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Entrepreneurship
Born, Made and Educated

Edited by Thierry Burger-Helmchen

ENTREPRENEURSHIP – BORN, MADE AND EDUCATED

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Meet the editor

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Contents

Preface

The birth and infancy of entrepreneurship was turned into a specific area of academic study and empirical research quite early. The field greatly evolved, and at the same time, a constant urge to deal with real problems existed, from firm creation to industrial growth, including firm strategy and economic policy.

Economic, sociological, and managerial academics began to devise a detailed and interpretative framework for the study of entrepreneurship. Many people came from different fields, and there was a need to overcome the limitation of the standard neoclassical theory of entrepreneurship. New areas of research were embraced, thereby recognizing that powerful mechanisms are at work in entrepreneurship and require systematic analysis.

The economics of entrepreneurship

Entrepreneurship, in a very broad sense, has always been at the heart of firm and industrial dynamics extoling it's influence at macro level. Starting with the analysis of the specific properties and effects of entrepreneurship as an economic function, researchers then proceeded to the historical and normative analysis of resource allocation mechanisms in the field of entrepreneurship. More generally, they analyzed the socio-economic institutions that could be relied upon to produce, mediate, and favor entrepreneurship.

Many authors tried to define Entrepreneurship:

"*Entrepreneurship is an act of innovation that involves endowing existing resources with new wealth-producing capacity*"

Drucker (1985)

"Entrepreneurship is a process by which individuals pursue and exploit opportunities irrespective to the resources they currently control"

Stevenson (1985)

"Entrepreneurship is the creation of organizations, the process by which new organizations come into existence"

Gartner (1988)

"Entrepreneurship is a way of thinking, reasoning, and acting that is opportunity drive, holistic in approach, and leadership balanced"

Timmons (1997)

"Entrepreneurship is about how, by whom, and with what consequences opportunities to bring future goods and services into existence are discovered, created and exploited"

Venkataraman (1997)

From these definitions, we can see that the academic understanding of entrepreneurship broadened over time. The first dimension of the entrepreneurial space is the continuum between economic approaches oriented towards the origin and context of entrepreneurship, social science approaches, and managerial concerns. Among others, influences can also be found in the education context, or, the institutional context. And finally, researchers raised the question of what happens if we do not take those issues into account? What if we take them for granted and simply state that entrepreneurs do things differently, for whatever the reason, and have ideas in different ways other than economic factors?

The following table summarizes these three divisions of research in entrepreneurship.

	Approaches		
	Classical economic and social context *Where*	Education, development and institutional context *Why*	Managerial context *How*
Description of the entrepreneur, object of the study:	The entrepreneur is an important element of macro and local development. The impact can depend on gender, geographical location and social context.	Is one a born entrepreneur? Does one become an entrepreneur through a specific education system or a special institutional context?	The entrepreneurial process, the detection of opportunities, the development of ideas, creativity, and innovation. The construction of new business models
Sectors of interest:	Political level (country, region, town level)	Educational system, historical studies, political influence	Economists involved in theory of the firm, management science

The three volumes of entrepreneurship are each dedicated to one of the above divisions. The first volume "**Entrepreneurship - Gender, Geographies and Social Context**" sheds new light on how the entrepreneur is an important element of macro and local development by taking into account gender, geographical places, and social context.

The second volume "**Entrepreneurship - Born, Made and Educated**" raises the question why some human beings turn into great entrepreneurs. Is it a gift of Mother Nature, or the outcome of a specific education system or from other institutional construction?

The last volume "**Entrepreneurship - Ideas, Creativity and Innovative Business Models**" is more managerial oriented and takes into account the detection of opportunities, the creative processes, and the impact of the entrepreneurial mindset on business models.

Entrepreneurship - Born, Made and Educated

This book is divided in three sections. **Section I: The Psychology of Entrepreneurship** is composed of five articles exploring the psychology of entrepreneurship, the entrepreneurial intention, the reaction of entrepreneurs in hostile situations, and the possible measure of entrepreneurship in such contexts.

The question of how entrepreneurs are educated and how academic programs and efforts can influence the outcome of entrepreneurship is at the center of **Section II: Academia and Entrepreneurship.** Those eight contributions cover the educational system from the younger kids to the highest academic level in different countries.

The final four papers form **Section III: Macro Effects of Entrepreneurship.** Those papers try and answer the question of the effect of entrepreneurship on the aggregate level.

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Part 1

The Psychology of Entrepreneurship

1

The Psychology of Entrepreneurship

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1. Introduction

1.1 Psychological perspectives on entrepreneurship

For the last fifty years, social history has witnessed a transformation that was not experienced in any period before. The facts that how people are affected and through what sort of characteristics individuals try to handle this situation has been a multi-perspective issue and was studied thoroughly. Understanding intersocietal and interpersonal relationship systems that are based on fluctuation and competition was aimed and studies were carried out to determine what characteristics that individuals had in order to survive in this period. For over thirty years, the role of entrepreneurship in dealing with competition has drawn researchers' extensive interest. In spite of this, the concept of entrepreneurship hasn't had an operational definition that everyone agrees on because it is multi-dimensional and it is affected by many variables.

Although entrepreneurship is mostly associated with the fields of administration, management and economy, in fact it is an interdisciplinary subject. Entrepreneurship and enterprise as being a broad subject and conceptual field was studied within the field of psychology, at least at the beginning, more than the fields of economy, administration and management. The studies of psychology over entrepreneurship have played an important role for a detailed consideration of the concept and in giving the concept the broader meaning that is used now. One of the first studies of psychology over entrepreneurship was conducted by Mc Clelland, Atkinson and Feather in the second half of twentieth century. According to them, the motivation of individual and society is one of the most important factors that explain entrepreneurship and individual's becoming an entrepreneur depends on the highest possibility of achievement (Korpysa, N.d). In other words, when the possibility of achievement gets higher, entrepreneurial propensity rate increases. Studies in the field of psychology have focused on the details of the factors that play a role in entrepreneurship's achievement (Baron, 2000).These studies stated that entrepreneurial ability of individual is connected with societies' perception of success and to what extent individuals are affected by this perception. However, even if it was stated that culture influence entrepreneurship, it was observed that individual differences have important effects on entrepreneurship despite cultural commonality.

Psychology's extensive interest for the subject matter of entrepreneurship at the beginning is closely associated with periodic interest to understand psychological dynamics of human

behaviors. Studies that were focused over people's relationships with enterprises and organizations realized that not only enterprises affect individuals, but also individuals affect enterprises. Therefore, when the characteristics of individuals were studied, it was wondered whether individuals with entrepreneurial characteristics affect enterprises more strongly so they looked for an answer for the question of "Who is the entrepreneur?" In this process, the data about entrepreneurship that psychology obtained became popular and the relationship between entrepreneurship and the characteristics like risk-taking, uncertainty avoidance, power distance, need for achievement and risk-management has been studied. However, although psychology was in the first place in the development of entrepreneurship research, later using the findings of psychology in understanding entrepreneurship was abandoned. The fact that research that has been carried out in psychology field is often limited by character approaches and over-emphasis of the effects of personality over the consequences played a role in this divergence. However, in later years the picture changed again and empirical studies that put forward the importance of psychological variables increased. From then on studies over the characteristics of individual with entrepreneurial qualities and entrepreneurship culture have become widespread and research over entrepreneurship in the field of psychology has become the focus of interest again.

When we consider it in general, it is possible to analyze the studies over entrepreneurship that psychology carried out and emphasized individual traits in two groups. One group of these studies has looked for a connection between entrepreneurship and personal characteristics and proved that individuals with entrepreneurial qualities are self-controlled, self-confident and competitive people. They also have a great imagination and they do not avoid risks. Another group of study examined motivation resources of entrepreneurial individual and has discovered that entrepreneurship is nurtured by sources such as motivation for achievement, power distance and willingness for taking risks. Besides, the studies that focused on entrepreneurship's relationship with culture try to uncover cultural resources that nurture and weaken entrepreneurship; therefore, entrepreneurship is also studied as an issue that draws socio-psychology's attention.Nowadays, entrepreneurship research continues by making associations with psychological variables like cognitions, emotions, perceptions, behaviors and motivation and the effects of psychological variables over entrepreneurship cannot be ignored. Even if different countries seem to have different development policies, especially since 1980s, entrepreneurship has become more important due to competitive development program that countries have to apply because of neo liberal development policies. The fact that societies have to increase their share in international markets or maintain their own national markets depends on the existence of human resources who have entrepreneurial characteristics to a certain extent.

Determining methods and details of training programs to educate entrepreneur individuals has become very important for social development so multidimensional analysis of entrepreneurship has also become more important. In this context, entrepreneurship is not a research field of general psychology anymore. It has become the subject matter of subfields of psychology and organizational psychology started to study entrepreneurship (Frese, 2009). As a result of entrepreneurship research which has been carried out in various different contexts, psychology tend to define entrepreneurship as an individual behavior or attitude with a tendency to challenge and it has said that it creates new facts and

circumstances and improves existing conditions. A new field among subfields of psychology has started and has been defined as entrepreneurship psychology.

Entrepreneurship psychology indicates many intersection points between industrial/organizational psychology and entrepreneurship. First of all, organizations which are the central phenomenon of organizational psychology exist by means of entrepreneurship and entrepreneurs. Organizations have to renovate themselves regularly so as to continue their own existence and in order not to be destroyed by their competitors who aimed at the same targets in tough market conditions. Providing this renovation is only possible by watching over the possibilities and opportunities in the market. Therefore, some of the individuals in every organization must have entrepreneurial skills such as innovative thinking, creative, risk-taking, and powerful future design; they also have to be bold and self-confident. One of the main elements in this kind of organization is entrepreneurship. This process leads industrial/organizational psychology researchers to study entrepreneurship process.

Many of the founders of business enterprises are not good managers because it is usual that people who have essential capital and a certain vision about the future of the organization can not make good managers at the same time. In other words, being the founder of an organization/enterprise does not require having the skills of a good manger. Therefore, it is important to search essential qualities to predict success of the organization and to increase its competitive power in its own field and it is also important to find individuals with these qualities and provide their connections with these organizations as executives.

This situation has become a factor that leads organizational psychology to be interested in entrepreneurship field. Once again, both organizational and entrepreneurial studies have focused on performance results. Thus, the fact that both research fields focused on performance results showed that they had common subject areas and this deepened psychology's interest in entrepreneurship. Psychologists evaluate performance in terms of supervisory judgments whereas entrepreneurship evaluates it in terms of market performance. Both fields' findings are needed to determine entrepreneurial performance. Almost all of the measurements, which are used to determine entrepreneurial characteristics like coping with stress, motivation, ability and knowledge, are carried out by using psychological assessment tools or the instruments which are developed by their methods. This situation has played a role in the intersection of psychology and entrepreneurship research. In conclusion, psychologists can be interested in the concepts of new characteristics such as motivation for achievement or big five personality that entrepreneurship research has discovered (Baum, Frese & Baron, 2007). As a consequence, psychological approaches towards entrepreneurship are important for both psychology and entrepreneurship. In fact, psychological variables undertake the role of mediators through the process that leads entrepreneurial individuals to success
(The_psychology_of_entrepreneurship.pdf).

2. Cognitive process of entrepreneurial thinking

There are not enough empirical studies to make clear connections between entrepreneurship and cognition because studies in this field are quite new. Cognition studies aim to understand how to achieve substantial learning mostly in order to see opportunities. It is

known that learning and personality are shaped through and within the culture. In researches that were done over entrepreneurial personality, it has been discovered that culture is one of the factors that determine entrepreneurship; and this discovery increased the interest towards the relationship between cognitive process and entrepreneurship. The question of whether these similarities of people who show similar behavioral responses towards an incident despite their cultural differences associated with cognitive process has been asked more often recently. Before that, while entrepreneurial culture and entrepreneurial personality characteristics as the main factors that affect entrepreneurship came to the forefront, recently cognitive science theories and concepts have started to be used to explain entrepreneurship subject matter. Cognitive perspective has provided new points of view to understand the phenomena which are related to entrepreneurship .In our daily lives, factors like information overload, high-level of uncertainty, strong emotions in the face of incidents, time pressure and exhaustion affect human cognition continuously and make people take new and sharp decisions all the time. This situation is a fact for entrepreneurial cognition as well. Therefore, cognition research is mainly focused on human cognitive processes or information processing systems and has aimed to predict whether these processes show any difference between entrepreneurial individual and people who do not have any tendency for entrepreneurship.

Although research over human cognition has continued for over a century, everything about this subject matter has not been resolved yet. In fact, studies that have been conducted over human cognition include subjects like "how we think, reason, decide, use language and symbols and store information for future use". A person's capacity for processing the information which comes from external world is limited. Moreover, as human beings, we try to obtain the most efficiency with the least cognitive effort. As a result of this, we often use "short-cuts". Therefore, our actions are less rational than expected and once again we often act with prejudice and make mistakes (Baron, 1998). Our cognitive styles are affected by adaptation and socialization processes as well (Akşit, 2003). Therefore, entrepreneurial cognition has its cultural codes. However, enough research has not been done over these cultural codes yet. It has been indicated that while taking risks, entrepreneurs do not act very differently from others but they act with very different terms while thinking about business opportunities so when they are compared to people who do not have entrepreneurial qualities, they are able to categorize the opportunities that have more profit potential (Palich & Bagby, 1995). Observations have shown that entrepreneurs are really different from other people in terms of personality characteristics and studies have proved that they are more focused on certain issues more than the others.

2.1 What is entrepreneurial cognition?

In fact, it is more precise to ask the question of whether entrepreneurial thought exist. However, it is hard to have an argument over the existence or absence of entrepreneurial thought. Therefore, it seems that it is more appropriate to mention a certain entrepreneurial thought style and defining this certain style is more convenient. Entrepreneurial thought defines knowledge structure of people who use judgments, evaluations and decisions which include using opportunities, risk taking and growth.

Studies about entrepreneurial cognitions are directed towards understanding of how entrepreneurs associate gathered information that seems not related to each other and how they use mental models. This data helps to determine new products or facilities and produce them. Besides, it helps to start business life and bring the resources together to develop/grow (Mitchell et al., 2002). However, there are so many variables about this subject. For example, it has been understood that even current moods affect cognition and the moods of people who have job interviews have become effective over the results (Robbins & DeNisi, 1994). Entrepreneurship studies deal with the questions of why some people create new opportunities more easily than the others and how they decide to make more efforts to realize their dreams or what the main differences are between successful and unsuccessful entrepreneurs. The answers to these questions have been searched in entrepreneurs' personality characteristics. Entrepreneurs differ from other people in terms of some certain characteristics and they also differentiate from others in distinguishing the opportunities and pursuing them. At the first sight, this hypothesis seems rational. When considered from this aspect, significant data/answers can be found related to the questions above (Baron, 1998). Firstly, entrepreneurial people are braver and bold, more tolerant and they are more effective in dealing with stress. However, one of the most significant differences that differentiate them from others is their competence in seeking and exploring the opportunities. There are two significant answers to the question of why some people discover entrepreneurial opportunities more than the others (Mitchell et al., 2002). a) Having the necessary knowledge to identify the opportunity, and b) Using cognitive qualities about this subject in their own favor as is required (Shane & Venketaraman, 2000). In other words, entrepreneurial cognition has the capacity for obtaining information to discover and take the opportunities; and using cognitive qualities that can process this information for their own favor.

Entrepreneurial cognition like non-entrepreneurial cognition has the propensity for misapprehension over many issues. For example, their being over optimistic can lead them to take high-level risks. "Cognitive blind spot" can prevent them from seeing the reality about risks and can cause them to make decisions as being isolated from their past lives. Glowing images of the future and their plans can make it hard to take their lessons from the past (Kahneman & Lovallo, 1994; Qtd. in Baron, 1998). Positive and negative moods can affect the memory in appositive or negative way; and someone who encounters a new situation can make wrong decisions because of his/her current moods. Individuals focus on the cognition of their emotions in the face of an incident or situation while they are experiencing external world. However, their cognition about their emotions does not match with a real situation. In other words, while people say that "I like this" or "I don't like this", they can have emotions resulting from a similar situation in the past but not from the actual situation at that moment. This process, which is known as "affect infusion" can cause errors in cognitive decisions. This process affect entrepreneurial consciousness as well because effortful processing of information processes the information more automatic compared to less effortful processing system.

It is highly possible for entrepreneurs to encounter uncertainties in their daily lives. When they face a new situation, unlike others, they have to modify existing information or find new data and use it for a new solution. They have to be more constructive and think more cautiously in new situations. Entrepreneurial people encounter more new situations than

others as part of their jobs and they have to manage more stressful relationships. As a consequence, they experience more severe emotions and this can lead them to generalize their emotions to other situations, which sometimes can be inappropriate. Compared to others, they transfer more emotions from their previous experiences to new situations. Therefore, their thoughts, judgments and decisions can be affected by emotions that are actually not associated with that situation. It is known that while more cognition which is not associated processes stimulus in the case of uncertainty, they felt more stressed. When only the emotions become automatic, cognition can follow this automatic processing.

The environment that influences entrepreneurship cannot be estimated. Under these circumstances, individuals cannot follow the predictable methods that they developed before so cognition and behavior have to reorganize themselves. Individual processes more data to make the environment more predictable. The way of knowing with what cognitive elements individual's emotions are affected is to focus on his perception of external world (Baron, 1998). However, external world perception cannot be formed independently of value. The individual's perception of his performance relating to his own ability is also associated with his perseverance. Intervening unexpected problems and overcoming obstacles is a powerful cognitive element for entrepreneurs and it requires a high-level perseverance. Perseverant individuals have the ability to find new ways to overcome obstacles and restrictions fearlessly in environments that require an uphill struggle. Perseverance that is accepted as one of the most powerful qualities of entrepreneurial individual keeps on struggling with persistence even in case of failure by challenging misfortunes (Kümbül-Güler, 2008). Therefore, entrepreneurial individuals have to focus on positive situations and have to think in the long run in order to cope with negative situations while they process information.

3. Entrepreneurship and personality

3.1 Entrepreneur's general personality traits

Since the first studies considered entrpreneurship as an organisational and industrial concept and this kind of research finds performance rating more suitable for its working process, the first related research is usually focused on actions and behaviours of entrepreneurs but their personalities are not emphasized (Cornwall & Naughton, 2003). However,it is known that certain characteristics that individuals have can have important influence in taking decisions to set up a business and achieving success in entrepreneurship (Brandstatter, 1997). Understanding entrepreneurship process depends on analyzing and determining entrepreneurial qualities and common trait of entrepreneurs. It is known that entrepreneurs are different from other people in terms of attitude, perspectives and some basic qualities. In other words, some people have the ability to see the new opportunities and are more skillful to fulfil their dreams about business whereas it is almost impossible for others to get that kind of achievement (Baron, 2000). Therefore, knowing the basic qualities that differentiate entrepreneurs from others is necessarry either to provide cultural transformation which will contribute to creating new entrepreneurs or to uncover entrepreneurial qualities that remained hidden in some individuals.

A lot of research has been done by various researchers to determine the basic qualities of successful entrepreneurs. Baron (2000) explains successful entrepreneurship in terms of

cognitive and social factors. He states that successful entrepreneurs are people who strongly believe in their own judgements and they have high social perceptions and ability of successful interaction. He also says that they are people who can be accomodated fast to new circumstances. Chell, Hawort and Bearly (1991) explain successful entrepreneurship as the quality of seeing and using business opportunities and starting appropriate actions. Lambing and Kuehl (2000) think that an entrepreneur has qualities like self-confidence, determination, risk-management, creativity, perfectionism and tolerance against uncertainity. It is also claimed that entrepreneurship is motivated by socio-psycological factors such as helpfulness, altruism, responsibility, social justice and forgiveness. This claim is an objection to people who claim that entrepreneurship is motivated by economic and sociobiologic factors (Montanye, 2006; Gibson and Schwartz, 1998). The fact that entrepreneurship is affected by numerous factors is also related to multiple characteristics that are attributed to it. Therefore, entrepreneurship is multi-dimensional and that's why there are so many qualities to be considered when entrepreneurship qualities are referred to. Frequent entrepreneurial qualities are given in Table 1.

1. Self-confidence	22. Reliability
2. Constancy	23. Prevision
3. Being active and energetic	24. Honesty
4. Skill	25. Commonality
5. Risk taking	26. Being profit-minded
6. Dynamizm & Leadership	27. The Ability of Learning from mistakes
7. Optimism	28. Desire for Power
8. Ambition	29. Good personality
9. Versatility	30. Self-centeredness
10. Creativity	31. Courage
11. The ability of Manipulation	32. Imagination
12. The Ability to Communicate with people	33. Understanding/Sympathy
13. Initiative	34. The Tolerance against uncertainity
14. Flexibility	35. Agression
15. Intelligence	36. Satisfaction
16. Focusing on Clear Objectives	37. Advantage
17. Being competitive	38. Being promising
18. Independency	39. The Ability to rely on employees
19. Sensitivity to critical situations	40. Sensitivity
20. Efficiency	41. Integrity
21. Being Decisive	42. Maturity

(Source: Kuratko & Hodgetts (1998), p. Otd.in Aykan, 2002)

Table 1. Frequent entrepreneurial quality

According to the chart, individual entrepreneur is expected to have socially accepted values like honesty, trust, reliability, maturity, integrity, sympathy and socially approved emotions such as sensitivity, satisfaction, optimism. Besides, they are expected to have the ability of interpersonal communication skills like having good relationships, which include

communicating and influencing other people so they must rely on employees. They are also expected to have the potential to improve life to a higher standard by working efficiently, being competitive and having self-confidence. Being energetic and having iniatitive are also required to be able to have the qualities like risk taking, leadership and the ability to focus on clear objectives. They are also expected to have alot of positive personality traits such as being tolerant against uncertainity and courage. Being skillful and patient are also required qualities.These individuals must have vision for future. Therefore, studies associated with individual entrepreneur can be gathered around some common qualities.

A very significant number of studies associated with common traits of individual entrepreneurs argue that individual entrepreneurs are people who have risk-taking ability. Risk-taking is related to innovation and creativity and it is necessary for the realization of objectives. Having high self-confidence increases the tendency to take risks. However, it is also known that excessive self-confidence leads to an ignorance of risk factors. Individual entrepreneur knows his limits. Therefore, he does not take unnecassry risks. He can control his emotions and accepts risk if only profit equals it or higher than it is (Tan & Pazarcık, 1984). There are different points of views that risk-taking is a characteristic of an entrepreneur. Very few studies, for example McClelland's research points out that the ones who are strongly in need of success moderate their desire for taking risks and moderate risks bring a high motivation for success. Similarly, the study states that people who have a strong self-control system also tend to be in need of success and they are restricted as moderate risk-takers. According to Low and MacMillan (1988), risk-taking is not a characteristic of an entrepreneur. They have tendency to take risks as much as everyone does; however, they are very good risk managers.

It is claimed that second common trait of individual entrepreneurs is "innovation" and "creativity". Imagination, following dreams and trying new ideas are some important characteristics of entrepreneurs. The claim of seeing the opportunuties where others see limits and turning them into business ideas is very strong in these individuals (Tekin, 1999). Entrepreneurs are very successful in developing new ideas for radical changes and they want to work in environments which are less structured and where there are fewer rules. They are mostly concentrated on action more than efficiency (Kümbül-Güler, 2008). It is almost a necessity for them to introduce original, new and surprising ideas or act in an original way or surprisingly; however, all these ideas and actions must contribute to his life or the others' lives in a positive way (Peterson & Seligman, 2004).

Successful entrpreneurs are determined and patient. They don not avoid decisions and look for solutions instead of accepting problems as they are. Entrepreneurs enjoy struggling with failures and obstacles. It is very important to be determined and perseverant in order to handle failures and overcome obstacles (Kuratko & Hodgetts, 1998; Otd. in Aykan, 2002). Perseverance sifnifies performance related to an individual's perception of his own ability. Persevarance as an entrepreneural characteristic is a strong cognitive element in order to handle and overcome the unexpected difficulties and obstacles. A perseverant individual has the ability to be able to find new ways to get over obstacles and limitations in competitive environments. Perseverance, which is accepted as one of the strongest points of individual means to keep struggling persistently by challenging misfortunes and difficulties (Kümbül-Güler, 2008). Individual entrepreneurs are much more determined than others in

challenging difficulties are and obstacles are and they observe the development of the conditions for the solution so that they can respond appropriately at the right moment.

Self-confidence and optimism are also common characteristics of successful entrepreneurs. This individual believes that he can overcome all difficulties he meets through his self-confidence. Self-confidence accelerates the development of positive feelings by increasing inner peace.Self-confident people have passion to learn and they are open to searching and criticism. Therefore, entrpreneurs have an optimist point of view (Avşar, 2007). However, as it was mentioned before, they are very sensitive about risks that can be resulted from excessive self-confidence so they don't allow themselves to make irrational moves.It is known that creativity, self-confidence and optimism trigger entrepreneurs interactively. Optimism is also defined as the tendency to concentrate on the positive side and see the best opportunities; however, seeing those opportunities requirs asking right questions (Kümbül-Güler, 2008). Entrepreneurs are not people who produce excuses for why something can not be done by focusing on problems because they are opportunity oriented (Dees et al., 2001). They use their self-confidence to choose creative and risky options fort he problems and opportunities.Therefore, self-confidence is seen as a compulsion for entrepreneurs (Bird, 1995; Otd.in Cansız, 2007).

Successful entrepreneur is someone who aims to act independently and in accordance with this purpose, he carries the risks. It is impossible for an entrepreneur to be trapped in strict bureaucracy and they are cabaple of resisting against rules or forcing to change rules in order to reach their aims. They are skilled at acting independently. Entrpreneurs are people who make a difference compared to others (Kuratko & Hodgetts, 1998). For an entrepreneur,independency means making moves freely without depending on anybody while taking decisions and it also means to act avoiding rules, procedures and social limitations.Entrepreneurs don not take all decisions alone but they want to be the only authority while taking the most important decisions (Cansız, 2007). Kourilsky and Walstad (2002) carried out a research on high school students and it was discovered that one of the reasons underlining the desire for having their own business is to be able to act independently. However, nowadays besides entrepreneur's desire to act independently, the concept of "team business" has come into forefront and it has been underlined that success is only possible by team work (Chell, 2007).

Since business relations spreaded beyond the nation, international division of labour is inevitable. Because of the factors of intercontinental competition and free movement of capital, social structure and relations change constantly so to be able to exist in this changing world, entrepreneurs have to renew themselves continously. However, no matter how entrepreneurs keep up with this changing world, they can stil remain in uncertainity because of these changes. Therefore, it is necessary for them to have the ability of tolerance for uncertainity to be able to stay away from stress and anxiety. The stronger tolerance they show towards uncertain conditions, the less they are affected by them and they can handle negative stiuations more easily (Avşar, 2007). In fact, risk and uncertainity are complementary qualities. Each risk has an uncertain element in it and each uncertanity involves a process, which is full of risks. Showing tolerance for uncertainity means their dealing with problems without feeling psychological pressure under the lack of information and unknown situations. Entrepreneurs not only perform in uncertain conditions but also look for new possibilities so that they can study and overcome uncertainity as they see it as

an achievement (Cansız, 2007). Johnson (2003) said that even when they do not have powerful predictor sources, entrepreneurs are able to act and work efficently without feeling discomfort.

Characteristics associated with entrepreneurs should not mean that they are selfish and self-centered people who only think about themselves. One of the most important factors that motivate entrepreneurs is that they consider not only their own personal benefits but also social benefits. Individual entrepreneur figures out advantages for himself while working in production field but at the same time he considers the advantages and disadvantages of this situation for the society. In this context, "altruism"that means "having the advantage for the other person's benefit" is one of the most important characteristics of entrepreneurs. Altruism which is studied in the context of prosocial behaviour involves protecting and increasing personal wellfare of related people. Entrepreneurs feel the need to make contributions to the society as well as personal success and advantages and they prove that they can make sacrifices for the society not only for their own good (Montanye, 2006; Velamuri, 2002). One of the basic characteristics that entrepreneurs must have is "empathy". The fact that they have other powerful entrepreneual traits is not enough for success. Being able to look at the world and the events with the opposite side's point of view provides competitive advantage in entrepreneurship. Emphatic entrepreneurs get advantages over many points. They meet their coustomers' expectations in the market and they make their employees happy by meeting their expectations from business enterprise and entrepreneur. They take precautions by predicting their competitors'moves beforehand (Cansız, 2007).

3.2 Entrepreneurship and motivation

It is known that motivation has an important role in forming entrepreneurship culture. Motivation includes a trinity cycle which is either an incentive that takes the entrepreneur to a certain target or it is the behavior which is done to reach the target and lastly it is the process of reaching the target (Cabar, 2006). It is highly difficult to develop a motivation model for every person or entrepreneur although it is admitted that there are some incentive tools for motivational purpose. We can include financial, psychological and social tools as incentives.There are also organizational and administrational incentive tools to be added to the list (Cabar, 2006). Values are the most wondered issue among these incentive tools. They cause an individual to have a purpose because their obeying existing rules of organization can be controlled mostly by these reinforcements. Yet economic results based on either reaching the objective or not achieving the goal are factual and these facts motivate individual more towards the action that can take him to success. However, values are abstract issues. It is interesting and also hard to understand exactly what values motivate individual to decide to be an entrepreneur.

