

Entrepreneurship Learning Ecosystem for Smart Cities through MOOCs

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Abstract

Started in 2008, the new Massive Open Online Courses (MOOCs) paradigm has brought challenges and innovation at all levels of education, aiming to respond to the most pressing learning needs, generated by the new development policies and the rapid evolution of technology. This paper reports on a project proposed by a group of universities and organizations specialized in training, research and consultancy with a view to develop and implement a learning ecosystem in entrepreneurship. The project is built on a package of MOOCs targeting the learning needs of young entrepreneurs in the context of „Smart cities and specializations” policies. The article presents the project concepts and the development and implementation steps, from MOOCs design, pilot phase, consultancy activities, impact study to proposals for national policies and accreditation. This work could be a starting point for developing new programmes and customized training courses on specific learning needs to support the „Smart cities” interventions.

Keywords: Smart Cities, Smart Specializations, Entrepreneurship, MOOCs, Learning Ecosystem.

1. Introduction

According to the United Nations studies, in 2008, for the first time in history, more than half of the world’s population lived in urban areas. Moreover, virtually all of the future growth of the world’s population, from 54% in 2015 to 60% in 2030, will take place in cities (UN, 2016). At the same time, although the overall population of Europe is projected to decline and in spite of hosting the largest number of international migrants in 2015, 76 million (UN, 2016), the European urbanization will increase from 73.6% in 2015 to 75.8% in 2025 (GeoHive, 2016).

Therefore, urban areas worldwide require new and innovative ways to deal with the complexity of living and overcrowding, energy consumption, resource management and environmental protection (Manville et al., 2014). They must also focus to succeed in becoming more intelligent, better connected and more open (Siso, 2015), thus becoming “Smart Cities”, requiring smart managers, entrepreneurs and citizens to achieve all these aims.

2. Definitions of Smart Cities. Relation with S3 - Smart Specializations Strategies. Connection with Entrepreneurship and Education

In Europe, where urban areas generate approximately 85% of the EU Gross domestic product (GDP), Smart Cities represent a priority for the European Commission. A recent EU study established as working definition of a Smart City: “a city seeking to address public issues via ICT-based solutions on the basis of a multi-stakeholder, municipally based partnership” and mapped the cities fitting this definition across the Member States (Manville et al., 2014).

The concept of “Smart City” is dynamic and often context-dependent, being an organic connection between technological, human, and institutional components. A comprehensive list of definitions can be found in (Nam and Pardo, 2011; Manville et al., 2014). Buchem and Pérez-Sanagustín (2013) consider that Smart Cities are “complex ecosystems supported by technological infrastructures transforming citizen engagement, learning and participation”, and also that “smart cities cannot be smart without smart citizens”.

Various instruments for assessing the “smartness” of cities and their contribution to competitiveness and well-being of the people have been created. An important and well-known project, called European Smart Cities (<http://www.smart-cities.eu>), coordinated by the Centre of Regional Science, Vienna University of Technology, which started in 2007 and is still in implementation, published the 4th version of the Smart City Model in 2015. A Smart City is well performing in “six key fields of urban development, built on the smart combination of endowments and activities of self-decisive, independent and aware citizens” (Giffinger et al., 2007). Table 1 quotes the six interconnected characteristics of a Smart City Model 4.0: smart economy, smart environment, smart governance, smart living, smart mobility and smart people, which are broken down in 31 factors and 74 corresponding indicators (ESC, 2015).

Table 1. Smart City Characteristics and Factors / Indicators (ESC, 2015)

Characteristic	Factors / Indicators			
Smart Economy	Innovative spirit	Entrepreneurship	Economic image & trademarks	Productivity
	Flexibility of labor market	International embedment	Ability to transform	
<i>Smart Environment</i>	Attractiveness of natural conditions	Pollution	Environmental protection	Sustainable resource management
<i>Smart Governance</i>	Participation in decision-making	Public and social services	Transparent governance	Political strategies & perspectives
<i>Smart Living</i>	Cultural facilities	Health conditions	Individual safety	Housing quality
	Education facilities	Touristic amenity	Social cohesion	
<i>Smart Mobility</i>	Local accessibility	(Inter-)national accessibility	Availability of ICT-infrastructure	Sustainable, innovative and safe transport systems
Smart People	Level of qualification	Affinity to lifelong learning	Social and ethnic plurality	Flexibility
	Creativity	Cosmopolitanism/ Open-mindedness	Participation in public life	

Citizens' capabilities are among the factors measuring smart economy and smart people, such as entrepreneurship, innovative spirit, qualification, affinity to lifelong learning, flexibility or creativity. The model uses indicators relevant to learning, innovation and entrepreneurship, such as: employment rate in knowledge intensive sectors, patent applications per inhabitant, self-employment rate, new businesses registration, and participation in lifelong learning.

