are less dependent on promotion of entrepreneurial spirit than in developed countries and universities are to keep this in mind in development of special entrepreneurship education programs. Second, though it was proven that trust is critical component of university improvement and effectiveness [20], the situation is a bit different in developing countries since the level of trust in such economies is usually very low [14, 18]. Moreover, cheating is considered completely normal if "there is enough money on the table" – and taking into consideration that in this paper we are talking about countries where people are living on 1.25 USD per

day "enough money on the table" is a very low amount. This low level of trust is partly due to low quality of formal institutions performance (first of all in case of justice system) and partly due to the fact that people in many cases do not understand how to use formal institutions and get access to them. But in such a situation there are some institutions that are trusted by people.

For the purposes of this study we evaluate entrepreneurial development centers, mainly created around universities, following Isenberg's definition (Isenberg, 2010) of ecosystems for startup creation and growth. The ideas express by Isenberg created stimulus for arranging ecosystems as key factor for entrepreneurial growth. Since then, and following Baumol [2], development of these were considered an important step to enhance entrepreneurial activity [12, 13]. In this paper we argue that development of entrepreneurial ecosystems drives technopreneurial growth only in case of relatively high competition; otherwise creation of entrepreneurial ecosystem does not enhance growth of technological startups.

3. METHODOLOGY

To conduct this research we have evaluated 59 countries present in GEM [6], Economic freedom [5] and Doing Business [4] datasets, where we used the following parameters: TEA rate, average tax rate, number of procedures to start business, costs to restore insolvency, insolvency restoration rate, average number of days to prepare taxation documentation, average number of days to enforce contract, number of days required to pay taxes, level of investors disclosure, legal rights enforcement level, duration of construction procedures, costs of starting business, the number of procedures needed to register property, cost of construction, average number of days needed for construction. Also, to indicate the level of technopreneurial development, we have created an integral variable: TEA rate weighted by improvement driven share of entrepreneurial activity, as technopreneurship is purely improvement driven. For the purposes of this research we have used regression and graph analysis, which was conducted with SPSS Statistics software (version 22.0).

We have set the following set of hypothesis to assess by quantitative evaluation in this study.

Hypothesis 1. Entrepreneurial ecosystem development is strongly related to the level of technopreneurial activity in any type of competitive environment.

Hypothesis 2. The influence of entrepreneurial ecosystem development on technopreneurial activity is higher in case when the level of competition in the environment is not distorted.

4. MAIN FINDINGS

Automated linear regression analysis

On the first step of the analysis we evaluated the level of entrepreneurial activity by means of regression analysis in case of low and high competition level. We used the level of economic freedom (Economic freedom ranking) as indirect parameter to evaluate competitions level. As our research was intended to assess countries with distorted competition, we did not include in a sample countries that feature economic freedom above 80. This sample was divided into two part of the same size – countries with economic freedom level below 60 (low competition) and above 60 (high competition).

Fig.. 1a and 1b feature automated linear regression analysis results in terms of predictor for the level of technopreneurial activity.

Figure 1a. Main predictors for technopreneurial TEA (high competition)

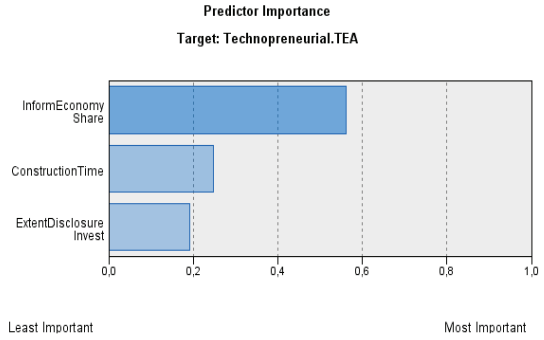
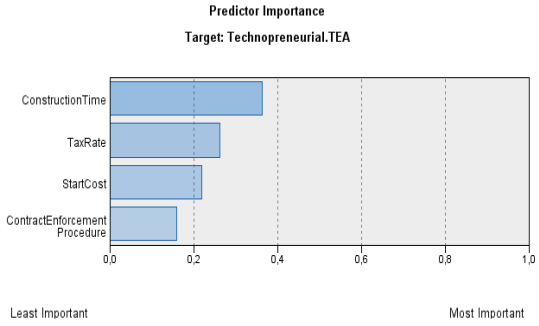


Figure 1b. Main predictors for technopreneurial TEA (low competition)



