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Digital Business Ecosystems for regional development: evidences from EU countries pilots

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Abstract: Digital business ecosystems (DBE) conception started gaining popularity from 2002 and currently is widely deployed by various EU regions aiming to facilitate regional economic growth. DBE brings many benefits for SMEs enhancing competitiveness and position in the market. DBE solution vary so regions a facing problem how to selected appropriate solution and what are the key success factors for such solution implementation. This paper discuss experience from 6 DBE good practices pilot implementation identifying key success factors and providing recommendation for future DBE transfer.

Keywords: Digital Business Ecosystems, ICT, regional development, SMEs

1. INTRODUCTION

Digital Business Ecosystems term became popular around 2002 in particular when European Commission start added term “digital” to Moore’s (1996) proposed “business ecosystem” concept. Moore described business ecosystems as “an economic community supported by a foundation of interacting organizations and individuals – the organisms of the business world” [5]. Adding term digital supports ICT perspective on strengthening technology role of community economic development and interaction with interested parties”. Information and Communication Technologies play a key role in the implementation of the Digital Agenda for Europe . ICT may be applied in various processes, organizations and contexts aiming at increasing efficiency, competitiveness and innovation development capacity. The Digital Ecosystem (DE) concept, be it a Digital Business Ecosystem (DBE) or a Digital Government Ecosystem (DGE), responds to these challenges through a collaborative environment perspective. According to Leon and Kataishi (2010) perspective on DEs – “Digital Ecosystems are context-specific socio-technical systems enabling sustainable socio-economic development at the local/regional scale or within a particular industrial sector, driven by networks of social actors and economic agents, and entirely reliant on distributed architectures for their technical components” [2]. A digital ecosystem can be seen as socio-technical processes that offer ultimately affordable and trustworthy cooperative solutions through investment and engagement by the local stakeholders.

DE-LAN (Digital ecosystems – learning applications network) project was funded by INTERREG IVC program and has been to investigate in detail the way in which the good practices and procedures already established via previous Digital Ecosystem initiatives could be transferred successfully to a wider range of business/industrial sectors and regions [6]. DE-LAN project identified a set of good practice in digital business ecosystems implementation and project’ partners after selecting the most suitable practices from foreign countries piloted them in their regions. In this paper we aim to describe piloting of good-practices in digital business ecosystems development identifying key success factors across EU countries and provide recommendations for further DE implementation.

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2. DIGITAL ECOSYSTEM CONCEPT

Digital Business Ecosystems are dedicated to the productive fabric of a region with the aim of fostering collaboration and networking among SMEs, reducing their dependency on big firms and fostering innovation by the use of ICT. Within this context it is important to stress SMEs possibilities and needs to cooperate as well as compete with one another. However cooperation, according Leon and Dini (2008) within a particular region usually brings greater sustainability of economic growth and greater competitiveness of that region ^[1].

It is widely recognized SMEs is a key factor for driving national and regional economic growth ^[7]. On the other hand SMEs faces variety of problems in their activities and in several cases digital business ecosystems strongly support SMEs development:

- DBE facilitate relations and networks development between SME providing new opportunities for communication and cooperation. DBE act as environment enabling new ways of knowledge creation, knowledge exploitation and knowledge dissemination. All these activities allow creating additional value for SMEs ^[3].
- DBE can facilitate market access through scaling SMEs activities in regional and national markets. Opportunities to reach new markets or new segment create economic growth preconditions for SMEs^[4].
- DBE phenomena is not limited to business sector, it also expand to public sector creating possibilities for cross-sector services provision and facilitating SMEs and governmental institutions cooperation/interactions.
- Nachira (2002) strongly believe DBE enhance SMEs competitiveness and enable at some point even competition with larger enterprises ^[3].
- DBE enables SMEs communities' creation and open knowledge and open innovation development ^[8].

DBE in particular gained attention from policy makers considering DBE as important instrument in regional economic policy development. However DBE implementation in regional context is a specific process requiring particular actors' involvement and particular actions ^[4]:

- Regional catalyst, which supports and promotes DBE idea in the region.
- Cluster or group of SMEs, which are willing to adopt DBE approach.
- Identifications of drivers and influencers, which can support DBE implementation.
- Appropriate communication and engagement actions working with SMEs.

Regional Catalyst typically closely cooperates with development agencies, local associations and universities in order to maximize DBE conception promotion and implementation. However SMEs involvement in DBE development is typically defined by 2 factors – SMEs willingness and abilities to adopt technologies; and SMEs intentions and wiliness to get engaged (cooperate).

3. DIGITAL ECOSYSTEMS PILOTS PREPARATION

DE-LAN project partners analyzed various projects and initiatives in 8 European regions across 6 countries and identified 18 good practice cases, which are presented in DE-LAN's Good Practice Study Reports. These cases can be grouped into 3 broad categories: (i) cases related to DBE development and implementation; (ii) cases related to DNB development and implementation; (iii) Living Labs.