Yet a lot of research, (Glazer et al., 2004; Knafo & Schwartz, 2004; Bardi & Schwartz, 2003; Devos et al., 2002; Naktiyok & Timuroğlu, 2009) which was carried out about this issue emphasized the relationship between entrepreneurship and values by means of motivational aspects and defined ten value types on this subject. Gain power, success and get pleasure, guide oneself, be helpful for others, follow the existing traditional forms, provide security, contribute to the universal forms are the main ones of these value types. Each of these value types present a motivational purpose and influence behaviors (Gibson & Schwartz, 1998). Power, social status and prestige, for instance, prove the importance of

authority and control over people and resources. The values under this dimension cover social power, wealth, authority, public image and publicity (Schwartz & Boehnke, 2004; Bardi & Schwartz, 2003) and individual tends to experience entrepreneurial action by means of these needs. While Peay and Dyer were studying the relationship between willingness for entrepreneurship and power, they found out that entrepreneurs are motivated by both their personal and social power needs (Peay & Dyer, 1989). Yet again the fact that there are cultural differences on this point must not be ignored. For example, Bhandari (2006) carried out research over the students in India and he tested his hypothesis that claims that social status and prestige influence entrepreneur's intention but couldnot prove this correlation.

Individual should set targets on how to live his life and being able to move towards these clear objectives is an important source for inner motivation. In these sense, setting a right and reachable target is important because each achieved target means the first step of a new reachable target. Yet every achieved target helps to eliminate and satisfy many important psychological needs, some of which are self-actualization, pride and the need for achievement (Allan, 1998). Need for achievement which is considered among important psychological needs is one of the variables whose effect in development of entrepreneurial behavior is mostly studied. Need for achievement means that individual sees and feels satisfied when his actions have positive outcomes by giving his own decisions and carrying his responsibilities (Avşar, 2007). McCleland (1961) suggested three dimensions of need for achievement: a) personal responsibility for solution of problems, setting targets and achieving goals; b) taking risks instead of luck; c) predict outcomes of a decision or a business success. According to McClelland (1961) individuals who have a high need for achievement prefer medium-level risky tasks which require personal skill and effort in order to be able to take personal responsibility of obtained results. Therefore, it is stated that individuals who have a high need for achievement tend towards entrepreneurship rather than working on salary basis. Besides, entrepreneurs have a desire to be successful more than to earn money. The gain obtained is not a consequence of the need for achievement but it can be considered as a means or feedback to evaluate success (Kümbül-Güler, 2008). According to Johnson (1990), the most important factor of entrepreneurship is the motivation for success. Individuals who have a high motivation for success have a high sense of responsibility. These individuals set targets to try to reach them and get feedback related to their performance. They do not put the blame on luck or external factors but take the responsibility in case of a failure.

Studies have shown that there is a correlation between entrepreneurship and a high need for achievement. In the longitudinal research that McClelland (1965) carried out, it was determined that the students who had a high need for achievement became entrepreneurs after years. Likewise, Fineman (1977) and Collins, Locke and Hanges (2000) have stated that need for achievement predicts entrepreneurship in a meaningful way. According to the theory of need for achievement, an important motivation source is"need for superiority". Need for superiority is a part of need for power and it involves gaining and keeping the control in hand. Because individual who is in need for superiority desires to be influential over others and wants to be considered as valuable (Önder, 2010), they are expected to show tendency towards entrepreneurship as they have the opportunity to use power and gain superiority over employees due to the fact that entrepreneurs are the center of authority inside the enterprise (Kümbül-Güler, 2008). However, there are objections from the field of

social psychology to the need of achievement that is suggested to have universal validity. Some studies in the field of social psychology (Kağıtçıbaşı, 1996) argue that the concepts of individualism and collectivism have become prominent since 1980s to understand the inner dynamics or different characteristics of societies. They suggest that "need for achievement" that is considered as intervening variable and even sometimes independent variable to explain economic growth earlier cannot fill in the space, which is prepared for it because of its entrepreneurial-individualistic quality. While explaining inner sources for entrepreneurial motivation, another concept that is emphasized is "need for autonomy". Need for autonomy, which resembles need for independence, is the main reason for an entrepreneur to set up business. If an individual has need for autonomy, it means that he wants deeply to have the control over the issues associated with him. The fact that individuals who want their decisions to be in control over their lives avoid working under management of others; therefore, It is obvious that these individuals want to have their own businesses. It can be said that entrepreneurs as being independent individuals who take their own decisions and carry their own responsibilities have the need for autonomy (Kümbül-Güler, 2008). Autonomous individuals take the responsibility of their own judgments instead of following others' ideas blindly. Besides, these individuals take the responsibility of their own lives instead of living based on other peoples' opinions and experiences. Many researchers have observed that the role of entrepreneurship requires independency. According to the researchers, entrepreneur takes the responsibility to go after opportunities; take the responsibility of outcomes of their actions either successful or failed and carry on entrepreneurial efforts since they like independency (Shane, Locke & Collins, 2003).

3.3 Entrepreneurship and self-efficacy

Self-efficacy is one of the main concepts of social-cognitive theory. It has been defined as the belief that one is capable of performing in a certain manner and how to be successful when he faces difficulties. The perception of self-efficacy affects one's behaviors at least in three ways: (a) one's choice of activities, which will be performed (b) one's performance quality (c) one's persistence in difficult tasks. It also increases the strength to overcome failures. The ones who do not have the belief of self-efficacy tend to emphasize their personal inefficacy and believe that potential obstacles cannot be overcome. One's performance quality and persistence for difficult tasks can be affected by their self-efficacy beliefs (Bell-Gredler, 1986). There are four sources that affect one's beliefs about their self-efficacy: enactive mastery experiences, vicarious experiences, verbal persuasion and physiological and emotional situation. Enactive mastery provides the most realistic indications about ability of bringing sources together for achievement. While one's achievements raise the perception of self-efficacy, repeated failures can lower the perception of self-efficacy.However, enactive mastery experiences do not include simple achievements. The individuals who have only simple achievements can easily lose their courage when they face failure.

Enactive mastery experiences and developing the perception of self-efficacy include cognitive and behavioral abilities that are necessary to perform a certain act in a certain manner. Vicarious experiences, on the other hand contribute to self-efficacy by means of models. Observing similar individuals performing certain acts in a certain manner can raise one's perception of self-efficacy. Vicarious experiences are effective in the case of not

having or very limited original experiences. Verbal persuasion, which is encouragements /incentives, suggestions and advice that are associated with one's achievement or failure affect the sense of self-efficacy.However, if other sources do not exist, verbal persuasion cannot raise personal self-efficacy. Physiological and emotional state can give data about self-efficacy. People tend to interpret tension and stress responses as an indicator of poor performance. Therefore, tendencies that create stress and negative emotions must be decreased (Gredler, 1997). Self-efficacy, which is an important factor in determining entrepreneurial behaviors, develop in time and can be affected by many internal and external factors such as financial situations, personality and values (Cox et al., 2002). According to Zhao, Seibert and Hills (2005) entrepreneurial self-efficacy determines entrepreneurial intentions. It also affects the perceptions of formal learning, entrepreneurial experience, risk propensity and gender. Entrepreneurial self-efficacy defines entrepreneur's belief about whether they are capable of doing their tasks successfully or they fail (Mueller & Dato-On, 2008). In entrepreneurship, one's evaluation of self-efficacy begins with the calculation of performance time for the realization of processes like taking the opportunities, business planning, and financial preparation. Then individual has to go over the situation of achieving these processes and resources to set up a business. Lastly, individual identifies his chances to set up a successful business by evaluating positive and negative entrepreneurship experiences in his past (Summers, 1998; Otd.in Kümbül-Güler, 2008).

Bandura (1986) says that self-efficacy is the most powerful predictor for choice of profession. On the other hand, according to Chandler and Jansen (1992), self-reported competencies predict entrepreneurial performance. Markman and Baron (2003) have stated that high-level self-efficacy is an important factor that enables to be a successful entrepreneur and that individuals with high-level self-efficacy are willing to take and carry on tasks, which require struggle. The individual who wants to test his own competence in every field of his life tend to face difficulties in business life. This situation raises his tendency to become an entrepreneur by stimulating his desire to explore his limits about difficulties.

3.4 Entrepreneurship and locus of control

How individuals attribute responsibility of their actions and whether these different attributions can be evaluated as personal traits of individuals became the focus of interest in psychology in 1960s. Multidimensional research was carried out by Rotter (1966) on the concept called locus of control for long years. Locus of control is an important variable in explaining human behaviors in organizations and business life because their ways of taking responsibility in these fields of life, which require responsibility, are effective by means of consequences. According to Rotter (1966) locus of control is one's belief and generalized expectation associated with the outcomes of one's actions and incidents in his life are in his control or depend on some external factors. Rotter (1966) emphasized that people who have internal locus of control are more aware of the opportunities around them to achieve their goals and get into action to improve their environment. He also emphasized that they underline the effort made for success and they are tend to improve their skills. These individuals feel that they are responsible for their own lives and they perceive that their destiny is affected by their own decisions not external factors outside their influence. The beliefs of having control over their destiny prevent them from doubting the process of

personal transformation because they feel responsible for their actions. They form a strong relationship between their actions and the things going on around them.

This self-confidence and independence make these people less anxious, more active and more successful. They make more efforts and they are mostly future-oriented. The people who have internal locus of control are also efficient and innovative. They have very high-level of self-control. They tend to be more motivated and more successful both in their academic lives and in their businesses compared to individuals who have external locus of control. Their belief in their potential makes these people tough and resistant against pressures so they are not easily affected (De Vries & Balazs, 1999). External locus of control is an aspect of personality, which is defined with the belief that individual does not have a control over his actions and their outcomes but his life and his experiences are under the control of external forces such as God, fate, ill-fortune and powerful others (Rotter, 1966). These individuals mostly see change as a danger. They do not feel control of powers that control their lives. They prefer to stay in a passive position in case of a change in their lives. They do not have the ability to step forward with determination. They are more obedient and conformist. They are likely to response with depressive reactions (De Vries and Balazs, 1999). Individuals with internal locus of control believe that they can control their business environment by their actions.Furthermore; they expose entrepreneurial performance and experiences. On the other hand, individuals with external locus of control have actions that are more conformist and they behave obediently. Individuals with internal locus of control become more successful when tasks or organizational demands require independence and initiative. It is possible for these individuals to have higher motivation for the tasks, which require higher motivation if they believe their efforts will bring reward. These individuals are more suitable for professions that require technical information and skill. They are also more suitable for professional jobs such as managers or supervisors whereas individuals with external locus of control are more suitable for traditional working methods and professions that do not require skill such as production business or office work. Besides, individuals with internal locus of control have higher job satisfaction because they believe in their abilities and that their efforts will result in a good performance. They are almost sure that their good performance will get award and they perceive their positions in a more objective way.Internal locus of control is a characteristic that is found more in business founders compared to other individuals as it is related to entrepreneurship (Spector, 1982). In a study which is done in Turkey (Korkmazyürek et al., 2008), the relationship among innovation, risk-taking and focusing on opportunity is analysed. They are the dimensions of locus of control and organizational entrepreneurship. In this study, it was determined that the ones with internal locus of control are more innovative, risk-taker and more target focused compared to the ones with external locus of control. Yet some studies point out that individuals in communitarian cultures are more external locus of control. This situation is used as a variable in explaining why there are less entrepreneurial traits in communitarian cultures.

4. Entrepreneurship and culture

4.1 A general overview on entrepreneurship culture

Studies which have been carried out on entrepreneurship have showed that there are a lot of indicators of entrepreneurial behavior. An important part of these studies have focused

on personal characteristics of individual entrepreneur or circumstantial properties. The studies that were focused on personal traits have claimed that entrepreneurship is an individualistic behavior. Therefore; they said that it is more important to understand the relationship between individualistic behavior and personal characteristics. Some other studies emphasize entrepreneurial qualities, and they think that culture must be the actual research field. They believe that it is impossible to understand an individual's entrepreneurial qualities without examining cultural properties of the society in which individual lives. In fact, these two propensities do not exclude each other. Both of them attach importance to each other's data and use it in their studies to improve them. Yet,when it is considered on the whole, the subject matter of entrepreneurship has the features of a field which can be studied in two ways , one of which examines personal characteristics,socio-demographic attributes, future objectives, hopes and expectations of individuals by focusing on individual properties; on the other hand, in the concept of entrepreneurship culture, it examines family, education, religion and belief systems by paying attention to value system that individual belongs to and cultural environment which this value system creates.

In the subject matter of entrepreneurship, studies which are focused on the effects of personal factors on entrepreneurship highlight that motivation resources that support entrepreneurship are mostly related to person and they do not pay much attention to individual's social motivation resources. These studies have shown that individual's personal resources affect individual behavior all at once not one by one. For example, individual's entrepreneurship is triggered by not only achievement motivation but also being tolerant for uncertainty and having a high potential to take risk. There are different cultural effects behind achievement motivation that seems to be individualistic. For example, the fact that autonomy or auditing is more individualistic structured or more social structured have a different impact on achievement motivation. Achievement motivation in American culture is determined over personal effort, actions and competition with others whereas experiences to impose individual achievement in communitarian cultures like India have failed (Kağıtçıbaşı, 2000). Likewise, cultural differences cannot be ignored in terms of risk-taking and tolerance for uncertainty factors. Even though personal characteristics of entrepreneurs have been studied for a very long time, the history of empirical studies which make comparative analysis of these characteristics in different cultures is not very long (Mueller & Thomas, 2001). Especially need for cross-cultural studies that will contribute to development of cultural approach related to entrepreneurship is obvious.

Some researchers who consider entrepreneurship as a personality characteristic (Tanrısever, 2004; Cabar, 2006) emphasize that the connection of these characteristics with the culture must not be ignored. These researchers also argue that the individuals in some cultures that support entrepreneurial qualities can have these characteristics more than the ones who live in some other cultures which do not support entrepreneurial skills. According to these researchers, cultures that support their members' independence raise individuals with more entrepreneurial skills in comparison with the cultures that expect obedience from their members. At this very point, the concept of entrepreneurship, which aims to raise the type of person who is oriented to give opportunities to others and obtain results for his studies and actions by being bold and dynamic has come to the forefront.

Conformity, consistency and efficacy messages that individuals get from media and personal relationships through their lives influence their intentions for being an entrepreneur while choosing their professions (Akşit, 2003); and in an age of constant initiation of division of labour, professions that require entrepreneurial skills are encoded in individuals' brains by their cultural environment. Besides, universal values like equality, a peaceful world, being in harmony with nature, social justice, freedom of opinion and protection of environment (Schwartz & Boehnke, 2004) that are popularized through globalism also existed in the values that are supported by entrepreneurs. Entrepreneurship culture improves with these values and post-modern culture causes to form a new entrepreneurship culture as a result of universal thought and standardization (Nicholson & Anderson, 2005).

It is not correct to categorize cultures and to say that cultures either support entrepreneurship or they are opposed to it entirely (Hisrich & Peters, 1998). There are sub-cultures that affect value systems in every culture. These sub-cultures are nourished by tradition and social relations habits or religion. Yet, every sub-culture or dominant culture lacks the power of framing all behaviors of individual. As a matter of fact, it is even possible to have collective behavior models in cultures that seem contrary with each other. For example, Yasin (1996) could not identify the difference between Palestinian Muslim entrepreneurs and Jewish entrepreneurs in terms of their needs for achievement and he attributed this situation to the effects of tradition more than religious values.

4.2 Value systems and entrepreneurship

Values are standards and principles that are accepted by the members of a society. Value, which is mostly nested within attitude are related to cultural properties that lie behind attitude. Values affect attitude and attitude affect behaviors (Sweney et al., 1999). Value, which is identified as permanent beliefs that determine what must be done in a situation, takes place in a value system within other values and some values play a more central role than the others in this system (Kağıtçıbaşı, 2000). Values guide individuals to act within reasonable social roles by drawing the outline of socially-accepted behaviors in a society. They structure individuals' interests in every field of their lives and the courage for actions of their interests. Thus, individuals act accordingly for valuable aims in accordance with their roles and expectations. Besides, values are means of social control and pressure and they are the elements/factors of social process. However, what values are associated with what actions or whether values have any relation with actions in general is not clear. Yet again, it is assumed that the relationship between values and actions is arranged by a simple motivational structure (Bardi & Schwartz, 2003).

Values are effective in determining the standards that guide individuals for their actions about their jobs in working life and in their plans to solve conflicts. Furthermore, business values are instruments for motivation and undertake the function of applying sanctions on individuals' actions. Nowadays, generally, enterprises in the world prioritize values like creativity, imagination, entrepreneurship, having a vision and also business ethic, social responsibility, total quality manner and in-service training. They also attach importance to respect for human rights, research and developmental activities and lastly a constant self-improvement (Silah, 2005). However, despite these generally accepted principles, there are different values among cultures in business world.

The value that is produced by working life is not limited by only business values but since it gives individual the opportunity to know his limits by putting him in a social environment, it creates differences in individual's personal values. For example, individuals who improve their social status through business life also improve their self-confidence. Self-confident individual tend to expand the limits of business activities; therefore, a new business position enables to internalize new business values and this cycle carries on like this. In this context, making an attempt for a business means a constant framing of not only personal values but also business and social values. Within this period, individual as a part of social culture is in an interaction with traditions, customs and ethical values. In social groups that have external environment-oriented leadership and support high moral values, individuals' chances to have entrepreneurial values increase (Casson, 1990). Enterprise culture of economic organizations is also effective in this period. It is important to have fiduciary culture in organizations to improve creativity, innovation and entrepreneurship. However, control mechanism can be internalized in such organizations and individual can make productions not only for the enterprise but also to experience the feeling of self-improvement (Sargut, 2001). Therefore, both business values and enterprise values must show parallelism with social values regarding the society to which they belong. The fact that these values coincide with individual's personal values is very important in effective entrepreneurship. Likewise, all these values have to update themselves regularly as part of universal values. Organizations can take the opportunities both to be able to deal with deepening high-level competition in business lines and in order to satisfy their employees as long as they make connections among these values and update them as well.

General characteristics of culture are as important as personal characteristics for cultural interaction and conducting activities within the values of social structure. Individuals' cultural commitment is stronger in societies that have traditional values compared to modern societies (Williams & Narendran, 1999). In traditional societies, there is less risk and the rules of life are determined by the society, which means everything is clear and obvious in these societies. In modern societies, however, individual has to struggle against uncertainty due to rapid change. Therefore, individuals in modern societies take more risks and try to struggle more against uncertainty in order to accommodate to the period of change from early ages. As a result they have to have qualities that require entrepreneurship at an earlier age. In countries which are in the period of transition from traditional to modern society, Uncertainty Avoidance still remains in power as a cultural value. In societies with a high Uncertainty Avoidance index, it is preferred to act by remaining in structured situations in every area of life. According to the results of Hofstede's research, which includes four cultural dimensions (Power Distance Index, Individualism-Collectivism, Masculinity-Femininity and Uncertainty Avoidance Index), it is determined that societies of countries like Greece, Japan, France and Turkey have a high Uncertainty Avoidance whereas countries like Denmark, United Kingdom and Sweden have a high tolerance for Uncertainty. In some later research concerning Turkish society (Sargut, 2001; Wasti, 1995), it was found out that there is a high Uncertainty Avoidance in this society. Raising individuals with entrepreneurial qualities in traditional societies can be possible through educational institutions that have entrepreneurial objectives. Through this period, it is strictly necessary to have new paradigms and policies.However; there is paradox here as traditional societies avoid change in education. Therefore, it takes seriously long time to raise individuals with entrepreneurial qualities in traditional societies.

Entrepreneurial individuals are intensely affected by sub-cultural values which they belong to. For example, in Turkey gender in business life creates a value perception. Turkey tries to stick to properties of a male-dominant society. Therefore, as an essential entrepreneurial quality, hard-work which is emphasized as a male quality has come forward. Because of the belief which suggests that females are more emotional and they cannot be reasonable, simpler and less demanding jobs which require love and affection such as social services, psychologist, human relations and teaching are considered to be more suitable for women.

4.3 Entrepreneurship in individualist and collectivist cultures

The fact that how internal dynamics of social relations affect individual and how different characteristics of different societies shape their individuals' behaviors has been a matter of discussion for many years. The concern for individualism-collectivism is considerably associated with the concern for human dimension of economic growth. While studying the ways of how different cultural structures affect economic growth, it has been determined that one of the most important four characteristics that makes cultures unique is individualism/collectivism (Hofstede, 1980, 1983). It has also been indicated that individuals who grow up in individualistic cultures adopt individualistic cultural behaviors and the ones who grow up in collectivist cultures adopt collectivist cultural behaviors. It has been discovered that this situation has also been reflected in psychological process and behaviors (Marin, 1985). Recently, the increasing interest of the West towards the East, the rise of Japan and the economic development of four Asian Tigers (Hong Kong, South Korea, Singapore and Taiwan) initiate to conduct a lot of research over mother-child relationships and other organizational relations in these countries. Previously, it was claimed that individualistic cultures raise more entrepreneurial individuals and as a result, economic growth is faster in those cultures. However, the experiences of economic growth in the Far East affected this idea significantly. Realization of rapid economic growth in these countries in which commitment and collectivist cultures are common has become an exception to break accustomed general pattern in which individualism and economic growth are considered to be identical (Kağıtçıbaşı, 1996).

The variation of creative behavior of people varies according to individual's character, cultural environment he lives in and the education he has. In individualistic societies, creativity can be affected by both the age of individual and the complexity of jobs and tasks he does; it may also be influenced by the pressures to which individuals are exposed to get a reward in a certain reward system. In collectivist societies, acting within the community and giving priority to social interest over self-interest are the most important factors that affect creativity (Yellioğlu, 2007). The USA can be the best example for an individualistic society; on the other hand, Asian countries can be given as the best examples for collectivist societies. Even if European countries are mostly individualistic, they also hold the qualities of collectivist societies (Döm, 2006).

Tiessen (1997) mentions that entrepreneurs in individualistic and collectivist societies follow different strategies from each other in providing resources. Busenitz and Lau (1997), who studied the reasons why some cultures create more entrepreneurs than others, think that this is determined by personal characteristics, social context and cultural values in collaboration with each other. According to them, cultural values like Individualism-Collectivism, Uncertainity Avoidance, Power Distance Index, Long-Term Orientation; social

context, which includes social mobility, ecology, business and marketing conditions; and individual variant/personal variables such as risk-taking, locus of control and need for achievement come together to form a cognition so that they can initiate individual to set up the enterprise. Besides, it is also emphasized that entrepreneurial qualities are more dominant in high security societies. Being able to have safe relationships depends on individuals' long-term interaction with the people opposite side. Long-term relationships take place by means of school and family.

Family is the first institution that culturalise individual, however, school which takes place in child's life from the very early age especially in big cities also is a very important agent of cultural transmission. Family as the initial culture transmitter teaches the child how to shape from very early ages via their class positions. Hence, family as a sub-culture teaches the child how to act within economic institutions. Cultural factors that affect entrepreneurship in these sub-cultures display diversity. It is known that extended or joint families in traditional societies based on primitive agricultural economics expect their children to be dependent and loyal. Erelçin (1998) has shown that urban people attach more importance to material support rather than moral support whereas rural people are more likely to share their material and moral resources with their close environment. These findings show that rural area relationship models empower the tendencies of collectivist behavior.

When family environment supports entrepreneurship, entrepreneurial qualities of child get stronger Families in Turkey do not support them to become independent individuals while raising their children. Being a "dutiful child" is prior to being rich or having financial resources. Since children have difficulty in making decisions without taking permission from their parents (Ekşi, 1981; Geçtan, 1973), they can feel blocked and cannot do what they want. Therefore, many young people have difficulty in aiming nonconventional jobs so they stay away from doing some jobs they can easily do.

Young people show a tendency to deal with more conventional and guaranteed jobs. Even if they are less paid, they would rather have clerical occupations than risky jobs that do not have a guarantee. These cultural codes that hinder children to achieve autonomy also prevent them from developing entrepreneurial qualities. The use of force on children leads to an inclination in their abilities to develop inner discipline and self-control. Even though there is less obedience in family and school relationships with the concept of modernity compared to past, corporal punishment methods can still be accepted as tools for child education (Göka, 2006). Children who are in a powerless position against adults are forced to show behaviors that are acceptable by adults to be able to escape from these uses of force and they are also made to act within the limits that adults established. This whole process is accepted as an obstacle that blocks the development of entrepreneurial qualities.

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2

Entrepreneurial Intentions: The Role of the Cognitive Variables

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1. Introduction

The impact of entrepreneurial activity and the creation of new businesses on the economic growth of a country and the generation of jobs are recognized worldwide. The degree to which a society stimulates entrepreneurial activity, as opposed to stimulating an individual to select a career as an employee, varies among nations, and within the different social groups of a nation. The reasons mentioned for these variations include cultural explanations (e.g., Altinay & Basu, 2002), business environment explanations (Acs et al., 2005), psychological explanations (e.g., Koh, 1996), or a mix of these. Accordingly, the study of the relation between individual's sociodemographic and psychological variables with the desire to follow an independent career in the future, what we call "entrepreneurial intention", is considered pertinent. Therefore, one of the objectives of the chapter is to determinate the antecedents of the entrepreneurial intentions of undergraduates. A second objective is to assess the degree to which the cognitive processes contribute, beyond the student country and socioeconomic condition, to students´ entrepreneurial intentions.

The variables used to study entrepreneurs have gradually changed over the years (Sánchez, 2011a). The personality traits and demographic variables that differentiate entrepreneurs from non-entrepreneurs were the initial focus of interest. These lines of analysis allowed us to identify significant relations between certain personality traits and demographic characteristics and individuals showing entrepreneurial behaviour. Nonetheless, some authors have criticized these approaches for their methodological and conceptual limitations and for their limited predictive capability (Robinson et al., 1991)

A new line of analysis, the cognition, has emerged as an important theoretical perspective for understanding and explaining entrepreneurial behaviour (Goodwin & Wofford, 1990; Sánchez, 2011b). Neisser (1967) defines cognition as "all processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used". Mitchel et al. (2002) consider that "entrepreneurial cognitions are the knowledge structures that people use to make assessments, judgments, or decisions involving opportunity evaluation, venture creation, and growth" (p.97). From this perspective, since the decision to become an entrepreneur is considered to be both conscious and voluntary (Krueger, 2000), it seems reasonable to analyze how that decision is taken. The analysis of cognition thus contributes significantly to the study of entrepreneurship (Allinson et al., 2000; Mitchell et al., 2002).

Indeed, some authors suggest that the future of entrepreneurship research should be focused on the study of cognitive social categories (Sánchez, 2011b).

Thus, entrepreneurship can be viewed as a way of thinking, a way of thinking that emphasizes opportunities over threats (Krueger, 2000), a process (opportunity identification) that takes place over time (Carrier & Kyrö, 2005). The opportunity identification process is clearly an intentional process, and, therefore, entrepreneurial intentions clearly merit our attention. The entrepreneurial intention has been considered as the key element to understand the new-firm creation process (Bird, 1988), as a prior and determinant element in the performance of entrepreneurial behaviours (Fayolle & Gailly, 2004). In cognitive psychology, intention is the cognitive state immediately prior to performing behaviour (Krueger, 2003). Essentially, behaviour is intentional if it is not the result of a stimulus-response relation, and any planned behaviour is intentional.

The intention to perform a behaviour (in our case, new venture creation) can be affected by certain factors, some of which are endogenous or internal (e.g., needs, values, habits and beliefs, Lee & Wong, 2004) and others are exogenous or situational (e.g., difficulty of the task). In this sense, entrepreneurial research has been conducted following two main lines: the personal characteristics or traits of the entrepreneur; and the influence of contextual factors in entrepreneurship (Robinson et al., 1991). From this last institutional approach, some entrepreneurial models with a cognitive basis emerged to explain this phenomenon: the Entrepreneurial Event Theory (Shapero & Sokol, 1982) and the Theory of Planned Behaviour (Ajzen, 1991) appeared as the main theory-driver models. They have been widely adopted by entrepreneurial intention research to analyze new venture creation.

There is, however, little variation among the different approaches taken from these models (Krueger, 2000) and some authors have even tried to integrate them into a single model (Kolvereid & Lakovleva, 2009). These models use two critical antecedents of intentions that can be classified (give or take some obvious terminological differences) as perceived feasibility and perceived desirability.

Now then, if the intentions depend on personal beliefs and attitudes, then researchers interested in entrepreneurial behaviour should also explore the sources of these antecedents. Cognitive science has demonstrated how attitudes and beliefs that are expressed on the surface have their origins in deeper structures, in how we represent knowledge and how that knowledge is interrelated. That is, that knowledge does not exist as discrete "data" but rather is interconnected. To analyze these deeper structures, cognitive science has used methods such as causal maps, schemes and scripts. In this chapter we take into consideration cognitive scripts.

As its name suggests, a script is "a cognitive mechanism that comprises the key elements in a situation decision and the likely ordering of events" (Krueger, 2003, p. 128-29), a "highly developed, sequentially ordered knowledge" that forms "an action-based knowledge structure (Mitchell et al., 2000 p.975). In the field of entrepreneurship the underlying assumption in this respect is that entrepreneurs possess a thought structure in relation to entrepreneurship that is significantly better than that of non-entrepreneurs (Lord & Maher, 1990).

Script analysis has been considered primarily from the theory of expert information processing in order to examine differences between entrepreneurs and non-entrepreneurs as

regards decision-making and is rooted in the following idea: entrepreneurs develop unique knowledge structures and they process (transform, store, recover and use) information differently from non-entrepreneurs (e.g., Mitchell, 1994; Mitchell et al., 2000). Thus, according to the theory of expert information processing, entrepreneurs are experts in the field of entrepreneurship and through deliberate practice (e.g., Baron & Henry, 2006; Mitchell, 2005) can acquire entrepreneurial cognitions; that is, scripts or knowledge structures that allow them to use the information significantly better than non-expert entrepreneurs.

Although it has been shown that scripts are antecedent to the venture creation decision, little has been done in the way of analyzing how these scripts affect entrepreneurial intention. In our opinion it is reasonable to expect that these same entrepreneurial scripts are also antecedent to other previous steps in the process of business venture creation, such as the entrepreneurial intention. We thus suggest that there is a relation between scripts and entrepreneurial intention.