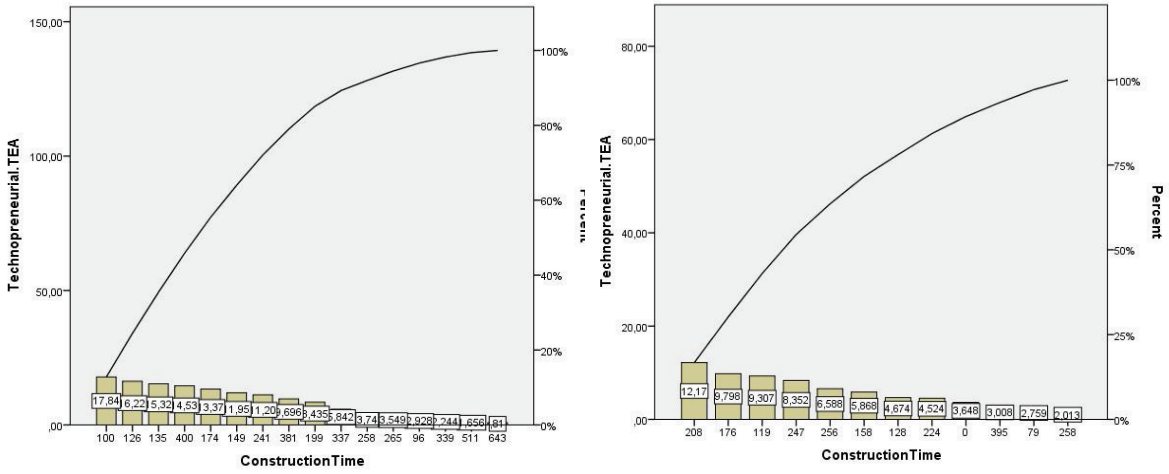
The model shown in Fig. 1a has 63.2% accuracy level in defining key factors for technopreneurial activity (TEA rate); while the model featured in Fig. 1b has 64.% accuracy. Interestingly, the only factor which appears in both models is average construction time, but this factor is two times more important in case of low competition. The

other two factors, share of informal economy and extend of investment disclosure (both indicating the level of economic transparency) are significant in case of high competition, but appear insignificant in case of low competition. For low competitive environment the following key factors define the level of technopreneurial development – average taxation rate, costs of starting the business and contract enforcement procedures. One can notice, that in while the level of investment disclosure can be influenced by development of entrepreneurial ecosystem directly, while the share of informal economy can be indirectly influenced by entrepreneurial ecosystem development as it leads to decrease of informal economic practices.

On the other hand, the average time of construction and contract enforcement, as well as the cost of starting business and taxation rate are mainly defined by the institutions and government policies, and not by the main outcomes that can be produced by entrepreneurial ecosystem.

On Fig. 2 we feature Pareto diagrams for technopreneurial TEA rate in relevance to construction times (low competition on the left, high competition on the right). As one can assess from the graphs, the in case of low competition the majority of technopreneurial activity appears if the time of construction is relatively short (the first exception can be seen on fourth place), while for the situation of high competition short construction time does not come to be an important factor of technopreneurial growth; thus hypothesis 1 can be rejected, as the research had proven that the same factor that defines quality of doing business has different influence on technopreneurial activity rate in case of lower and higher competition. Close results were acquired when we analyzed technopreneurial growth rate in relevance to other indicators estimated by linear regression analysis.

Figure 2. Pareto diagram for technopreneurial TEA rate in relevance to construction times (low competition on the left, high competition on the right)



To finalize the regression analysis section, we have developed ANOVA regression models with the defined key factors driving technopreneurial activity for the case of both high and low competition (see Tables 1 and 2).

Variation explained by the model present in Table 73.5%, while no collinearity problems were detected, and all analyzed factors are statistically significant. Thus we can see that the influence of entrepreneurial ecosystems in case of low competition is limited to maximum 26.5%, so in this case it is more important for the government to focus on institutional development rather than on creation of ecosystems.

Table 1. Technopreneurial TEA regression model (low competition)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28,039	6,974		4,020	,002
	Construction Time	-,022	,006	-,583	-3,745	,003
	Tax Rate	-,108	,034	-,480	-3,149	,008
	Contract Enforcement Procedure	-,405	,161	-,410	-2,513	,027
	Start Cost	,165	,057	,453	2,906	,013
Dependent variable: Technopreneurial TEA						

Development of institutions would allow to reduce construction time and the length of contract enforcement; and also in long-term perspective – to reduce taxation burden, which in complex would create stimulus for

technopreneurial development with higher probability than in case of ecosystem development with relevant soft factors improvement. As it was expected, in case of low competition hard factors have more impact on technopreneurial development, than the soft ones – and hard factors are almost not influenced by ecosystems development.

When the same model was implemented for the case of high competition, technopreneurial TEA variance explained dropped down to 19.1%. Thus we have developed the other ANOVA model for this situation. Table 2 provides technopreneurial regression model for the case of relatively high competition, and is developed on the basis of the above defined factors.