Table 1. Good practices identified in DE-LAN project

Types	Description	Good practice
Digital business ecosystems implementation	Online environment inspired by biological systems and actively populated by agents that enable communities to collaborate. Any distributed adaptive open socio-technical system with properties of self-organisation scalability and sustainability inspired by natural ecosystems (DE-LAN, 2011)	<ul style="list-style-type: none"> • DBE Pilot Action in Lazio region (Italy); • Extremadura region (Spain) good practice case in the Knowledge Cluster of Extremadura; • Vysocina Tourism Portal (Czech); • Vysocina region e-Crime DE (Czech);
Digital networked business implementation	Digitally Networked Businesses are an advanced form of business to business networking aimed at encouraging collaborative working, improving the sharing of knowledge, and increasing productivity & efficiency of trade and commerce between networks and clusters of businesses.	<ul style="list-style-type: none"> • Wales Tourism Sector DNB (UK); • Wales Creative Industry DNB (UK); • DNB Demonstrator tool (UK); • Wales Environmental Sector DNB (UK); • The Virtual Market place initiative (Spain); • MESAP E-COLLAB Collaborative Platform for Enterprise Cluster (Italy); • eBusiness automation platform (Lithuania);
Living Labs	Living Lab is defined as a forum for research and innovation applied to the development of new products, services and processes. It employs working methods facilitating the integration of people as users and co-creators throughout the development process and recognizes the needs of users and working conditions of service providers, both in their actual, respective, contexts (LILAN, 2008).	<ul style="list-style-type: none"> • VOS Project - combat the digital divide by bringing pervasive broadband (Italy); • eLivingLab (Slovenia); • Technology Network ICT (Slovenia); • Digital Cities initiative (Spain);

The selected good practises case demonstrated the different aspects as well as different experience in digital ecosystems implementation. After careful assessment through internal and external review process 8 cases were selected to pilot, but eventually only 6 pilots were implemented.

4. DIGITAL BUSINESS ECOSYSTEMS PILOTING IN EU REGIONS RESULTS

Despite a big variety of pilot contents and lessons learned, it is very interesting to follow, which key success factors were mentioned in digital business ecosystems pilots, and which issues were critical for implementation. Experiences of such kind may be very useful for any future transfer of knowledge, models, approaches or technologies. The table summarizing digital business ecosystems pilots and key success implementation factors is presented below.

Table 2. Digital business ecosystems pilots' key success factors

Country	Pilot	Key success factors
UK	<p>European Regional e-Crime Partnership DE. The pilot used existing good practices from Wales and Extremadura's DEN4DEK project, including the DNB demonstrator platform and the Sirona tool, a peer to peer collaboration tool for exchanging, creating and editing documents for the team work. The application of the DE principles has been a step towards reaching a positive impact in partners regions, and this would result in enhanced e-Security. Information exchanged in the DE included (1) copies of regions' e-Crime prevention literature, (2) Discussions on what regions do to prevent e-Crime in their regions, (3) discussion on current electronic threats in their regions, (4) discussion on activities for safer internet day 2012, (5) discussion on safer social networking, and (6) documents and discussion on security standards for IT specialists.</p>	<ul style="list-style-type: none"> • The demand coming from the partnership. • The use of already existing good practice in the form of tested technology and methodology. • Existence of skilled developers within Wales. • Strong leadership and management from the coordinator to ensure activity of all members.
Italy	<p>Digital Ecosystem flavours, tourism and innovation. The pilot action was demand driven and has transferred best practice SVEA from Piedmont. The objective was to support better collaboration of SMEs, especially micro-companies in the area of agriculture/food and tourism sectors in the province of Viterbo (Lazio region). The aim of the pilot was to make a first step towards the creation of a value chain linking high-quality products with sustainable tourism.</p>	<ul style="list-style-type: none"> • Demand driven pilot • Collaboration with key local stakeholders. • Close collaboration with pilot initiator • Good complementarity among pilot partners.
Italy	<p>Advisory board for research lines and priorities. The Piedmont Regional Government identified Technological Transfer (TT) as a key factor for regional development, so main aims of the pilot were related to the regional priorities: to contribute to the innovation of the ICT sector and market development, both focused on SMEs, with expected benefit for the local economy and local policy formulation.</p>	<ul style="list-style-type: none"> • Bottom-up and multi-stakeholder approach to the research agenda definition. The CIR model includes, within a formal board, the main local market and research players, asking to express their needs and to influence the definition of the research priorities. • Collaborative environment, which is flexible, scalable and user friendly. Collaborative open source based platform SVEA, customized with add-on modules and web 2.0 applications, has provided new opportunities to the members of a collaborative group to share, to learn and to work.