The reasoning behind these expectations is consistent with the fact that those who have an entrepreneurial intention may not perceive starting a business as a risk, since what may be perceived as a risk by some individuals is not perceived as such by others (Simon et al., 2000). Thus, we suggest that scripts affect entrepreneurial intention. Given that individuals who work in specialized fields have unique knowledge, it is logical to expect that among a broad range of demographic groupings (e.g., age, culture, gender, etc.), the individuals who score high in these dimensions of cognitive scripts probably have similar thought patterns in regard to entrepreneurship and to this extent they can be differentiated from those who do not have an entrepreneurial intention.

However, we also accept that, in some cases, the variance in the expected relation is not completely explained solely by inter-group analysis; there are often intra-group differences that can explain additional variance in this relation (Keppel, 1991). In the study of this relationship there are arguments that suggest the possibility of intra-group variance. Country of origin may be one possible explanation of intra-group variance. It is reasonable to expect that this intra-group variation in levels of entrepreneurial intention could be explained to the extent that perception is affected by the cultural values associated with the participants' country of origin.

Although it is well accepted that cultural values are an antecedent of human behaviour, they are also thought to affect the perceptions that precede that behaviour (Mitchell et al., 2000, 2002). Since each culture can have unique values and norms concerning the creation and running of business ventures, we can expect that entrepreneurial scripts may be culturally specific in their effects on entrepreneurial intention, given the differences in perception that emerge in the processes of engaging in creating an enterprise. Thus, we expect that, to the extent that there are cultural differences between countries, the effects of entrepreneurial scripts on entrepreneurial intention may be country-specific, and therefore we suggest that the effects of the scripts on entrepreneurial intention vary by country.

In this context, the main objective of this chapter is to identify some of the cognitive elements that may explain differences in start-up intentions. The chapter proceeds in the following manner. First, we discuss the central research question to further enable entrepreneurial cognition inquiry. Second, we present the conceptual background and

several representative approaches to entrepreneurial cognition research that form the context for this question. Third, we introduce the empirical analysis carried out to examine the relationships between cognitive scripts and intention, by comparing diverse socio-cultural background. Finally, we offer the results and conclusions concerning the challenges facing the next generation of entrepreneurial cognition and intention. Thus, this chapter seeks to contribute toward redressing this gap in our knowledge by empirically testing a model that draws on the theory of planned behaviour to examine the cognitive antecedents of entrepreneurial intentions among students.

2. Entrepreneurial intention

Psychologists have claimed that assessment of intentions is the most obvious way of predicting the behaviour (eg. Ajzen, 1991). In various situations, intentions have been considered as the most effective predictor of behaviours, such as job search activities and career choice (Kolvereid, 1996). In the entrepreneurship context, behaviours as new ventures, creation of new values are outcomes of entrepreneurial intentions (Bird, 1988). Thus, the entrepreneurial intention has been considered as the key element to understand the new-firm creation process. In this sense, entrepreneurial research has been conducted following two main lines: the personal characteristics or traits of the entrepreneur (eg. Zhao et al, 2005); and the influence of contextual factors (e.g. political and social context, markets, industry opportunities, and financial support, Franke & Luthje, 2003) in entrepreneurship (Robinson et al. 1991).

However, these lines have a limited understanding of the processes through which entrepreneurial intentions develop and come into existence (Markman et al., 2002). Fini et al. (2009) identified several explanations a) the research in this area has an empirical orientation with scant theoretical contribution; and b) many studies have considered isolated variables, often without a clear theoretical rationale, as drivers of entrepreneurial intentions (Zhao et al., 2005). That is, predicting entrepreneurial intentions by modelling only individual or contextual factors as isolated domains usually resulted in disappointingly small explanatory power and even smaller predictive validity (Krueger, 2000).

To address these limitations, some authors have undertaken a multi-disciplinary approach, adopting the so-called process models (or intention models). Historically, the first widely accepted model was the theory of reasoned action (TRA, Ajzen & Fishbein, 1980). Later, was called the theory of planned behaviour (TPB). Thus, according to Ajzen, intentions are explained by: a) subject's attitudes (perceptions of personal desirability of performing the behaviour); b) social norms (the approval or disapproval that important referent individuals -or groups- have in relation to the enactment of a given behaviour); and c) perceived behavioural control (the perception that the target behaviour is within the decision maker's control). According to the theory, attitudes, subjective norms and perceived control predict intentions, while intentions and perceived control predict behaviour. The TPB (Figure 1) is the most used model of the human intentions to this day (Ajzen, 1987, 2002).

Another well recognized model is the Shapero's entrepreneurial event model (SEE), that is conceptually similar to Ajzen's theory of planned behaviour. In this model, entrepreneurial intentions depend on three elements: a) the perception of the desirability; b) the perception

of feasibility; and c) the propensity to act (Shapero, 1982; Shapero and Sokol 1982). The perceived desirability is defined as the attractiveness of starting a business, perceived feasibility as the degree to which the individual feels capable of starting a business, and propensity to act as the personal disposition to act one one's decisions.

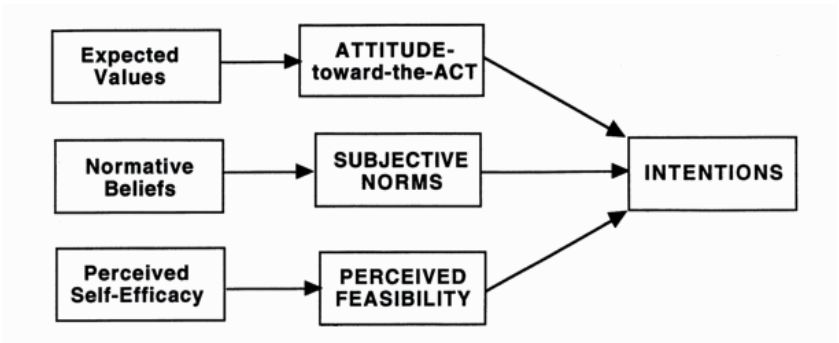

Fig. 1. Ajzen's Theory of Planned Behaviour

While the SEE model was developed to understand entrepreneurial intention and behaviour, Ajzen's TPB was developed to explain individual behaviour in general. According to the TPB attitudes, subjective norms and perceived behavioural control determine intentions. Intentions, in turn, along with perceived behavioural control determine actual behaviour. Empirical testing of entrepreneurial intentions among students has found support for both the SEE model and the TPB (Kolvereid, 1996; Krueger, 2000). Krueger (1993) argued that attitude in the TPB encompasses the notion of perceived desirability in the SEE model. He also argued that subjective norm overlaps with the notion of desirability and feasibility, and that feasibility overlaps with perceived behavioural control. Bagozzi (1992) suggested that attitudes may first be translated into desires, which then develop into intentions to act, which direct action. Armitage & Conner (2001) speculated that desires would inform intentions, upon which behavioural self-predictions are partly based. They argued, however, that further work is needed to test the causal relationship between desires, intentions, and self-predictions.

Another model of intentions was developed by Bird (1988) which considers that entrepreneurial intentions are based on a combination of both personal and contextual factors. Further development of the Bird's model was made by Boyd & Vozikis (1994) to include the concept of self-efficacy taken from the social learning theory. Another model was proposed by Davidsson (1995), which suggested that entrepreneurial intentions can be influenced by: conviction, defined by general attitudes (change, compete, money, achievement, and autonomy) and domain attitudes (payoff, societal contribution and know how); conviction, in turn, is related to personal variables including age, gender, education, vicarious experience and radical change experience.

Different studies have been conducted around the models described above (see e.g. Audet, 2002; Boyd & Vozikis, 1994; Davidsson, 1995; Peterman & Kennedy, 2003; Souitaris et al., 2007). However, none of these models and studies have considered cognitive variables as variables that can influence and determine the entrepreneurial intention.

3. The cognitive approach

The cognitive approach uses the cognitive aspects of entrepreneurs to study and even to explain their behaviour, which is related to the identification of opportunities for the creation of businesses and business growth. In fact the term "cognitive style" is used to characterize certain ways of processing information related to entrepreneurial behaviour. Two main lines can be differentiated within the cognitive literature: the study of cognitive *structures* and the study of cognitive *processes* (Sánchez et al., 2011). Some studies have attempted to identify the knowledge structures that entrepreneurs use to make assessments, judgments or decisions, in evaluating opportunities, and in the creation and growth of businesses (Boucknooghe et al., 2005; Gaglio & Katz, 2001; Mitchell et al., 2000). Other types of research are based on the idea that whatever the individual thinks, says or does is influenced by the cognitive processes through which individuals acquire, use and process information (Baron & Markman, 1999; Evans & Krueguer, 2004). This perspective suggests that entrepreneurs think and process information differently from non-entrepreneurs and such differences may help to distinguish people who create or aim to establish businesses (entrepreneurs) from people who do not create and will not create companies (non-entrepreneurs). Thus, some authors have coined the term "cognitive style" to characterize certain ways of processing information related to entrepreneurial behaviour (Baron, 2004; Boucknooghe et al., 2005).

Cognitive psychology is not only an aid to understanding individuals and their behaviour, considering their mental processes when they interact with other people, but also addresses the environment in which these mental processes and interactions take place (Mitchell et al., 2002). The Theory of Social Cognition introduces the idea of knowledge structure; i.e. the mental models (cognitions) that are used to achieve personal effectiveness in certain situations**.** Thus, since entrepreneurship is defined as relating to individuals or teams that create products/services for other people, Cognitive Psychology is increasingly useful to help establish the phenomena associated with entrepreneurship (Sánchez, 2011b).

In this sense, experts insist on the possibility of explaining a large part of entrepreneurial behaviour and its origin from both cognitive structural and process variables (e.g., Busenitz & Lau, 1996). Cognitive structures represent and contain knowledge, while cognitive processes relate to the manner in which that knowledge is received and used. In sum, the field of entrepreneurial cognition includes all aspects of cognition that can potentially play an important role in certain aspects of the entrepreneurial process. Thus, we shall address the main cognitive aspects reflected in the literature that shed light on the study of entrepreneurship.

3.1 Self-efficacy

Originally defined by Bandura (1994, p. 72) as "one's beliefs in their abilities to perform a certain level of performance or desired outcomes that influence situations that affect their lives", self-efficacy has become an important variable considered in the cognitive study of entrepreneurial behaviour. Shane et al. (2003) emphasize self-efficacy as a robust predictor of individual outcome in a given activity and its validity to explain why people with equal skills may act differently.

Like Chen et al. (1998), by entrepreneurial self-efficacy we understand the self belief in one's ability to adopt the role and conduct the tasks of an entrepreneur successfully. Thus, research on self-efficacy in entrepreneurial behaviour has been characterized by making distinctions between entrepreneurs and non-entrepreneurs (Chen et al., 1998; Markman et al., 2005). In a given situation, entrepreneurs perceive more opportunities than those who have low levels of entrepreneurial self-efficacy, who perceive the same situation to have more costs and greater risks (Cooper & Lucas, 2005; Vecchio, 2003). People who have a higher level of self-efficacy also feel more competent to overcome perceived obstacles and they anticipate more positive results (Vecchio, 2003) and persist in the effective search and organization of activities in the midst of uncertainty (Trevelyan, 2009).

Entrepreneurial self-efficacy enables us to differentiate entrepreneurs from managers and it also correlates with the intention of owning a business, pointing to the notion that the individual who believes or feels him or herself most capable of undertaking a business concern is more prone to implementing such behaviour than one who does not feel able to do so (Chen et al., 1998). Self-efficacy can also be used to identify the reasons why some individuals avoid becoming entrepreneurs, since some people avoid entrepreneurial activities not because of their lack of ability but because they believe that they do not have such ability. Moreover, it can be used to identify areas of weakness or strength for developing the entrepreneurial potential of individuals or communities and to improve the performance of existing entrepreneurs (Chen et al., 1998).

Further, entrepreneurial self-efficacy studies provide data that help to understand why some businesses do not grow, on the grounds that some entrepreneurs have insufficient self-efficacy to cope with specific tasks (Vecchio, 2003).

All these contributions have lent considerable impetus to clarifying the cognitive study of entrepreneurs. Accordingly, it is crucial to focus on possible factors that might influence the development of self-efficacy. For example, Oliveira et al. (2005), seeking to identify the impact of the social environment on the self-efficacy beliefs of entrepreneurs, reported that those who had a favourable micro-social environment (support from family and friends) had higher levels of self-efficacy than those who had an unfavourable micro-social environment. Similarly, Krueger and Kickul (2006) argued that individuals assess their entrepreneurial skills in reference to perceived resources, opportunities, and obstacles in the environment; thus, the environment exerts an impact on entrepreneurial self-efficacy.

3.2 Scripts

The area of scripts has expanded considerably and has provided fruitful results in the field of entrepreneurship, mainly thanks to Ron Mitchell and colleagues. Like Fiske & Taylor (1991), we define a script (schema) as a cognitive structure of beliefs and standards concerning a given domain of stimulus, which provides the individual with a reference point from which to represent his or her environment and provides guidelines for action and decision making. This cognitive structure represents the organized knowledge that a person has about a particular concept and contains information about the attributes of this concept and about the relationships between such attributes (Busenitz & Lau, 1996).

Within the context of entrepreneurship, scripts are considered to refer to the knowledge structures that entrepreneurs use to make assessments, judgments or decisions regarding

the assessment of opportunities, enterprise creation and business growth. In other words, research on entrepreneurial scripts refers to the study of how entrepreneurs use simplified mental models to link previously unconnected information that will help them to identify or invent new products or services and the necessary resources to start up and cultivate a business (Mitchell et al., 2002). Thus, scripts in the field of entrepreneurship are knowledge structures that individuals have concerning the actions themselves to be undertaken (Busenitz & Lau, 1996).

The main contribution of these studies suggests that expert entrepreneurs think differently from novices. The way in which entrepreneurial experts become experts is reflected in the development of an expert script. Experts have knowledge structures or scripts about a particular domain that allow them to perform better in their environment than non-experts, who neither have nor use structured knowledge (Mitchell et al., 2000; Westhead et al., 2009).

This contribution extends to the intercultural level. Several cross-cultural studies have shown that knowledge structures differentiate between entrepreneurs and non-entrepreneurs in different countries (Mitchell et al., 2002; Smith et al., 2009). The explanation is that entrepreneurs have shared experiences about the conceptualization, early development and growth of new businesses, leading them to develop similar and more refined mental models than non-experts might have, given their reduced experience in the domain (Mitchell et al., 2002, Smith et al., 2009).

Moreover, script studies provide clues to understanding the functioning of entrepreneurs in a group. Scripts are manifested not only individually, but are also manifested in a team**.** Although teams do not have cognitions alone, the prospects of the team about what is an appropriate action (schema) are significantly greater than the collection of individual perspectives, and the collective cognition of the entrepreneurial team is what drives many strategic business decisions (West, 2007).

3.3 Cognitive styles

Cognitive style is defined as the way people perceive environmental stimuli, and how they organize and use information from their environment to guide their actions. In their study, Boucknooghe et al. (2005) raised the following questions: "What is the cognitive style of entrepreneurs?" Is the way they perceive, organize and use environmental information different from the way non-entrepreneurs do? The results of that investigation confirmed the notion that entrepreneurs differ in their cognitive styles.

Successful entrepreneurs enjoy discovering opportunities, being innovators and taking risks, as do inventors. Individuals who use a *knowing style* (analytical and conceptual) look for facts and data. They want to know exactly how things are, and they tend to retain many facts and details. They are task-oriented and accurate, and they thrive on complex problems if they can find a clear and rational solution. The creative style is characterized by holistic and conceptual thinking. Individuals who use this style tend to be creative and enjoy experimentation. They tend to see opportunities and challenges. They do not like rules and procedures, and take pleasure in uncertainty and freedom. They are ambitious and achievement-oriented. Successful entrepreneurs show more originality than others and are able to produce solutions that run against established knowledge. Creative thinking also facilitates the recognition of business opportunities (Bridge et al., 2003). The integration of

both analytic (knowing) and intuitive (creative) processing styles is required to process information (Hodgkinson & Sparrow, 2002) and minimizes the dangers of cognitive biases identified by researchers into behavioural decisions (e.g. Mintzberg, 1994; Sinclair et al., 2002).

In addition, other research has shown that entrepreneurs collect, process and evaluate information in a more intuitive manner than managers, middle managers and initiates**.** Senior managers have cognitive styles similar to those of entrepreneurs (Allison et al., 2000). Recently, Lindblom et al. (2008) have found differences in the cognitive style of the different types of entrepreneurs. Those authors investigated the cognitive style of retail entrepreneurs with respect to marketing decisions. The results revealed that the cognitive style of retail entrepreneurs is more consistent with the style of employees than with that of other entrepreneurs.

3.4 Decision making: Heuristics and errors

Research on heuristics has afforded important results in our understanding of the cognitive functioning of human beings in general and of entrepreneurs in particular. Heuristics are simplifying strategies that individuals use to manage information and reduce uncertainty in decision making (Khaneman & Tversky, 1973).

Research has shown that entrepreneurs with a logic based on heuristics are able to make sense of complex and ambiguous situations more quickly and take more orthodox approaches in making decisions (Mittchel et al. 2009). However, other studies (Baron & Markman, 1999) have shown that the use of certain cognitive heuristics leads to biases and errors, as discussed below.

*Counterfactual thinking***.** This is understood as an afterthought in decision-making in which the procedures followed to perform the task are discussed, and various alternatives that could have been followed are considered (Wadeson, 2006). These are the thoughts that occur due to adverse outcomes or wrong expectations (Markman et al., 2005). Counterfactual thinking has positive and negative effects on the entrepreneur. On the one hand, it can lead to regret and can reduce perceived self-efficacy if one decides the choice was not the best one. On the other hand, counterfactual thinking can lead to the formation of alternative strategies for the future, so the best strategies can be learned from experience.

In the field of entrepreneurship, research that has analyzed counterfactual thinking reveals that entrepreneurs are less likely to engage in counterfactual thinking, they regret missed opportunities less and bear past mistakes more easily, both their own and those of others (Baron, 2000).

Another important contribution was a study by Gaglio and Katz (2001), who hypothesize that people on entrepreneurial alert are involved in counterfactual thinking, unravelling the causal sequences. Therefore, they are more likely to increase the complexity of their mental patterns, changing in response to novel events. A further discussion of the role of counterfactual thinking and its importance in entrepreneurship can be found in Gaglio's work (2004).

The planning fallacy. The planning fallacy is a cognitive aspect related to errors in planning, that is, the tendency to believe that one can achieve more in a given period of time than one

is really is capable of. The planning fallacy is the result of people failing to break down multifaceted mental tasks into their different components (Evans & Krueguer, 2004). Thus, when people are asked to break down the tasks to be performed, the planning fallacy becomes reduced. Most people, including entrepreneurs, tend to overestimate how much they can accomplish in a given period of time and may underestimate the amount of resources needed to complete certain projects (Baron & Markman, 1999).

These authors defended the idea that entrepreneurs tend to be more susceptible to the planning fallacy than other people, because they operate in a dynamic and uncertain environment, under the severe pressure of time and large amounts of information. However, the results have shown the opposite, i.e. that entrepreneurs are less prone to the planning fallacy (Baron & Markman, 1999).

Overconfidence. Over-confidence refers to the tendency of thinking one knows more than what one really knows (Baron & Markman, 1999). That is, our failure to know the limits of our own knowledge. Over-confidence occurs when decision makers' assessments are overly optimistic. In sum, overconfident people are characterized by poor meta-cognition.

According to Russo & Schoemaker (1992), overconfidence may be the result of the availability heuristic, the anchoring and adjustment heuristic, confirmatory bias, and hindsight bias. The confirmation bias is a tendency to gather evidence for and assign more weight to information that confirms one's belief, and to stop seeking or to ignore dissonant information. Hindsight bias is a tendency to see past events as more predictable than they actually were, such as the familiar saying: "I knew it." It is important to realize that to collect less information when a person is feeling very safe is not really a heuristic, but something rational. However, if the confidence level is not justified, then it will fail in the collection of information**.**

Over optimism. This is the tendency to believe that things will work out. Overoptimism has three main forms (Brown & Taylor, 1988): positive self-evaluation, optimism about plans and future events and over-optimism due to the illusion of control bias**.** Cooper et al. (1988) found that 81% of entrepreneurs interviewed believed that their chances of success would be at least 70% and 33% claimed that they were destined for success. However, reality showed that only 25% of new businesses survive for more than five years. Such positive statements partly reflect a need for self justification**.** The authors suggest that entrepreneurs can start a psychological phenomenon called post-decisional reinforcing, in which decision makers tend to exaggerate the attractiveness of an option once it has been chosen. They also advance the possibility that employers may have a natural tendency to talk positively about their efforts as an incentive to encourage others, such as financiers, employees and customers into believing they will be successful. If employers are more optimistic when they decide to start a business, then this has additional implications in comparison to a situation in which one is only over-optimistic after the initial decision.

According to Vecchio (2003), there are studies that have identified highly secure entrepreneurs and managers of small businesses. He cites the discovery of Cooper et al. (1988) that entrepreneurs express a high level of confidence in success. Also, Parker (2006) argues that certain findings in the psychology literature suggest that entrepreneurs are particularly over-optimistic. It is this optimism that tends to be greater when individuals have emotional commitment to the results of their work.

Bernardo & Welch (2001) found that by providing positive information externally to their social group, over-confident entrepreneurs are more preferred by their environment. If these externalities are significant enough, then social welfare will be increased through having some over-confident people in the population, even though such people are not behaving in an optimal way as regards their own welfare. This has important implications and applications for the workplace, and suggests that the inclusion of over-confident workers in the company will have beneficial effects on work climate, self-efficacy, performance, etc.

In conclusion, the relationship between different heuristics is established: overconfidence, as defined above, leads to incorrect estimates of the risks that an entrepreneur has to face, but the estimates could go in two directions: either being too pessimistic or too favourable, depending on whether the estimate is positively or negatively biased. However, it is quite possible that people who are optimistic enough to start a business show a tendency towards the overconfidence bias in the direction of underestimating the risk they face. Similarly, the belief in the law of small quantities can lead to over-confidence if the small sample used is biased in a positive direction. The anchor could lead to overoptimism about the creation and progress of a company, in cases where the expectations based on indications of the progress made so far are too optimistic**.**

4. The study

In the field of entrepreneurship, three types of entrepreneurial scripts have gradually been defined: arrangements, willingness, and ability scripts (e.g., Mitchell, 1994; Mitchell et al., 2000, 2002). Arrangements scripts are the knowledge structures that individuals have about the contacts, relations, resources, and assets that are needed for economic relations. Willingness scripts are the knowledge structures underlying the idea of engaging in an economic relation. Ability scripts are the knowledge structures that individuals have about the capabilities, skills, knowledge, norms, and attitudes needed to create a business venture.

Although it has been shown that entrepreneurial arrangements, willingness, and ability scripts are antecedent to the venture creation decision, little has been done in the way of analyzing how these scripts affect entrepreneurial intention. In our opinion it is reasonable to expect that these same entrepreneurial scripts are also antecedent to other previous steps in the process of business venture creation, such as the entrepreneurial intention. We thus suggest that there is a relation between arrangements, willingness, and ability scripts and entrepreneurial intention.

Consistent with previous research (Mitchel et al., 2000), we argue that people who are able to: a) use arrangements scripts most suitably in relation to the idea of protection, resource possession, venture networks, and venture specific skills; b) possess more developed willingness scripts with respect to their opportunity seeking focus, opportunity motivation, and risk tolerance; and c) trust in their ability scripts to diagnose the conditions and potential to create business ventures, see the need and create value and apply the lessons learned to a variety of experiences (Abelson & Leddo, 1986) will have a higher entrepreneurial intention.

The reasoning behind these expectations is consistent with the fact that those who have an entrepreneurial intention may not perceive starting a business as a risk, since what may be

perceived as a risk by some individuals is not perceived as such by others (Simon et al., 2000). Thus, we suggest that scripts affect entrepreneurial intention. Given that individuals who work in specialized fields have unique knowledge, it is logical to expect that among a broad range of demographic groupings (e.g., age, culture, gender, etc.), the individuals who score high in these dimensions of cognitive scripts probably have similar thought patterns in regard to entrepreneurship and to this extent they can be differentiated from those who do not have an entrepreneurial intention. In short, we expect to find that: High scores in arrangements, willingness, and ability scripts are positively related to high scores in entrepreneurial intention (proposal 1).

However, we also accept that, in some cases, the variance in the expected relation is not completely explained solely by inter-group analysis; there are often intra-group differences that can explain additional variance in this relation (Keppel, 1991). In the study of this relationship there are arguments that suggest the possibility of intra-group variance. Country of origin may be one possible explanation of intra-group variance. It is reasonable to expect that this intra-group variation in levels of entrepreneurial intention could be explained to the extent that perception is affected by the cultural values associated with the participants' country of origin.

Although it is well accepted that cultural values are an antecedent of human behaviour, they are also thought to affect the perceptions that precede that behaviour (Mitchell et al., 2000; Mitchell et al., 2002). Since each culture can have unique values and norms concerning the creation and running of business ventures, we can expect that entrepreneurial scripts may be culturally specific in their effects on entrepreneurial intention, given the differences in perception that emerge in the processes of engaging in creating an enterprise. Thus, we expect that, to the extent that there are cultural differences between countries, the effects of entrepreneurial scripts on entrepreneurial intention may be country-specific, and therefore we suggest that: The effects of the arrangements, willingness, and ability scripts on entrepreneurial intention vary by country (proposal 2).

The data were collected from a sample of 726 university students, 266 of them from Mexico, 252 from Italy, and 208 from Spain. Approximately 64.2% of the surveyed participants were women. Participants' ages ranged between 19 and 24, with a mean age of 21.24 (Sd=3.32) in the Mexican sample, 21.9 (Sd=3.09) in the Italian sample, and 21.09 (Sd=2.90) in the Spanish sample. No differences were found among the participants from Mexico, Italy or Spain regarding age and sex. The level of formal education was also similar among the different countries. Although education is not theoretically linked to entrepreneurial cognition or intention (Fischer & Reuber, 1994) it can limit the clarity of the variance explained by the cognitive scripts and was thus entered as a control variable when examining the proposals.

4.1 Measures

The participants responded to 4 items concerning intentions to start their own business (dependent variable). The responses were categorized on a 0 (very unlikely) to 5 (very likely) point Likert-type scale. An index of intention to become self-employed was created by averaging the four item-scores. Our data confirmed the reliability of the scale (α=0.75), which exceeds the Nunnally (1978) criterion of .70 for scale reliability in exploratory research.

The scales used to measure scripts (independent variables) were adopted from Mitchell et al. (2000; 2002). Items from the original scales were translated into Spanish and Italian using a *translation/back-translation* procedure (Behling & Law, 2000).

Mitchell et al. (2000; 2002) developed 27 items to measure entrepreneurial scripts indirectly, following an accepted script-scenario construction model proposed by Read (1987). In this approach, the existence and degree of mastery of scripts is inferred based on selection by respondents from paired response choices; one represents expertise and the other is a distracter cue. When solving problems within a specific domain, experts are able to select the response consistent with their expert scripts (Glaser, 1984), whereas non-experts are more likely to choose the socially desirable distracter cue (Crowne & Marlowe, 1964).

The arrangements scripts scale is comprised of 7 items regarding the contacts, relationships, resources, and assets necessary to engage in entrepreneurial activity. The willingness scripts scale includes 9 items about engaging in venturing and receptivity to the idea of starting a new venture. Finally, the ability scripts scale is composed of 11 items regarding the capabilities, skills, knowledge, norms, and attitudes required for venture creation. All items ask the participants to choose between an expert script (coded as "1") and a distracter cue (coded as "0"). Responses in each script scale are used as formative indicators and summed into interval scales (Nunnally, 1978) indicating the likelihood or strength of script possession.

4.2 Data analysis

Before testing the proposals, and following the recommendations of Mitchell et al. (2000; 2002), a factor analysis was run (principle components analysis, using an eigenvalue of 1 and varimax rotation) to confirm the dimensionality of each of the script constructs. Proposal 1 was tested using analysis of co-variance (ANCOVA), with education and country of origin as the co-variants. Proposal 2 was tested using multivariate analysis of variance (MANOVA) and hierarchical regression analysis. Since ANCOVA requires categorical variables, the scales used to measure arrangements, willingness, and ability were recoded in three categories of approximately the same size - low, intermediate, and high (each category contained at least 20% of the participants surveyed). The mean values of each scale were assigned to the intermediate category and at least two values for each of the low and high categories. These three categories were chosen to minimize the loss of explanatory power in the categorization processes, maintaining groups of sufficient size to fulfill the analytical suppositions. To test proposal 2 we used the original independent variables (interval scale) in the hierarchical regression analysis. Hierarchical regression analysis checks the ANCOVA results using the information provided by the measures.

4.3 Results

Support was found for the dimensions conceptualized in the work of Mitchell et al. (2000; 2002) regarding scripts. Although some items showed high loadings on several factors they were not eliminated from the analysis and were assigned to the factor most related to the theoretical content of the subscale. The items assigned to each factor were averaged to obtain the score of the participants in each of the script subscales.

After controlling for the effects of the education and country of origin variables, ANCOVA (Table 1a), showed that arrangements, willingness, and ability scripts explained 39% of the variance in entrepreneurial intention and these cognitive constructs explained 22% of the total variance when the effects of the education and country of origin variables were not taken into account. The main effects were all significant, thus confirming our first hypothesis: arrangements, willingness, and ability scripts are related to the level of entrepreneurial intention despite the participants' country of origin and level of education. Similar results were found using hierarchical regression (Table 1c, all).

