



SMEs INNOVATION IN A NETWORK ENVIRONMENT, CASE STUDY IN ROMANIA

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ABSTRACT

After the 1990s, the private sector in Romania has tried to win in emerging market niches: IT services, e-commerce, retail, energy. With the liberalization of the market after admission to the EU, local entrepreneurs could not cope with external competition, crushing debts or insolvency. The situation is not different today when multinational companies compete strongly with local capital. After a continuous research process, the conclusion is that the only solution for SMEs is collaboration in business centers, virtual companies and other forms of local cooperation. This article presents a type of collaboration between SMEs that use discount coupons to recommend to other customers.

Keywords: SMEs, Network Business Environment, Lempel-Ziv algorithm)



1. INTRODUCTION

ICTs have a great impact on all current activities of SMEs. As a consequence, the innovation capacity of SMEs depends on adapting to the Internet of Things (IoT) paradigm using ICT. Innovation capacity is the driving force of new green products and services, communication and cooperation B2B and B2C. There are many complex and diverse factors that consolidate the premises to achieve innovation by SMEs: as the impact of human resources and ICT on innovation

2. LITERATURE REVIEW

ICT offers technical support for data analysis and configuration decisions, for internal and external communication, for networking and collaboration, saving time and money, overcoming geographical restrictions and offering a platform for international electronic markets.

The majority of current ICT facilities are offered by Cloud Computing, through the Software as a Service paradigm that seems to be dedicated to SMEs, strengthening the process of knowledge creation.

Cloud computing is no longer a recommendation, but a necessity for the business of SMEs in today's economy. SMEs must collect and share information, knowledge, technology and human resources to deal with market requests.

Liebhart (2015) "estimates 30% of improvements caused by efficient, flexible and networked IT." The last challenge for SMEs is to overcome the so-called business and IT alignment, and close the gap between business and IT domains. . With regard to offers in the Cloud, this means that the view of the current application needs a corresponding business process view. Commercial parameters, such as legal aspects, commercial packages, interoperability of processes or prevention of blocking of suppliers are used to distinguish between different market agents. The specific parameters of the Business Domain, such as the relationship with the client for SMEs in the domain of health, or the web appearance of an IT company, are possible future options" (WOITSCH, 2016)

But ICTs are nothing without human resources. One of the most common categories of economic operators in the markets of the modern economy is the Entrepreneur, a flexible and creative person, with a lot of energy and self-confidence,



who likes challenges and takes great risks to develop diverse projects, representing the materialization of their own vision. The entrepreneur is oriented towards results, creates new companies and drives them to success, sometimes converting them into large companies or selling them to national or international agents. Entrepreneurs and small and medium-sized enterprises, SMEs, have a positive influence on macroeconomic indicators, such as GDP growth or the decrease in the unemployment rate.

This statement is reinforced by [Jones, 2016]. She demonstrated that the transfer of human resources has a significant positive effect on the capacity for innovation, and the capacity for innovation, in turn, is positively related to the performance of the company. In addition, the literature reveals that there is a three-dimensional relationship between knowledge management (KM) practices, technological innovation (IT) and competitive advantage (CA) (LEE, 2016). KM has a positive and significant direct relationship with IT and CA; while IT positively and significantly affects CA. The most remarkable thing is that the mediating role of IT that connects KM and CA has proven to be positive and significant.

Empirical studies show that, in developed countries, SMEs contribute to more than 55% of GDP and more than 65.8% of total employment (comparable to those of EU-27: 66.9%), which means that 2/3 of the employees in Romania and the EU - 27 operating in SMEs (OECD, 2015).

Economic development can be stimulated through the establishment of new and innovative companies and the increase of competitiveness and the productivity rate of SMEs, with a view to their integration in the world-class commercial and investment chains (OECD, 2015). SMEs are very flexible in the face of changes in the market and the environment.

3. INNOVATION MODEL FOR SMES IN A NETWORK BUSINESS ECOSYSTEM

SMEs consider that the biggest obstacle they face is the financing of their business, due to the lack of effective communication with the banking and financial system. Another obstacle could be their inability to cope with inflation and the relected bureaucracy in the number and amount of taxes and regulations that will be observed. Political instability, corruption, street / organized crimes should also be considered.



It can be noted that most of these factors are external to organizations and are influenced by state policies. The same happens with anticompetitive practices, with infrastructure and legal problems. Most of these obstacles are far beyond the control of SMEs. SMEs can try to avoid some of them by seeking alternative fundraising or improving IT infrastructure problems through partnerships in a digital network environment that could get support from large companies, government and smart young people world, in the online environment. SMEs tend to be less organized, since a member of employers and the Chamber of Commerce (TONIS, 2016) and SMEs are associated in the business cooperation networks and do not take advantage of production in scale.

