

Entrepreneurs Skills for Creating and Managing IT Projects

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Abstract This article we will analyze the concept of entrepreneurship and the importance of skills development for entrepreneurs to create and manage IT projects. The problem studied in this research was to identify skills for developing an IT culture of entrepreneurship and the main objective was to build a model of skills development for IT entrepreneurs. To accomplish this research it was developed a search of articles based on the keywords "entrepreneurship" and "skills of IT entrepreneurs", the period being considered between 2010 and 2014. The goal was to identify personal skills (cognitive, social and relational skills, technical skills and management skills) and business skills (strategies adopted by the company, products and/or services, corporate image, and management systems: human resource management, financial management, marketing, among others, and the formal and informal structure of the company).

The literature review was based on entrepreneurship studies with the goal to identify soft skills that entrepreneurs need to develop to create and manage IT projects and to identify emergent technologies given the current economic challenges in order to create awareness of the possibilities for promoting the entrepreneurial activity.

Keywords: Entrepreneurs, Skills, Project Management, IT

1 Introduction

Entrepreneurship can be currently regarded as part of a strategy to boost the economy. It can be undertake as a challenging task, either internally within organizations, either externally, by the creation of new businesses that are sustainable in a market and in a complex economic environment. Examples are studies on the importance of entrepreneurship in transition economies [1].

The relevance of entrepreneurship to economic development is well known and it is now recognized that education and training opportunities play a key role in cultivating future entrepreneurs and in developing the abilities of existing entrepreneurs to grow their business to greater levels of success [2].

Thus, it is considered that entrepreneurship is associated with two different aspects:

- Creation and development of business/innovative companies - entrepreneurship
- Development of a function in an innovative way – intrapreneurship.

In the context of this article, the focus will be in the first part, associating entrepreneurship to the creation of innovative businesses.

The main objective of the research was to build a model of skills development for IT entrepreneurs, which will be presented and discussed in this article.

The article briefly explores the concept of entrepreneurship, followed by the presentation of the methodology used for building the skills development model, and the analysis and discussion of results. The article concludes with implications for practice and findings.

This paper structure begins first with the introduction explaining the main goals of this research and the structure of the paper. Second the literature review on entrepreneurship and competencies are presented followed by the research methodology and the analysis and discussion. Finally the model of competencies development proposed and the conclusions pointing out the main findings from the research.

2 Literature review

2.1 Concept of Entrepreneurship

The origin of the word 'entrepreneurship' is 'rooted in the Latin language, from the words *prehendere* and *apprehensione*.

Entrepreneurship is a practice and that "most of what you hear about entrepreneurship is all wrong. It's not magic; it's not mysterious; and it has nothing to do with genes. It's a discipline and, like any discipline, it can be learned" [3]. If one agrees with Drucker's concept of entrepreneurship, then it follows that education and training can play a key role in its development.

Entrepreneurship can be understood as a individual or collective system and internal or external to the organizational structure, developing something new, from conception of ideas to the creation of a business.

The concept of applied entrepreneurship [2] argues that an entrepreneurial firm focuses on innovation, is open to risk and proactive in relation to its competitors. Assuming that innovation is according to [3] a specific function of entrepreneurship, whether in an existing business, a public service institution, or a new venture started by an entrepreneur which creates either new wealth-producing resources or endows existing resources with enhanced potential for creating wealth.

The entrepreneurship concept assumes different definitions regarding its evolution:

It is defined as a systematic innovation [3], which consists in the purposeful and organized search for changes, and it is the systematic analysis of the opportunities such changes might offer for economic and social innovation.

It is the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organization [4].

On another perspective entrepreneurship can be conceptualized as the discovery of opportunities and the subsequent creation of new economic activity, often via the creation of a new organization [5].

It is a powerful driver of economic growth and job creation: it creates new companies and jobs, opens up new markets, and nurtures new skills and capabilities.