To test our second proposal we performed a MANOVA (Table 1b). The results of this analysis indicate that the mean values of arrangements, willingness, and ability scripts were significantly different according to the countries studied. We found differences in arrangements and willingness between Spain/Italy and Mexico and in ability between Spain and Mexico. The rest of the comparisons were not found to be significant. These findings suggest that there may be some differences in scripts according to country, but that there can also be some similarities (e.g., between Spain and Italy). A regression analysis (Table 1c) was run in an attempt to understand the differential effects of the scripts on entrepreneurial intention.

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The results of this analysis indicate that the mean values of the arrangements, willingness and ability scripts were significantly different according to the countries under study. *Post hoc* analyses showed differences between Spain/Italy and Mexico in Arrangement and Willingness scripts and between Spain and Mexico in Ability. No differences were found between Spain and Italy in any of the cognitive scripts. These results suggest that country differences exist in the content of entrepreneurial scripts, but that there are also similarities. We therefore performed a hierarchical regression analysis to understand the potential effects of the scripts on entrepreneurial intention (Table 1c).

A. Hypothesis 1 – ANCOVA†				B. Hypothesis 2 - MANOVA				C. Hypothesis 2 Hierarchical Regression‡				
						Univariate F's						
	MS	F	*p*		Multi-variate F	Wilkes' lambda *p*	*F*	*p*		All	Spain	Italy	Mexico
Covariates	141.4	357.5	.000	Country effect	5,54	.000			Formation	,211***	,122*	,128*	,272***
Formation	3,97	10,05	.002	Arrange-ments			14,68	,000					
Country	29,23	73,91	.000	Willingness			9,46	,000	Scripts model				
Main effects				Ability			3,65	,026	Arrange-ments	,281***	,261*	,272***	,240**
Arrange-ments	15,94	40,31	.000						Willingness	,209***	,110	,212**	,242**
Willingness	1,40	3,54	.029						Ability	,077*	,100	,109*	,013
Ability	1,80	4,56	.011						Formation	,116**	,086	,056	,156*
									R^2 (base model)	,044***	,015	,012*	,074***
									ΔR^2	,253***	,149***	,225***	,251***

Table 1. Hypothesis Tests

The Chow Test turned out to be significant, and thus there are significant differences between the models at country level and the overall model. No script was significant in the sample of Spanish participants, whereas they were all significant for the sample of Italian participants. The results of the MANOVA and the regression analysis indicate that although the arrangements, willingness, and ability scripts are related to entrepreneurial intention, there are nevertheless certain differences between the countries. To analyze these differences we examined the relation between the attributes of the cognitive scripts and entrepreneurial intention, performing a *post hoc* hierarchical regression and considering the attributes of the scripts within each country. The results of this hierarchical analysis are shown in Table 2a. The arrangements scripts block of variables were significant for Spain, Italy and Mexico, explaining, respectively, 7%, 16%, and 14% more of the variance in entrepreneurial intention. All of the subscales were significant in the three countries. The willingness scripts block of variables is significantly related to entrepreneurial intention in all three countries, explaining, respectively, 5%, 2%, and 6% more of the variance in entrepreneurial intention than the base model, education. Seeking focus was significant for Italy and Mexico. Risk tolerance was significant for Spain and Mexico whereas Opportunity motivation was not significant in any of the countries. The ability script block was only significant for Mexico, explaining 3% more of the variance than the base model (education). The total effects of the script constructs were examined in a stepwise regression (Table 2b) in order to identify the most salient scripts in each country. Resource possession (arrangement) and venture specific skills (arrangement) were significantly related to entrepreneurial intention in all three countries. Protectable idea (arrangement) was significant ($p < 01$) in the Spanish and Italian models but not in the Mexican one. Venture work (arrangement), seeking-focus scripts (willingness), and venture situational know-how (ability) were significant in the Italian and Mexican models, but not in the Spanish one, and risk tolerance was significant in the Spanish and Mexican models, but not in the Italian one.

These results support the idea that there are similarities and differences between the countries as far as the content of the entrepreneurial scripts is concerned. By identifying these similarities and differences we have thus extended the work of Mitchell et al. (2000). The theory of social cognition suggests that interactions among the arrangements, willingness, and ability scripts can be crucial for representing the script, since representation requires a configuration of forces of both entry scripts and action scripts (Fiske & Taylor, 1991). Arrangements scripts are necessary for carrying out the subsequent steps in the creation of value, but alone are probably not sufficient. Without the willingness scripts, there may not be enough motivation to constitute the arrangements scripts. Without the ability scripts, there may not exist sufficient capability to enact the arrangements scripts. Willingness scripts without ability scripts may not give rise to the following steps in the creation of value sequence. These potential interaction effects were explored using *post hoc* ANCOVA (controlling for the effects of country and education). None of the two-way interaction effects were significant, but the three-way interaction among arrangements, willingness, and ability scripts was significant ($p < .05$) beyond the significant principal effects, which is consistent with the theory of social cognition and entrepreneurial cognition that the arrangements, willingness, and ability scripts all combine to influence entrepreneurial intention.

	A. Block Effects									B. Full model stepwise					
	Spain			Italy			Mexico			Spain		Italy		Mexico	
	Δ R^2	*B*	*P*	Δ R^2	*B*	*p*	Δ R^2	*B*	*p*	*B*	*p*	*B*	*p*	*B*	*p*
Formation Arrangement	.015* .078**	,122		.016* .160***	,128	,043	,074*** 141***	,272	,000	,122	,079	,128	,043	,272	,000
Protectable idea		,339	,001		,360	,000		,188	,009	,353	,001	,275	,001		
Resource possession		,348	,001		,493	,000		,188	,000	,365	,002	,380	,000	,173	,034
Venture work		,223	,010		,398	,000		,408	,000			,309	,000	,305	,000
Venture specific skills		,278	,001		,275	,000		,298	,000	,246	,005	,220	,001	,176	,009
(Formation)		,101	,141		,041	.489		,162	,005						
Willingness scripts	.054**			.023*			.067***								
Seeking focus		,101	,201		,179	,011		,189	,003			,174	,013	,204	,001
Risk tolerance		-,172	,013		,063	,314		,239	,000	-,161	,021			,235	,000
Opp motivation		-,085	,273		,048	,464		,058	,324						
(Formation)		,067	,333		,045	,452		,150	,008						
Ability scripts	.017			.020			.030**								
Ability/ opportunity fit		,103	,138		,062	,301		-,106	,051						
Diagnostic		-,066	,330		-,065	,262		-,045	,403						
Venture situational know		,069	,297		,111	,055		,142	,008			,111	,055	,142	,008
(Formation)		,061	,384					,155	,006						
										Δ R^2	,16***	Δ R^2	,21***	Δ R^2	,31***

Table 2. Post Hoc Tests

5. Conclusion

The aim of this chapter has been twofold: first, to extend the theoretical development of the research on entrepreneurial cognition beyond the level of individuals, and second, to increase the usefulness of previous work regarding entrepreneurial intention. To meet these two objectives we posited two basic proposals.

The results of our study suggest that individuals with high scores in the dimensions of the cognitive scripts considered have higher levels of entrepreneurial intention, regardless of the country of origin and educational level of the participants, thus confirming our first proposal. Our results also show that the effects of the scripts on entrepreneurial intention vary according to country. There are differences in the scripts according to the different countries, but we also found similarities between some of the countries studied as regards some of the contents. What do these cognitive differences mean when it comes to entrepreneurial intention? To answer this question we shall examine the results presented in Table 2b and then discuss what these differences may mean.

Our first observation of the results in Table 2b is related to the similarity among the participants of the three countries. On the one hand, the participants seem to have important scripts in common: in all three countries, resource possession and venture specific skills are significantly related to entrepreneurial intention. The fact that these characteristics are shared by the three countries may be suggesting the importance of resources and specific skills as the main scripts for being able to carry out an entrepreneurial intention. That is, if individuals have the resources and skills necessary to create a business venture, they will have more possibilities for carrying out that venture. This is a very hopeful result that can suggest concrete ways of action to foster entrepreneurial intention among university students. This result contrasts with those found in the literature analyzing the differences between new entrepreneurs and experienced entrepreneurs, where the seeking-focus scripts emerge as the most common and important script in experienced entrepreneurs across countries (Smith et al., 2009).

Our second observation has to do with the differences among the countries studied. Although the differences found in the cognitive scripts may hinder the process of comprehending the entrepreneurial intention, we feel that an understanding of these differences may be the key to a better understanding the entrepreneurial intention process. More specifically, we found that a protectable idea is significantly related to the entrepreneurial intention for the participants in both Spain and Italy, but not for those in Mexico; that risk tolerance is significant for Spanish and Mexican university students but not for Italian ones, and that venture work (arrangement), seeking-focus (willingness), and venture situational know-how (ability) scripts are significant for the Italian and Mexican samples, but not for that of Spain. What can account for these differences are the institutional paradigms established in these countries that favour or hinder entrepreneurial intention in young people, for example with the creation and transmission of anecdotes, stories, role models, or social models that facilitate (or not) engagement with the creation of business ventures. Through social influence (Carsrud & Krueger, 1993; Weick, 1995) such paradigms transmit to youth an understanding of the processes of acquiring resources and the feasibility (o not) of entrepreneurial ideas. These differences become obvious if we

examine, for instance, the GEM (Global Entrepreneurship Monitor [GEM], 2009) reports at an institutional level.

Thirdly, we can point out that the risk tolerance scripts are positively significant only for the Mexican participants. One of the explanations for this greater risk tolerance in the Mexican students may be necessity (being unemployed, seeking an alternative way to work, etc.). In the literature two types of entrepreneurs have been differentiated: those who become entrepreneurs through necessity and those who do so through opportunity. Whereas entrepreneurs through opportunity start a business because they perceive certain weaknesses in the market and develop a product or service to satisfy that gap, entrepreneurs through necessity are those that choose to act independently because they are not able to find a satisfactory job (or are unemployed). Thus, the former take a more long-term view and generate businesses with high growth potential, whereas the latter tend to create smaller enterprises where the idea is to generate an income for the owners in the face of unattractive job prospects. The GEM survey, carried out in 46 countries and coordinated in Mexico by the Centre for Entrepreneurial Development of the Graduate School in Public Administration and Public Policy of the Tec in Monterrey and by the Secretary of the Economy, shows that in Mexico the majority of those who have recently started a business have done so out of necessity. According to the study, this is due to the economic factors of the country, its historical dynamics and the entrepreneurial spirit of Mexicans.

Our final observation is in regard to extending the theory of entrepreneurial intention. Different models of entrepreneurial intention have emerged in the literature, but none of them has considered the information processing perspective. Many decisions are taken to a certain extent through automatic processing. Some decisions are derived simply from a relatively limited group of decision norms based on an equally limited group of deep-rooted suppositions. Only a relatively small number of decisions require in-depth processing. These suppositions represent the critical architecture of how we structure our knowledge (including our cognitive schemes, scripts and maps). Previous literature in this sense (Smith et al., 2009) has shown that experienced entrepreneurs use expert scripts to process information differently from novices. Much of this literature has compared experts to novices, but little has been done to analyze the differences in these scripts in regard to entrepreneurial intention comparing individuals who intend to start a business venture and those that do not. Our study shows that participants who score high in these scripts, that is, those who have more expert knowledge, show a higher intention to start a business. This result contrasts with previous research that deterministically saw entrepreneurial intention as based on innate traits and abilities (Seibert & Zhao, 2006). Thus, research on information processing is fundamental in the study of entrepreneurial intention. In particular, one element of this information processing theory that this study has shown to be very useful in research on entrepreneurial intention is the notion of cognitive scripts.

Our study has shown that people who intend to start a business, as opposed to those who do not, use to a greater extent cognitive scripts that allow them to process information in such a way that they can see the advantages despite adverse market conditions. This is because they utilize the information in a significantly better way than those who do not have an entrepreneurial intention. These cognitive heuristics allow them to make quicker decisions and to reduce the perception of risk, which in turn seems to create a bias towards action that favours the decision to start a business venture (Keh et al., 2002; Simon et al.,

2000). This result is similar to that found by other authors when comparing the cognitive scripts of expert and novice entrepreneurs (Abelson & Leddo, 1986; Lord & Maher, 1990).

Our study also corroborates findings in the literature on the sequencing of cognitive scripts (Abelson & Leddo, 1986). According to the theory, arrangements scripts are expected to occur first, followed by willingness and ability scripts. Our results are consistent with this theoretical expectation. Arrangement scripts were more salient in their relation to entrepreneurial intention, followed by willingness and ability scripts, and this held true for the three countries studied.

These results must be considered in relation to the limitations of the study. First, this study is exploratory in nature since it applies a relatively new theory in relation to entrepreneurial intention and examines relatively new constructs in the context of entrepreneurship research that are still in the early stages of development. Second, in this study we used an intended sample. Nonetheless, we believe that this did not affect the results, since those surveyed in each country were demographically similar in regard to educational level, age, and so on. Third, the "cognitive situation" was collected at a specific moment in time, making it necessary to use the same instrument to measure both the independent and dependent variables. To mitigate potential problems we used a combination of self-reported measures and more objective measures, employing different scales and asking questions related to the dependent variable before asking about the entrepreneurial scripts.

We hope to have thus satisfied the necessary measurement requirements and minimized the potential disadvantages of measurement (Smith et al., 2009). Despite these limitations, we believe that the research results provide grounds for additional cross-level theory development with implications that can lead to an increase in the practicality of the theory of information processing based on entrepreneurial cognition. They also identify important differences in potential entrepreneurs and how these differences affect entrepreneurial intention. In this way some progress has been made towards finding out what, when and how some individuals and not others intend to start a business.

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3

Do External Factors Influence Students' Entrepreneurial Inclination? An Evidence Based Approach

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1. Introduction

For decades world economies have witnessed increasing unemployment rate. Recent developments in world economic systems have also affected the employment level in countries (Alam, 2009). In Pakistan, continuous wave of terrorism and increasing instability has shattered all economic activities. This in result has negatively influenced level of employment in Pakistan. It is challenge of the time to employ these unemployed persons. Unemployment rate has increased drastically in Pakistan from 13.60% in 2008 to 15.20% in 2009 (CIA-the world fact book). Now this unemployed workforce is creating lots of problems both for the public and state like increased crimes, law and order situation, and many more social problems. One of the most effective solutions adopted by researchers is self employment. Self employment or entrepreneurship can contribute a lot for both the state and society as a whole. As noted by Awogbenle and Iwuamadi (2010) concluded that entrepreneurship can be a tool that might minimize the level of unemployment and can be source of sustainable economic development.

Entrepreneurship offers opportunities to enjoy independence, reap greater financial returns, and overall contribution to economy through innovation and economic development. Entrepreneurship works like an engine for economic development, job creation and social adjustment for developing economies (Alam, 2009). Family characteristics have implication on emergence of new business, recognition of opportunity, start up decisions and resource mobilizations (Aldrich & Cliff, 2003). Various researchers have identified various factors that might affect the entrepreneurial start ups, out of those factors one factor that has been of great significance is/are external factors. Various researchers have found various external factors that might influence entrepreneurial start up decisions, like, Bowen & Clercq (2008) have studies effects of economic freedom, regulatory environment, quality of government, political stability, and other aspects as external factors that might influence the intentions to set up business. Amoros (2009), Bowen & Clercq (2008) have studies effects of economic freedom, regulatory environment, quality of government, political stability, and other aspects as

* Corresponding Author

external factors that might influence the intentions to set up business. Sullivan & Shkolnilov (2004) investigated the effects of political factors and corruption on economic development and entrepreneurial intentions in the society. Barro (1985) have discussed that political instability slows down the economic activity in the country. Like other external factors terrorism can be a factor that might influence the entrepreneurial intentions. Like, Huddy *et al.* (2002) found that when individuals feel personal threat they adopt such attitude through which they can reduce their risk. Similarly, national threats reduce economic activities (Huddy *et al.,* 2002). Perception regarding chances of future terrorist attacks leads to pessimist approach regarding future of the economy and stock market (Huddy *et al.,* 2002). As entrepreneurial start ups and business developments are one of the major economic activities performed at micro and macro level, so these factors might influence entrepreneurial start up decisions.

So, linking external factors with business start up decisions is an area of research that requires further in-depth investigation, as entrepreneurship contributes for social and economic development of country, entrepreneurship is a topic requiring a lot of attention from academicians and researchers. This paper is aimed to study impact of external factors i.e. Family support, Political stability, and terrorism on the entrepreneurial intentions of students.

2. Literature review

Entrepreneurial intentions are said to be state of mind, which guides and gives direction to individuals towards formulation of new business concepts (Bird, 1988). Entrepreneurial intentions have received much attention from researchers through out the world. The existing literature consists of study of personality dimension (Yosuf *et al.* 2007; Shaver and Scott, 1991; Gartner, 1988), theory of planned behavior, impact of education (Souitaris *et al.*2007; Shepherd and DeTienne, 2005; Franke & Luthje, 2004; Jo & Lee, 1996; Dyer, 1994; Krueger & Brazeal, 1994), impact of gender differences (Gupta *et al.*2008; Brush *et al.*2006; Welter *et al.*2006; Marlow & Patton, 2005; Boden & Nucci, 2000; Fay & Williams, 1993; Brush, 1992), family background (Carr & Sequeira, 2007; Aldrich & Cliff, 2003), personal and family experience (Krueger, 1993; Raijman, 2001; Basu & Virick, n.d.; Shapero & Sokol, 1982), and their impact on desire to become entrepreneur. All these studies are primarily aimed to studies is to segregate entrepreneurs from non-entrepreneurs and to find whether entrepreneurial intentions can be developed or not. If it can be developed how it can be implemented to increase entrepreneurial intentions of students. But very few studies have considered importance of external environment and supporting factors that might influence intentions to become entrepreneur or not. Like considering the entrepreneurial behaviors of management in organizational setup, Huang et al. (2010) while considering the entrepreneurial orientation of the management of organization found that social capital influence relationship of entrepreneurial orientation and resources acquisition in organizational set up. There are numerous studies available that have discussed the entrepreneurial inclinational of students with respect to various factors i.e. Basu & Virick (n.d.) discussed the impact of personality traits and prior family experience on the entrepreneurial intentions of students, Franke & Luthje (2004) studied the impact of education and planned behavior on the entrepreneurial intentions of students, similarly Ali et al. (2010) have studies external factors that might influence

students entrepreneurial intentions, their research considered governance system as the external factor that might influence the entrepreneurial system. This study is aimed to discuss external factors i.e. political stability/instability & Family support and increasing terrorism as the external factors that might influence individual's intentions to become entrepreneur.

External environment is considered to be one of the most important determinants of entrepreneurial intentions, as noted by Drucker (quoted by Mcquaid, 2002) entrepreneurship is an action that can be attributed to systematically analyzing the opportunities already prevailing in the environment. Amoros (2009), Bowen & Clercq (2008) have studies effects of economic freedom, regulatory environment, quality of government, political stability, and other aspects as external factors that might influence the intentions to set up business. Sullivan & Shkolnilov (2004) investigated the effects of political factors and corruption on economic development and entrepreneurial intentions in the society. Barro (1985) have discussed that political instability slows down the economic activity in the country.

Exogenous influences (like demographics, society, traits, financial support, and culture) affect the attitudes and also the intentions indirectly and behaviors to become entrepreneurs (Shapero and Sokol, 1982). Out of the exogenous factors family support is one of the most important as it proves to be backup of the entrepreneur. Family characteristics have implication on emergence of new business, recognition of opportunity, start up decisions and resource mobilizations (Aldrich & Cliff, 2003). Financial resources in the family have direct bearing on entrepreneurial intentions (Raijman, 2001).

Pakistan has been in wave of severe terrorism for last two decades. Like (Embassy of Pakistan, Economic Division) in its report showed that there were 8141 terrorist incidents have taken place since 2002 which caused 8875 deaths and 20675 injuries; and these terrorist attacks costed $ 51.3 billion of loss to Pakistan economy in form of reduced GDP growth, fall in FDI, declined exports, increased unemployment and other factors. When individuals feel personal threat they adopt such attitude through which they can reduce their risk (Huddy *et al.,* 2002). Similarly, national threats reduce economic activities (Huddy *et al.,* 2002). Perception regarding chances of future terrorist attacks leads to pessimist approach regarding future of the economy and stock market (Huddy *et al.,* 2002). Karolyi & Martell (2005) investigated impact of terrorist attacks on the stock market; he found that terrorist attacks significantly effects stock market. Presence of Terrorist threats reduces the business success prospects. Prospects of starting business are the prime consideration in formulation stage of new venture (Atherton, 2007).

From the discussed literature we can formulate following hypothesis and research model:

	Hypothesis Statements
H1	Family support is positively related with entrepreneurial intentions
H2	Political instability is negatively related with entrepreneurial intentions
H3	Terrorism negatively effects entrepreneurial intentions

Table 1. Hypothesis Statements

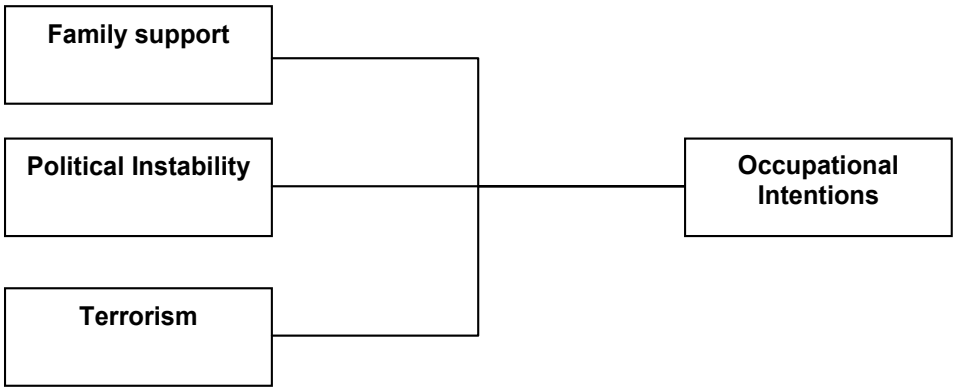

Fig. 1. Research Model

3. Research methodology

For the purpose of the study 200 students were selected from graduate classes of both business and non-business programs. Simple random sampling technique was used for the study. Students from both business and non-business background were selected to identify overall impact of external factors on entrepreneurial intentions of students. The purpose was to remove the affect of education as Frank and Luthje (2004) found that business graduates are noticed to be more inclined towards the entrepreneurial career because education positively influences entrepreneurial inclination. For data collection purpose questionnaire was constructed, to make sure that questionnaire was usable its reliability was tested which was 0.87 which falls in accepted level. The questionnaires were personally distributed to the students in the class. The method is beneficial as instructions and explanation can be given to students to obtain better response. The instrument for data collection comprised of 5 point likert scale. Questionnaire consisted of 21 questions excluding of demographical questions. It consisted of nine questions of family support, four factors of political stability/instability, five item of terrorism, and three questions for occupational intentions. Structural equation model was used (SEM) was used for analysis of data and AMOS 16.0 was adopted for this purpose. Results of the study are given in the finding section.

4. Findings

The index fit of the model is shown in the table-1. Most index values satisfy the general standard values for index fit. The general accepted standards for model fit are; Chi-square value (significant level > 0.05), goodness of fit index (GFI > 0.80), adjusted GFI (AGFI > 0.80), Normed fit index (NFI > 0.90), comparative fit index (CFI > 0.90), and root means square residual (RMR < 0.05). Although this model fit does not meet all standards, it may be overall an accepted model.

The results of hypotheses tests of the relationship between constructs of external factors and entrepreneurial intentions are given in table-2 and figure-2. In order to accept the hypothesis the P value should be <0.05. Table-2 shows that all values of estimates and critical ratio (C.R) in positive terms which means that presence of family support increases entrepreneurial intentions of students; while presence of political instability and terrorism will not restrict

entrepreneurial intentions of students. So we can conclude that students are not influenced by external forces of Political instability or terrorism and would like to start their own business in future.

Path	Estimates	S.E.	C.R.	P	Hypothesis	Results
FamilySupport-Occupational Intentions	**.257**	**.051**	**5.021**	**.000**	**H1**	**Accept**
Political_ Instability- Occupational Intentions	**.262**	**.045**	**5.829**	**.000**	**H2**	**Reject**
Terrorism-Occupational Intentions	**.149**	**.056**	**2.657**	**.008**	**H3**	**Reject**

Table 2. Regression Weights (Results of Hypothesis Tests)

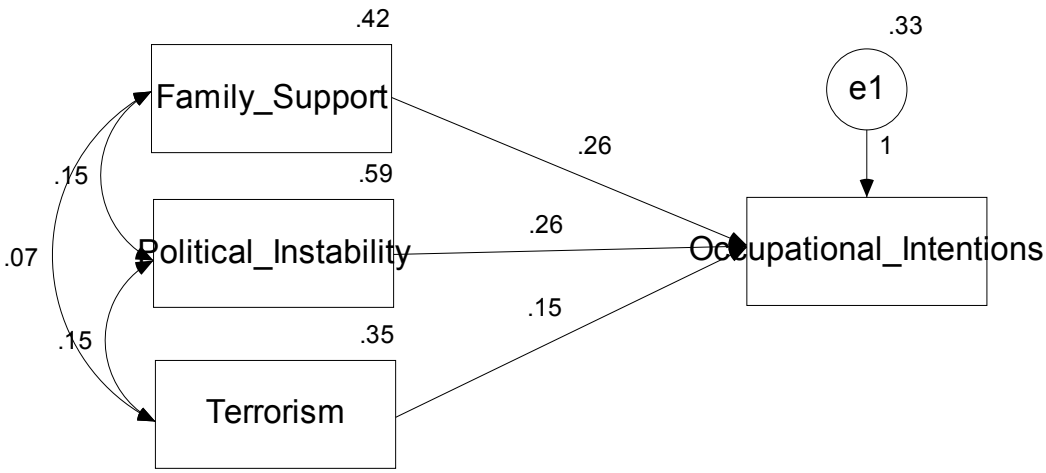

Fig. 2. Structural Equation Modeling

Figure-2 explains the nature of relationship between external factors i.e. Family support, Political instability, Terrorism and entrepreneurial intentions.

Findings of the study suggest that there is positive relation between family support and entrepreneurial intentions of students, which justify H1, these findings are consistent with the findings of Krueger (1993), Raijman (2001), Basu & Virick (n.d) and Shapero & Sokol (1982), who found that family support positively influences entrepreneurial attitude. But the findings do not prove other two hypotheses H2 and H3, and results indicate that political instability and Terrorism are not having influence on the entrepreneurial intentions of students. Discussion of the study is given in the following section.

5. Conclusion

This study provides interesting findings as it can be concluded from the study that students are not negatively influenced by external forces of political instability and terrorism. Rather students are willing to start their businesses even in such hostile situation. This would be an interesting study to find out the main reasons why students are not influenced by these factors. The reason that has been observed is that people are now willing to face the problem

of terrorism and want to get rid of it and only solution proposed is to overcome the issue by facing it courageously, similarly political instability is a common phenomenon in Pakistan, so this might not influence intentions of students. It is also observed that, students are willing to start their own business even in such hostile situations that might be outcome of increasing unemployment level in the country due to economic crunch, lack of investment, and distrust in Government policies, which fail to increase employment level and youth feel unsecure. So conclusively saying, students are not influenced by these factors and they will still like to be entrepreneur in future.

6. Future Implementation

This research gives good insight into the factors that might influence the entrepreneurial decision, but the findings are quite interesting as the students are not influenced by external factors like terrorism, political instability, and economic crunch. These findings are surprising in itself and require further research in itself. This research gives direction to researchers that why students are not influenced by these factors (behavioral aspects), what are the other factors that would have more influence on the students to be inclined towards entrepreneurship (economic and social aspects) and any other factor that is deemed to be studied.

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4

Reflections on Eco-Preneurship

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1. Introduction

Ever since the industrial revolution, people have reflected on the question of why industrial systems seem to be in tension with nature. In the last few decades much has been written about possible ways to overcome or dissolve that tension and create a harmony (e.g. Capra 1970, Hawken 1993 *et seq,* McDonough 2008, McKibben 2007; to mention a few). All of these authors agree on the importance of changing or adapting the ways we think about the business system (i.e. a paradigm shift) and the ways we act within that system (e.g. re-localization, conservation, footprint-reduction, restorative designs, industrial ecologies, etc.). Most reflections on how to achieve such changes then dwell upon one or more of the following three themes:

i. The link between environmental sustainability and profit, or wealth creation; that is, win-win environmental strategies and eco-affluence (e.g. Martin, 2006)
ii. The link between environmental damage and poverty. The *one-bus theory*, for example, holds that social entrepreneurs, micro-finaciers and eco-preneurs around the world are all, in effect, riding "the same bus" (e.g. Hawken 2007).
iii. The overarching (but unresolved) question of the role of human intentionality within ecosystems that encompass mind and nature (e.g. Bateson 1972 *et seq*, Dawkins 1976 *et seq,* Harries Jones 1995).

The latter question invariably leads us to think about: (a) pre-industrial forms of agriculture and the breeding of crops and livestock to serve human purposes, (b) post-industrial genetic engineering and synthetic biology that directly produces new organisms for specific purposes, (c) an evolving ecology of mind (or symbols or codes) that encompasses natural (i.e. human) and now also artificial intelligence, but also (d) the deliberate development (by humans) of hybrid entities or "wet AI" with the attendant prospect of these entities eventually taking control of the entire (eco-) system to serve *their* emergent purposes (i.e. after the takeoff point).

The present chapter offers some reflections on the linkages between eco-preneurship as we now normally think about it (i.e. a profitable and responsible business practice) and the deep structure of the very idea of "eco-business" in which recursive (self-referential) relationships are quite pervasive, as they are in genetic replication and ecologies *per se*. Particular attention is paid in this chapter to a few less-obvious and rarely noticed examples of self-reference within this complex web of ideas, namely:

i. a dualism (of dualisms) that reflects the ambivalent relationship between economic and ethical ways of thinking about eco-prenurship: are these opposites, or the same thing?
ii. preferences over preferences, i.e. *meta*-preferences in consumer behaviour,
iii. forms of rationally and their *meta*-rational inter-relationships, in the context of business strategy,
iv. conceptual *meta*-models (i.e. models of models) and their apparent fractal-like qualities.