Table 2. Technopreneurial TEA regression model (high competition)

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-2,873	2,339		-1,228	,254
	Construction Time	-,017	,007	-,534	-2,457	,039
	Informal Economy Share	,232	,062	,815	3,710	,006
	Extent Disclosure Investors	,426	,196	,412	2,171	,062
Dependent Variable: Technopreneurial.TEA						

The model featured in Table 2 explains 73.3% of technoprneurial TEA rate variance in case of high competition, and all the factors in the model are statistically significant. Except for the time required for construction period, the other two factors in the model can be considered as soft, which can be possibly influenced by the development of entrepreneurial ecosystem development.

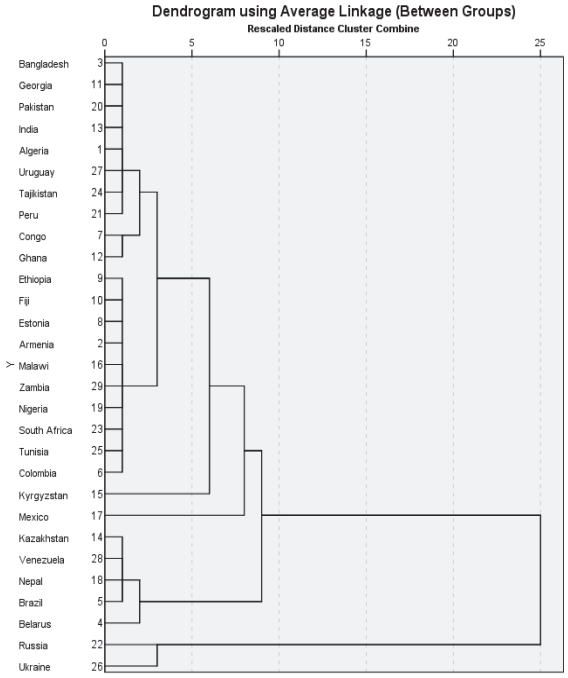
According to the performed analysis, hypothesis 1 was rejected, as we have witnessed that the situation differs significantly for the case of high and low competition. Hypothesis 2, on the contrary, was supported, as we have assessed higher influence of soft factors in case of higher competition (low distortion of competitive environment).

Cluster analysis

At the final stage of the survey we performed cluster analysis to evaluate the amount and type of clusters one can assess for technopreneurial development and relevant factors assessed by regression analysis. The results of hierarchical analysis can be seen in Figure 3.

The dendrogram reveals four main clusters; which were further evaluated by means of K-centered analysis. We have used the set of influential factors defined above, and revealed that four calculated clusters differ in the following way. The first cluster features middle-length construction time and taxation burden, but higher level of transparency – with relevant average rate of technopreneurial activity (examples: India or Peru). The second cluster came to the lowest technopreneurial activity rate in non-transparent environments with slow construction (Russia or Ukraine). The third cluster has the highest technopreneurial activity rate among analyzed, short construction times and low tax burden (i.e., South Africa or Tunisia). Finally, the fourth cluster also has high technopreneurial activity rate, which is lowered by high taxation burden and long construction periods (Kazakhstan or Brazil).

Figure 3. Technopreneurial development factors dendrogram



The practical outcomes of these findings are that development of entrepreneurial ecosystem would be the most efficient in the first and third clusters, where for different reasoning business already witnesses the necessary level of competition and institutional support, while for the second and fourth cluster such measures seem to be less efficient.

5. CONCLUSIONS AND LIMITATIONS

Our research allows development of some conclusions that extend existing knowledge on entrepreneurial ecosystem development in relation to possible technopreneurship growth.

The first hypothesis of the study was testing existing findings on the influence of entrepreneurial ecosystems in Stam&Spiegel's [19] definition; existing literature [9, 15,

21, 22] indicates that entrepreneurial ecosystems have a positive influence on technopreneurial startups growth in any type of environment. The quantitative testing of this hypothesis revealed that this is not exactly true – in case of low competition the soft factors, which come from entrepreneurial ecosystem and have significant positive influence on business development, do not have an important impact. Almost ¾ of the impact are driven by hard entrepreneurial development factors which can hardly be achieved by means of developing entrepreneurial ecosystem. The second hypothesis proposed that different tools are needed to stimulate entrepreneurial activity in case of high and low competition, and this statement is proven by both regression and cluster analysis in our research. Thus, creation of entrepreneurial ecosystem would not lead to sustainable results for low competitive environments.

The main limitation of our study is the sample size and type, as we have used combined GEM and Doing business ranking datasets with the level of economic freedom below 80; using the existing datasets also leads to limitations of the study related to the dataset limitations themselves.

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