Entrepreneurship has grown as a concept, and in the level of importance placed on the development and sustainability of the economy.

2.2 Entrepreneurial Capacity

Entrepreneurs are individuals who take significant risks in terms of capital, time and/or the commitment of his career providing value through the products or services

that may be new or exclusive, but the value must be infused somehow by the employer to locate and obtain the skills and resources [7] Ronstadt. From this point of view the entrepreneur not only his risking money but also his prestige.

Entrepreneurial action is conceived as a human attribute, such as the willingness to face uncertainty [8].

Drucker [3] describes the entrepreneur as an individual exploiting opportunities created by changes in its environment.

Being entrepreneurial and the creation of an entrepreneurial culture goes beyond the fear of risk [9] and the stigma of failure, that influence decisively the entrepreneurship context.

Implementing ideas is not an easy process even though we can say that entrepreneurs profile are crucial to define a business idea and implement it successfully, but it is important to note that there is also the possibility of developing entrepreneurial characteristics and here come the educational institutions that should play a key role, very early in the creation of knowledge and skills related to entrepreneurship.

The example of an innovation is a discipline that can come into teaching from the earliest years of school, because it is a specific tool of entrepreneurs, used to explore new opportunities for business or a different product or service.

It's important to know how to reduce the risk, seek for new sources of innovation, use creativity tools, and learn from the market, these are skills that every entrepreneur or potential entrepreneurs need to have [10]; [11].

It is also significant to mention the concept of entrepreneurial orientation, which is the practice of entrepreneurship within organizations. Its origins are in strategic planning, since it refers to actions by individuals [12]. In this perspective the company adopts this situation as a practice of entrepreneurial management.

[13] Referred the type of entrepreneurial management that characterizes an entrepreneurial organization capable of innovating in products and/or markets, with some degree of risk in business, and acting proactively as to their competitors.

Every day we witness the birth and death of companies, products, processes and services, and the goal of entrepreneurship learning is to seek and to systematically explore new business/new practices that add value to the market and streamline the economy.

In this sense, entrepreneurship is built based on the different types of skills widely studied in the literature and referred as soft and hard skills.

Entrepreneurship skills are the target of analysis in the next section and the basis for building the skills development model [14]. The soft skills can be defined as the behavioral skills required for the application of hard skills and knowledge in organizations [15]. [16] also suggest that soft skills are a set of skills and talents of an individual.

Other authors categorize the soft skills such as: 1) interpersonal skills; 2) personal and social skills; and 3) cognitive skills [17].

With regard to soft skills inherent to managing entrepreneurial projects, [18] relates that are skills and practices of successful managers. He states that "the emphasis of the future have to be in leadership skills and interpersonal management practices that ensure project success."

For example, Web entrepreneurs constitute a specific category of entrepreneurs who create new digital services and products that use the web as an indispensable component. Digital entrepreneurs are those entrepreneurs that fully exploit digital products and services, including "cloud computing", to reinvent their business models and sharpen their competitiveness [6].

To identify the soft skills of the entrepreneur we used a qualitative methodology, which will be explained in the next section.

2.3 Learning how to be an Entrepreneur

In the traditional perspective, entrepreneurship was associated with the creation of a business and therefore researchers argued that the skills required could be developed through training. In present days entrepreneurship is seen as a way of living very relevant to all parts of the economy requiring a different approach to skills development as individual's mindset, behaviour, skills and capabilities that can be applied to create value in a range of contexts: universities, social enterprises, organisations and new venture start-ups.

Entrepreneurs have different levels of skills and therefore each entrepreneur requires different approaches for developing skills. The literature published regarding the skill-sets required to be an entrepreneur is show us three groups of skills: entrepreneurship skills, technical skills and management skills.

[19] also identified four main dimensions of skill:

- technical skills - which are those skills necessary to produce the business's product or service;

- managerial skills, which are essential to the day-to-day management and administration of the company;
- entrepreneurial skills - which involve recognizing economic opportunities and acting effectively on them;
- personal maturity skills - which include self-awareness, accountability, emotional skills, and creative skills.