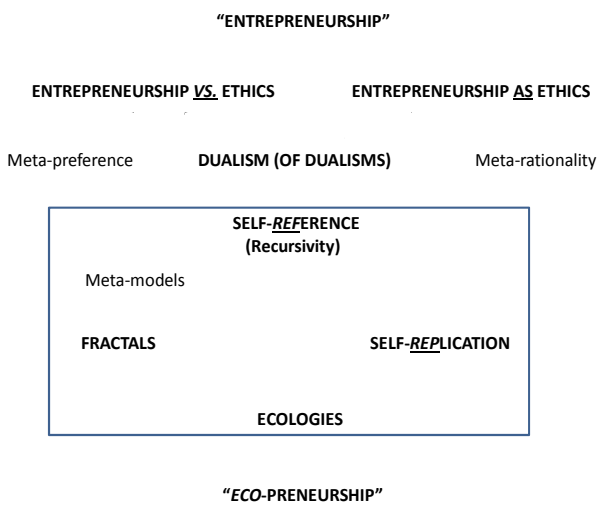

Fig. 1. Chapter overview

The following section sets out two contrasting perspectives on the relationship between ethics and entrepreneurship (i.e. a dualism). A more detailed framework is then set out in sections 3 and 4. This triggers a discussion of the idea of preferences and meta-preference as expressed by buyers (users, consumers, clients, customers etc.). Section 5 then briefly describes several correspondence frameworks whereby entrepreneurship and ethics are perceived as essentially the same thing. The self-referential qualities of all these lines of inquiry is then discussed. Finally, attention turns to some seldom-discussed pathways from self-reference to ecology. The first involves the boundary (if any) between symbolic self reference in the mind (or in a computer) and self replication in "nature"; the second involves conceptual models of business strategy and how these "models" themselves (i.e. when reified) seem to have fractal-like properties, just as they function within an ecology of mind (e.g. Bateson 1972).

2. Two perspectives

The effects of entrepreneurial activities on ecosystems and social systems are often described in ways that reflect tensions between industry and nature. These descriptions are all associated with the familiar quip that "Business Ethics is an oxymoron" and the claim that entrepreneurs (as a class) detract from the common good, to the extent that they:

> "damage the environment, destroy ecologies, create sweatshops, decrease local affordability, conceal or monopolize knowledge, destroy ancient cultures, avoid and evade tax, lobby at other's expense, support corrupt or oppressive regimes, frustrate

> others with unrealistic goals, create slaves, colonise the mind, cynically service an image, and so on".

However, many others (or the same people at different times) claim that entrepreneurs as a class add to the common good to the extent that they...

> "restore the environment, design ecologies, create jobs, satisfy demand, create and share knowledge, facilitate cultural renewal, pay taxes (to good governments), lobby to update outmoded laws, stabilize governments, act as role models, keep the dream of wealth alive, demonstrate mastery, encourage value-expression, engage in philanthropy, and so on".

Indee, entire conceptual frameworks for understanding the relationship between ethics and entrepreneurship have been structured around related tensions and conflicts, as described in the following section. Yet, at the same time, there are alternative conceptual frameworks (cf. section 4 below) that posit identities between (i.e. the sameness of) ethics and entrepreneurship. According to the latter ethics and entrepreneurship are ultimately concerned with the question of "how to live a good life with others" as practices and as areas of inquiry.

3. Entrepreneurship *versus* ethics

The above conflicting descriptions also apply to the wider concept of "strategic management" which in turn includes the "entrepreneurial context". Just as the words "strategy" (or "business") and "ethics" are often used to summarise contrasting value-priorities, so the overall relationship between strategic management and business ethics can be described as a set of contrasting ideas or constructs (e.g. Singer 2009 *et seq*). This lively but tense discourse can represented and organized with reference to a set of bi-polar *components* and *spanning* themes that can be deployed to inform various *topical* themes including eco-preneurship or technology policies, and so on (Figure 2).

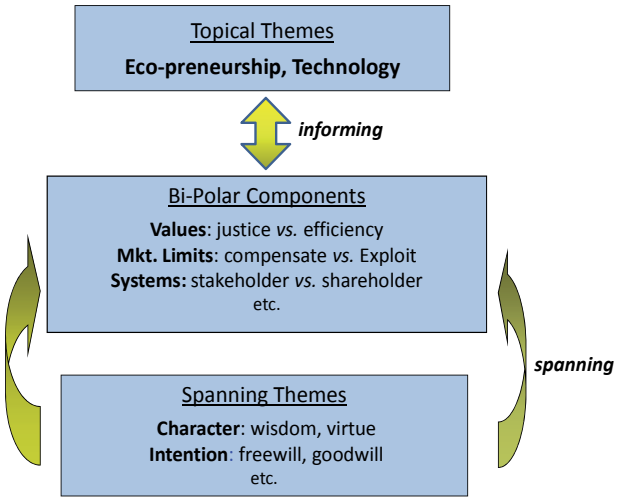

Fig. 2. Bi-polar components and spanning themes

The bi-polar components of the dualism include: generic strategic responses to the known limitations of market based systems (i.e. exploit *vs*. refrain or compensate); the stakeholder *vs.* shareholder models of management (that are broadly associated, in turn, with left *vs*. right political leanings and with regional variants of capitalism, but also with the notion of the natural environment as a "silent stakeholder"); "efficiency *vs*. justice" as conflicting value-priorities; the timing of ethics (e.g. restoring ecologies now *vs*. later); forms of capital (i.e. ecological social or cultural capital-formation *vs*. financial forms, etc.). All of these are in turn associated with contrasting usages of language within the mainstream narratives of "business" and "ethics", such as value-based *vs.* values-based strategies, and so on (Table 1).

COMPONENT	LEFT-POLE	RIGHT-POLE
Mkt. Limits	***compensate***	*exploit*
Systems	***stakeholder***	*shareholder*
Politics	*econ-left*	*econ-right*
Values	*justice*	*efficiency*
Timing	***Restore eco now***	*restore later*
Capitals	***Eco*** */multi-forms*	*financial forms*
Language	*values-based*	*value-based*

Table 1. Some bi-polar components of eco-preneurship

The spanning-themes in the dualism framework then include concepts such as character and intentionality, which can duly be used to inform *both* poles of selected bi-polar components (for example, eco-preneurs appreciate nature, which is a mark of good character, and so on). Topical themes such as eco-prenership and technology (especially biotech, nanotech & info-tech) can then be informed by (but also also inform) the bi-polar components and spanning–themes. For example, under the topic of eco-preneurship *timing* seems especially important (i.e. the imperative to restore ecology and stop polluting now), along with the notion of forms of *capital* (i.e. adding to ecological capital and overcoming any tradeoffs with financial capital accumulation), but also the notion of the set of market *limitations* (Table 1, row 2) and the "strategic" responses to each of these.

3.1 Market limitations

Profitable strategies, including win-win green strategies, necessarily involve the temporary exploitation of at least some of the known limitations (failures or imperfections) of market-based systems. These involve:

The monopolistic tendencies of producers, the lack of concern with distributive justice and those who lack the ability to pay, alienation (i.e. for the producer, the expressive product is replaced its utility or market price), information asymmetries (about the things being purchased), the distinction between revealed preference *vs.* well-being (and the creation of desire), but also, especially, un-priced externalities (e.g. pollution)

All such features in effect "limit" or place constraints upon the total co-production of human goods within a market based system (e.g. health and beauty, wealth and justice, happiness and fulfilment, etc.). The two particular limitations that seem most directly relevant to eco-preneurship are:

i. un-priced environmental externalities (i.e. the costs, harms, and deprivations imposed on others by traditional polluting businesses, but not paid for or compensated for by those businesses), and
ii. the distinction between the revealed preferences (of buyers) and their personal well-being.

In contrast with the traditional polluting industries, or worldwide "business as usual", eco-preneurs make a point of *refraining* from exploiting these two limitations. Indeed, ethical businesses in general can voluntarily refrain from exploiting any of the limitations, simply by exercising a kind of self-restraint (including constraints on their own profit) and by imposing self-regulation (even though there might be a risk of shareholder lawsuits, in some jurisdictions) For example, an ecopreneur might strive to create a green value chain even if costs are somewhat higher. A case can also be made for pro-actively compensating for (i.e. mitigating the effects of) exploitative behaviour by others, or in the past; for example, Royal Dutch Shell at last making efforts to clean up the Rivers Delta region of Nigeria (Figure 3).

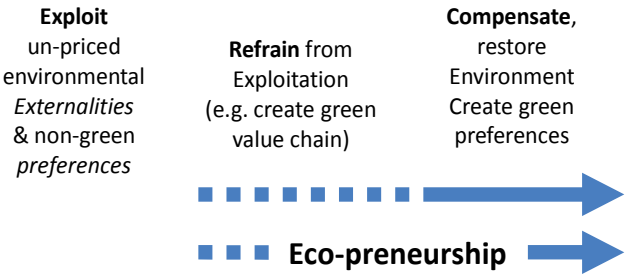

Fig. 3. Strategic responses to market limitations

Many eco-preneurs see themselves as trying to do this very thing when they restore local ecologies and thus compensate for pollution. This is also in accordance with the idea of a duty-of-benevolence that arguably falls on the enterprise itself (e.g. Margolis & Walsh 2003). In addition, ethical eco-preneurs typically do not exploit, nor deliberately create, desires and preferences that are known to conflict with wellbeing (i.e. the buyers' expected future experience of the human goods). Instead, they actively attempt to create green or healthy desires and preferences (or choices) in their target markets. Often, these forms of compensation and restraint involve strategic partnerships with like-minded institutions and NGO's that express the underlying green values (e.g. Hawken 1993 *et seq*).

3.2 Meta-preference

The concept of self-harm through personal consumption choices in the marketplace really seems to get to the core of the eco-preneur's larger mission. It is a "core" that can be modeled with recursive relationships. First it must be acknowledged that human emotion and the psyche can sometimes drive consumers and citizens into dark spaces, where they make choices that are not only against their own interests, but in some cases well-understood by the individual to be such. Examples include desperately poor people voting against social re-distribution, or a decision to purchase (and consume) items like narcotics or cheeseburgers that harm the consumer in specific well-known ways (put differently, their consumption is expected to create high costs for the consumer and others, later on[1].)

Many economists, psychologists and philosophers have inquired into this (or related) damaging aspects of human behaviour (e.g. Laing 1971, Lux & Lutz 1988, Etzioni 1988 *et seq*, Elster 1986; to mention a few) and they have duly developed behavioural theories or models of the mind that incorporate multiple levels of analysis with recursive relationships. For example, in *Humanistic Economics,* Lux & Lutz (1988) emphasised the distinction between:

i. *revealed* preference (i.e. what the person actually buys, such as a cheeseburger),
ii. *reflective* preference (i.e. what a person might eventually buy if they thought about it or studied it for long enough, such as a stick of broccoli), and
iii. a *meta*-preference (i.e. a preference amongst "preferences" like those in (i) and (ii) above).

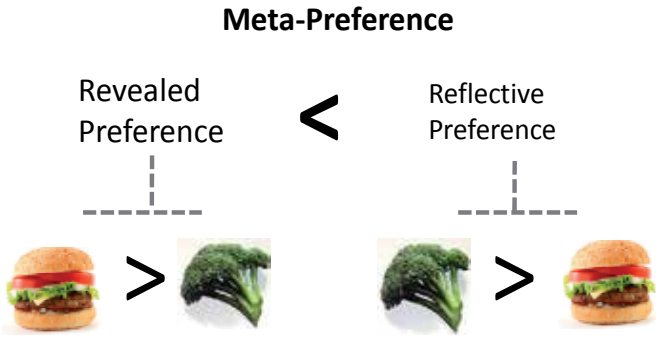

Fig. 4. Preferences and meta-preference

The latter *meta*-preference is something that can be "expressed" through natural language statements like "I wish I liked broccoli more than burgers" (Figure 4) or "I really want to quit drugs", or "I wish I could stop making purchases where the producer's value chain is obviously not green". It is only when a person becomes a reflectively-rational consumer, or becomes more committed to green or healthy causes, that these kinds of meta-preference are revealed by their actual behaviour.

4. Entrepreneurship as ethics

So far, the present inquiry into the deep structure of eco-preneurship has focussed upon various areas of tension and contrast. However, as mentioned at the outset, several other lines of inquiry cast entrepreneurship and ethics as essentially the *same* subjects. Both subjects refer to quite general problems of action, coordination, communication, production, exchange and wellbeing. Each is comprised of a structured set of concepts that can be placed in direct similarity-based correspondence with each other. Examples of so-called correspondence frameworks in the general area of business ethics include (i) Business and Citizenship, (ii) Entrepreneurship and Wisdom, and (iii) Strategy as Moral Philosophy, as follows:

i. *Citizenship*: In a discussion of the notion of "business citizenship", Logsdon & Wood (2002) placed elements of the strategy discourse in correspondence with political-citizenship related categories (e.g. business responsiveness to local market tastes was described as a form of caring, like a caring citizen; whilst the notion of global business citizenship was seen as entailing the universality of human rights, etc.)

ii. *Wisdom:* In the conceptual framework of "entrepreneurship as wisdom" Singer & Doktor (2008) place previously-identified components of wisdom (e.g. Kekes 1983, Zeleny 2005) in one-to-one correspondence with components of strategy. For example, wisdom requires awareness of the limits of one's capabilities, but this corresponds to the idea of assessing the weaknesses (and the strengths) of an enterprise, as in a standard "SWOT" analysis.

iii. *Rationality*: In the conceptual framework of strategy-as-rationality (e.g. Singer 1994) distinctive forms of rationality that have been explicitly defined within the spectrum of the social sciences and philosophy (i.e. the rationality-set) are placed in isomorphic correspondence with a set of core concepts in the domain of strategic management, as depicted in Figure 5. Some illustrative examples of correspondences involving ends (or goals) are listed in Table 2.

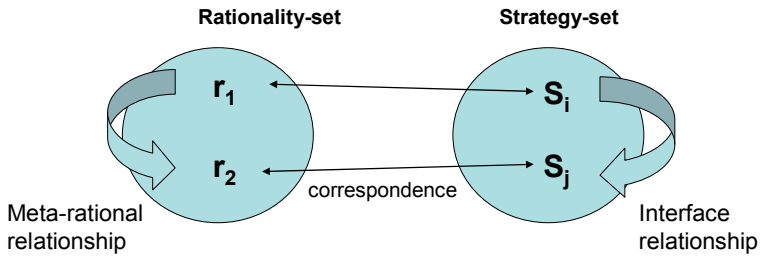

Fig. 5. The concept of an isomorphism between a rationality-set and a strategy-set

STRATEGY CONCEPT	FORM OF RATIONALITY
shareholder-wealth (with incentives for managers)	*egoism*
stakeholder approach	*extended*
stakeholders as constraints	*sympathy, interdependent*
not-for profit environmental or service ethos	*commitment, altruism, Kantian*

Table 2. Some strategic goals and ends-rationalities

4.1 Meta-rationality

The "strategy as rationality" framework (Singer 1994) in particular conceals yet another recursive phenomena (quite similar to meta-preference) that is revealed in any attempt to *evaluate* distinctive forms of rationality (and by implication, the corresponding "strategy" concept). Suppose for example we ask whether an environmental ethos is "really" rational as distinct from emotional, or incoherent or lacking in rigor. To delve into this question we have to turn to a *general* theory of rationality, which incorporates:

i. *classificatory* metarational criteria used to classify the forms of rationality (e.g. forms that primarily involve beliefs *vs.* ends, etc.)

ii. *relational* meta-rational arguments, that place elements and subsets of the rationality-set relative to each other (e.g. the extent of utility-capture, the relations between beliefs and ends, etc.), and

iii. *evaluative* metarational criteria that indicate the merits of a particular form of rationality (e.g. its universalizability, level of *self-support*, etc.)

The latter criterion of *self-support* (Gautier 1990) involves yet another recusive relationship. A self-supporting form of rationality is one that hypothetically chooses itself when used to "choose rationalities" or to select amongst the many forms (as depicted in Figure 6). The Commitment and Kantian forms of rationality that are implicit in eco-preneurship are indeed self-supporting, in this technical sense. In contrast, the rational- utility-maximisation that lies at the core of neo-classical economic theory (and the normative principle of profit maximization) is *not* in general self –supporting: it is self-defeating in Prisoners' Dilemma game contexts, but these often arise in the context of cooperative and environmental strategies. The overall implication is that the Kantian and Commitment forms are somehow superior: more consistent, more coherent and less inherently flawed[2]. The very same evaluation then applies to eco-strategies and to the environmental and service ethos of the eco-preneur. In sum, eco-preneurship both embodies and expresses the *recursively* self-supporting forms of rationality.

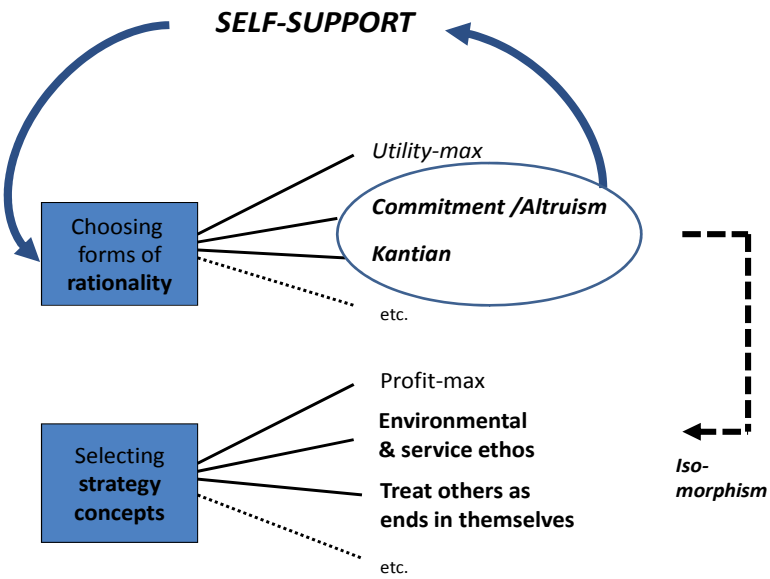

Fig. 6. Eco-preneurship and the self-supporting rationalities

5. Self-reference

When the above correspondence frameworks are compared with the dualism framework set out in section 3 (above) a so-called "dualism (of dualisms)" is revealed, namely: "correspondence frameworks *vs.* dualism frameworks". It is now quite ambiguous whether "ethics" (including environmental ethics) is essentially the *same* field of inquiry as "business strategy", or whether it is in fact a kind of *opposite*, or a mirror image of ethics, or a "topsy-turvey world" as described in Hawken (2007). This point may be considered as purely semantic or even trivial, yet it is another (rarely-noticed) example of how inquiries into social or human or ecological systems almost always seem to display a *dialectical* structure: that is, "an idea posits its opposite, but these rise to synthesis over and over again" (Reece

1980, citing Hegel). Indeed, ever since the dialectic *per se* was first written about (by Plato, *c.*450BC) it has also been associated with "the sciences of life and mind": the very "sciences" that concern the eco-preneur and that have now merged and exploded. Genetics, memetics, sustainable-biology, artificial general intelligence and the like all have at their cores processes of self-replication and self-reference. This is how natural human and hybrid and virtual ecosystems function. Accordingly, the remainder of this chapter focuses on the notion of self-reference *per se* and its many connections with the very idea of eco-preneurship. First various aspects of the relationship between self-reference and self-*replication* are briefly considered, then the notion of *meta*-models of strategic behaviour is described, along with their apparent fractal-like (or nature-like) qualities.

5.1 Self-replication

The distinction between self-reference in the abstract *vs.* the real or "wet" type of self-replication that occurs in evolution and biology has become increasingly blurred. The ultimate inseparability of these categories (or mind and body) appears to have been grasped and foreseen by the philosopher Spinoza over three centuries ago, who proposed the (heretical and anti-thesitic) idea that the mental and physical worlds are ultimately one and the same. Several other 20th century ideas and practices also pave the way for this merger. They include Russell's paradox, Hofstader's "beautiful parallels", but especially the science and technologies of synthetic biology. The latter involves the computer-aided sequencing & synthesising of DNA itself, but under current political and social conditions it is mainly a commercial endeavour.

5.1.1. Russell's paradox

The notion of self-reference in the abstract was first expressed in the classical paradox of Epimenides: "this sentence is false". More than 2000 years later, it was re-formulated as Russell's paradox: "the set of all sets that are not members of themselves". The proposition that "this set contains itself" then quickly yields in the mind the idea that it does not. To

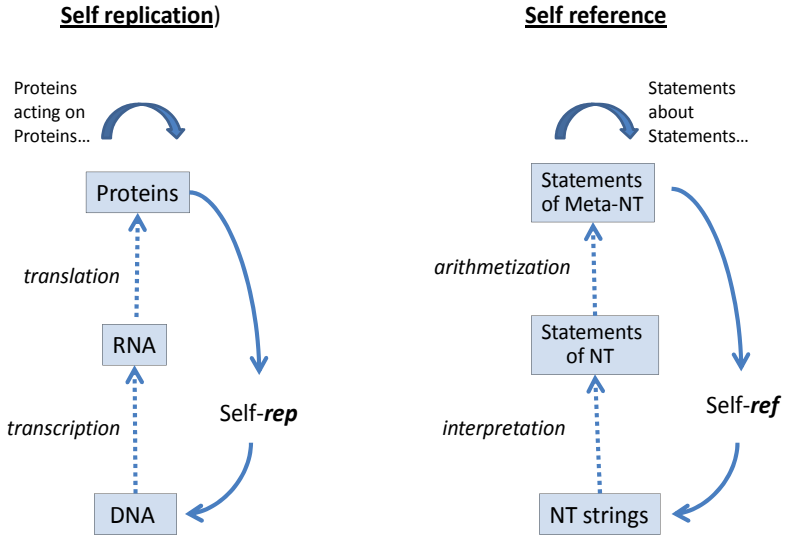

Fig. 6. Hofstadter's Self-*ref* and Self-*rep*

resolve this paradox a formal mathematical theory of "types" was designed (in *Principia Mathematica*) in which a formal distinction is drawn between signs (e.g. sentences, conceptual models) and their referents (meanings or semantics). A significant variant of Russell's paradox states that:

"In a certain village, there is a barber who only shaves the men who do not shave themselves. Who shaves the barber?"

The proposition that the barber shaves himself also quickly generates in the mind its opposite. This version on the paradox refers to a real physical entity (the barber) who uses resources (or tools produced by others) in order to co-produce a slight variant of itself (i.e. a shaved barber). This seems a step closer to the kinds of processes that go on in the "real" ecologies that concern and motivate eco-preneurs.

5.1.2. Hofstader's parallels

With Bertrand Russell's barber in mind, one might look more closely at the relationship between self-reference in language statements and the "wet" processes of self-replication in the biological or "real" world. Douglas Hofstadter, a renowned computer scientist, explored this very relationship. He identified "mechanisms that create self-**ref**erence" and he compared them, point by point, with natural "mechanisms" that self-**rep**licate. He identified "many remarkable and beautiful parallels." Figure 6, which is adapted from Hofstadter (1979, p.533), depicts a sequence of symbols (a code) within formal mathematical number theory (NT), which apparently "corresponds" to a single DNA molecule. The interpretation of the string (i.e. its conversion to a meaningful form) then corresponds with the biological transcription of DNA to RNA (i.e. its conversion to active form) and so on. The mechanism of self-reference in the abstract thus appears to be the same (up to isomorphism) as self-replication in living systems[3].

5.1.3 DNA sequencing & synthesis

The 1970's also saw the emergence of the ultimate technology for spanning the boundaries (if any) between the physical and symbolic worlds, not to mention the boundary (if any) between eco-preneurship and business as usual. It is the technology of sequencing and synthesizing DNA. "Sequencing" refers to the reading and recording of the total sequence of the four base nucleic acids A-G-C-T in a piece of DNA (by means of X-rays, florescent dyes, etc.). In "DNA synthesis", human designers (the ultimate eco-preneurs) work with computer databases to write the symbolic code for a new (or re-designed) genome, which is then input to a computer-controlled synthesis machine (Figure 1).

The four bases are stored in separate reservoirs in the synthesis machine, quite like the inks in colour photocopier, but they are linked together according to the code, producing the required *oligo-nucleotide* chain. These chains are assembled by the machine into a synthetic genome which is stored in yeast then implanted into a natural recipient cell that duly develops into a synthetic cell which possesses the "real" capabilities that were intended by the human designer.

When one reflects on this process (as depicted in Figure 6) it is obvious that the "designer" is a special kind of eco-preneur. She is coordinating "economic" resources and "creating a new synthesis" just like any other entrepreneur; but doing this at the molecular level. Futhermore, the (apparent) intention is to achieve advances in the very areas that are traditionally associated with grass-roots "eco-prenurship" such as renewable energy, food production, agriculture and health[4].

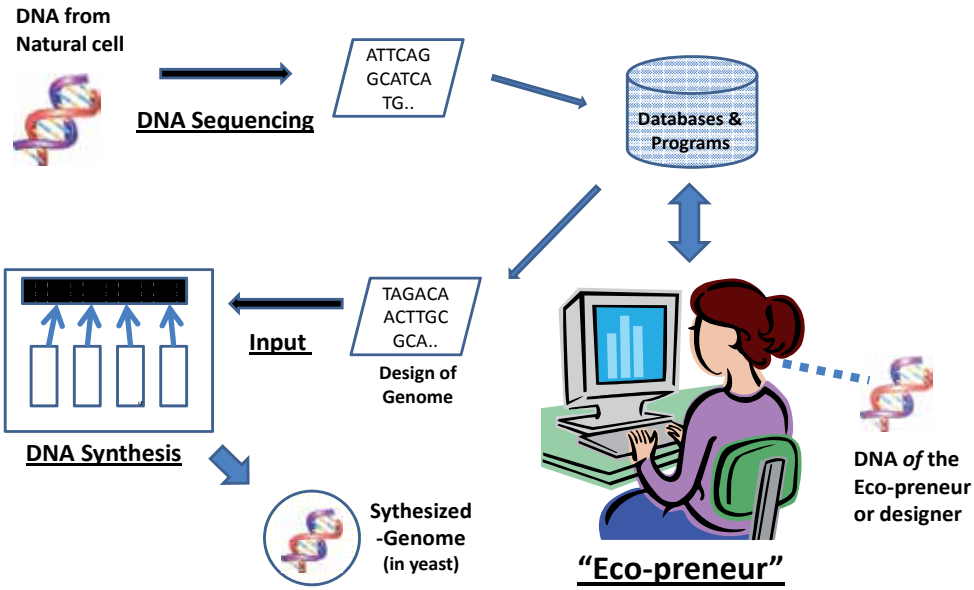

Fig. 7. Eco-preneurship as the coordination of nucleotides and synthesis of DNA

5.2 Meta-models & fractals

Yet another line of inquiry linking eco-preneurship with self-reference involves a chain of associations between conceptual models of "strategy" and fractal patterns (e.g. Singer 2002, 2003). A conceptual model *per se* can be defined as "a set of images and natural language expressions that depict and describe a problem context or a perceived reality" (e.g. Oral & Kettani 1993). Strategy "models" such as a green value chain, or a cost-of-greening graph or the stakeholder model then typically refer to productive entities (e.g. an entrepreneur, a firm, a value chain or network, etc.) together with some subset of their behavioural repertoires. The term meta-modelling then refers to any inquiry into the nature and usefulness of those strategy models *per se*. Thus a meta-model can be defined as: a conceptual-model of (a conceptual-model of (strategy or behaviour)).

Many "meta-models" of this type have been suggested in the literatue on systems and decision making, including those based around notions of comparison, design, transition, renewal and replication (refer to Table 6). In the *comparison* meta-model, for example, a conceptual model of strategy is viewed as an object-of-choice in the sense that *it* must be chosen and compared with alternative models (Figure 10). This perspective also casts the entity (the eco-preneur or strategist) in the role of an analyst or a decision maker. In the

Meta-model	CONCEPTUAL MODEL IS...	Entity is ...
Comparison	Object-of-choice	Analyser
Design	Trigger	Designer
Transition	End-state	Learner
Renewal	Trigger	Self-producer
Replication	Meme	Host

Table 6. Metamodels and strategic entities.

design meta-model, a conceptual model is viewed as a trigger of further processes of re-design (Table 6 row 2). The model (e.g. a green value chain) is seen to motivate an entity to "design" some new model, or schema. The *transition* meta-model then depicts a model as an end-state of an internal psychological transition (e.g. towards eco-consciousness). The model user is cast in the role of a learner. Similarly, "*renewal*" refers to a more profound inner-directed change process, or the renewal of an entity. Here, reflection on a model is assumed to trigger an exploration of core values, resulting in a heightened sense of self (e.g. Broekstra 1998). The eco-preneur is thereby cast in the role of a self-producer. Finally, but also in line with the boundary-blurring discussed earlier, conceptual models can be thought of as memes that lodge in the mind of entrepreneurs and co-produce ideas and copies of themselves[5]. Under this last description, it is the models of strategic behaviour that replicate and co-produce in an ecology of mind.

