

An Assessment and Planning Methodology for University-based Entrepreneurship Ecosystems

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Abstract

This paper proposes a method for assessing a university-based entrepreneurship ecosystem, grounded in the identification of major stakeholders, entrepreneurship-related activities directly related to those stakeholders, and with an eye to more comprehensive experiential entrepreneurship education that goes beyond traditional classroom education. The method incorporates specific approaches with each major activity area as well as outcomes, which are then aggregated into overall ecosystem strategy and performance. The paper concludes with an approach to action planning and resource allocation staging for university officials and supporting government bodies.

Introduction

Universities play a foundational role in local and regional entrepreneurship ecosystem development and are recognized around the world as important sources of new technology and innovative ventures. In parallel with increased student interest in entrepreneurship, universities have undergone expansive growth in entrepreneurship education, with many building venture incubation programs that did not exist a mere decade ago. This has also stimulated alumni and other external stakeholders to engage with young entrepreneurs and their innovative ideas.

There is a rich array of research pointing to success factors for university-based entrepreneurs, examining the role of research and innovation culture (O'Shea et al., 2005), educational curriculum and strategy (Etzkowitz et al., 2000), experiential education (such as internships) (Corbett, 2005) and team formation (Roberts, 1991). However, research on entrepreneurship ecosystems generally extends outside the university context to cities and regions. Stam (2015), for example, identifies nine attributes of a startup ecosystem: leadership, intermediaries, network density, government, talent, support services, engagement, companies, and capital. A university is certainly influenced by conditions in the community around it, but also has its own set of factors that can impact entrepreneurial activities arising from within.

The purpose of this paper is to provide a practical method for assessing entrepreneurship ecosystem development and continuous improvement at the university level. It is based on experiences developing university-based ecosystems at Northeastern University and research funded by the Korean Institute for Startup Enterprise Development (KISED). It is our belief that certain programs and policies can increase the incidence and success rate of entrepreneurial activity, and that university leaders have the capacity to improve entrepreneurship outcomes by taking a comprehensive view of the ecosystem in which this activity can thrive on campus.

We present an instrument that recognizes the range of stakeholders involved in administering and supporting a university's entrepreneurial activities, and that involves them in assessing the current state of the entrepreneurship ecosystem on campus. The data are then coded and analyzed, and the results are discussed with the university's key decision makers to develop an action plan targeting

areas that need strengthening. This instrument was developed more specifically for universities that have science and engineering programs and where much of the venture activity involves technology commercialization. After identifying stakeholders and discussing dimensions of the assessment framework, we demonstrate its application with a case study of a university in the Republic of Korea.

University Entrepreneurship Ecosystem Stakeholders

A university requires a community of interdependent stakeholders who coordinate activities and ensure that the decisions and policies of the university's leadership are carried out and translated into productive outcomes. The primary stakeholders in a university-based entrepreneurship ecosystem are described as follows:

- **Students** can be enrolled at the undergraduate or graduate level, and their participation in entrepreneurship may range from taking a class on the subject to engaging in the array of entrepreneurship offerings on campus, including starting a business. Students may also come from different areas of study (business, engineering, science, etc.). As such, entrepreneurship is viewed as an interdisciplinary field of study and work, reaching beyond the exclusive domain of business schools (Henderson & Robertson, 2000; Hayter et al., 2017).
- **Faculty** include those who teach entrepreneurship courses, as well as engage in non-classroom experiential activities (such as advising student entrepreneurs or overseeing entrepreneurship clubs). Faculty may be research productive or tenure track professors, preferably with entrepreneurship experience, or they may be practitioners who serve as adjuncts or full-time professors of practice, and who currently or previously have worked as entrepreneurs, investors, consultants or in other related occupations. In highly active entrepreneurship-focused universities, entrepreneurship education extends beyond the business school faculty, to include those from disciplines such as engineering, life sciences, and computer science and who teach such courses as new product design and prototyping (Kuratko, 2005).
- **Alumni** can leverage their experience to serve in a multitude of roles: as mentors, venture investors, donors funding entrepreneurship events or programs, and even as entrepreneurs returning to campus for support in starting their ventures.
- **Entrepreneurs** are those individuals who start ventures in universities or receive substantial support from the university during the startup process. Note that the entrepreneurs can come from any one of the three stakeholders noted above. For example, some faculty may take leaves of absence to start a business (Di Gregorio & Shane, 2003).
- **University administrators** are the senior leaders in an educational institution who make strategic decisions and allocate resources to entrepreneurship-specific activities such as the launch of an entrepreneurship center or new faculty lines dedicated to entrepreneurship teaching and research.
- **University staff** include center directors or program managers for entrepreneurship-specific activities like on-campus venture incubators, and those involved in fund-raising, administering internship programs, and licensing university intellectual property.