According to [20] there are key elements which he believed featured prominently in entrepreneurship skills:

- The ability to identify and exploit a business opportunity;
- The human creative effort of developing a business or building something of value;
- A willingness to undertake risk;
- Competence to organise the necessary resources to respond to the opportunity.

Following the extensive review of the literature undertaken for this review, the following are the resume and the principal entrepreneurial skills that need to be developed amongst growth orientated entrepreneurs:

- Customer-Orientated - Entrepreneurs must be committed to creating customer value through the provision of innovative products / services;
- Strategic Development - Entrepreneurs should learn how to select from a number of market strategies that can influence their chances of success (e.g. Choice of Market, Customer Driven, Constantly Innovate, Differentiation/Focus, Highest Quality, Exporting);
- Financial Management - Entrepreneurs must learn the skills required to access additional venture capital (e.g. how to structure a proposal).

But the development of these skills is not enough in themselves because the following conditions must exist if any progress is to be achieved: the entrepreneur must be motivated to grow the business; peer-to-peer mentoring from successful entrepreneurs is a critical element of any training programme (mentors must also be motivated to work in this role); entrepreneurs must be provided with increased access to networks, finance and international markets.

2.4 Attribute Capabilities and Attributes of IT Entrepreneurs

The IT Entrepreneur according to ownership and commitment is a resilient person focused on the business implementation and viability. He identifies himself with the project success and work in order to achieve that goal.

He has a learning agility capability and adapts to ambiguous and unfamiliar situations, reflecting on experience to improve future performance.

The judgment process is complex and he need to be able to make decisions in difficult situations, balancing execution efficiency with risk mitigation.

The IT entrepreneur works basically with projects and in this context the team leadership it is very important because he needs to motivate teams to support organizational goals and to develop staff skills and capabilities effectively. He also needs to create stakeholder partnerships, managing competing stakeholder needs and communicating effectively.

Other major capability is to manage risk, anticipating and effectively mitigating major risks and aligns decisions with company's risk profile executing standard project management methodology and linkage project goals with business context.

3 Methodology

The methodological approach of the research was qualitative and quantitative. With regard to the specifics of this investigation the main technique used was content analysis from the literature review of studies on entrepreneurship. The content analysis was used to determine the presence of certain words or concepts within the articles to identify and analyze the skills of entrepreneurship.

A systematic analysis allows identification of keywords contained in articles selected from the scientific databases.

It is an exploratory and descriptive study comprising the data collection, analysis and synthesis of results arising from research in scientific databases Web of Knowledge and Science Direct.

A search of articles was based on the keywords "entrepreneurship" and "skills of the entrepreneur, the period being considered between 2010 and 2014

Finally to identify factors that could aggregate the competencies identified in the theory we used factor analysis

4 Data Analysis

In this section we will first consider how the theoretical concepts discussed in the literature, can be measured and related to the group of skills through factor analysis.

Statistical analysis of data has been carried out using SPSS. As a primary set of measures, the Kaiser-Meyer-Olkin (KMO) was 0.755 which provides solid support for proceeding with factor analysis. It's also important to refer that in the factor analysis process, the number of observations was 50 and two factors with eigenvalue > 1 were detected. They explain 71.8% of total variance and the extraction method was iterated principal factors and the rotation was oblimin oblique.

Table 1 outlines the items taken into account and that were considered for the identification of the two factors. The first of these factors is strongly correlated with indicators reflecting personal skills, mainly related to problem solving and the creation of new knowledge critical to innovation process. The second factor is correlated to the creation of new products and improvement of the existing ones.