Companies, especially SMEs, should innovate in the network of a business ecosystem. They must have an open and tariff communication that can be facilitated by a government institution and a very clear policy regarding intellectual property. We imagine a model that follows the complete life cycle of a product / service (awareness and training, analysis, product design, communication / certification) and supply chain.

In our model, large companies and state institutions can invest in an open innovation platform and licenses. All companies that have a new product / service idea can become members of the ecosystem. Within the network, the company must obtain the acceptance of an ecological agency. This agency proves how sustainable the idea is. If the idea is ecological, market research is needed.

This must be done by a marketing agency within the ecosystem. Taking into account the market feedback, the company proves the viability of the idea with a consulting agency. If the result is positive, inventors in the network and academic researchers can find possible solutions for implementations. The best solution will be chosen and the company will collaborate with the inventor to implement the idea. Then, the marketing agency must market the product / service. A supervisor, the government partner, is responsible for sharing the benefits and protecting the patent (PISTOL, 2015).

Some examples of SMES accumulate innovative technological capabilities through a NBE is shown in (FIGUEIREDO, 2018; TOWNSEND, 2018; CASTALDI, 2018).



In order to offer support to SMEs, a portal for Romanian SMEs was conceptualized and developed to support the creation of networks among SMEs. This article describes a discount system based on coupons that serve as reciprocal recommendations among SMEs, as a free advertising method.

The network is important, the more it promotes SME performance and access to information resources, that having closer tie with the bankers allows a better access to financial resource (ADAMA, 2018). Establishing and developing networks and partnerships to facilitate the exchange and integration of good practices is an important element in the circular economy (PASNICU, 2018). Even in small countries, as Sri Lanka, it was revealed a positive trend in the higher education sector towards performing effective role in the future towards innovation of SMEs. (WEERASINGHE, 2018)