One can note that the Smart Economy and Smart People characteristics demand an innovative education system to produce smart, adaptable and continuing learning entrepreneurs and citizens, while Entrepreneurship and Education represent real pillars of future city smartness.

In 2010, after establishing „Smart Cities” as a EU priority, the „smart” label was also applied to regional policies, in the context of the economic crisis in Europe and the need to stimulate the best from each typology of region. Thus, a new term has been coined, Smart Specialization Strategies (S3) (European Commission, 2010). S3 is a novel approach to regional economic and social development promoted by the EU, stating that "the discovery of well-defined domains for specialization in a region or country, e.g. of research and innovation (R&I) areas in which it could excel and have comparative advantages, may trigger economic advancement in that region or country” (Fotakis et al., 2014).

Spotting the lack of studies explaining the similarities and differences between the Smart City and the S3 paradigms, in spite of their popularity in the EU policies, Caraglio and Del Bo (2013) came with a single unitary framework for both concepts. As concluded by the authors, empirical results suggest that EU regions appear to be on a smart specialization path and that Smart Cities are more likely to emerge in smartly specialized regions.

In the policy context of Europe 2020, higher education institutions (HEIs) and research organizations (ROs) play key roles in Innovation, Education, and the Digital Agenda, which are all initiatives for smart growth, i.e. Smart Cities and Smart Specialization Strategies. At large, this means that these institutions are responsible for key activities such as human capital and skills development, knowledge transfer, innovation and enterprise formation and wider community development (Fotakis et al., 2014).

3. Smart City and S3 Initiatives in Romania

In Romania, there are various programmes that offer public funds for the development of “Smart cities”. The Regional Operational Programmes 2007-2013 funded interventions for urban development, including smart cities infrastructure, provided that the concept is transposed into the city strategic planning (<http://www.inforegio.ro>). Other operational programmes, such as the Human Resources Development Sectorial Operational Programme for education and training, the Increase of Economic Competitiveness Sectorial Operational Programme for research development and innovation, the Administrative Capacity Development Operational Programme for governance could have funded other “smartness” dimensions and factors. 2014-2020 European funds continue to support the development of smart cities through the successors of the above-mentioned programmes. Additional funding is available from the European Commission through other programmes, such as Horizon 2020 and COSME. The challenge for the cities, their governments and the relevant stakeholders remains their ability to design integrated measures addressing all elements of the cities’ “smartness” and implement them in a coherent and synergic manner.

The literature reveals the first attempts to support strategic approaches for the development of Smart cities in Romania in 2013, when a national strategy for Smart cities was discussed and initiated. It was pointed out that “there are no smart cities without smart people”, and also that “the process of governing smart cities is based on a continuous dialogue between institutions, enterprises, research/universities and different other stakeholders, which need a space to interact – a smart cities platform” (Elisei and Dimitriu, 2013; <http://urbasofia.eu/ro>). An Association of smart

cities was launched with the support of some key stakeholders, such as the National Institute for Research and Development in Constructions, Urban and Sustainable Territorial Development.

A few isolated Romanian initiatives were presented during the debates, starting with the city of Timisoara, which focuses on a smart transport approach, followed by Sibiu, which aims to implement the smart grid concept, and also by Craiova. These three Romanian towns were also assessed in a ranking of European medium-sized cities published in 2007: all three cities scored best on "smart environment", but had lower scores on smart economy and smart people dimensions (Giffinger, R. et al., 2007).

In the autumn of 2013, a very active Smart City Association was launched in Timisoara, meant to develop the software infrastructure of the city, based on open data. Thus, with the support of the City Hall, it became the first Romanian town "to publish datasets on the national open data portal and the first to issue a regulation framework for official open data activities" (<http://www.mysmartcity.ro>).