Table 1 – Factorial Analysis – Entrepreneurship Skills

Items	Factor 1	Factor 2
	Skills Personal Development	Business Skills
Cognitive skills	0.84	-0.03
Social and relational skills	0.90	-0.02
Technical skills	0.92	0.65
Management skills	0.87	0.40
Strategies	0.64	0.65
Product/Service	0.41	0.78
Management system	0.70	0.79
Organization structure	0.50	0.65

5 Analysis and discussion

Despite the dilemmas we face, we know that the economy's performance depends, in large part, of the business environment, including, most creative and innovative companies supported by people with certain technical skills and characteristics - the entrepreneur.

It is assumed that the profile of the entrepreneur embraces the idea that entrepreneurial characteristics can be acquired / learned throughout life.

Based on different studies we present a range of characteristics that are associated to the entrepreneur profile:

- Ability to achieve goals, particularly planning and autonomy to achieve results.
- Self-confidence to achieve defined goals and overcome obstacles.
- Sense of responsibility for the success or failure of business.
- Ability to learn using failure as a learning experience in a positive way.
- Ability to develop and maintain a successful business through hard work and effort.
- Ability to develop innovative new approaches to the market, new concepts, new products and services.
- Capacity of initiative identifying and implementing new business opportunities.
- Ambition to achieve goals.
- Persistence to face obstacles and reset strategies.
- Ability to establish a network of contacts, to develop and maintain business relationships.
- Social and relational skills in order to establish interpersonal relationships.

5.1 Skills Development Model for IT Entrepreneurs

The characteristics identified were the basis for building a model of development of personal skills (Figure 1) that fits the dimensions: skills, attitudes and creative thinking.

Figure 1 – Entrepreneurs Personal Skills



The knowledge of the entrepreneur is based on the cognitive skills, social and relational skills, technical skills and management skills. This mixture is crucial to creating and running a business.

Cognitive skills include creative thinking, formulation and problem solving, decision making and initiative.

Social and relational skills include communication skill, capacity for teamwork and ability to adapt to new situations.

Technical skills integrate concepts of technical expertise including working methods, processes and contexts.

Management skills integrate knowledge about potential strategies to adopt in the company, capacity planning and setting strategic goals and ability to make strategic decisions on company policies in their various areas of expertise.

On the other hand, the entrepreneur must acquire skills with regard to business development (Figure 2), which includes the strategy that the company will adopt, products and/or services, the corporate image management systems (human resources management, financial management, marketing, etc.) and the formal and informal structure of the company.

Figure 2 – Entrepreneurs Business Skills



With regard to strategies, skills development is needed to understand the mechanisms that contribute to the creation and implementation of technological, organizational and market innovations.

Knowing the specifics of the markets it is possibility the internationalization through various modalities, export, licensing, franchising, joint venture and foreign direct investment.

Identify the best marketing strategy for business development, taking into account the analysis of the environment, competitive analysis, market analysis and the company itself. Know how to create a corporate and brand name for products and services such as media publicity image.

In terms of products and/or services skills development it is important the technical specifications and forms of using the products and/or the implementation of services, as well as the types of possible customizations to meet the needs of the market, and more specifically, potential customers.

Management systems put into practice the company's processes: business management, marketing, human resources management, financial management and risk management.

The formal structure of the company and the informal structure are also important to define and manage, especially for the leaders.

Finally knowing how to create and manage informal networks related to partners and formal networks related to customers, suppliers, and official bodies.

5.2 Learning Cycle for IT entrepreneurs

The learning cycle shows to IT entrepreneurs how to achieve effective behaviors:

Learning Before the IT Project Begins

To develop skills based on lessons learned the entrepreneur should ask themselves if it is possible to learn lessons from other projects and concentrate on the aspects unique to this project and if the circumstances and objectives are comparable for the lesson to be valid to the new project.

Learning During the IT Project Implementation

The main questions are what can we learn from what we have done so far and has anyone done a similar project before and how can they help with any unexpected difficulties that have emerged?