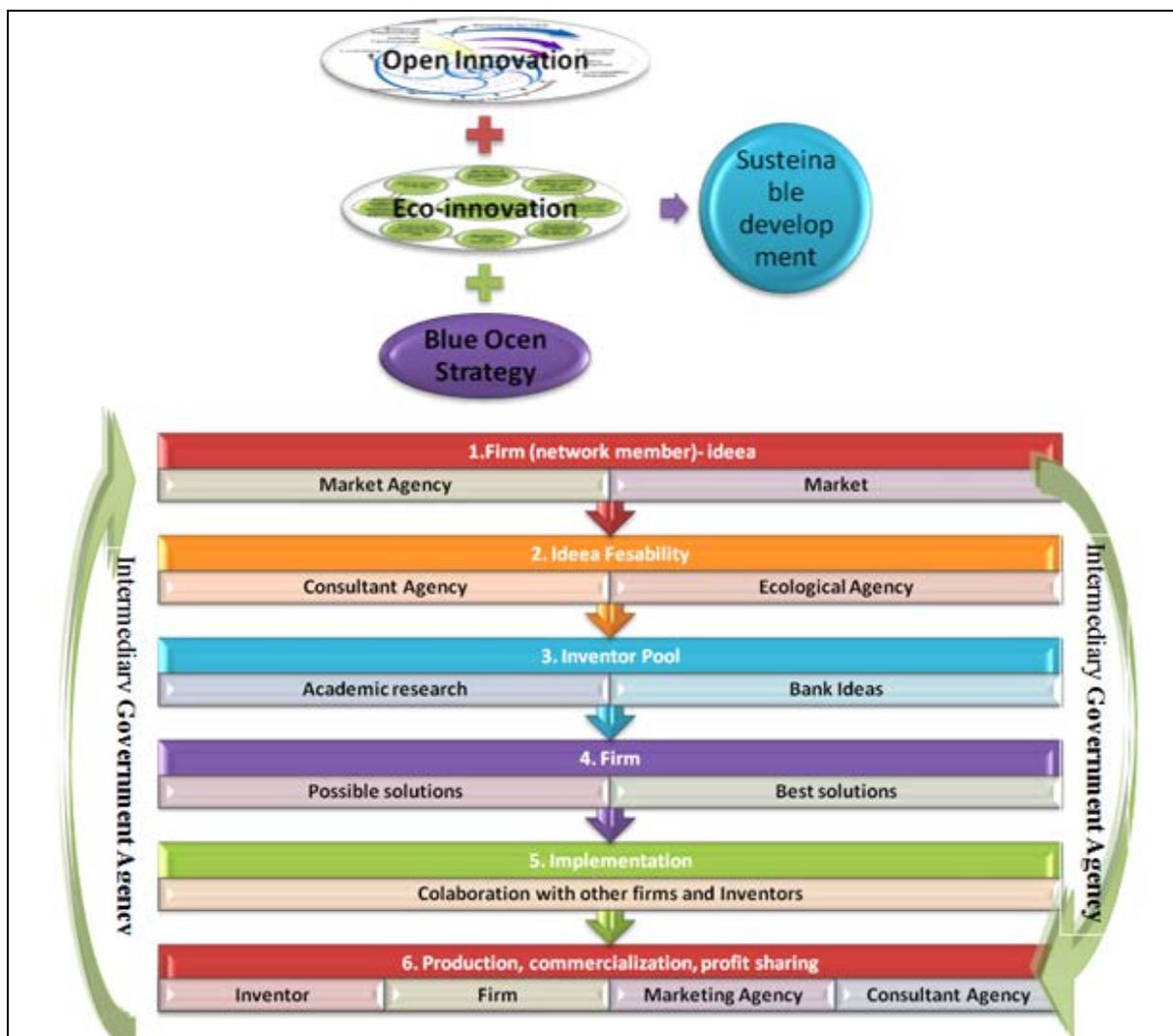


Figure 1: Innovation model for SMEs in a network business ecosystem

4. CASE STUDY

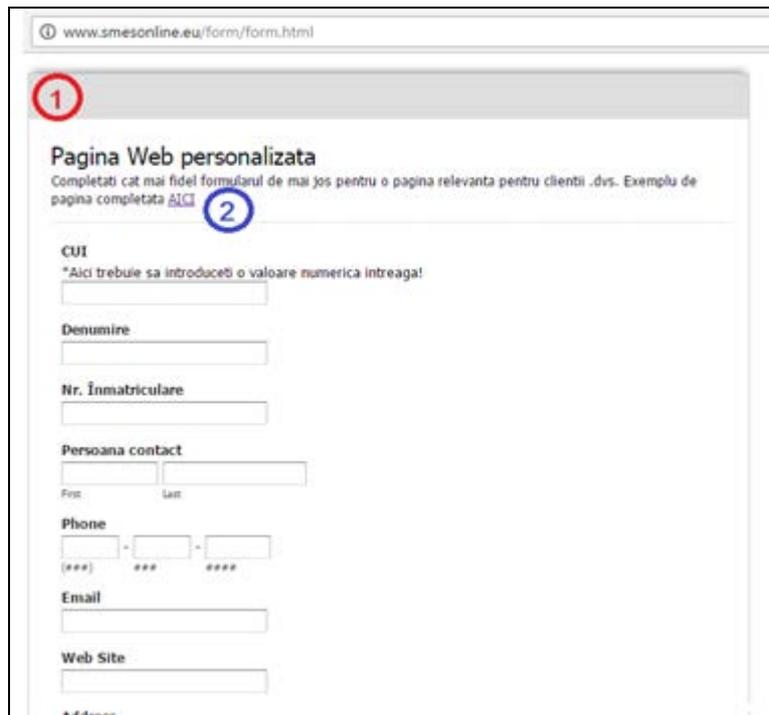
A B2B web portal was designed where SMEs have their own presentation page, forum and the possibility of managing a joint client portfolio through the issuance of nominal discount coupons.

This portal facilitates:

- online publication: articles, free resources for the local audiovisual commercial community;
- seminars and meetings with great impact, free, dedicated to the development of entrepreneurship and leadership;
- online order platform for products / services from smesonline.eu partners at a discount;
- intensive training series per day, two or three days in the main cities;
- complex series of workshops and training programs with a tracking system
- active vacations, training and inspiration: complete business experience.

To become a member and benefit from the customer recommendation system based on discount coupons, SME has to access the page www.smesonline.eu, section About ImmOnline, and click on the link "Create your FREE web profile HERE (Creeaza-ti GRATUIT profilul tau web AICI.)".