There are also a number of external stakeholders that play a critical role in the entrepreneurship ecosystem as follows:

- **Investors** provide funding to early-stage ventures, generally in the form of angel or venture capital. In most countries, startups are funded by individuals or institutions, while in others, such as the Republic of Korea, venture activity receives significant amounts of government

funding (Drover et al., 2017; Meyer, 2015). Crowdfunding is also an increasingly important source of finance for university-based startups (Kuppuswamy & Bayus, 2018).

- **Mentors** have prior business experience and a desire to “give back” to young entrepreneurs. They not only provide business advice but can also connect entrepreneurs with investors, resellers and other key contacts (Krueger et al., 2000; Perren, 2003; St-Jean & Audet, 2012). Mentors may come from the alumni ranks or from the community around the university, particularly in entrepreneurship-rich regions like Boston, Tel Aviv, Berlin or Silicon Valley.
- **Corporations and managers** can provide practical learning-by-doing experiences, which empirical evidence has shown to be beneficial to entrepreneurial outcomes for university students (Fayolle et al., 2006; Solomon, 2007; Dhliwayo, 2008). Increasingly, universities with dedicated entrepreneurship programs are establishing work internships in venture companies.
- **Service providers** offer pro-bono (free) services to nascent ventures. These include lawyers, accountants, and public relations, marketing, and/or branding firms. Technology companies are also participating in university venture incubation: for example, Amazon is providing free Amazon Web Service credits for ventures at a number of U.S. campuses.
- **Government officials** vary widely in terms of their strategies and budgets for supporting entrepreneurship. Federal, state, and local agencies may each have their own set of policies and resource-providing programs. While research on the efficacy of government grant programs for venture and job creation is mixed, they remain quite popular (Minniti, 2008).

Governments also try to help entrepreneurs and growing firms through tax policy. These include investment credits for small businesses and other types of preferential tax treatment, policies which in some countries have been shown to have widespread impact, but producing limited actual outcomes (Bruce & Mohsin, 2006). Some governments have created special programs for foreign nationals to start companies in a particular country or region, all in an effort to attract new talent and investment capital (Saxenian, 2002; Stangler & Konczal, 2013).

Ecosystem Assessment Dimensions

A university entrepreneurship ecosystem recognizes the importance of a dynamic relationship between classroom education that includes learning through practice and experiential components that students engage in outside the curriculum. In a holistic education paradigm, classroom and non-classroom learning are highly synergistic. Figure 1 illustrates the University Entrepreneurship Ecosystem framework. This framework includes five major dimensions. Four are considered endogenous, arising and functioning from within the university, while the fifth, external ecosystem support, operates from outside the university.

Classroom Education

There is a substantial amount of research on the design of entrepreneurship curricula for undergraduates, and some specific focus on technological entrepreneurship courses for graduate students (Kuratko, 2005; Solomon, 2007; Nichols & Armstrong, 2003). Based on the literature and our own experience building entrepreneurship programs, the four major components for assessing the classroom education dimension of the university ecosystem model include the following:

- **Undergraduate entrepreneurship curricula.** Assessment includes the existence and duration of majors and minors, the number and types of courses offered, majors and minors at the undergraduate and graduate level, and the number and percentage of students enrolled in courses, as well as pursuing majors and minors. It is also important to examine the extent the curriculum introduces emergent topics such as design thinking, corporate innovation, social entrepreneurship and new forms of finance.

- **Graduate entrepreneurship curricula.** This is similar to the undergraduate assessment above, with MBA tracks/electives and dedicated masters' programs.
- **Post-launch skills training.** This includes the extent non-credit supplementary business management skills are provided for those starting and running early-stage businesses, generally through the university's entrepreneurship center. This may include seminars on topics such as bookkeeping, legal considerations, and public relations.
- **Faculty capabilities.** Assessment elements include the number of full-time faculty dedicated to entrepreneurship teaching and research, the type of faculty (tenure-track versus professors of practice), the number of part-time faculty, and whether these faculty are housed in a distinct entrepreneurship unit.
- **Entrepreneurship Center Structure and Resources.** Assessment elements include the existence of a dedicated organization structure and governance for entrepreneurship, whether the center director position is permanent versus rotating, the scope of activity controlled by the center, and its annual budget.