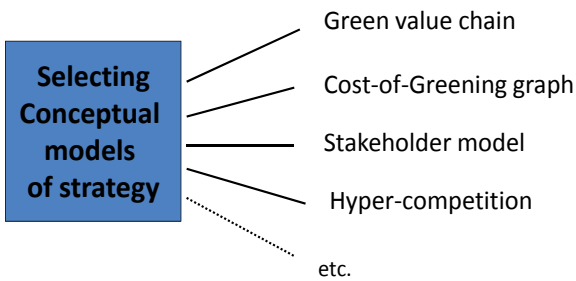

Fig. 10. The comparison meta-model

5.2.1 Meta-models & strategy concepts

All the categories in table 6 (above) arose while attempting to answer the question: "What is a conceptual *model* (of strategy)?" However, it turns out that the very same categories have been deployed in attempts to answer the more obvious question: "What is *strategy*?" For example, the "replication" meta-model implies that models are not freely selected. In the strategy literature similar doubts have been expressed about the ability of any entity (firm) to freely choose its strategy (e.g. Mintzberg & Waters 1985; Whittington 1993). Similarly the timing of "strategic *moves*" is a feature of the conceptual model of hyper-competition, but one can equally well consider the timing of any "transition" from one *model* (of strategy) to another, such as a transition from a conventional value chain model to a green value-chain, in the mind of the eco-preneur.

Accordingly, yet another correspondence appears to exist between the meta-models (i.e. comparison, transition, design, etc.) and concepts within conventional strategic

management, such as selecting strategic alternatives, generating options, the management of change, the development of competencies and the emergence of strategy, and so on. These all exist at the object level, which is two levels of analysis lower than the meta-models

META-MODEL	STRATEGY CONCEPT
Comparison	Strategic choice, selection
Design	Generate options, overcome tradeoffs
Transition	Management of change
Renewal	Develop Competencies
Replication	Emergent

Table 7. Meta-models & strategy concepts

5.2.2 Fractals

As one reflects at successively higher levels on the meaning of entrepreneurial "strategy" of eco-preneurship one encounters *recurring* categories. This hints at yet another way of linking eco-preneurship with nature itself. Fractal nature-like patterns (e.g. the Mandelbrot-set or M-set) can be produced by infinitely recursive mathematical operations (i.e. where the result of one operation is input back into that same operation) whose (complex-) numerical results can be represented on a 2-dimensional plane (the Argand diagram). As a viewer "zooms" through successively higher levels of image resolution, similar patterns recur again and again. For example, an M-set becomes temporarily obscure but then, upon further zooming, it reappears in a very similar form to the original set (these are called the "baby M-sets"). It seems that something rather similar has occurred with the meta-models of strategic behaviour. Starting at the object level (reality, practice), attention was directed to a set of conceptual models (Table 6, column 2). The epistemological status of those models seem somewhat obscure and controversial. However, by "zooming" further to the level of meta-modelling a more orderly set of categories re-appears, which are just like the conventional "object-level" strategy concepts (Table 7).

CATEGORY	META-CATEGORY	RELATED ECO-TOPICS
Dualism frameworks	dualism (of dualisms)	Strategic responses to externalities,
Preference relations	preferences (of preferences)	green value chain, healthy consumption
Forms of rationality	Meta-rationality	Self-support, rational-commitments
Strategy model	models (of models)	Replication, memes, fractals

Table 8. Summary of recursive relationships

6. Summary & conclusion

This reflection on the concept of eco-peneurship began by asking why industrial systems often seem to be in obvious tension with nature. The resulting inquiry has uncovered or pointed to many instances of recursivity and self-reference that lurk around within the frameworks and theories used to understand these things. The "instances of self-reference" involve (i) a dualism (of dualisms), (ii) meta-preferences, (iii) meta-rational arguments, and

finally (iv) meta-models of strategy. In the course of this inquiry several other topics were encountered that seem more directly relevant to eco-preneurship, such as responses to unpriced environmental externalities and consumer awareness of producers' green value chains.

Self-reference and self-replication are the very "mechanisms" that have given rise to the entire natural, human or "ecological" world; but they also have yielded an ecology of mind within which all the above ideas exist. Accordingly, almost every aspect of this chapter seems to invite further reflection on the nature of the boundary (if any) between the mental (symbolic, coded, virtual) world and the "real" (physical, wet) world within which eco-preneurs are normally thought to operate. In the course of this reflection, one might turn to evolutionary psychologists who concluded over forty years ago that that "consciousness (itself) must be subject to the evolutionary processes" (Sperry 1979) and that " ... *new relations* (are) emergent at each higher level (...of evolution, which in turn...) guide and sustain the course of events distinctive of that level (Jaynes 1976). The emergence of synthetic biology in particular has now brought these notions of co-evolution and guidance of events into sharp focus. It thus seems that we should think of eco-prenurship as an emergent phenomenon (both an idea and a practice) that will guide and sustain the course of future "events" in diverse ways and at many different levels.

7. Notes

1. It is still possible (if somewhat disingenuous) to make a utilitarian moral claim that the immediate hedonic pleasure from the consumption of cheeseburgers (rather than broccoli) is sufficient to compensate for the expected longer term physiological and environmental harms.
2. The principle of rational utility maximisation is often criticised on the grounds that the *maximand* (the thing being maximized) is not specified. Subset of the human goods are often proposed, to fill that void (e.g. Etzioni 1986 1988).
3. For a fuller account see Hofstadter (1979)
4. Furthermore, evolutionary theory (e.g. Dawkins 1976 & 2007) holds that the genes in the designer or eco-preneur himself (also depicted in Figure 7) are somehow driving the entire process. They are "blindly and selfishly" using the human designer and all his co-produced equipment as tools, in order to maximize *their* chances of survival.
5. The "replication" meta-model is similar to the concept of a *meme* (Dawkins 1976). Memes are chunks of information that lodge in minds, just as parasites might lodge in biological organisms. Their role in mental processes, or in an ecology of mind (e.g. Bateson 1972) is fully analogous to the role of genes in biological systems or natural ecologies. For example, every time an entity hosts a meme (e.g. an entity attends to a strategy model) a replication occurs.

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Part 2

Academia and Entrepreneurship

5

The Effect of an Entrepreneurial Training Programme on Entrepreneurial Traits and Intention of Secondary Students

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1. Introduction

One of the earliest discussions in entrepreneurship literature is whether to be an entrepreneur can be learned or not. This discussion reflects two extreme positions: in one side there are those who defend that "entrepreneurs are born", on the other side there are those who believe that "entrepreneurs can be made". In the confront of these positions it seems to win the line that defends that it is possible to learn to be an entrepreneur making use of differentiated policies and instruments in education. The support for this view comes from a widely literature review of entrepreneurship and business creation, which suggest important links between entrepreneurship education, business creation and entrepreneurial performance.

Thus, entrepreneurship education arises as a crucial tool in the development of the competences needed to new business creation and several European governments have been promoting the creation of courses to teach entrepreneurship. It is believed that the development of entrepreneurial talent is important to sustain competitive advantages in an economic system driven by innovation. Therefore, encouragement and support of start-up new ventures is a major public policy concern because of their impact on economic growth, particularly job creation (Raposo and Paço, 2011). This concern is especially legitimate in a crises period where new challenges arise in relation to economic development. In fact, as stated by Rae (2010) the international financial and economic crisis in 2008 produced a new economic era with significant implications for enterprise and entrepreneurship education. These implications affect the outcomes and applications of learning and the power balance between learners, institutions and educators and one of the difficulties of developing an integrative process model of entrepreneurship education lies in the fact that lines between actor roles are not always clear (Wood, 2001).

Furthermore, as stated by Wood (2001), entrepreneurship education is not a single event, but rather a continuous process comprised of a series of events. In consequence, the role of education and training in entrepreneurship and in the identification of endowment of entrepreneurial potential at a young age, are becoming evident for students, politicians and educators (Rasheed, 2000).

One of the critics in entrepreneurship courses, pointed by Neck and Greene (2011), is the fact that they are focused in the exploitation of opportunities assuming that the opportunity has been already identified. Thus, very little time and attention is given to creativity and idea generation process. Accordingly, Jusoh *et al*. (2011) in their analysis about training needs of education in entrepreneurs, found that in entrepreneurial skills training there is a lack in areas such as how to enhance creativity and innovation.

Several European programmes have been identified as best practices, and presented for instance at the Oslo Conference "Entrepreneurship Education in Europe: Fostering Entrepreneurial Mindsets through Education and Learning", being one of them the student company programme "Empresa Joven Europea" (EJE, meaning "European Young Enterprise"). This programme was created and developed in the Spanish region of Asturias, targeted at youngster from 14 to 16 years old, and consists on the creation of a mini company in class. This company has real business with real customers (preferentially from another country) and real money (Rodrigues et al., 2008).

The purpose of this chapter is to evaluate the effect that this educational programme has on the students that attend it.

The chapter is divided in the following major sections. The first section reviews the literature about entrepreneurship education, specifically in what concerns to the psychological and behavioural approach. The second section presents the methodology. The third section discusses the results. Finally, the last section discusses some practical implications and presents some conclusions.

2. Literature review

Despite the discussion whether entrepreneurs are born or made, most accept that entrepreneurship, or certain facets on it, can be taught, or at least encouraged, by entrepreneurship education (Kuratko, 2005).

There is a strong case to be made for the benefits of entrepreneurship education, for a variety of potential stakeholders (Wood, 2011). In this sense, a number of benefits are available to those who choose to be directly involved in the process.

According to Rae (2010) education is vital in creating understanding of entrepreneurship, developing entrepreneurial capabilities, and contributing to entrepreneurial identities and cultures at individual, collective and social levels. More, the role of education is to shape ideas of what it means to be an entrepreneur, not to promote an ideology of entrepreneurship, and to create critical alertness that contributes to the responsibility of entrepreneurs to society.

To Bakotic and Kruzic (2010), entrepreneurship educational programmes contribute to increase the perception of important entrepreneurship aspects, as well as create a real vision of entrepreneurship problems. For this, the authors advocate the need for students' permanent education which should be focused on additional development of their competences and required skills needed later in the market context.

Although the alleged benefits of entrepreneurship education have been much celebrated by researchers and educators, there has been little rigorous research on its effects (Peterman

and Kennedy, 2003). In fact, entrepreneurship education ranks high on policy agendas in Europe and the US, but little research is available to assess its impact and their effects are still poorly understood. Several previous studies find a positive impact of entrepreneurship education courses or programmes (Peterman and Kennedy, 2003; Fayolle et al., 2006; Raposo, Paço and Ferreira, 2008; Raposo et al. 2008; Rodrigues et al., 2010). Other studies find evidence that the effects are negative (Oosterbeek et al., 2010; von Graevenitz et al., 2010). There may be methodological reasons why the literature has not generated consistent assessments as of yet.

There is some evidence that entrepreneurship education has a positive role to play in student entrepreneurial intention (Pittaway and Cope, 2007; Florin et al., 2007; Raposo et al., 2008; Nabi et al., 2010). Henry et al. (2003) conclude that entrepreneurship programmes can be effective and yield significant benefits for aspiring entrepreneurs. However, the impact of university education on entrepreneurship has been questioned, especially with regard to impact on the transition from intentionality to entrepreneurial behaviour or impact on entrepreneurial success (Nabi et al., 2010).

According to Pittaway and Cope (2007) entrepreneurship education has had an impact on student propensity and intentionality. However, what is unclear is the extent to which such education impacts on the level of graduate entrepreneurship or whether it enables graduates to become more effective entrepreneurs.

According to Nabi et al. (2010) the entrepreneurial intention research tells us very little about: (i) the process of personal change in relation to attitudes towards entrepreneurship brought about by higher education; (ii) the transition from student to entrepreneur; and (iii) it fails to explain the low follow-up on entrepreneurial intent.

In spite of the fact that there are a number of studies on several aspects of start-up activities, one aspect that is also not very clear is whether the activities that lead to the possibility of starting a new business or venture correspond to the content of course work in entrepreneurship classes. Because of this it is necessary to reflect about the relevance of what educators are teaching in the classroom, and more particularly, if start-up activities are effectively reflected in entrepreneurship course content and delivery (Edelman et al., 2008).

Garavan and Barra (1994) state that the most commonly referred aims of entrepreneurship education and training programmes are the following: i) to get useful knowledge of entrepreneurship; ii) to acquire skills in the use of techniques, in the analysis of business atmospheres, and in the synthesis of action plans; iii) to identify and stimulate entrepreneurial skills; iv) to develop empathy and support for all aspects of entrepreneurship; v) to develop attitudes towards change and uncertainty; and vi) to encourage new start-ups.

These entrepreneurship training programmes will contribute to the stimulation of entrepreneurial abilities. Hisrich and Peter (1998) say that the various skills required by entrepreneurs can be categorised as: technical skills, business management skills and personal entrepreneurial skills. Henry et al. (2005) refer that the development these personal skills differentiates an entrepreneur from a manager.

Thus, very different skills, abilities and knowledge may be required to fulfil these different aims of entrepreneurship education programmes. Therefore, while many of the aspects of entrepreneurship can be taught, it also needs a certain attitude towards taking risks.

However, some of these programmes only connect the entrepreneurship to new venture creation and business management and educate about entrepreneurship and enterprise, rather than educating for entrepreneurship, and only rarely the focus is in the development of their students' skills, attributes and behaviours (Kirby, 2004).

Also regarding the pedagogy of practice in the entrepreneurship method, Neck and Greene (2011) defend real-world venture experiences and suggest games and simulations, designed-based learning, by observing the world from diverse point of views, and reflective practice to give students time to think and mature the ideas. These authors proposed the concept of teaching entrepreneurship as a method that is different from the current way in which it has been taught, that is, as a process of identifying opportunities and implement the business. This method is "teachable, learnable, but it is not predictable … is people-dependent but not dependent on a type of person…goes beyond understanding, knowing and talking and demands using, applying and acting". Essentially it requires practice and implies that educators focus their selves in helping the students to understand, develop and train the abilities. Thus the assumptions of the method are the following: (i) applied to beginners and experts; (ii) is inclusive and wide-ranging; (iii) needs constant practice; (iv) can be used for a volatile environment.

The responsibility for teaching entrepreneurship does not rest wholly with the educational world. In fact, at public level there is a need for the creation of an environment that will promote entrepreneurship (Murray and White, 1986).

In this sense Peterman and Kennedy (2003) emphasise that entrepreneurial activities need to be supported by school culture. These activities should be integrated into the programmes of the institution from an early stage. Thus, in entrepreneurship education literature, primary and secondary school has received growing attention and enterprise education programmes in secondary school were confirmed to be important for later entrepreneurial intentions. It is believed that the ideal stage to acquire basic knowledge about entrepreneurship and to foster a positive attitude towards entrepreneurship is during childhood and adolescence years (Peterman and Kennedy, 2003; Paço et al., 2011a; Paço et al., 2011b).

In fact, some works advance the idea that early formal entrepreneurship education affects the attitudes of students, influencing them in the direction of their future career, and affect their propensity for entrepreneurship when they become adults. Florin et al. (2007) stated that the students need to perceive that the application of the skill is feasible and that an entrepreneurial approach is desirable and a focus on developing a positive attitude toward entrepreneurial behaviour appears to be central to entrepreneurship education. The identification and study of students' entrepreneurial characteristics assumes special relevance for the development of adequate educational programmes related with entrepreneurship and business creation.

To measure the entrepreneurial intention probably it is necessary to incorporate insights from both psychological and behavioural approaches.

Several authors agree that psychological traits are good predictors of entrepreneurial orientation (Park and Ku, 2008)

In general, the main psychological characteristics associated with entrepreneurship in the literature are: locus of control, propensity to take risk, self-confidence, need for achievement, tolerance to ambiguity and innovativeness.

For instance, Bygrave (1989) presented a model that includes need for achievement, internal locus of control, tolerance for ambiguity and risk-taking propensity as determinants of entrepreneurial intention. Moreover, Robinson et al. (1991), in their research, find that achievement, innovativeness, locus of control and self-confidence could be predicting entrepreneurial attitudes.

Robinson et al. (1991) state that internal control leads to a positive entrepreneurial attitude and most students who receive entrepreneurial formation may develop a higher level of control and self-efficiency.

Ho and Koh (1992) refer that self-confidence is an entrepreneurial characteristic and that it is related to other psychological characteristics, such as locus of control, propensity to take risk and tolerance of ambiguity. Robinson et al. (1991) have found entrepreneurs to have a higher degree of self-confidence relative to non-entrepreneurs.

According to Koh (1996) these evidences should be expected, given the understanding of psychological traits that are unique to entrepreneurs.

So, a challenge is to understand if entrepreneurship education can have repercussions both on the level of cognitive development and on the level of the youngsters' psychological development.

In what concerns to the behavioural characteristics associated with entrepreneurship, the literature reinforces the importance of the perceived behavioural control, the personal attitude and the subjective norm. These constructs were presented by Ajzen (1991) that defends that any behaviour requires a certain amount of planning and it can be predicted by the intention to adopt that behaviour (Theory of Planned Behaviour – TPB).

Li (2006) argues that the TPB is very useful and it provides a sound theoretical framework toward understanding the antecedents of entrepreneurial intentions. Also in their research, Souitaris et al. (2007) used the TPB in order to test the impact of entrepreneurship education on attitudes and intention of science and engineering students, applying empirically the theory of planned behaviour.

Subjective norm is defined as an individual's perception of whether people think the behaviour should be performed. Hence, overall subjective norm can be expressed as the sum of the individual perception and motivation assessments for all relevant aspects. In other words is the influence of people in one's social environment on his/her behavioural intentions. The people's beliefs weighted by the importance of site their opinions will influence one's behavioural intention (Ajzen and Fishbein, 1973).

In their study Souitaris et al. (2007) present a possible interpretation of the significant raise of subjective norm after the entrepreneurship educational programme: the small increase in the "expectations of significant others" could reflect the creation of a new circle of

entrepreneurial-minded friends from the programme. The larger increase in the "motivation to comply" could be due to a consciousness that their family and friends were right about this career possibility, or to a feeling that they had to comply with the significant others' expectations after investing time and effort in the course.

Kolvereid (1996) argues that the greatera person's perceived behavioural control, the stronger is that person's intention to become self-employed. In turn, this perceived control corresponds to perceived feasibility, one of the key factors of self-efficacy. According to Fayolle (2005) self-efficacy has been found to significantly influence entrepreneurial behaviour and supporting entrepreneurship students' self-efficacy is therefore seen as a key tool in entrepreneurship education to enhance students' entrepreneurial intentions (Raposo, et al., 2008).

Thus, several empirical results in entrepreneurship broadly confirmed the theory's predictions regarding the relationship between attitudes (attitude towards self-employment, subjective norm and perceived behavioural control) and intention towards self-employment (Kolvereid, 1996). However, due the failure in some studies to find a link between subjective norm and intention, more studies with more reliable measures are needed.

3. Methodology

The study consisted on an experimental design with pre and post treatment inquiries.

We chose the two classes of the 9th grade which were to attend the entrepreneurship education programme EJE[1]. The sample was composed by 48 students ranging from 14 to 15 years old.

The EJE programme is based on an extensive network of "mini-companies" exchanging information, catalogues and products. It includes all stages to the creation, development and dissemination of a firm inside the school, where the students have the opportunity to interact with another national or foreign school. So, this programme is based on practical experience where students have the opportunity to display a wide array of social, personal and business skills.

Using a scale to measure entrepreneurial intention and related constructs (Liñan and Chen, 2007), , and Koh's (1996) scales to measure psychological traits (Table 1), students were surveyed before starting the programme.

The constructs included in the questionnaire were Entrepreneurial Intention (EI), behavioural constructs - Perceived Behaviour Control (PBC), Personal Attitudes (PA), Subjective Norms (SN) (see table 1) and psychological constructs - Locus of Control (LC), Propensity to Risk (PR), Self Confidence (SC), Need for Achievement (NA), Tolerance to Ambiguity (TA) and Innovativeness (IN) (see table2)

One year later, after the completion of the programme, the same students were surveyed again with the same tool. There was a high mortality rate in the sample for the second data collection moment. Only 37 of the original 48 completed valid questionnaires, which represents a mortality rate of 22.9%.

[1] http://www.valnaloneduca.com/eje

Construct	Items
EI	I am ready to do anything to be an entrepreneur My professional goal is to become an entrepreneur I will make every effort to start and run my own firm I am determined to create a firm in the future I have very seriously thought of starting a firm I have the firm intention to start a firm some day
PBC	To start a firm and keep it working would be easy for me I am prepared to start a viable firm I can control the creation process of a new firm I know the necessary practical details to start a firm I know how to develop an entrepreneurial project If I tried to start a firm, I would have a high probability of succeeding
PA	Being an entrepreneur implies more advantages than disadvantages to me A career as entrepreneur is attractive for me If I had the opportunity and resources, I'd like to start a firm Being an entrepreneur would entail great satisfactions for me Among various options, I would rather be an entrepreneur
SN	If you decided to create a firm, would people in your close environment approve of that decision? Indicate from 1 (total disapproval) to 5 (total approval). Your close family Your friends Your colleagues

Table 1. Entrepreneurial Intention, Perceived Behaviour Control, Personal Attitudes, Subjective Norms

Data was analyzed using SPSS software (IBM SPSS, 2010). Descriptive statistics of the summated scales and indicators and t-test for equality of means were performed, as well as Levene's Test for the equality of variances, considering both moments: *before* and *after* the training.

The data collected in both moments will be analysed in the next section. It is expected that scores are higher in the second measurement, revealing that the programme had an effect on students.

Construct	Items
IN	I avoid changing the way things are done. R
	While others see nothing unusual in the surroundings, I am able to perceive in it opportunities for business.
	I am able to beat around difficulties through strokes of ingenuity and resourcefulness.
	I believe there are always new and better ways of doing things.
	I find it difficult to come up with new, wild or even crazy ideas. R
LC	People's misfortunes result from the mistakes they make. R
	Many of the unhappy things in people's lives are partly due to bad luck. R
	I do not enjoy outcomes, no matter how favourable, if they do not stem from my own efforts.
	I am willing to accept both positive and negative consequences of my decisions and actions.
	It is I, not luck nor fate, which influence the outcome of events in my life.
	I cannot wait and watch things happen; I prefer to make things happen.
	I believe success is a product of luck and fate rather than personal effort. R
NA	I take pleasure in responding to challenges, so competition makes me work harder.
	I do not like a well-paid job if I cannot derive a sense of achievement and satisfaction from it.
	I want to earn only as much as possible to attain a comfortable way of life. R
	I do not mind routine, unchallenging work if the pay is good. R
	When I do something, I see to it that it does not only get done but is done with excellence.
	I hire people on the basis of friendship and other relations (for their loyalty) rather than on the basis of competence.
PR	I do not care if the profit is small so long as it is assured and constant. R
	I am willing to take high risks for high returns.
	I do not mind working under conditions of uncertainty as long as there is a reasonable probability of gains from it for me.
	I do not fear investing my money on a venture whose dividends I have calculated.
	I will consider a risk worth taking only if the probability for success is 60% or more. R
	I fear moving into a new undertaking I know nothing about.
SC	I accomplish most when I am alone, under no direct supervision of anyone.
	I have confidence in my ability to achieve.
	I have weaknesses and fears that are far from being resolved. R
TA	Job security is extremely important to me. R
	A good job is one with clear instructions as to what is to be done and how it is to be done. R
	I enjoy working in unstructured situations.
	I have a work schedule which I try to follow very carefully. R
	It bothers me when several people have over-lapping responsibilities. R
	In unclear situations, I like to make decisions and take the "lead".

Table 2. Locus of Control, Propensity to Risk, Self Confidence, Need for Achievement, Tolerance to Ambiguity and Innovativeness.

4. Results

As a first step, descriptive statistics of the summated scales and indicators were produced, as shown on Table 3 (summated scales), and Table 4 (EI indicators).

Table 3 shows very similar means in the two periods. But in what concerns to data dispersion, in all constructs there is a rise in standard deviations, which can mean that the EJE programme made students more different among them. The training programme seems to have the effect of parting the "weed from the wheat" in terms of entrepreneurial traits, entrepreneurial intention, and related constructs.

Construct[2]	*Before the training*			*After the training*		
	n	**Mean**	**Std. Deviation**	**n**	**Mean**	**Std. Deviation**
PA	48	3.288	0.573	37	3.205	.745
PBC	48	3.191	0.532	37	3.236	.688
SN	48	3.701	0.608	37	3.820	.612
EI	48	2.840	0.631	37	2.644	.781
LC	48	3.336	0.475	32	3.455	.544
PR	48	2.990	0.388	33	2.778	.467
SC	48	3.382	0.485	33	3.374	.524
NA	48	3.490	0.487	32	3.396	.655
IN	48	3.229	0.454	33	3.364	.513

Table 3. Descriptive Statistics

	Before the training			*After the training*		
	n	**Mean**	**Std. Dev.**	**n**	**Mean**	**Std. Dev.**
I am ready to do anything to be an entrepreneur	48	2.770	0.881	37	2.57	0.899
My professional goal is to be an entrepreneur	48	2.290	0.798	37	2.35	0.857
I will make every effort to start and run my own business	48	3.620	0.841	37	2.92	0.894
I am determined to create a business venture in the future	48	2.600	0.962	37	2.68	0.818
I have serious doubts about ever starting my own business [3]	48	2.920	0.942	37	2.70	1.051
I have a very low intention of ever starting a business [3]	48	2.830	0.996	37	2.65	1.086

Table 4. Descriptive Statistics - EI indicators

[2] PA – Personal Attitudes; PBC – Perceived Behaviour Control; SN – Subjective Norms; EI – Entrepreneurial Intention; LC – Locus of Control; PR – Propensity to Risk; SC – Self Confidence; NA – Need for Achievement; TA – Tolerance to Ambiguity; IN – Innovativeness.

[3] Inverted formulation, rescaled for analysis.

Indicators of EI, as shown in Table 4, also present similar means in both periods. And again there is a rise in the majority of standard deviations, pointing to the greater differences among students after the training programme EJE.

Next step was to test for statistically significant differences from one period to the other. Table 5 presents the results of that test for the summated scales, while Table 6 does it for EI indicators.

Considering a confidence level of 95%, Personal Attitudes (PA) and Entrepreneurial Intention (EI) shows differences in the variances of the two periods. Relating this result with the ones presented in Table 3, we can conclude that students are more heterogeneous regarding PA after taking the programme. Students are also more different among thems regarding EI after the training programme. A possible explanation is that students get more knowledgeable about what starting up and managing a firm seems to make them more realistic about their entrepreneurial intentions. This is consistent with the results presented in Table 6, which presents one single indicator with significant differences in pre and post programme means: "*I will make every effort to start and run my own business*". There is a diminution in this indicator after the programme ended. Again, it may be the case that the awareness of the level of effort that an enterprise implies, leads to a discouragement of some students towards the entrepreneurial process. Contrary to constructs results, in Table 6 it can be seen that there are no significant differences in pre and post programme variances, for any of EI indicators.

	Mean			**Levene's Test for Equality of Variances**		**t-test for Equality of Means**		
Cons-truct [4]	Before the training	After the training	Mean Difference	F	Sig.	t	df	Sig. (2-tailed)
PA	3.288	3.205	-.082	6.883	**.010**	.556	65.9	.580
PBC	3.191	3.236	.045	2.534	.115	-.341	83	.734
SN	3.701	3.820	.118	.005	.943	-.888	83	.377
EI	2.84	2.644	-.196	4.109	**.046**	1.246	68.1	.217
LC	3.336	3.455	.119	.267	.607	-1.037	78	.303
PR	2.99	2.778	-.212	.721	.398	2.220	79	**.029**
SC	3.382	3.374	-.008	.067	.797	.072	79	.942
NA	3.49	3.396	-.094	1.096	.298	.734	78	.465
IN	3.229	3.364	0.134	.532	.468	-1.242	79	.218

Table 5. Tests for Equality of Means and Variances– Constructs

[4] PA – Personal Attitudes; PBC – Perceived Behaviour Control; SN – Subjective Norms; EI – Entrepreneurial Intention; LC – Locus of Control; PR – Propensity to Risk; SC – Self Confidence; NA – Need for Achievement; TA – Tolerance to Ambiguity; IN – Innovativeness.

The only construct that shows a different mean after the educational programme is Propensity to Risk (PR), which lowers after the programme. Again, this diminution of PR may have to do with the bigger knowledge that students have of the entrepreneurial process, being more sensible when considering risk.

	Mean			Levene's Test for Equality of Variances		t-test for Equality of Means		
Item	Before the training	After the training	Mean Difference	F	Sig.	t	df	Sig. (2-tailed)
I am ready to do anything to be an entrepreneur	2.77	2.57	-0.2	0.29	0.594	1.05	83	0.299
My professional goal is to be an entrepreneur	2.29	2.35	0.06	0.52	0.473	-0.33	83	0.741
I will make every effort to start and run my own business	3.62	2.92	-0.7	0.11	0.742	3.73	83	**0,000**
I am determined to create a business venture in the future	2.6	2.68	0.08	0.72	0.398	-0.36	83	0.718
I have serious doubts about ever starting my own business [5]	2.92	2.7	-0.22	1.53	0.22	0.99	83	0.326
I have a very low intention of ever starting a business [5]	2.83	2.65	-0.18	1.04	0.311	0.81	83	0.418

Table 6. Tests for Equality of Means and Variances – EI indicators [5]

To access if the training affected awareness of Entrepreneurship as a possible professional career, the results of the question "Have you ever seriously considered becoming an entrepreneur?", before and after the training were analysed (table 7).

	Before the training	*After the training*
Yes	29.20%	48.65%
No	70.80%	51.35%
n	48	37

Table 7. Answers to the questions "Have you ever seriously considered becoming an entrepreneur?"

According to Table 7, more than two thirds of students had never thought of becoming an entrepreneur before the educational programme, which is consistent with the proposed unawareness of the entrepreneurial activity. After the programme, almost half the students had seriously considered becoming an entrepreneur, which is a significant change ($\chi^2(1)= 3.378$, $p<.1$).

In order to better understand if students were more convinced to be, or not to be, an entrepreneur after the training, the evolution of subjects with positive EI (scoring above the neutral value 3), and the evolution of the subjects with negative EI (less than 3) Table 8. These results reinforce that the training programme extremes entrepreneurial intentions. Students with positive entrepreneurial intention seem to have higher EI after the training programme. On the other hand, students with negative entrepreneurial intention have lower values of EI after the training programme ($t(43)=1.912$, $p<.1$).