The smart specialization concept was transposed in Romania in a national strategic document, "The National Strategy for Research, Development and Innovation 2014-2020" that the Romanian Government adopted in 2014 (<http://www.cdi2020.ro>). The strategy was a specific requirement for the programming of competitiveness-related EU funds for 2014-2020, with complementarities in all operational programmes, such as: regional development, competitiveness, rural development and human capital.

At a regional level, significant experience has been acquired over the last ten years when the Regional Development Agencies played the role of engines for RDI strategic development. The most prominent region appears to be the West Region which is the only Romanian region to have priorities on the S3 platform (<http://s3platform.jrc.ec.europa.eu/map>), although other regions are registered too. Using the experience of two strategic cycles, RIS 1 (2005-2008) and RIS 2 (2009-2013), the West Region prepared the RIS 3 whose general objective included the high level of innovation, the attraction and capitalization of skills and ideas.

4. Entrepreneurship in Romania. The need for innovation

Currently there is no consensus in Europe on what makes an entrepreneur, thus some current projects and studies aim at developing a European reference framework that defines the key Competence for lifelong learning „Sense of Initiative and Entrepreneurship (EntreComp)" and the Indicators on Entrepreneurial Learning and Competence (JRC, 2015; Henry and Chatzichristou, 2014).

The Entrepreneurship 2020 Action Plan, launched by the European Commission (EC) in 2013, after identifying some of the barriers for entrepreneurs, such as the image of entrepreneurship, heavy bureaucracy and various financial constraints, has proposed three solutions:

- Entrepreneurial education and training in supporting growth and business creation,
- Strengthening framework conditions for entrepreneurs by removing the structural barriers and supporting them in the crucial phases of the business lifecycle,
- Activating the culture of entrepreneurship in Europe by nurturing the new generation of entrepreneurs.

In order to facilitate networking and support new business ideas a European Mentors Network for training, advice and coaching is going to be created, but such a network has not been implemented yet.

The action plan also mentions the need to stimulate the development of Massive Open Online Courses meant for fostering web entrepreneurship and also to set up platforms for mentoring and skill building.

In Romania, the Human Capital Operational Programme 2014-2020 is supporting entrepreneurship interventions with European and Structural Investment Funds, in order to address a key weakness of the country's competitiveness, the reduced entrepreneurial culture, which generates a low density of SMEs, much below the European average.

A recent study (Curaj et al., 2015) confirms this weakness and highlights the factors that affect entrepreneurship, such as low quality of management and entrepreneurial education and a small number of opportunity-driven entrepreneurs. Among the study recommendations we mention the targeted support for the development of high quality education in management and entrepreneurship programmes.

The Danubius Academic Consortium (Teodorescu, 2016) proposes an innovative and challenging approach for the soft measures necessary to support smart growth, such as the education, learning and development programs. It integrates three concepts: invention, innovation and entrepreneurship. According to Teodorescu, each of these elements alone cannot produce the economic and social benefits expected from the public policies, invention alone remains a "splendid game of mind", the innovation without invention ends up by cloning and saturating of the market, while "entrepreneurship without innovation input is just a waste of energy and impetus, often a broken hope".

5. Open Education and MOOCs. European and Romanian Initiatives

Throughout the years, a variety of EU institutions, organizations or foundations were engaged in launching initiatives for programmes and projects related to Open Education, seen as „a mode of realizing education enabled by digital technologies aiming to widen access and participation to everyone, offering multiple ways of teaching and learning, building and sharing knowledge, as well as a variety of access routes to bridge formal and non-formal education” (OpenEdu, 2015). Some of the recent and current initiatives which act as driving forces for transforming education and learning at all levels are: Open Education Europe (Opening Up Education Through New Technologies), SCALE CCR (Up-Scaling Creative Classrooms in Europe), OEREU (Open Education Resources and Practices in Europe), OpenupEd (a pan-European MOOC initiative), OERup! (Erasmus+ project focusing on OERs for Adult Education, one partner is IREA - Romanian Institute for Adult Education), POERUP (Policies for OER Uptake, continuing on the related projects SharedOER and ADOERUP - Adult Education and OER), HOME (Higher education Online: MOOCs the European way), EMMA (European Multiple MOOC Aggregator) and D-Transform (Transforming universities for the digital age).

Some strategic studies are OpenEdu (proposing a framework for opening up practices in HEIs), OpenCred (ways in which the main open education collaborative networks, consortia and platforms in Europe offer recognition for open learning) and MOOCKnowledge (a knowledge base with a European view on MOOCs).