Student Engagement

Student engagement in entrepreneurship-related activities is a necessary antecedent to actual venture incubation. The use of the word engagement is specific – not to the classroom, and not necessarily as part of a student venture. It lies in between the classroom and the actual venture activity. For most students, such engagement comes in the form of student clubs. These clubs enhance the entrepreneurial atmosphere across the university, bring alumni and the business community on campus, and serve as a seeding ground for new ventures (Pittaway et al., 2011).

Student entrepreneurship clubs may organize guest speakers' series, hackathons, and conferences. Examples of activities include Georgetown's entrepreneurship club, which runs the university's on-campus coffee shops, with student managers and employees. Socially focused entrepreneurship clubs organize social innovation and micro-finance trips to in-need venues around the world. Clubs may also engage students in hardware and software prototyping, web design and branding, and healthcare innovations. Assessment criteria include the existence, membership, and activities of entrepreneurship clubs, their location across the university, and whether their activities are interdisciplinary.

Work Internships

A number of schools in the United States feature cooperative education programs as important elements of their curricula (Linn et al., 2004). Co-ops provide direct industry experience in the form of such aspects as understanding customers, sales channels, new product development, and working effectively in teams. Assessment of this dimension includes the existence of a work internship program, the number of student placements, the structure (duration, paid or non-paid), and the level of support provided. Additionally, work in a startup or growing venture has been recognized as an important part of entrepreneurship education at the collegiate level (Mandel & Noyes, 2016; Scott et al., 2016). The most intensive experiences are therefore extended duration co-ops (six-month or more) specifically within startups or pre-IPO, independent companies with fewer than 500 employees.

Venture Incubation

Over the past decade or so, universities have moved from offering only annual business plan competitions to hosting incubators and accelerators directly within university facilities. These may be associated with prototyping facilities: for example, for 3D printing or wet-lab space. While some research has pointed out the lack of effectiveness of incubators in terms of producing actual ventures which launch and sustain themselves through venture finance and continuing profitable operations (Stal et al., 2016; Hewitt-Dundas & Burns, 2016; Hong & Lu, 2016), it must be

remembered that a key purpose is student education through hands-on experience. In addition, it is important to assess effectiveness in critical areas such as the following:

- **On-campus incubators.** Assessment includes the specific processes within the incubator (ad hoc versus a structured learning process), the resources and facilities offered by the incubator, its professional staff, student participation in the management of the incubator, the type and extent of advising and coaching, the availability and amount of seed funding, and the number of ventures working through the incubator and milestones achieved.
- **Mentorship:** Assessment of this sub-dimension include the existence of a formal mentor program, a systematic process for assigning mentors and tracking effectiveness, the number of active mentors, the types of services or areas of advice provided by mentors, and a dedicated budget allocated for the mentoring program.
- **Technology licensing offices (TLOs):** This assessment includes: university intellectual property licensing agreements, deal structure, negotiation processes (customized or standard), activity level, and measures of success (ventures launched with licensed IP, licensing revenue).
- **Alumni engagement and fund-raising for entrepreneurship.** Assessment includes the number of alumni engaged in ecosystem activities, types of activities, and the processes and funds raised from alumni to support entrepreneurship on campus.
- **Venture tracking.** This assessment includes the existence of a venture tracking system and the types of data tracked: for example, new products launched, changes in key team members, funds raised, and other key milestones.

Exogenous Ecosystem Factors

Universities sit within communities that have their own elements influencing entrepreneurship. While a university has less control over these *exogenous* entrepreneurship ecosystem factors, they are nonetheless important to assess, because they can influence a university's entrepreneurship efforts, and the university can reach into the community for partnerships and other forms of cooperation.

- **Investor network:** Assessment elements for this component include the presence of a local/regional investor network, the activity level of that network, and access of first-time university entrepreneurs to that network.
- **External accelerators:** Assessment includes the number of near-campus accelerators, funding levels and services, and the extent and nature of the university's participation in it, as well as outcomes.
- **Government policies and programs:** Assessment of government support for entrepreneurship must include the type of support, the amount and duration of that support, and if available, measures of outcomes and efficacy.