[5] Inverted formulation, rescaled for analysis.

	Before the training			*After the training*		
	n	**Mean**	**Std. Deviation**	**n**	**Mean**	**Std. Deviation**
Positive EI (>3)	15	3.49	.373	10	3.58	.317
Negative EI (<3)	24	2.37	.450	21	2.10	.507

Table 8. Changes in positive and negative entrepreneurial intentions

5. Discussion

Results do not support a clear positive impact of the EJE educational programme on Entrepreneurial Intention of the studied youngsters. Also, the results do not indicate a positive outcome concerning the development of a positive attitude toward entrepreneurial behaviour, as advocated by Florin et al. (2007).

However, Personal Attitudes (PA) and Entrepreneurial Intention (EI) show significative differences in the variances of the two periods, reflecting greater differences among students. In fact, students seem to be more convinced of their choice (both positive and negative alternatives) about following an entrepreneurial career. In fact the percentage of students who seriously considered becoming an entrepreneur rose by 77%.

The only construct that shows a different mean after the educational programme is Propensity to Risk (PR), which lowers after the programme. Therefore, while many of the aspects of entrepreneurship can have been taught, the programme failed, in developing a certain attitude towards taking risks.

Considering the most commonly referred aims of entrepreneurship education and training programmes mentioned by Garavan and Barra (1994), namely: i) to get useful knowledge of entrepreneurship; ii) to acquire skills in the use of techniques, in the analysis of business atmospheres, and in the synthesis of action plans; iii) to identify and stimulate entrepreneurial skills; iv) to develop empathy and support for all aspects of entrepreneurship; v) to develop attitudes towards change and uncertainty; and vi) to encourage new start-ups, this programme clearly did not achieve the last three ones.

A possible explanation for these results is that students are more aware about the process and implications of start up and manage a firm. In other words, they are more realistic about the implications and requirements of entrepreneurship. In this sense we cannot say that the programme did not affect the attitudes of students. It influences them in the direction of their future career, and may affect their propensity for entrepreneurship when they become adults. However this influence is exerted in both directions.

Thus, even if the programme fails to lead students to intend to start-up a business, it enhanced the awareness of entrepreneurship amongst these teenagers, and led them to assess their future as entrepreneurs.

In this sense the positive outcome of the programme was mainly to shape ideas of what it means to be an entrepreneur and to create critical alertness, aspects pointed by Rae (2010) as the main role of entrepreneurship education. This aspect was also pointed by Bakotic and Kruzic (2010), who argue that entrepreneurship educational programmes contribute to

increase the perception of important entrepreneurship aspects, as well as to create a real vision of entrepreneurship problems.

Furthermore, since Entrepreneurial Intentions are based on more realistic perceptions of reality, is not unreasonable to think that the training can act as a filter: those who are attracted by an entrepreneurial career are more committed to become an entrtepreneur (and to learn what is needed to be a successful entrepreneur), and thus their change of success could be greater. In this sense, even if the training was not effective promote entrepreneurial intentions, in the long term it could have effects in the promotion of entrepreneurial performance and success. This is a question that only can be answered with longitudinal studies.

Even if we highlighted the positive outcomes of this educational experience, it is important to reflect on the aspects of the course content and delivery. It is possible that the almost exclusive focus on new venture creation and business management was a handicap, disregarding the development of students' skills, attributes and behaviours, as advocated by Kirby (2004).

In view of these results and along with Bakotic and Kruzic (2010), we also advocate the need for students' permanent education. At this phase more students' awareness about entrepreneurship was achieved. Further education in subsequent phases of their life and learning experience, should be focused on additional development of their competences and required skills, abilities and knowledge needed later in the market context (Hisrich and Peter,1998; Henry et al., 2005), but also on developing an entrepreneurial attitude, in particular, an attitude towards risk taking.

Finally, we must note that the results must be seen with caution. The reduced size of the sample, mainly in the post programme inquiry, may contribute to the lack of statistical significance. Also, the high mortality rate in the sample from one period to the other is a serious limitation to these results. These limitations should be avoided in future studies in order to achieve results with more statistical robustness.

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6

Academic Entrepreneurship and Financial Problems: The Capital Structure of the University Spin-Offs

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1. Introduction

The external environment in which universities carry out their activities has changed substantially in the last century. A historical milestone in this change was the publishing of Bush's report in 1945. The fundamental principle of Bush's report was simple: basic research discoveries will be converted via technology transfer to become powerful drivers of economic development and social welfare. Afterward, the mission of universities was no longer limited to teaching; in addition they must research (Valls and Condom, 2003).

More recently, as a consequence of a set of reforms targeted to improve the transfer of research results to industry, a reconceptualization of the universities' role started during the 1980s. In the U.S., Bayh-Dole Act allowed universities to own patents resulting from federal research money. Starting from early 1990s, structural changes in the external environment of European universities pushed them for a more proactive role in technology transfer, too (Baldini et al., 2006). As a result, universities currently have to meet the social and economic needs of society. Therefore, the mission of universities is no longer limited to research and training (Branscomb et al., 1999; Etzkowitz et al., 2000); in addition, they must also contribute to the economic growth of the regions where they are located (the "third" mission). This new phenomenon emerged from the "second revolution" has been labelled "The Entrepreneurial University" (Ertkowitz et al., 2000) or "Academic entrepreneurship".

What is an entrepreneurial University? The term was practically coined with the publication of Clark's work (1998), *Creating entrepreneurial universities organizational pathways of transformation*. In order to define an entrepreneurial university, the author analyse the experience of five European universities which have adopted organizational and functional criteria similar to private companies. Clark (1998) identifies a set of characteristics necessary for the success of the entrepreneurial activities: 1) managers with the authority to make decisions, 2) developed potential partners (industry and government), 3) a diversified financial base to guarantee independence, 4) motivated academics' groups, and 5) an

entrepreneurial culture that demands continual internal renewal in order to adapt to changes in external relations.

According to Etzkowitz (2004), the academic entrepreneurship can be expressed in a set of inter-related propositions: 1) the capitalization of knowledge becomes the basis for economic and social development and, thus, of an enhanced role for the university in society, 2) the interaction with the government and industry, what Etzkowitz et al. (2000) call the "triple helix" model, 3) the university independence, 4) the creation of hybrid organizational formats that incorporate business sector practices (managerialism) and those of "traditional" universities, and 5) the continuing renovation of the university's internal structure as its relationship to the industry and government changes.

On the other hand, several authors have outlined the perils of misunderstanding the university entrepreneurial activity. Industry may excessively intervene in the university activities, leading academics to "academic capitalism" (Slaughter and Leslie, 1997) and "McUniversities" (Hayes and Wynyard, 2002). Society and academics may confuse an entrepreneurial university with a "for-profit university". Zemsky et al. (2005) emphasize the importance of the university's teaching function, encouraging universities to "move learning to the center of the teaching enterprise" (Zemsky et al. 2005, p.9). The excessive industry's intervention may also generate interest conflicts among universities and their members. In addition, the university services created to improve the transfer of research results to industry come at a high cost and require much maintenance.

Despite these perils and the lack of a consensus definition, the academic entrepreneurship adds another mission to the university' traditional list (research and teaching); the economic and social development of the geographic area it is immersed in. There are a very wide range of university-industry interactions which may contribute to carry out this entrepreneurial activity (Agrawal and Henderson, 2002; Cosh et al., 2006; Hughes, 2007; Lester, 2005): informal contacts, recruitment of graduates, use of publications, collaborative research, faculty consulting, attending conferences, patenting and licensing, and new business formation around university science and technology (spin-offs).

Although founding a new company is only one of a number of mechanisms for the transfer of knowledge from universities to industry, this choice has been growing in importance because of its recognition as an instrument for fostering local economic growth. In fact, recent decades have seen an increasing number of companies stemming from university-developed technology. This phenomenon is more evident in the U.S. (Carayannis et al., 1998; Degroof and Roberts, 2004) and in some European countries like the U.K. (Shane, 2004; Locket et al., 2003) or Sweden (Stankiewicz, 1994).

However, several recent studies have suggested that spin-offs are not the most useful of the available pathways for the transfer of knowledge from universities to industry, even in the countries where this phenomenon is more extended. According to Lester (2005), spin-offs are a very small fraction (2-3%) of the total rate of new business starts in the U.S. Hughes (2007) also suggests that there is an overemphasis on spin offs, which may lead decision makers to misunderstand the nature of the technology transfer model.

In addition, a large number of the spin-offs do not succeed in the long term because of their low quality (see Lambert (2003) for the British case). The features which characterise USOs

(small size, recent creation and innovative character) could partially explain these failure rates as they difficult the access to financial resources. Like Di Gregorio and Shane (2003) and Montañez (2006), we consider that several reasons justify an in-depth analysis. Firstly, USOs are a source of technology transfer, demonstrating the important role that universities play in the knowledge economy. Secondly, spin-offs are set up near where the knowledge was developed, thereby, fostering local economic growth. Thirdly, they impel changes in university itself by improving attitudes towards applied research and contact with the business community. And finally, in this way, universities and researchers can obtain long term financial returns.

This paper analyzes the factors that determine the capital structure of the USOs created by the Spanish universities. This study contributes to the literature in several ways. Firstly, our work sheds light on a facet of USO decision-making that has received very little prior academic attention. Secondly, using information from the financial statements of the USOs, we have filled in one of the gaps in the empirical literature and initiated a line for future research. Finally, our results provide quantitative evidence of the importance of firm size, age and guarantees in obtaining long-term debt. With these findings in mind, the policy-makers will be able to design policies which will make it easier for spin-offs to obtain appropriate financing.

This paper is organized as follows. In Section 2 we outline the Spanish university environment. Section 3 describes the theoretical background of the models and outlines the hypotheses to be tested. In section 4, the methodology is explained. In section 5, the empirical results of the study are presented. Finally, we conclude by summarizing the most important findings, introducing the potential limitations of the research and discussing areas for further research and implications for policy-makers.

2. Entrepreneurship trends in Spanish universities

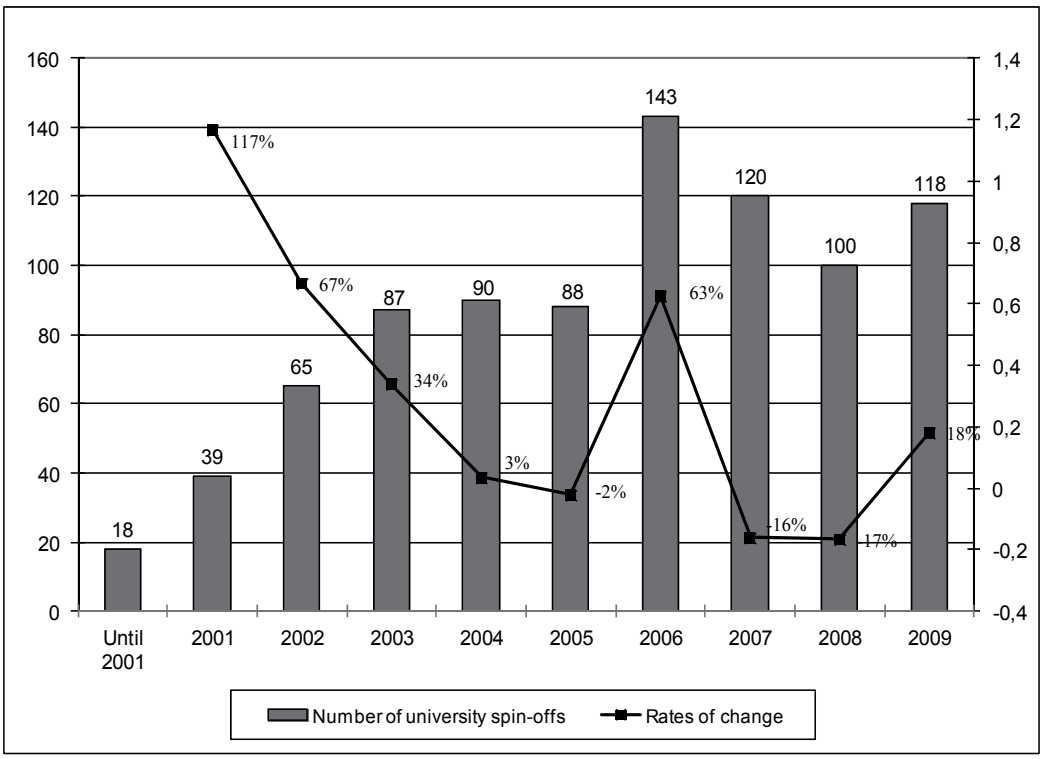
In Spain, the university system has traditionally been an example of a fully and highly centralized governance structure. After the restoration of democracy, the major change was introduced by the *University Reform Act* (1983). This increased the universities' administrative autonomy and transferred the responsibility for universities to the seventeen regional governments, which have had to take care of them in financial and organizational matters.

Despite these legal changes, Spanish universities have been characterized by a short tradition of ties with industry. In 1986, the *Law of Promotion & General Coordination of Scientific & Technical Research (Law of Science)* designed a new scientific and technological policy in order to face certain deficiencies of the national research system. Later, in 1988, the Government established the universities' Technology Transfer Offices (TTOs) to support and promote the dissemination of scientific knowledge and technology transfer activities.

Twenty years later, Spanish universities have substantially improved their contribution to the national research system by increasing the activities related to the commercial exploitation of knowledge. For instance, the research contracts have increased considerably in recent years, growing from 100 million Euros in 1996 to 428 million Euros in 2006. The

requests of patents made in the Spanish University System have growth from the 282 requests in 2000 to 572 in 2006. The TTOs have also played an important role in this process by managing about the 98% of the knowledge protection in the Spanish universities (Office of Technology Transfer, 2007).

Regards to the USOs, in the Spanish University System only 18 new companies had been created until December 2000. From that year, the number of companies created in the universities has increased significantly until 2003. As shown in Figure 1, from the 39 companies created in 2001 the number of spin-offs up to 118 in 2009 (TTOs, 2010). When we analyzed the rates of change in the number of spin-offs created, we found that there is a very significant increase in percentages above 100% at the beginning of the century. These rates decreased in the following years and stabilized in recent periods analyzed.



Graphic 1. Number of university spin-offs (2001 – 2009)

In fact, the creation of USOs increased its importance in the Spanish University System because the policies and activities to promote these companies also grew. However, this phenomenon is not as important as in other countries, eg, U.S.A., and its impact on the economy is relatively low (Callan, 2001). The Spanish case is consistent with the conclusions of the work *Fostering Entrepreneurship* (OECD, 1998). This work found that the number of these companies does not reach the hundreds in many OECD countries. Also it found that most of these companies are born in a little group of universities that have a high level of excellence in research. Usually, these universities match up with those that spend a great deal of financial resources to create structures to support these technology transfer activities.

3. Theoretical framework and hypotheses

Ever since Modigliani and Miller (1958) put forward their theory as to the irrelevance of financing decisions in the value of a company, numerous studies have attempted to demonstrate the existence of an optimum capital structure. Most of them focus on large and SMEs, however we have not found any work which analyses the factors which lie behind their capital structure of the USOs, although many empirical works highlight the funding difficulties they face.

Therefore, we have decided to review the empirical works which analyzes the capital structure determinants at enterprises of similar characteristics to USOs, in particular: those of a small scale (SMEs) and those belonging to high-technology industries (technology-based firms, or TBFs). In general, these works focus on three major lines of research: the trade-off theory, the agency theory and the pecking order theory. Drawing on these studies, our research presents a series of hypotheses connecting the aspects highlighted by the above theories with the capital structure of the Spanish USOs. Even though we contrast the applicability of the three research paradigms, the pecking order theory would seem to be the most appropriate for the case of small size and high-technology firms.

Table 1 summarizes the hypotheses regarding the expected relationship between the characteristics of USOs and their capital structure.

Theoretical rationales		Dependent variables	Pecking order theory	Agency theory	Trade-off theory
H1	Growth opportunities	Total debt/ Long-term debt	-	-	-
		Short-term debt	+	+	+
H2	Firm size	Total debt/ Long-term debt	+	+	+
		Short-term debt	-	-	-
H3	Profitability	Total debt/ Long-term debt	-	+	+
		Short-term debt	+	-	-
H4	Firm age	Total debt/ Long-term debt	+ / -	+	-
		Short-term debt	-	-	+
H5	Guarantees	Total debt/ Long-term debt	+	+	-
		Short-term debt	-	-	+
H6	Effective tax rate	Total debt/ Long-term debt			+
		Short-term debt			
H7	Non-debt tax shields	Total debt/ Long-term debt			-
		Short-term debt			

Notes: (+ / -) Positive / negative influence on the debt level or external finance

Table 1. Hypotheses: firm characteristics

Growth opportunities

Companies with greater growth opportunities generally have a higher level of uncertainty as to their ultimate development, and are subjected to a greater information asymmetry. From the perspective of the pecking order theory, this raises the cost of external funding, and impedes access to finance. Consequently, those enterprises with the greatest growth opportunities give priority to internally generated resources over debt (Diamond, 1991).

SMEs, and in particular USOs, are mainly subjected to conflicts of interest between shareholders and creditors, as the managers and owners are practically the same. According to Myers (1977), the under-investment problem increases at those companies with the greatest growth opportunities, meaning that creditors tend to reduce the funding made available. However, given that firms could recourse to short-term debt in order to mitigate the under-investment problem, some authors, such as Michaelas et al. (1999) and Sogorb-Mira (2002) suggest a positive relationship between levels of short-term debt and growth opportunities.

Those companies with the greatest growth opportunities generally have a high level of intangible assets, including in particular R&D expenditures and intellectual property. Since R&D expenditures are deductible, spin-offs with a major volume of R&D expenditures could be less interested in taking advantage of the tax benefits derived from the payment of interest on debts over the long term, and instead choose to take on a greater volume of short-term debt (Casasola, 2003). Similarly, a high level of intangible assets is generally associated with a greater probability of bankruptcy (Azofra and Fernández, 1999). For both reasons, from the perspective of the trade-off theory, an inverse relationship can be expected between growth opportunities and debt level.

Size

The pecking order theory states that external finance will be more expensive for smaller companies as they are subjected to greater information asymmetries, leading them to prefer internal finance and to reduce the repayment period of their debt in order to benefit from renegotiation. Meanwhile, larger companies present more detailed information to outsiders (Petit and Singer, 1985) and have credit ratings for bonds, reducing their information asymmetry and allowing them to increase their debt.

According to the agency theory, the larger the company, the greater the conflicts of interest between managers and shareholders because of the greater separation between ownership and control. An increase in the volume of debt could reduce the agency problems.

Meanwhile, larger companies are generally more diversified, and become bankrupt less often, meaning that size is generally seen as a proxy variable for bankruptcy probability (Warner, 1977; Smith and Warner, 1979; Ang et al., 1982). Moreover, the relative effect of the financial distress costs weighs more heavily on smaller companies. Then, from the perspective of the trade-off theory one would expect a positive relationship between size and debt level.

Profitability

According to the pecking order theory, the most profitable companies use internal finance to a greater extent, and reduce the role of external finance (Myers, 1984; Myers and Majluf, 1984).

At small firms, the managers are generally the owners and prefer to avoid any source of funding which involves the entry of new shareholders. Drawing on this agency argument, the most profitable spin-offs prefer to use internally generated resources and, if external finance is required, they will choose finance which does not limit their management capacity (generally short-term debt which comes with fewer covenants than long-term debt).

The trade-off theory considers the balance between the interest tax shield and the costs of possible financial distress that increasing debt would cause. It predicts that the most profitable spin-offs borrow less.

Age

The pecking order theory predicts that those firms which have been in business longer will have lower levels of information asymmetry, and will therefore draw on external financing to a greater extent (Petersen and Rajan, 1994). Some authors, such as Berger and Udell (1995) and Degryse and Van Cayseele (2000), hold that the age of the company reflects the reputation which it openly communicates to the market. Thus, the study by Hyytinen and Pajarinen (2005) focusing on small Finnish TBFs produced similar results to those predicted by the pecking order theory.

However, age may also have a negative impact on the debt level, as longer-established companies generally build up a greater volume of internal resources, thereby reducing their need to draw on outside sources of funding. Thus, Hogan and Hutson (2005) demonstrates that at TBFs which have been in existence for more than ten years, funding through the retention of profits takes on a greater role, replacing external finance.

More mature companies are more likely to have a greater separation between ownership and control, thereby increasing the conflict between shareholders and managers. Meanwhile, one would expect the conflicts between shareholders and creditors to be reduced as a result of the common interest in maintaining the company's prestige achieved in the previous years of operation. Taking into account these agency conflicts, one would expect that more mature companies would have a higher debt level, and that their repayment terms would be longer.

More mature companies have other tax deduction mechanisms apart from interest tax shields, meaning that according to the trade-off theory one would expect them to have less of an interest in increasing their debt for fiscal reasons, and that they would seek to shorten the repayment periods on their debt.

Guarantees

According to the pecking order theory, tangible assets reduce information asymmetries, as a clearer picture is available of the investments made by the company, meaning that their assets are not undervalued.

The conflicts of interest between shareholders and bondholders, such as the moral hazard problem, would decrease proportionately to the amount of committed investments already in place (De Miguel and Pindado, 2001). The tangible assets provide a greater guarantee for creditors, thereby giving easier access to external finance.

Tax Aspects

Finally, from a purely tax-based perspective, we have included two hypotheses in order to establish whether the tax system has any influence on the financing decisions made at spin-offs. Modigliani and Miller (1963) conclude that firms will prefer debt to other financing resources due to the tax deductibility of interest payments. Thus, one would expect a positive relationship between the effective rate at which USOs are taxed and their debt level.

According to De Angelo and Masulis (1980), if the firm has other alternative tax shields such as depreciation that could substitute the tax advantages of additional debt, they will be less inclined to use debt for such purposes. Consequently, an inverse relationship could be expected between the non-debt tax shields and the debt level.

4. Methodology

4.1 The sample and data

In our econometric analysis, we have used panel data from the Spanish USOs. The population of Spanish USOs was identified using the annual report of the University Network of Technology Transfer Offices (2005). At the end of 2005 there were 387 USOs in Spain. We first used a survey in order to compile qualitative data through direct contact with spin-offs. The survey was administered by mail and addressed to named CEOs or Managing Directors using a web-based questionnaire. Completed questionnaires were received during January and June 2006. The number of valid returns was 72, giving a response rate of just under 19% (Table 2).

Universe	Spanish university spin-offs *
Sphere	Spain
Sampling procedure	Computer assisted survey by means of web-based form
Rate of response	18.6%
Sample size	72 spin-offs
Sample error	±10.43%
Level of confidence	95%
Fieldwork	January 2005 - June 2006

Notes: * University Network of Technology Transfer Offices (2005).

Table 2. Technical research sheet

Secondly, we used SABI database taking into account the annual accounts deposited by companies in business registry offices throughout Spain. Therefore, we have constructed an unbalanced panel comprising 72 USOs for which the information is available between 1999 and 2005.

4.2. Definition of variables

As no market values are available for privately held USOs, all the variables are book values. Table 3 shows the variables employed in the analysis.

Our dependent variable is book leverage (*book_lev*). It is measured as the ratio of book value of total debt to the book value of the sum of total debt and equity. Total debt covers both

long-term debt and current liabilities, the latter including those which do not have an explicit cost, as the balance sheets of most spin-offs within the sample did not allow such data to be distinguished.

Nonetheless, an analysis of capital structure based only on total liabilities may screen the important differences between long – term and short – term debt (Barclay and Smith, 1999; Sogorb-Mira, 2002). In order to provide a more complete view of the capital structure of the Spanish USOs, we also consider as dependent variables the following measures of leverage: long-term debt ratio (*lt_lev*) and short-term debt ratio (*st_lev*).

GROUP	VARIABLE	DEFINITION
Dependent Variables	Book leverate (book_lev)	Total debt /Total debt and equity
	Long-term debt ratio(lt_lev)	Long-term debt / Total debt
	Short-term debt ratio (st_lev)	Short-term debt / Total debt
Independent variables	Growth opportunities (%int_assets)	Intangible assets / Total assets
	Firm size (l_totalassets)	Natural log of total assets
	Profitability (ROA)	Earnings before interest and taxes / Net total assets
	Firm age (more_2)	1 for spin-offs aged more than 2 years, and 0 otherwise
	Guarantees (%tang_assets)	Tangible assets / Total assets
	Effective tax rate (effec_tax)	Taxes / (Earnings after interest and before taxes + depreciation)
	Non-debt tax shields (ndebt_taxshields)	Depreciation / Total assets
Control Variables	Sector (booklev_cont, ltlev_cont, stlev_cont)	Deviation in terms of the debt (total/long-term/short-term) of each spin-off from the annual median for the sector

Table 3. Variables

The independent variables are the following:

In order to measure growth opportunities, the proportion of intangible assets was used (*%int_assets*).

The proxy variable employed for the size of the spin-off was the natural logarithm of its total assets (*l_totalassets*).

In order to evaluate the profitability, the ratio of EBIT to total assets was used (*ROA*).

The firm age was defined as a dummy variable, with a value of 1 for spin-offs aged more than 2 years, and 0 otherwise (*more_2*).

In order to measure guarantees, the proportion of fixed tangible assets was used *(%tang_assets).*

Following Sogorb-Mira (2002), the effective tax rate was calculated as the ratio of tax to the total pre-tax profit plus depreciation (*effec_tax*).

The non-debt tax shields were calculated as the ratio of depreciation to the total assets (*ndebt_taxshields*).

Finally, the control variable was the deviation in terms of the debt (total/long-term/short-term) of each spin-off from the annual median for the sector. The aim of this approach is to control industry effects.

5. Empirical analysis

5.1 Univariate analysis

Table 4 provides summary statistics of the variables used in the estimation.

	Obs.	Min.	Max.	Mean	Median	S. D.
book_lev	206	0	0,9988	0,5961	0,6070	0,2724
st_lev	206	0	0,9794	0,4440	0,4171	0,2767
lt_lev	206	0	0,8583	0,1521	0,0061	0,2213
%int_assets	206	0	0,9306	0,1430	0,0512	0,2052
l_totalassets	206	7,79	16,05	11,63	11,61	1,65
ROA	206	-0,9720	0,7381	-0,0112	-0,0008	0,2509
%tang_assets	206	0	0,9477	0,2097	0,1518	0,2172
effec_tax	203	0	0,9821	0,0751	0	0,1339
ndebt_taxshields	204	0	0,3515	0,0536	0,0334	0,0640
stlev_cont	206	-0,3463	0,6387	0,0023	-0,0025	0,1552
ltlev_cont	206	-0,8453	7862000	201503	1306	733557
booklev_cont	206	-0,6588	0,2823	-0,0259	0,0048	0,1535

Table 4. Summary statistics

Total liabilities on average amount to about 59.6% of total assets value. If we split total liabilities into long-term debt and current liabilities, the figures 15.2% and 44.6% respectively, show that debt financing for USOs in our sample corresponds mainly to a short term nature, exactly 74%. We find that intangible and tangible assets represent over 14% and 20% of total assets value, respectively. The average ROA over the period of study of the USOs in the sample is negative (-1.1%). Finally, the variables which measure the effective tax rate and non-tax debt shields have mean values of 7.5% and 5.3% respectively.

Table 5 shows the correlation matrix. As could be expected, most of the variables that are theoretically related to leverage are correlated and present the predicted sign. To determine the extent to which multicollinearity was a problem, we calculate the variance inflation factor (VIFs) scores. It was found that the VIFs scores did not exceed 2 for all the variables, which is not close to the rule of thumb "threshold" value of 10 (Hair et al., 1998). Therefore, multicollinearity was not a major problem in the analysis.

	book_lev	st_lev	lt_lev	%int_assets	l_totalassets	ROA	%tang_assets	effec_tax	ndebt_taxshields	booklev_cont	ltlev_cont	stlev_cont	VIF
book_lev	1												
st_lev	0.675***	1											
lt_lev	0.386***	-0.419***	1										
%int_assets	-0.27***	-0.326***	0.075	1									1.36
l_totalassets	0.145**	-0.136*	0.349***	0.324***	1								1.29
ROA	0.063	0.142**	-0.099	-0.255***	-0.055	1							1.45
%tang_assets	0.399***	-0.041	0.543***	-0.235***	0.117*	-0.012	1						1.13
effec_tax	0.008	0.127*	-0.149**	-0.191***	-0.043	0.507***	-0.049	1					1.37
ndebt_taxshields	0.058	-0.061	0.150**	0.172**	0.141**	-0.149**	0.047	-0.134**	1				1.08
booklev_cont	0.476***	0.300***	0.209***	-0.002	0.221***	-0.137**	0.109	-0.104	0.141**	1			1.69
ltlev_cont	-0.095	-0.050	-0.054	-0.036	-0.184***	0.184***	-0.109	0.131*	0.038	-0.138**	1		1.10
stlev_cont	0.361***	0.398***	-0.053	0.051	0.234***	-0.074	0.071	-0.056	0.094	0.614***	-0.12*	1	1.64

Notes: ***,**,* denotes significance at the 1%, 5% and 10% levels, respectively.

Table 5. Correlation matrix

5.2 Multivariate analysis

As we explained in Section 2 and bearing in mind that the estimations were carried out with panel data, the basic regression that we run can be expressed as:

$$\left.\begin{array}{l} Book\_lev_{it} \\ Lt\_lev_{it} \\ St\_lev_{it} \end{array}\right\} = \mu + \%int\_assets_{it} + l\_totalassets_{it} + ROA_{it} + more\_2_{it} + \%tang\_assets_{it} + effec\_tax_{it} + ndebt\_taxshields_{it} + (booklev\_con_{it} / ltlev\_cont_{it} / stlev\_cont_{it}) + \alpha_i + \lambda_t + \varepsilon_{it} \quad (1)$$

where λ_t is a time-specific effect, α_i denotes the unobservable individual specific effect that is time – invariant, and ε_{it} is a white noise disturbance. According to Baltagi (2001), the panel data methodology presents clear advantages over cross-sectional or time series studies. For instance, it can control for firm heterogeneity, and reduce collinearity among the variables that are contemplated (Arellano and Bover, 1995).