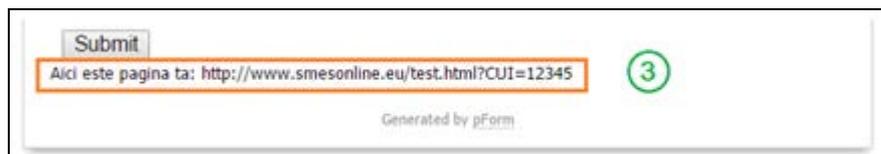
By accessing the hyperlink "Create your web profile" ①, SMEs can complete a personal page for the company as an ImmOnline member ver or see the demo page that contains demo data ②:



The screenshot shows a web browser window with the address bar displaying 'www.smesonline.eu/form/form.html'. The page title is 'Pagina Web personalizata'. Below the title, there is a sub-header 'Pagina Web personalizata' and a paragraph: 'Completati cat mai fidel formularul de mai jos pentru o pagina relevanta pentru clientii .dvs. Exemplu de pagina completata AICI'. A red circle with the number '1' is placed over the top header area. A blue circle with the number '2' is placed over the 'AICI' link. The form contains several input fields: 'CUI' (with a note '*Aici trebuie sa introduceti o valoare numerica intreaga!'), 'Denumire', 'Nr. Inmatriculare', 'Persoana contact' (with 'Firma' and 'User' sub-fields), 'Phone' (with a format '(xxx) xxx-xxxx'), 'Email', and 'Web Site'. A 'Send' button is located at the bottom right of the form area.

Figure 2: smesonline.eu - Custom website

Fill in the form fields described on the personalized web page ① and execute them by clicking on the Send ③ button, the SMEs can display the corresponding URL of the new web page created ③:



The screenshot shows a 'Submit' button and a message box. The message box contains the text 'Aici este pagina ta: http://www.smesonline.eu/test.html?CUI=12345'. A green circle with the number '3' is placed over the message box. Below the message box, it says 'Generated by pForm'.

Figure 3: smesonline.eu - Access to the personal page

Next, you can access the corresponding hyperlink link page URL page newly created or complete ② you get the page template below:

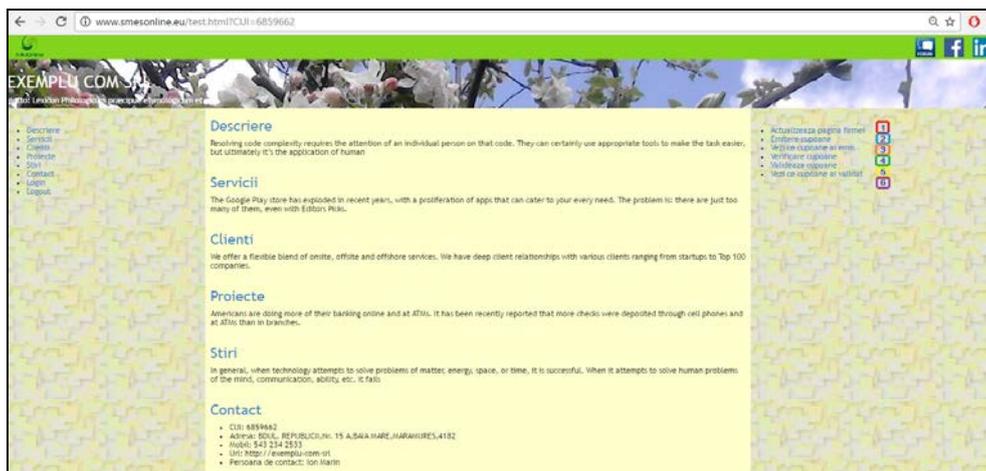


Figure 4: smesonline.eu - Personal page

The options in the right panel of the signature of the page (from ① to ⑥) can only be accessed securely. The credentials are the email address and the password. The password is provided by office@smesonline.eu after completing the form in the previous step. Now SMEs have these options:

1. Update the company page using a form without completing the CUI. The CUI cannot be updated only if it is addressed to the administrator.
2. Issuance of coupons using the form shown in figure 9.

Note: Percent reduction is recommended It is not mandatory that the company accepting the coupon applies the same discount! Name, surname and date of birth belong to the client. They are necessary because they do not allow issuing more coupons with the same name for the same service!

3. The coupons issued can be seen in a report with search services to print ①, for example:



Figure 5: smesonline.eu - Coupons report

4. The coupon verification option allows you to view the information associated with a coupon (such as the date of issue, the name of the customer and the last name) by means of the identification coupon issued.

Note: The coupons issued and validated do not appear in the search results, so they cannot be validated in the next step.

5. Validation of coupons implies applying a discount and changing the status of the coupon that will make it unusable for the second time.

6. Validated coupons can be seen in a report.

4.1. The security of the data in EU portal

The security of the data will be guaranteed through the implementation of a security policy. It provides the association of users in groups according to the roles they have assigned. We will identify two categories of users for the beginning: administrators and simple users, and in the future we will differentiate simple users in companies and people. The assignment of rights at the level of the database will be made with the GRANT and REVOKE directives, respectively.