Sharing the Learning from IT Projects Developed

Based on their experience entrepreneurs can advise future project teams ensuring that the lessons are transferred to others and based on the stored lessons and document guidelines making them accessible to others.

Learning After the IT Projects Implementation

The analysis of the lessons learned on the project and the pitfalls that need to be avoided in the future.

The most effective ways of developing the IT entrepreneurial skills is to increase experience-based learning.

6 Implications for practice

6.1 Roles and responsibilities in creating an IT entrepreneurial culture

Until recently, entrepreneurship was not part of the economy context, a result of a culture that never invested in the development of entrepreneurial skills and most part of company's lack also of an entrepreneurial culture that value people, privilege ideas and implement successful practices

To create an entrepreneurial culture and develop entrepreneurial skills several actors have a crucial role:

- a) Government - responsible for creating policies (economic, financial, educational, social, and others) that promote IT entrepreneurship.
- b) Schools and universities - responsibility to produced programs and implement learning methodologies to develop IT entrepreneurial skills.
- c) Companies – responsible for develop leadership models to promote intrapreneurship, implementing and managing processes among employees that fosters creativity and innovation.

All of this actors need to create a context that encourage and promote a new attitude towards risk and to invest in businesses related to emerging technologies as internet and cloud computing, mobile technologies, big data, robotics and nanotechnologies.

Cloud Computing is a model for delivering internet based information and technology services in real time or, 'on-demand' and is particularly driven by: economic opportunity; cost reduction; technological change and consumer's needs.

Mobile technologies englobes communications, devices and applications are integrating and converging enabling multiple uses and advanced collaboration. This requires constant innovation and new technology solutions.

Big data as new phenomenon associated to the increase of volume of data as result of Internet, social media and mobile devices. The potential value of this data has led to the development of new techniques for managing and analyzing very large data sets such as images, text, or speech.

Robotics by integrating technologies such as computer vision and automated planning with very small, high-performance sensors, actuators, and cleverly designed hardware, has given rise to a new generation of robots that can work alongside people and flexibly perform many different tasks in unpredictable environments.

Nanotechnology is the engineering of functional systems at the molecular scale.

This technologies are changing the way markets and organizations work: Internet has changed the music, travel, and retail industries, Big Data is changing the way we store, organize and visualize information. Robotics is transforming industry, mainly automotive, aeronautic and health care and also engineering. Nanotechnology is changing computer industry, energy industry and health care industry.

In this context, markets need that countries invest in the development of IT entrepreneurial skills as a strategy to overcome the financial crises and achieve economic growth.

6.2 Contribution of Entrepreneurship to the Economic Growth

In a country with an economy that does not grow or grows very little IT entrepreneurship can help:

- to create and maintain businesses and create innovative products or processes that add value to existing ones;
- firms to internationalize, overcoming a culture of risk aversion;
- to attract foreign investment, as the economy continues to develop and companies are becoming competitive.

However, entrepreneurship is not an easy road, although some IT organizations emerge and develop and many others arise and quickly disappear from the market.

7 Conclusions

The aim of this investigation was to identify skills for developing an IT culture of entrepreneurship. The literature review made based on the methodology used allowed us to identify personal skills (cognitive, social and relational skills, technical skills and management) and skills about the business (strategy that the company will adopt, products and/or services, the corporate image, the management systems: human resource management, financial management, marketing, among others - and the formal and informal structure of the company).

With regard to future studies it's important to acknowledge that entrepreneurs need to take risks, have the ability to overcome difficulties, take the initiative and reach objectives – developing entrepreneurial skills.

The development of this kind of skills is critical to create a culture where entrepreneurship is something natural becoming an integral part of our evolution and a new model of economy.

As directions for future research it's possible to point out studies that develop and test a theoretical framework that relates the entrepreneur's skills with the organisational outcomes and the success of the business implemented, and studies to analyse the capabilities of entrepreneurs to integrate national and international networks in order to maximize their business.

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