Started in 2008, the new Massive Open Online Courses (MOOCs) paradigm, a core key of Open Education, has brought challenges and innovation at all levels of education, aiming to respond to the most pressing learning needs, generated by the new development policies and the rapid evolution of technology.

In Romania there are many initiatives related to MOOCs (Holotescu, 2012):

- implementation of platforms and MOOCs (<http://unicampus.ro>, <http://novamooc.uvt.ro>, <http://mooc.ro>, <http://unibuc-virtual.net>, <http://eliada.ubbcluj.ro/proiect>, <http://udemy.com/management-ong>, <http://estudent.ro>, <http://startarium.ro>);
- experiments for integrating MOOCs in blended academic courses can be found at the "Politehnica" University of Timisoara and the „Ioan Slavici” University of Timisoara (Holotescu et al., 2014; VasIU and Andone, 2014; Bogdan, 2017);

- workshops and national conferences on open education organized by the Romanian Coalition for OERs.

6. Steps for an Entrepreneurship Learning Ecosystem through MOOCs for Smart Cities

Presently, entrepreneurship is a topic for many courses delivered at all levels of education, from pre-university to university and continuous education. Most of them have the following limits (European Commission/EACEA/Eurydice, 2016; Curaj et al., 2015):

- They are based on a traditional teaching paradigm, the materials are lectured f2f, even if modules are hosted in (closed) LMS, without the possibility to interact with external learners and experts, also without concrete group projects to be validated;
- The courses are not connected with the current EU priorities and with the needs of cities/regional development.

The group of universities and organizations specialized in training, research and consultancy, coordinated by the authors of this paper, already have experience in MOOCs development and integration (Holotescu et al., 2014; Vasiu and Andone, 2014), and in assessing the learning needs of Smart Cities (Grosseck et al., 2014; Andone et al., 2014).

The partners are working on implementing an Entrepreneurship Learning Ecosystem, consisting of a training network that uses MOOCs, also providing (massive) mentoring/coaching and support for finding finance.

The trainees should be prepared to become informed, creative and hyper-connected entrepreneurs, to actively participate, collaborate, and develop the activities, decisions and economies of cities/regions.

The prospective trainees are part of a diversity of sectors, as the project addresses the needs of the following target groups:

- Students in pre-university and university systems, who want to better the knowledge received in specific courses and to participate in collaborative projects connected to the real needs of the city/region;
- Teachers and trainers who want to enlarge their competencies and skills in using Open Educational Practices (OEPs) and in updating the Entrepreneurship courses they teach;
- Individuals running their own business who want to extend/improve their knowledge and to adapt/start new businesses that respond to the needs of the city/region;
- Policy makers for educational and business systems;
- Regional and local governments, decision makers and staff responsible with policies and programmes related to Smart cities development.

We intend to distribute the created MOOCs on different well-known international and European hosting platforms, such as: EdX, EMMA, iMooX, ECO Project. The benefits would be the following:

- The visibility of the project is increased, and the project's content is disseminated;
- Offering teachers and tutors the possibility to have a critical view of a variety of platforms and to know and work directly with their specific features; equally participating in the communities of practice of trainers using those platforms;
- The same critical view will be developed by the participants in MOOCs; they will also be able to know the courses offered by those platforms and to enlarge their knowledge, skills and competencies by participating in other MOOCs too. In fact, for each course the project develops, we intend to inform our students about the possibility to participate in other connected curated MOOCs;

- Most of the platforms have the features for video transcripts and materials translation, thus eliminating the language barrier, and assuring openness to a larger participation.

The project website will direct to the project MOOCs, facilitated in blended manner, with f2f, synchronous and asynchronous communication between teachers and participants, and also live lectures from guest teachers/experts; it will also permit the group work of participants and will curate a large category of resources.

The project's online space will facilitate the continuity of the learning communities of participants, peer mentoring for the teachers, the possibility to interact with external learners, practitioners and experts.

Because at least a part of the courses will have as participants teachers, managers, policy makers and other educational stakeholders, who will create, reflect, validate their own proposals for projects and strategies for smart cities, together with the teaching staff, they will create a real community of practice.

The development of MOOCs uses the structured design and quality criteria (Ebner et al., 2014; Warburton and Mor, 2015).

