154 OPEN-SOURCE AS ENABLER OF ENTREPRENEURSHIP AMBITIONS AMONG ENGINEERING STUDENTS – A STUDY INVOLVING 20 FINNISH STARTUPS

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ABSTRACT

This exploratory study assess the role of open-source software on the entrepreneurship initiatives of engineering students. Taking a case-study approach, the authors interviewed 20 start-up organizations present at a demo-area on one of the biggest entrepreneurship events in Europe. At a later stage, several key technological entrepreneurs were identified and their academic background was subjected to analysis using the Linked-in social network. Findings suggest that open-source software plays an important role in everyday life of the studied start-up organizations. Moreover, the authors suggest that educators, seeking an increase of entrepreneurship initiatives from their students, should increase the exposition of their students to open-source technologies and promote the creation of independent and multi-disciplinary entrepreneurship societies.

Keywords: Open-source, Entrepreneurship, Finnish startups

1 INTRODUCTION

1.1 Entrepreneurship, society and education

Entrepreneurship, as the act of individuals becoming entrepreneurs, is widely-accepted as a good and desirable phenomenon in our society. The ones undertaking innovations, finance and business acumen in an effort to transform ideas into new businesses, commonly referred as start-ups, are creating an valuable economic and social god. However, as claimed by Shane (2003) entrepreneurship is rather poorly explained by academics, limiting the governance, stimulation and exploitation of entrepreneurship opportunities

Much descriptive and explanatory research already exists on the entrepreneurial process. Wide accepted multidisciplinary research exists on the effects of individual and cultural attributes on the entrepreneurship initiatives. Recent advances in organizational and innovation studies also pointed their lenses at the entrepreneurship phenomenon. However, when seeing entrepreneurship from universities governance perspective, the existing relevant theoretical body is quite limited. Some research reveals the importance of promoting entrepreneurship in higher education, but few models and guidelines exists for guiding the higher-education leadership.

"Much of our American progress has been the product of the individual who had an idea; pursued it; fashioned it; tenaciously clung to it against all odds; and then produced it, sold it, and profited from it" - Hubert H. Humphrey (1966)

1.2 On entrepreneurship and engineering education

Some published academic research advocates the stimulation of the entrepreneurship phenomenon within engineering education. The researchers Meltovaara and Lindström (2011) describe their approach aimed at fulfilling the prerequisites of entrepreneurship by introducing an new syllabus for students of automotive engineering and logistics. Kairisto-Mertanen and Mertanen (2008), pursued the same goals by driving students to participate in different entrepreneurial learning environments; both business and engineering students established and run co-operatives and carry out different project in collaboration with local players.

1.3 On open-source and entrepreneurship

Several studies link the open-source and entrepreneurship phenomena. For instance, Zutshi (2006) provides an detailed explanation on how e-entreprenetures make use of open-source. Advocating the open-source phenomena, Perens (2005) claims that using open-source cut way down on start-ups software costs. Expanding and customizing open-source technologies is by far easier and the economic costs of failing are lower than in big coorporate initatives (Perens 2005).

On other hand, some studies are quite critical on entrepreneurs embracing the open-source phenomena. Bärwolff (2006) claims that venture capitalists entering in the open source arena are taking on some financial risks. Stam and Elfring (2008) reports that open-source start-ups firms experienced legitimacy problems, as reflected by the scanty public knowledge regarding open source software and the lack of support from organizations with vested interests in the proprietary software market

1.4 Bridging open-source, entrepreneurship and engineering education

The authors did not find relevant literature literature bridging the open-source phenomenon with the topics of entrepreneurship in engineering education, raising the following research questions: First, "Does open-source software play any role in the entrepreneurship ambitions of engineering students?" ; and if consequently "How higher-education leaders can better stimulate students-entrepreneurship?". Without an answer from the academic literature, the authors were driven in an empirical quest trying to get the answers by methodologically observing, studying and interacting with entrepreneurs on the terrain.

For contextualizing the research questions with empirical cases, we can provide the examples of bambuser.com and walkbase.com. Two recent technological start-ups, both employing and innovating, that already secured an considerable amount of seed funding. Both ventures, providing software products and services being used by thousands of users worldwide over the Internet, started as student projects in Åbo Academy in Finland. We rise then the discussion

:"Did open-source play any role in the entrepreneurship ambitions of their founders?", "How can the University stimulate more cases of student-run start-ups?"