Data protection will be done in three directions. The first is data compression based on an algorithm that combines the advantages of the Lempel-Ziv and Huffman methods. In summary, part of the principle of the formation of long strings as receiving length codes are inversely associated with the frequency of these strings in compressed text. We add the important aspect, namely, that the compression algorithm will be as efficient as the original text will be longer.

The second directive intends to encode data of 16, 32 or 64 bits, depending on the international character of the source, the adopted norm will be UTF also chosen for its compatibility with the presentation of the web application.

The last data protection address is encryption. The encryption of data is simple, either with an encryption and public key, with different keys for encryption and decryption. We are currently studying the possibility of adopting an electronic signature system based on a double-encryption algorithm RSA. This encryption algorithm is based on the properties of integers, since it is derived from Fermat's great theorem. More specifically, it is believed that you can effectively check the first character of an integer, but its divisors are identified relatively difficult depending on

the entire size considered. The first public key will be to encrypt textures by the formula:

$C = Pe \text{ modulo } r$, where r is the product of two prime numbers is relatively small compared to that found relatively close (divisors are not found in the product of e).

The second key will be used to decipher the text by the formula:

$P = Cd \text{ modulo } r$, where d is the multiplier is an inverse relation $(p-1) * (q-1)$, as judged from the relation $d * e = 1 \text{ module } (p-1) * (q-1)$.

In a first stage of data encryption we will rely on the Rijndael algorithm, which involves the selection of encryption keys as long (32, 64 or 128 bits), then the string of characters encrypted group by the number of characters that make up the key. The next stage is represented by a character encoding, followed by the addition module 27 (26 character alphabet is English) pairs of digits of each character in the original text and each encryption key encoded characters, as follows:

original text: "PYME RED"

key: RADU

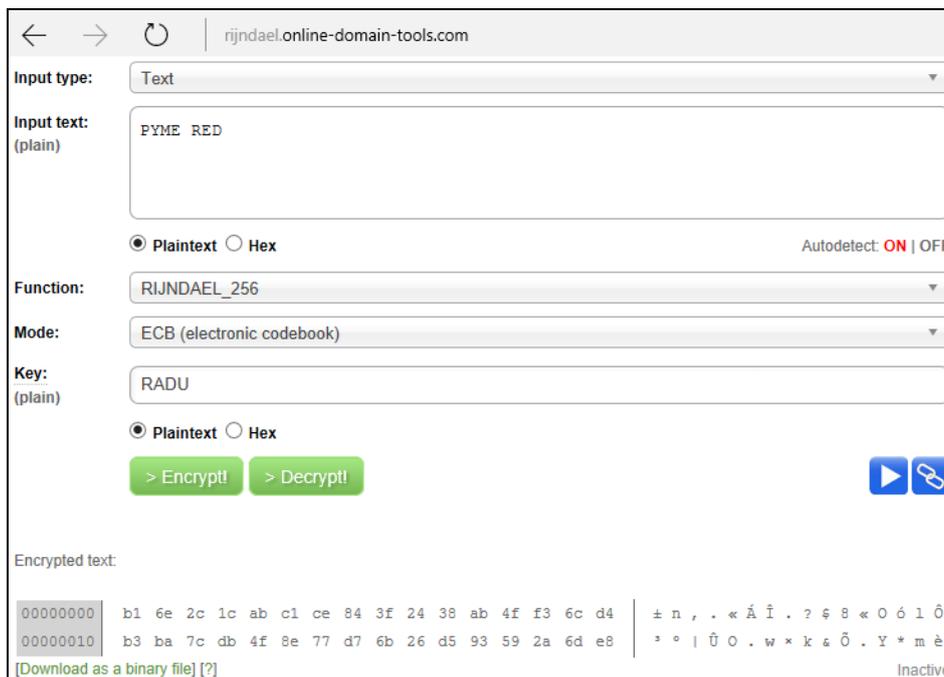


Figure 6: Encryption for data security in eu portal

5. CONCLUSIONS



The entire review of the literature shows that SMEs must collaborate within a network that shares resources and market niches. A business network that facilitates real-time communication, shares information and software applications, attends trainings and online business workshops or implements actions to improve the customer experience, becomes a strong community capable of influencing decisions commercials outside the group. Being a group instead of an isolated company, the commercial network could apply for grants or other government funds.

6. MORE RESEARCH

Further research will describe the platform in the Cloud and the available tools.

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