Case Study in the Republic of Korea

The ecosystem dimensions above were incorporated into an assessment tool in the form of a survey. The instrument was first developed and deployed with academic partners in five engineering colleges located in the state of Andhra Pradesh in India. It was intended to help with understanding the current status of these institutions before making curriculum, incubator, and mentor network recommendations. This resulted in the assessment instrument, which was then tested in other universities in the United States. In this section, we present a case study of the instrument's application to a university in the Republic of Korea.

The focal university is a large, public institution whose entrepreneurship program is supported by the Korean government in the form of grants to foster startups by students and faculty. It has a university-wide entrepreneurship center with dedicated staff, accelerator services and grant funding for local startups not directly affiliated with the university. The incubator is well-known in Korea for its mentor network, where the university manages the meeting space, scheduling, and mentor remuneration.

Data gathering required pre-work by entrepreneurship staff at the university, a full day visit by the research team to the participating university, follow up conversations on specific items, and several days of work by the researchers, who scored questions, and calculated averages for each dimension and sub-dimension. The vast majority of items were scored based on actual activity levels, resources, and venture outcomes. The process culminated in a presentation to the university's leadership on results and recommendations.

Table 1 shows the assessment dimensions and ratings. Curriculum and faculty received lower scores than the other dimensions. A required entrepreneurship course for business majors used mostly lecture and case study methods, as opposed to more hands-on pedagogy. While elective courses exist, there is no structured entrepreneurship major or interdisciplinary entrepreneurship minor for nonbusiness students. Other survey dimensions revealed only a single full time, dedicated entrepreneurship faculty member, and an entrepreneur-in-residence program that was in flux and seeking to transition to a single full-time professor of practice hire.

The on-campus incubator is very active with nearly 80 ventures. However, explored further, it became clear that the vast majority of these ventures were neither undergraduate or graduate student-based, but rather, older entrepreneurs recruited from the local region. Only a few student ventures from the university's annual startup business plan challenge progressed into the incubator. Of all the ventures in the incubator, only a handful raised what might be considered significant investment capital. The results also showed the absence of a structured approach for entrepreneurs in guiding them through processes such as learning about customer needs, designing solutions, and creating effective business models.

Based on these results, an ecosystem improvement strategy was developed. The focus of these recommendations was to increase student engagement in entrepreneurship, develop an entrepreneurship minor for nonbusiness students, and design a structured learning process for young entrepreneurs to build their ventures within the incubator. Recommendations included pedagogies more appropriate for teaching entrepreneurship and specific practical courses in such areas as design thinking, business model design, sales, and digital marketing. For the incubator, specific internal processes were recommended to guide the entrepreneurs and mentors in progressing through the steps involved in building a business.

Concluding Remarks

Entrepreneurs are highly reliant on the stakeholders they interact with and the environment in which they start businesses. While this environment may take the form of a region or local community, a university can be viewed as having its own particular context with specific dimensions that can stimulate and support entrepreneurship. Additionally, a university's purpose is to not only foster new ventures but to provide optimal learning opportunities for students and an outlet for faculty developing commercializable technologies. The purpose of this paper, and the development of the assessment instrument, is to provide a basis for conversations with university leadership and major stakeholders on ecosystem design and continuous improvement in a university environment.

The instrument treats all dimensions as equal: for example, on-campus incubation programs are weighted equally with classroom entrepreneurship education, and mentor programs are regarded as

important as work internships. Further development of this assessment might consider weights for the various dimensions. The stakeholders interviewed might place importance values on the dimensions which would be translated into weights. These weights may factor into the setting of priorities for ecosystem improvement, along with considerations about the feasibility of the actions identified and resource availability.

Although we did not examine external ecosystem factors in great detail, given the limited control a university can have over these, we recognize their value to the university's entrepreneurship efforts. Businesses, government, and other organizations and people in the region can participate as mentors, investors, advisors, value chain partners and other stakeholders. They, in turn, receive benefits such as access to potential employees, customers or suppliers for their businesses, jobs and revenues for the economy, a lens on new technologies and cutting edge knowledge, and investment prospects. A university should, therefore, reach out into its community as it builds its entrepreneurship ecosystem, establishing relationships and collaborations that can provide mutual benefits.