Rather, than limiting our research to the previous mentioned two cases, we addressed the research questions by pointing our lenses to 20 other start-ups in an early stage that are currently operating in the Nordic region. The following chapter describes the methodological approach followed and we later provide how the captured research data was analysed. In the last section, we present our contributions to the body of theoretical knowledge in engineering education and attached governance implications. We close this paper by discussing and warning about possible generalizations from a study conducted solely in Northern-Europe geographies.

2 METHODOLOGY

In this regards, we have adopted a theory building approach as described in the taxonomy of research methods from Järvinen (2004). By analysing the role of the open-source software phenomena in the reality of the Finnish entrepreneurial start-ups, our empirical study lead to dissencus from the current body of theoretical knowledge on entrepreneurship and engineering education. This study is a qualitative and exploratory in the moulds of Eisenhardt (1989), Stebbins (2001) and Yin (2002) for social science research. Data was collected from semi-structured interviews performed by both authors at Slush 2011, an start-up conference attracting start-ups and investors in Europe's Nordic region, during the the second and third of November 2012.

Interviews were performed by informal and flexible manners with interviewers and interviewees following the a priori questionnaire provided in the apendix, but also further exploring other issues on the interest of both parts. At different timings, one of the authors inquired about the venture goals, business model, funding rising and product development efforts; other author, more interested in the open-source phenomena, asked afterwards both about the use and offer of open-source technological components by the venture organizations. Interviews were conducted in the Finnish and English language and paper notes were taken with pencil in two discrete paper notebooks.

From 50 start-ups at demo stands present at Slush 2011, we randomly selected and interviewed 20 start-ups. All start-ups been extremely collaborative and did not had issues in collaborating with the authors that always introduced themselves as researchers from Turku School of Economics. Two interviewees, where not able to answer in-depth technical questions out of their startup competences, but as agreed, they provided the missing answers aftewards by email. All answers and notes taken been typed, organized and categorised in digital formats less that 24 hours after being collected.

The use of interviews in exploratory and qualitative research has been accepted by the entrepreneurship academic community. For instance (Murray 1996) used case study methodology to identify the roles of venture capital investments in newly established technological firms, Zutishi et al. (2006) interviewed two entrepreneurial organizations to assess the implication of the new open-source software distribution model for entrepreneurs on e-business.

The Linked-in social network was used afterwards to screen the academic background of all 21 interviewed entrepreneurs present at Slush 2011. Thanks to the social network, we were able to identify for every studied organization their founders/co-founders and respective educational background. Surprised with an considerable number of entrepreneurs with foreign origin operating in Finland, we decided to collect additional information on their national background and holed foreign degrees.

3 ANALYSIS OF COLLECTED DATA

Demonstrating rigor through a careful and comprehensive articulation of data analysis is a critical issue in improving the robustness of qualitative research. The qualitative inquiry as presented by (Eisenhardt 1989) and (Miles & Huberman 1994) guided the data categorization and analysis within this research. Popular and wide available software tools facilitated the interviewees data categorization: a text editor, a spreadsheet processor and some mindmap software were used.

Different theories and empirical perspectives were applied on the collected data. The authors searched for patterns reflecting who are the entrepreneurs, their academic background, their ambitions and on how are they conducing their business ventures. The authors, constrained by their educational background, employed mostly the marketing, entrepreneurship, computer science and information systems perspectives to reason from data. However the collected data might have value for other areas of expertise.

Complementary data, regarding the entrepreneurs curriculum in general and their academic background in particular, was collected a posteriori from the Linked-in social network and treated as Silverman (2009) natural occurring research data. A set of had-hoc hypothesis, related with entrepreneurs exposition with the open-source phenomenon during their graduate studies, emerged during the analysis of the collected data and the authors were required to perform a syllabus analysis of several graduate courses among some Nordic higher-education institutions . This last analysis was based on public-available textual information such as study guides and virtual learning environments. Textual information was collected in Finnish, Swedish and English languages and allowed us to test most of our analysis driven had-hoc hypothesis.

4 IMPLICATIONS AND DISCUSSION

Open-source seams to play an important role in everyday life of start-up organizations, especially among organizations founded by entrepreneurs with high-technological academic background. In a universe of 20 start-ups: 20 were using open-source software development tools; 19 were embedding open-source technological components in their products and 14 were working up-stream, contributing back to the open-source community. Moreover, three entrepreneurs considered their developments as open-source products, and a forth one was planning to open-source their product blueprints; all this reveals a considerable correlation between open-source phenomena and the Finnish entrepreneurship initiatives.