The delivery of MOOCs must ensure the following issues needed for future recognition by other HEIs and employers (Whittahaus et al., 2016):

- Checking the identity of the participants,
- Suitable supervised assessment and evaluation of students participation,
- Issuing (digital) certificates/online badges to acknowledge learning,
- Quality assurance and management of the courses,
- Awarding credit points for transversal courses,
- Information and collaboration with institutions or bodies which might potentially recognize MOOCs.

The project's steps are presented below:

1. Input for entrepreneurial MOOCs design: the first phase aims to define the specific competencies for smart cities/regions entrepreneurs, starting with a research that comprises: EU priorities and studies, analysis of the training needs and of the existing Entrepreneurship courses and MOOCs, collection of Social Media data, interviews and experience of partners, understanding different expectations of Smart City stakeholders (universities, public administration, NGOs, business companies, professional communities, citizens). A Delphi study will collect the feedback from national and European experts for the proposed framework containing the specific competencies, as well as the objectives and learning outcomes and curricula of the Entrepreneurship MOOCs, using a methodology similar to the studies of Okoli and Pawlowski (2004) and Okoli and Wang (2015).

2. Publish the previous results as open data by using open CC licenses.

3. MOOC to train MOOC facilitators: only some of the teachers and trainers who will develop the project MOOCs already have experience in using OEPs and in developing and facilitating online courses; thus, they will take part in a MOOC specially designed for preparing MOOC facilitators, which will be open for other participants as well. The topics of this MOOC will concern Open Education, CC licenses, OEPs, OERs and MOOCs and scenarios for integrating them in traditional courses. This course is meant to be a task-based MOOC, in the sense that the activities aim to build a strategy for integrating OEPs in their own courses and to develop MOOCs.

4. Implement and pilot Entrepreneurship MOOCs: MOOCs are developed as blended courses, integrating Open Educational Resources and Practices, gamification for Entrepreneurship, study cases. A badge system will be used for different levels of completion; participants who will complete all tasks will receive a participation certificate.

5. Follow up activities: monitor the activities of trainees, run face-to-face and online consultancy activities, consisting in experiments for Massive Open Online Consultancy (MOOCo);

the project platform could be the space for a community of practice of actors involved in Open Education, Entrepreneurship for Smart Cities and S3, representing the basis for Massive Open Online Research (MOOR); offer connections with events, startup incubation and seed funding/crowd-funding programmes (<http://ree.uefiscdi.ro/funding-resources>); find synergies between participants competencies, experience, skills and the needs of the smart cities and smart specialization strategies; facilitate the building of a community of practice between the students and trainers/coaches; at least a percentage of the ideas/projects developed collaboratively during the MOOCs should take part in local and regional hackathons and participate in seed funding programmes.

6. Impact study and empowerment evaluation: define the evaluation metrics for the developed MOOCs, such as the trainees' abilities and knowledge, networking connections, number of created Smart City applications.

7. Pack MOOCs as nano-degrees or specializations included in formal and informal training programmes, also in Master programmes; during the pilot project, MOOCs will run as optional courses for students in the partner universities.

8. Develop a set of proposals for national policies and accreditation system.

The partners are currently involved in the first research phase, necessary to prepare the design and curricula of the MOOCs for Entrepreneurs and also for the third phase, designing the MOOC meant to train the MOOC trainers of the project. In an extended partnership we intend to apply for a grant in order to implement the envisioned project.

7. Conclusions

Started as an initiative of a few universities and training, research and consultancy organizations willing to modernize and update their entrepreneurship education offers, we consider that our project could become one of the strategic programmes of the Western region of Romania, involving other regions with similar strategies. Moreover, this project could respond to the findings of the recent exploratory study related to the Romanian Entrepreneurial Ecosystem (Curaj et al., 2015).

We estimate that our project has the following impact:

- Opening education in the organizations participating in the project, towards using OEPs;
- MOOC for training MOOC facilitators could address teachers, trainers and practitioners from a wide range of institutions, which could thus adopt the Open Educational Practices too;
- It could contribute to the openness movement, spreading the knowledge and benefits of open education and enlarging the communities of practice around OERs, MOOCs, OEPs and open licenses;
- The participants in the project MOOCs could become real smart entrepreneurs of their cities and regions;
- The large category of actors involved in the project contribute to the building of a real learning ecosystem;
- The project could bring a real impact in innovation, in research and in creating smart citizens.

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