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Figure 1: Ecosystem Assessment Dimensions

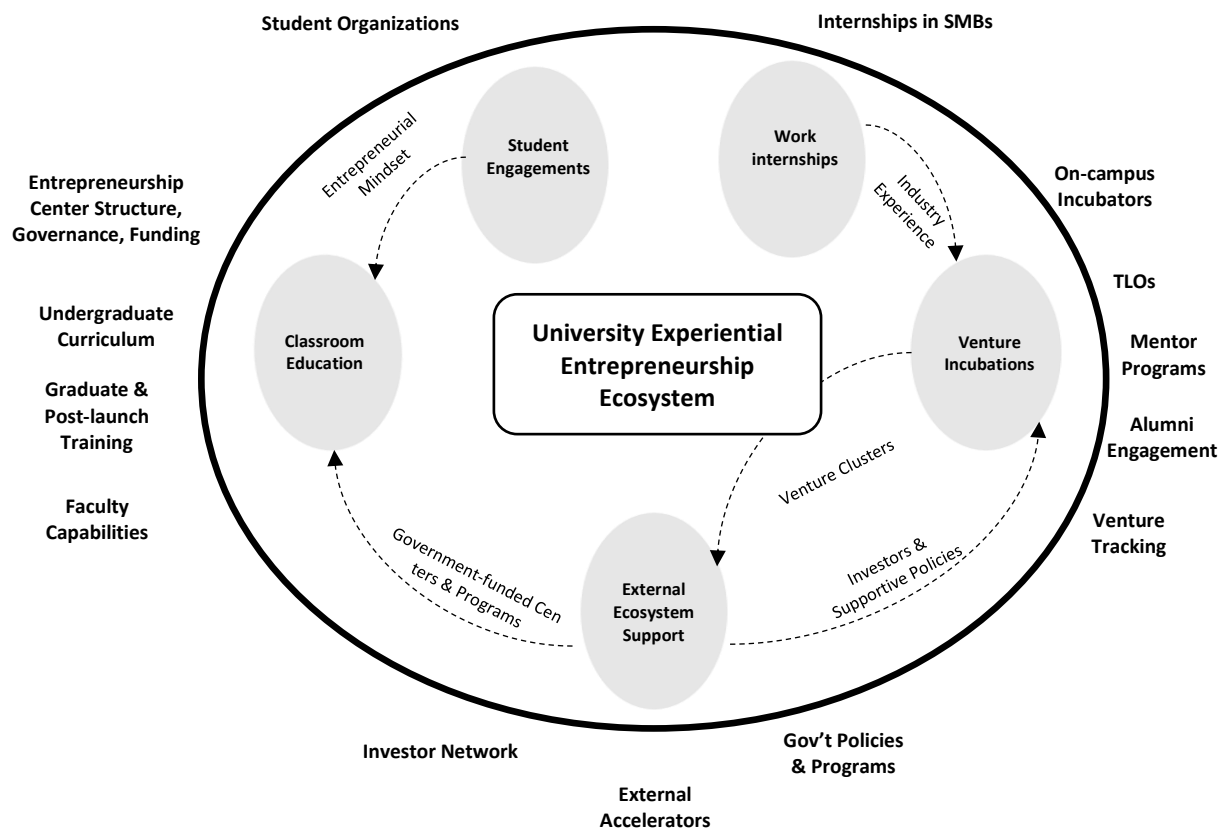


Table 1: Entrepreneurship Ecosystem Assessment for a Republic of Korea University

Ecosystem Dimension	Assessment (5=highest)
Entrepreneurship Center organization, and governance	3.5
Student Engagement in Entrepreneurship Outside of Classroom	2.5
Undergraduate entrepreneurship curriculum (as designed for the SMBA grant)	2
Graduate entrepreneurship curriculum	1
Faculty capabilities for classroom education	1.5
Work-internship design and intensity for experiential learning	3.5
On-campus student startup incubator organization and activity	4
Post Incubator Skills Training	5
Commercializing Technologies from Research Labs	2.5
Mentor programs	4.5
Alumni Engagement for Mentoring and Fund-raising	3
Venture development activity tracking and reporting systems	3
Endogenous Factors	3.0
Investor Network	2.5
Near-campus business scale-up incubator organization and activity	4
Government policies and programs	4
Exogenous Factors	3.5