By investigating entrepreneurs academic background on Linked-in, it is important to refer that, a considerable amount of studied start-ups, manifested high diversity on the academic and

cultural backgrounds of their founders. Many start-ups were initiated by teams of entrepreneurs from completely difference academic backgrounds i.e. (a chemist, a computer scientist and a ethnologist) and different cultural background i.e (entrepreneurs with Finnish, Indian and Turkish origins collaborating in the English language).

The same investigation based on the entrepreneurs academic background, suggests that a high number of the identified entrepreneurs followed the same higher-education paths. Two Finnish universities, well-known in the national panorama for promoting Linux and open-source technologies in their study programs, educated together more than half of the investigated entrepreneurs. This could suggest an important and novel correlation between the promotion of open-source software at universities and the entrepreneurship ambitions and capabilities of their students. The same two universities also host students entrepreneurship societies empirically well-known for intensively promoting early entrepreneurial thinking among their students.

The authors propose then two managerial implications for universities wishing to promote entrepreneurship among their students: First, increase students experiences with open-source software and, secondly, promote student's entrepreneurship societies willing to grab together students from diverse academic and cultural backgrounds. Everyone willing and interested in start-ups could then practice, at side of their studies, many aspects of corporate-life such as pitching, product-development, sales, team-work, coaching, marketing, etc.

By including open-source software in the syllabus, over promoting the teaching of high-branded technologies from Oracle, Sap, Cisco, IBM, Microsoft to engineering students, we allow students to play with more open and transparent technologies. Those last ones, by promoting standards; releasing their blueprints; and voiding lock-in mechanisms; are more likely to be deeply studied and integrated by possible student-entrepreneurs. Many of the products showed by entrepreneurs at Slush 2011, were not a reality without the low entrance costs, interoperability and rapid prototyping characteristics of open-source software .

Moreover, for developing countries it does not interest to graduate hundreds of consultants both on Oracle, Sap, Cisco, IBM, Microsoft corporate manners and technologies. Once students graduate, they are going to compete in a price and language basis with thousands of graduates from the developing world that dominate the current outsourcing, in-shoring and off-shoring tendencies of the industry. The authors suggest that, many open-source entrepreneurs would became consultants on their own public-domain solutions addressing the more specific needs of the local market. Those ones, are in better position to make the difference by their knowledge and expertise on a specific product/problem rather than on the consultancy hourly rate for projects involving high-branded general-purpose product/solution.

Finally, the authors would like to encourage the creation of independent student-run entrepreneurship societies were student-entrepreneurs and students interested in start-ups could find support for realizing their entrepreneurship projects. In Finland, Boost Turku, Aalto Entrepreneurship Society and Hanken Entrepreneurship Society are examples of entrepreneurial community of students, alumni and researchers developing entrepreneurship skills and awareness . Those societies are operating in English and encourage the participation of everyone independently of their studies background or nationality. Both by the number of students involved in events organized by the mentioned bodies and by the number of student

running start-ups that operate for more than one year, those societies are playing a good role in creating jobs for skilled students in a society where graduates unemployment rises year after year.

5 CONCLUSION

Our core findings suggest that open-source software plays an important role in everyday life of the studied start-up organizations. Moreover the authors recommend, to educators seeking an increase of entrepreneurship initiatives among engineering students, both to increase the exposition of their students to open-source technologies and to promote the creation of independent and multi-disciplinary entrepreneurship societies.

The authors must warn on possible generalizations from this qualitative study conducted solely in Northern-Europe geographies that covers solely a sample of start-ups dedicating their efforts to the creation and commercialization of high-technological software products and Internet services. Any generalization reasoning should be mitigated carefully.

Besides complementing existing literature on entrepreneurship and engineering education with a novel study on the open-source software role within student's entrepreneurship, this research provides new variables to a wide stream of research on "Who is the entrepreneur" and "How entrepreneurs do it by taking opportunities into business ventures?" currently fomenting a vivid debate within entrepreneurship research.

We conclude this paper by challenging quantitative researchers on entrepreneurship and education, to make more rigours assessments on this research both by testing our theoretical propositions and by considering of open-source education as a variable capable of affecting the technological entrepreneurship process.

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