Spain	<p>Documentation and methodology transfer from Regions of Lazio and Wales to Extremadura. The main purpose of this pilot was the implementation of an Open Innovation methodology to build public digital agendas in the Region of Extremadura in order to improve efficiency, to help Government to reach its knowledge policies and to continue the work done in other DE projects. The objective of the pilot was to develop an exploitation model to be sustained by institutions participating in Metainnova through cooperation and Knowledge share. The pilot introduced new approaches into regional work: open access and co-responsibility during the whole process of creating new strategies or policies. The localisation of Open Innovation Methodology is the main result of the implementation of this good practice, supported by practical sharing of knowledge during the staff exchange.</p>	<ul style="list-style-type: none"> • Advantages of the Open Innovation Methodology (Free/Libre and Open Knowledge), based on collaborative science, open access and co-responsibility during the whole process. • Getting political support. • Good public-private collaboration.
Lithuania	<p>eLiving Lab Lithuania - internet based social game for young people. Pilot action in Lithuania aimed to facilitate the development of the internet based social game for young people by deploying Living lab approach: learning-by-doing. Living Lab approach is not widely adopted in Lithuania, while the demand for new concepts of involvement and cooperative development is present. Original experience came from educational organization (Maribor University). Living Lab stakeholders' group from private and public sectors was established, and the concept of social game promoting entrepreneurship between young people was developed and tested. The pilot enabled Living Lab approach testing and enhanced product development, supported the learning-by-doing approach. It has promoted a new approach for Lithuania, applied for social game development.</p>	<ul style="list-style-type: none"> • Well balanced stakeholders group and cooperation (public, private and academic sectors in Kaunas). • Involvement of the target audience - young people – into the concept development and testing (focus group). • Attractiveness of the main idea and relevance of the selected instrument (game) for the target group of young people.
Czech	<p>eCrimeVysocina. The purpose of Vysocina pilot action was to increase awareness of electronic criminality, to increase knowledge about electronic safety by exchange of experiences, based on the identified need for more secure business environment in a situation of contemporary growth of electronic violence. All eCrime activities in Vysocina Region were developed as bottom up and supported by the eCrime working Group. Vysocina pilot was inspired by the Wales eCrime Project. Vysocina Region created an online communication platform where all focus groups can find a list of possible threats, database of electronic crime cases, etc. The result of Vysocina pilot action is the creation of shared communication technological platform, which has brought for beneficiaries (focus groups) the chance to get advice in some specific topic of electronic security with a very dynamic structure.</p>	<ul style="list-style-type: none"> • The identified demand coming from practical life (Cyber threats). • Strong political support from regional decision-makers. • The spontaneously arising cooperation between different stakeholders was fixed into a Working Group and supported by face-to-face meetings, trainings for teachers and workshops. • The vision of a better long-term sustainability of this initiative after creation of a collaborative platform and tools of DE.

5. DIGITAL BUSINESS ECOSYSTEMS DEVELOPMENT OBSTACLES IN EU

DE-LAN consortium implemented 6 pilots and was able to assess the potential of digital business and digital business ecosystems development in EU countries. Despite differences in the countries and different digital business ecosystems solutions pilots identified key obstacles and issues to be solved dealing with digital business ecosystems implementation:

- Most of stakeholders lack cooperation and collaboration experiences. This leads to passive involvement at the beginning of pilots, but active communication with all stakeholders in group or individually and involvement from initial steps of pilot is critically important. The need for stimulation and additional information provision activities is crucial.
- As pilot process deal with innovation aspects resistance to changes from the side of stakeholders is inevitable. The resistance aspect vary from public sector stakeholders mentality to stick to current processes, tools and methods to SMEs mentality related to fear of competitiveness and avoidance of cooperation.
- Pilot initiator or catalyst often face situation of limited resources (personal and financial) from interested parties so careful resources planning is required.
- Involving unexperienced partners in the pilots relates to time management issues. The lack of experience leads to delays, lack of understanding and difficulties to find common solution, integration and cooperation problems between different involved parties.
- Insufficient management and ICT skills of public administration staff to manage a complex pilot action and to work with new collaborative tools to foster participation.
- Limited time for the pilot to solve all unexpected obstacles, to roll-out new activity, if the action was not linked to some already existing initiative.
- Dealing with end users engagement problems appear especially in cases when engagement depends on new partners. Engagement problems also arise from lack of ICT skills on the side of users, lack of awareness in general public.

6. CONCLUSIONS

Digital business ecosystems recently became an important tool in supporting regional economic growths as well as mean supporting and enhancing SMEs competitiveness. Currently various initiatives is taken aiming to adopt or transfer digital business ecosystems in European regions.

Digital business ecosystem concept deal with various solutions varying from software supporting cooperation or cooperation platforms, to digital business networks solutions or even specific cases such as Living Labs. Regional authorities is facing problems selecting appropriate solution to transfer for fitting regional needs and this solution is mainly determined by local economic climate and region development perspectives and priorities.

The analysis of 6 digital business ecosystems pilots in various EU regions identifies lack of knowledge and cooperation from various sectors representatives in digital business ecosystems solutions piloting. The lack of knowledge and experience also closely relates to mentality problems when interested parties are avoiding cooperation. However intensive communication at group or one to one level is one of the key success factors in pilot implementation.

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