A critical question in cross-section models is to identify whether the unobservable individual effects are correlated with the independent variable of the model (fixed effects) or not correlated (random effects). In order to contrast the correlation between the individual effects and the independent variables, both the Hausman test (Hausman, 1978) and the Breusch-Pagan test (Breusch and Pagan, 1980) can be used.

	Total debt			Long-term debt			Short-term debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	R.E.	F.E.	I.V.	R.E.	F.E.	I.V.	R.E.	F.E.	I.V.
%int_assets	-0.2457*** (-2.97)	-0.2082** (-2.07)	0.1499 (0.96)	0.0645 (0.9)	0.0368 (0.4)	0.5010*** (2.84)	-0.3434*** (-3.75)	-0.2884** (-2.48)	-0.2324 (-1.16)
l_totalassets	0.01736 (1.51)	0.0186 (1.29)	0.0261 (0.95)	0.0400*** (4.09)	0.0474*** (3.81)	0.0771** (2.26)	-0.0226* (-1.81)	-0.0134 (-0.85)	-0.0766** (-2.16)
ROA	0.0595 (1.01)	0.0347 (0.54)	-0.1933 (-0.8)	-0.0095 (-0.17)	0.0013 (0.02)	-0.5942** (-2.14)	0.0342 (0.52)	0.0306 (0.41)	0.0737 (0.22)
more_2	0.0462 (1.58)	0.0411 (1.29)		0.0159 (0.6)	0.0487* (1.67)		0.0648** (1.97)	0.0165 (0.45)	
%tang_assets	0.2322*** (3.12)	0.0771 (0.8)	0.1749 (0.78)	0.4731*** (7.39)	0.2536*** (2.93)	0.1692 (0.51)	-0.0974 (-1.19)	0.0631 (0.57)	-0.1397 (-0.47)
effec_tax	-0.0734 (-0.67)	-0.1167 (-0.99)	-0.3346 (-1.09)	-0.0616 (-0.61)	0.0454 (0.42)	0.7399** (2.26)	-0.0003 (0)	-0.1128 (-0.83)	-0.9839*** (-2.71)
ndebt_taxshi elds	-0.1476 (-0.69)	-0.2118 (-0.91)	0.1567 (0.58)	0.1441 (0.75)	0.0833 (0.39)	0.0313 (0.1)	-0.2652 (-1.1)	-0.2497 (-0.93)	-0.0384 (-0.11)
Booklev_cont /ltlev_cont/ stlev_cont	0.7087 (8.41)	0.7195*** (8)	0.1236 (0.79)	0.0000 (1.08)	0.0000 (0.55)	-0.0000* (-1.67)	0.8481*** (9.69)	0.8533*** (9.44)	0.4979*** (3.96)
constant	0.3941*** (3.13)	0.4072** (2.5)	-0.0136 (-0.61)	-0.4274*** (-4.06)	-0.4960 (-3.62)	-0.0003 (-0.01)	0.7570*** (5.63)	0.6393*** (3.67)	-0.0032 (-0.12)
Obs.	203	203	40	203	203	40	203	203	40
Breusch–Pagan T1	49.75 (0.000)			12.36 (0.000)			23.44 (0.000)		
Hausman T.2		15.86 (0.0445)			92.06 (0.000)			18.60 (0.0172)	
Hausman T.3			(0.99)			(0.99)			(0.99)
Regresión-based T4			2.25 (0.1378)			1 (0.3208)			0.05 (0.8273)

Notes: ***,**,* denotes significance at the 1%, 5% and 10% levels, respectively. t – statistics in parentheses. RE Random effects model, FE Fixed effects model, IV Instrumental variables (first differences)

1. The Breush-Pagan Lagrange multiplier test in the random effects model for the null hypothesis that there are no individual specific effects.
2. $\chi 2$ statistic and p-value for the Hausman test for the null hypothesis that explanatory variables and individual effects are uncorrelated.
3. P-value of the Hausman test comparing IV and OLS estimates. If we accept the null hypothesis, then there is no endogeneity.
4. F statistics and p-value of the regresión-based test proposed by Wooldridge (2002) If we accept the null hypothesis, then there is no endogeneity.

Table 6. Determinants of debt level

In addition, the profitability variable could lead to problems of endogeneity, which would invalidate the consistency of the estimator for fixed effects as a result of the repercussion which debt levels could have on this variable. In order to contrast this fact, we corrected the proposed models by using instrumental variables and by applying the first difference estimator. The most frequent means of instrumenting the variables where problems of

endogeneity exist involve replacing exogenous regressors with themselves, and the endogenous variable, in this case profitability, with its lags (Hsiao, 2003). We subsequently contrast the similarity of the coefficients of the models estimated by instrumental variables and by ordinary minimal squares, once again applying the test of Hausman (1978) in addition to the test proposed by Wooldridge (2002).

The results of fixed effects models, random effects models and instrumental variables estimators are reported in Table 6.

The Breusch-Pagan test rejects the null hypothesis that there are no individual specific effects, something which generally occurs in practice (Wooldridge, 2002; Verbeek, 2004). The outcome of the Hausman test also enables us to reject the hypothesis of no correlation between the individual unobserved characteristics and some explanatory variables and, thereby, the choice should be the fixed effects model.

However, as mentioned above, the profitability variable could present problems of endogeneity which would invalidate the consistency of the fixed effects estimator. Therefore, given the existence of correlation between the non-observable heterogeneity and the explanatory variables (first problem of endogeneity), we corrected the model using instrumental variables (IV). We took the second lag as the instrument for the profitability variable.

Then we contrasted the similarity between OLS and IV estimates by means of two tests. The regression-based test proposed by Wooldridge (2002) provides low F (1.77) statistics, allowing us to accept the null hypothesis that the coefficient of the residuals is equal to 0, and hence the exogeneity of the variables. These results are ratified by the Hausman test (1978). Since no evidence was found for the existence of problems of endogeneity, we concluded that the fixed effect estimation was consistent. The results of the empirical analysis ratify some of the outlined hypotheses (Table 7).

In the analysis of total debt, only the proxy variable for growth opportunities is statistically significant. The negative coefficient of the percentage of intangible assets *(%int_assets*) confirms the expected inverse relationship between total debt and growth opportunities. Companies with greater growth opportunities are subjected to a higher level of uncertainty (pecking order theory), greater under-investment problems (agency theory) and a greater probability of financial distress (trade-off theory). These circumstances would explain a limit on funding by external investors.

Although the remaining variables present the signs predicted by the pecking order theory, except for profitability and effective tax rate, we did not find a statistically significant relationship between these and the book leverage.

The proposed hypotheses present a closer fit in explaining the levels of long-term debt of the spin-offs. In addition, in this case all the significant factors present the expected sign according to the pecking order and agency theories.

We find a positive and statistically significant relationship between the size of the USOs and their level of long-term debt. This result supports the hypothesis of the pecking order theory, according to which larger companies are subjected to lower information asymmetries, giving them easier access to external finance. It also confirms the ideas based

on the trade-off theory, according to which the costs of bankruptcy have a relatively smaller impact on larger-sized companies, and they are therefore less concerned about taking on a greater level of debt. In addition, at larger-sized companies a high level of debt can help reduce conflicts between managers and shareholders.

	Pecking order theory	Agency theory	Trade-off theory	Results
book_lev				
Growth opportunities	-	-	-	-
Firm size	+	+	+	Ns
Profitability	-	+	+	Ns
Firm age	+	+	-	Ns
Guarantees	+	+	-	Ns
Effective tax rate			+	Ns
Non-debt tax shields			-	Ns
lt_lev				
Growth opportunities	-	-	-	Ns
Firm size	+	+	+	+
Profitability	-	+	+	Ns
Firm age	+	+	-	+
Guarantees	+	+	-	+
Effective tax rate			+	Ns
Non-debt tax shields			-	Ns
st_lev				
Growth opportunities	+	+	+	-
Firm size	-	-	-	Ns
Profitability	+	-	-	Ns
Firm age	-	-	+	Ns
Guarantees	-	-	+	Ns
Effective tax rate				Ns
Non-debt tax shields				Ns

Note: (+ / -) Positive / negative influence on the debt level. (Ns) No evidence of a relationship was found

Table 7. Hypotheses and results

There is also a statistically significant relationship between the firm age and the long-term debt ratio; spin-offs aged more than 2 years generally have a higher level of long-term debt. This result supports the hypothesis of the pecking order theory, according to which companies which have been in operation for a longer time are subjected to less information asymmetry. Our results partially coincide with those of Hogan and Hutson (2005), who indicate that TBFs aged less than two years generally use internal sources.

Finally, the positive coefficient of the percentage of tangible assets (*%tang_assets*) confirms the expected relationship between long-term debt ratio and guarantees. This result corroborates that the tangible assets can act as collateral, reducing agency conflicts between creditors and shareholders, and reduce information asymmetries regarding the value of the company's investments, as they are easier to value than intangible assets.

In the analysis of short-term debt, only the proxy variable for growth opportunities is statistically significant (*%int_assets*). However, the negative sign was contrary to the relationship predicted by the financial theories. Normally, the circumstances explaining lower debt levels lead SMEs to have recourse to short-term debt as a possible solution for funding limits, but the results do not support this hypothesis. In our opinion, the considerable weighting which short-term debt has at total debt (74%) lead short-term creditors to mistrustful of spin-offs with high proportion of intangible assets, and restrict the funding which they make available to them.

Finally, although the size and profitability variables present the signs predicted by the pecking order theory, we do not find a statistically significant relationship between both variables and the short-term debt ratio.

The above results lead us to conclude that both the pecking order theory and the agency theory are more appropriate than the trade-off theory in explaining the long-term debt ratio of the USOs. We cannot say the same either for book leverage or for short-term debt ratio. The fact that aforementioned theories refer to the debt with explicit cost, which was not possible to split up from the rest of debt, could explain the lack of significance in the estimated coefficients both for total debt and for short-term debt ratios.

The tax variables are not significant in any model. This result corroborates the opinion of some authors according to whom tax aspects do not help explain the capital structure of SMEs, and in our case of the spin-offs.

6. Conclusions

Society claims University must be a force for fostering regional economic and social development. The University's response has been an increase in the dissemination of scientific knowledge and technology transfer activities among other ways by creating academic spin-offs. But, recent studies have suggested that spin-offs are not the most useful of the available pathways for the transfer of knowledge from universities to industry due to slow growth of these firms in various countries. USOs tend to remain relatively small and fail to grow; this suggests that large numbers of companies remain struggling with different obstacles. These barriers could be related to the market, finance and management,

accommodation, regulatory issues, etc. But one of the most important obstacles is the access to financial resources, especially after a few years of existence of a spin- off when (small) series production facilities are needed or when additional R&D investment is necessary.

For these reasons, in this paper, we have analyzed the factors that determine the capital structure of the spin-offs created by Spanish universities. We have constructed an unbalanced panel comprising 72 USOs from 1999 to 2005. We have estimated a variety of models that included the main explanatory variables mentioned in theoretical framework and earlier empirical studies.

In our model, growth opportunities are negatively related to debt level. Due to the characteristics of the proxy constructed for these growth opportunities, the interpretation is that as investors perceive that there is a greater probability of bankruptcy and a greater information asymmetry, they demand a higher premium from the USO which discourages the use of debt.

The empirical evidence obtained from the estimation of the models shows that the critical factors in setting the long-term debt ratio of a USO are firm size, age and guarantees. The positive coefficients for these variables suggest that both the pecking order theory and the agency theory are more appropriate than the trade-off theory in explaining the long-term debt level of the USOs.

Finally, growth opportunities are also negatively related to short-term debt level. From our point of view, the high weighting which short-term debt has at total debt impedes USOs to have recourse to short-term debt as a possible solution for funding restrictions.

Our findings show a picture where spin-offs has a problematic situation in gaining resources. A way for obtaining finance resources, especially long-term debt, is increasing size, age and guarantees.

The results of this paper have implications for the design of public policies that aim at supporting USOs. First, our descriptive results of the financial situation of the USOs suggest the need to balance the short-term and long-term debt levels. The specific characteristics of USOs (technology-intensive small businesses) lead them to rely excessively on short-term resources. In this contest, when those companies with the greatest growth have to look for funds to finance investment projects, could find themselves strangled by an excess of unwanted short-term debt, and are "stifled by their own success".

Second, the USOs have a high proportion of intangible assets if compared with other SMEs, while tangible assets provide collateral for barely one fifth of their liabilities. As a result, USOs are often forced to provide additional guarantees due to the high perception of risk on the part of creditors. In this contest, public authorities, in partnership with universities, need to promote instruments to help USOs guarantee the repayment of the debt.

Finally, firm size and age have a positive relationship with the level of long-term debt. These results suggest the need to create instruments to help USOs not only at the point of foundation, but also during the early years of a business's life cycle. USOs very often do not have an ended product or technology which can directly be launched onto the market, or simply lack the necessary business skills and experience. In this regard, universities can play a major role, as they are familiar with the main weaknesses of spin-offs in the period

immediately after foundation, although there would be a need for the involvement of other types of outside agents with greater experience of the business world (innovation centres and technology parks).

Finally, this paper presents some limitations which could partly explain the lack of significance in some variables and open the way for further research. Firstly, the lack of significance in some variables may be associated to the sample size. In order to correct this problem, financial data could be collected from those USOs which did not respond to our survey by extending the sample. Secondly, although we placed the emphasis on the firm characteristics highlighted by financial theories, the social and human capital of the entrepreneur and the host university have also to be considered in order to explain the capital structure of the USOs. Thirdly, due to the size of the USOs in the sample, it was not possible to distinguish the debt with explicit cost. These aspects must therefore be taken into consideration when interpreting the results.

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7

Entrepreneurship Education and Pupils' Attitudes Towards Entrepreneurs

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1. Introduction

Entrepreneurship is widely recognized as an engine of economic and social development. Initiating policies to increase peoples' propensity to become entrepreneurs is a key challenge for policymakers, and entrepreneurship education is considered important to create a culture for entrepreneurship. Over the past decades there has been a significant increase in the use of entrepreneurship education in schools, university colleges and universities in Europe. This chapter will focus on entrepreneurship education in upper secondary education and training. The main aim is to assess whether a European entrepreneurship programme promotes positive attitudes towards entrepreneurs among pupils. An investigation of pupils' attitudes towards entrepreneurs is important because these attitudes may also reflect how desirable they find the prospect of becoming an entrepreneur themselves as a future career choice (Kolvereid, 1996; Guerrero et al., 2008). It is also argued that the roots of an entrepreneurial career can be attributed to early phases of a person's socialization, and that there is a positive correlation between entrepreneurial intentions at a young stage in life and entrepreneurial activity later on (Krueger et al., 2000; Aldrich, 2006).

The following research question is asked: Are pupils participating in entrepreneurship education programmes more likely to have positive attitudes towards entrepreneurs compared to non-participants? The data used to answer this research question is from a Norwegian study of entrepreneurship education in upper secondary school. 1400 pupils answered a large survey about entrepreneurship and learning. 25 percent of the respondents had been involved in an entrepreneurship programme called the 'Company Programme' (CP) and 75 percent of them had not. CP is provided by Junior Achievement – Young Enterprise (JA-YE), the main provider of entrepreneurship programmes in Europe and Norway. CP is a practical programme where pupils – under the guidance of the teacher and a volunteer business adviser – establish, run and close a mini-enterprise during a school year. The European Commission (2005) considers CP as "Best Practice" in entrepreneurship education.

This chapter about entrepreneurship education in secondary schools serves a triple purpose vis-à-vis former research on entrepreneurship education. The first point is the need for more studies on entrepreneurship in upper secondary school. Whilst there are many studies on the

effects of entrepreneurship education in higher education (Solomon et al., 2002; Souitarus et al., 2007; Rodrigues et al., 2010), little attention has been given to the role of secondary schools. This is a paradox as secondary schools are highlighted as an important force influencing innovation systems and entrepreneurship (Fagerberg & Shrolec, 2009). The second point is that recent reviews of the entrepreneurship education literature conclude that the link between entrepreneurship education and entrepreneurial intentions and new venture creation is "under-researched" (Pittaway & Cope, 2007; Goduscheit, 2011). The analysis provided in this chapter helps to correct this gap in research in an upper secondary school context. The third point is that the entrepreneurship education literature is criticized for the lack of high-quality quantitative studies of entrepreneurship education (Johansen & Schanke, 2011). In this chapter, the effects of an entrepreneurship education program are examined, using a rigorous and strong quasi- experimental control-group design and a multilevel regression that controls for the non-random assignment of pupils into a test group or a control group.

The chapter is structured in four sections. The next section gives a short presentation of the Norwegian strategy on entrepreneurship, as well as details about the implementation of CP in Norway. The research design, data and variables are discussed in section 3. Section 4 presents our empirical analyses, and relates our results with other studies on the impacts of CP in Norway and in Europe. Section 5 ends the chapter with some final comments.

2. The Norwegian strategy on entrepreneurship education

Policy makers have developed a wide array of measures to support entrepreneurship, and key among these is the call for the education system to contribute through proper educational programmes, i.e. entrepreneurship education. A series of influential reports by OECD (Ball, 1989) and the European Commission (2005), argue that entrepreneurship education must be at the core of any nation's education policy. Currently, entrepreneurship education is one of the fastest growing areas in higher education (Finkle, 2009), and there appears to be a consensus that entrepreneurship education has a major role to play in the economic development of a country (Gibb, 1996).

This section will give a presentation of the Company Programme (CP). It will also give a short presentation of the distribution of entrepreneurship projects in Norwegian upper secondary schools.

2.1 JA-YE and the Company Programme

JA-YE Europe is a non-profit organisation educating young people about the world of entrepreneurship. JA-YE offers entrepreneurship programmes for all stages of education; from kindergarten to higher education. They are Europe's largest provider of enterprise education programmes and reach more than 2 million children in 40 member countries annually. In Norway, more than 100,000 children learned about entrepreneurship through 'learning by doing' programmes provided by JA-YE in 2010 (Johansen & Schanke, 2011). JA-YE Norway is financially supported by the ministries of Education and Research, Business and Industry and Local Government and Regional Development.

CP is considered the premier programme of all entrepreneurship education programmes offered in Norway, and it is by far the most widespread programme. Approximately 15 % of

all pupils participate in the programme during their time in upper secondary school (ibid.). CP combines practical and theoretical learning and stimulates collaboration between school and working life. The programme aims to prepare young people for working life by showing them how to generate wealth and manage it, how to create jobs which make their communities more robust, and how to apply entrepreneurial thinking to the workplace. In CP, pupils form mini-enterprises under the guidance of a teacher and volunteer business advisers. The students sell stock, elect officers, produce and market products or services, keep records, conduct stockholders' meetings and liquidate, all in about 25 weeks (from October to May). The programme provides a real experience of business enterprise, and, at the end of the school year, the mini-companies participate in National and European Competitions and Trade Fairs. Another Norwegian study estimates that pupils, on average, spend 200 hours on CP: half of this time is school work and the other half is after school activities (Johansen et al., 2011).

When our research group was asked to assess the impacts of entrepreneurship education in secondary schools, a quantitative study of the possible impacts of CP-participation was the no. 1 issue of our assignor, the Norwegian government. More precisely, we were asked to investigate whether or not CP reaches their objectives of: i) promoting personal qualities relevant to entrepreneurship (creativity, cooperation abilities, and spirit of initiative), ii) infusing knowledge and skills concerning innovative processes and business, and iii) contributing to positive attitudes towards entrepreneurs and self-employment. The latter objective is the focus of this article.

2.2 The distribution of entrepreneurship education in Norway

Since the 1970s, Norwegian secondary schools have offered action-learning projects. The concept "entrepreneurship" was not used until the mid-1990s, when it was introduced as an educational objective and linked to the use of the project method in the Curriculum for the 10-year compulsory school in Norway (L97). Subsequent to L97, JA-YE Norway was founded and three Government Action Plans on entrepreneurship education have been presented. The first plan was *See the opportunities and make them work* from 2004. This plan was revised in 2006, and the new plan offered practical advice on how to implement entrepreneurship. The current Action Plan, *Entrepreneurship in education and training 2009-2014,* comprises the entire educational career. Entrepreneurship education in Norway is also anchored in three Government White Papers: White Paper no. 7 (2008-2009) An Innovative and Sustainable Norway; White Paper no. 25 (2008-2009) Local Growth and Belief in the Future; and White Paper no. 44 (2008-2009) Education Strategy. Furthermore, the strategy on entrepreneurship education is embedded in the National Curriculum for Knowledge Promotion in Primary and Secondary Education and Training. This is the official curriculum for Norwegian schools, and it highlights entrepreneurship education as a means to increase motivation, improve the pupils' completion rates, and as relevant for an active working life in the future (Directorate for education and training, 2011).

Norway has comparatively high percentage of schools involved with entrepreneurship education (Martinez et al., 2010). A recent study shows that approximately 90 % of Norwegian lower secondary and upper secondary schools provide entrepreneurship education of some kind (Johansen & Schanke, 2011). As previously mentioned, CP by JA-YE is the most widespread entrepreneurship programme: CP is offered in 67 % of all upper

secondary schools. Other schools organize entrepreneurship education projects such as pupil enterprises themselves. In addition, a subject called Entrepreneurship and Business Development was established in 2007. This subject is taught 280 school hours over two years, and it is offered in 18 % of upper secondary schools (ibid.). Finally, entrepreneurship is a topic in subjects such as Social Studies (both lower secondary school and upper secondary school), Food and Health (lower secondary school) and Leadership Development (upper secondary school) (Directorate for education and training, 2011).

Investigating whether or not Norwegian schools offer CP, Johansen & Schanke (2011) find that the distribution of CP varies according to education programme, school size and geography. CP is more widespread in schools with vocational education programmes compared to schools specializing in general studies. CP is less widespread in small schools compared to the larger ones. Finally, CP is particularly widespread in regions where counties have a particular strategy on entrepreneurship education. These two regions are North Norway and Central Norway.

3. Design and variables

Sections 3 to 5 will examine whether pupils participating in the Company Programme (CP) are more positive towards entrepreneurs compared to non-participants. The data used is from a pupil survey administered to 24 upper secondary schools. The selection of schools was based on two criteria: i) regional diversity and ii) level of CP-participation (low and high). Questionnaires were answered in writing at school. 1900 children were invited to participate in the study, and the net sample included 1454 respondents. That gives a response rate of 76. As mentioned in the introduction, 25 percent of the respondents had been involved in CP and 75 percent of the respondents did not. This section looks into the research design and the variables used in the analysis.

3.1 Research design

Research that aims to examine the effects of education programmes needs to answer the following counterfactual question: what would have happened with the participants (e.g. their attitudes), if they had not participated in the programme? Considering CP, one is able to observe the factual situation (what happens to CP-participants), but it is not possible to observe the counterfactual situation (what would have happened to participants had they not been included in CP). Hence, it is necessary to approximate the counterfactual situation.

Many evaluation studies rely on comparison-group designs when approximating the counterfactual situation. In such designs, a group of participants (the test group) are compared to a group of non-participants (the control group), where the latter group is used as an estimate of the counterfactual situation. The difference in the average score (on some indicator) between these two groups is then used as the estimate of the causal influence of the programme. Unfortunately, the allocation of individuals to either the test or control-group is non-random in most evaluation research. Non-randomness creates several statistical problems associated with unobserved heterogeneity, self-selection, and selection bias. Therefore, random assignment of individuals to the test and control group is judged as the 'gold standard' in the literature (Wooldridge, 2002).

In this study, a group of 16-17 year-olds who participated in CP is compared to a group of non-participants. Pupils themselves do not influence the decision to participate in CP or not, and, in theory, the pupils could have been randomly assigned into either CP-participation or non-participation. In practice, the random assignment rule is violated. One challenge is that the school leadership decides whether or not their school should participate in CP. In order to avoid any potential selection bias that may arise due to non-random selection of schools into the programme, fixed school effects are controlled for in the analysis. The second challenge with this design is that a few schools in the sample systematically allocated pupils with the weakest academic skills (in terms of marks) to CP-participation. Approached on this matter, school leaders argued that theoretically low skilled pupils should take part in CP in the hopes that they might benefit from a more practical and less academic learning environment (Johansen et al., 2011). In order to control for the possible overrepresentation of pupils with low academic skills in the CP-group, a variable measuring average mark is included in the analysis.

In sum, by controlling for school effects and average marks, we control for the two factors that distort the random assignment rule. We are, thus, in the position where we have a methodologically strong quasi-experimental research design. The dependent variables and the independent variables are discussed in more detail below.

3.2 Dependent variables

A number of studies have been dedicated to assessing the effectiveness of entrepreneurship education in higher education. They have shown that entrepreneurship education programmes have a significant positive impact on various competencies that are associated with entrepreneurship, entrepreneurial intentions and attitudes to entrepreneurship. Providing information about a different level of the education system, upper secondary school, this chapter aims to contribute to the literature about impacts of entrepreneurship programmes.

Entrepreneurs play a key role in the economy in relation to prosperity and growth, but the public image of the entrepreneur is by no means always a positive one (Volkmann & Tokarski, 2009). Pupils' attitudes towards entrepreneurs can also reflect how desirable they find the prospect of becoming an entrepreneur themselves as a future career choice (Kolvereid, 1996, Guerrero et al., 2008). In our study, the pupils were asked to agree or disagree with a series of six statements about entrepreneurs. A five-point Likert scale was used on all statements: strongly disagree, disagree, neither agree nor disagree, agree and strongly agree. The net sample for this part of the survey was 1399, and that means that 55 respondents in the sample did not answer questions about attitudes toward entrepreneurs.

Table 1 shows that 85 % of the respondents agree that using their creativity is important for people who choose to become entrepreneurs. The majority also agree that entrepreneurs desire to be their own boss (68 %).

Pupils in upper secondary school in Norway are divided on whether or not entrepreneurs want to be recognised by society and want much flexibility at work. 43 % agree that an entrepreneur is someone who wants recognition by society, 14 % disagree and 43 % neither

agree nor disagree. 41 % agree that an entrepreneur is someone who wants to work when he or she feels like it, 21 % disagree and 38 % neither agree nor disagree.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
… wants to use his/her creativity	1	2	12	46	39
… wants to be his/her own boss	3	5	24	49	19
… wants recognition by society	4	10	43	32	11
… wants to work when he/she feels like it	5	16	38	30	11
… is not well educated	28	32	33	4	3
… cannot find other job	41	28	25	4	2

Table 1. An entrepreneur is someone who … (%)
N = 1399

Necessity entrepreneurship refers to individuals pushed into entrepreneurship because they have no better alternatives for work. Pupils in upper secondary school in Norway do not think that entrepreneurs risk unemployment and are uneducated. Only 6 % think entrepreneurs cannot find other jobs compared to the 69 % that disagree. Only 7 % think entrepreneurs are not well educated compared to the 60 % that disagree.

3.3 Independent variables

The main focus of our article is to assess whether CP affects pupils' attitude towards entrepreneurs. The survey includes questions on many background variables that will enable us to control for a range of 'competing explanations' in our assessment of the impact of CP. We use multilevel models to estimate the influence of CP on attitudes towards entrepreneurs. Multilevel models are statistical models of parameters that vary at more than one level. They are well suited for our study in upper secondary schools, where the opinions of pupils within the same school can be correlated. Such correlations must be represented in the analyses for the correct inferences to be drawn from the study.

The main explanatory dimension is entrepreneurship education. It is expected that a higher share of participants in entrepreneurship education programmes have a positive attitude toward entrepreneurs than non-participants. The chosen variable is participation in CP. In the model, CP-participation equals 1 and non-participation equals 0 (reference category).

The first control variable is school, and this variable represents level 2 in our multilevel model. One reason to control for school effects is that some schools in our sample have violated the random assignment rule. Another reason is that we expected to find differences between schools; that pupils from some schools are more positive towards entrepreneurs than other schools (Snijders & Bosker, 1999).

The second control variable is academic skills, and the indicator used is the average mark from lower secondary school. The scale varies from 2 (lowest) to 6 (best), and the mean is about 4. This variable is included because some schools chose to actively recruit pupils with lower levels of scholarly achievement to CP-participation (test group). The inclusion of this

variable also allows the investigation of whether pupils who are doing well academically, or those who are not, have a more positive view of entrepreneurs.

The third control variable is gender. Sociological theories and studies of social stratification have found profound gender differences when examining vocational attitudes. In most European countries, men are more involved in entrepreneurial activity compared to women. It is expected that boys will have a more positive image of entrepreneurs compared to girls. The sample consists of 54% girls and 46% boys. In the model, boy equals 1 and girl equals 0 (reference category).

The fourth control variable is immigrant background. Studies of immigration and entrepreneurial activity in Norway continue to show that a considerably lower share of immigrants start up businesses as compared to native Norwegians (Østby, 2004). We also expect attitudes towards entrepreneurs to be less positive amongst immigrant pupils compared to native-born Norwegian pupils. The sample consists of 8% immigrants and 92% native Norwegians. In the model, immigrant equals 1 and Norwegian equals 0 (reference category).

The fifth control variable involves parents' education. Former studies show that those with higher education (university degree) are more often involved in entrepreneurial activity compared to those with lower educational attainment (Bosma & Harding, 2007). The sample includes 32% respondents with low educated parents, and 68% of the respondents have one or two high educated parents (minimum bachelor degree). In the model, high education equals 1 and low education equals 0 (reference category).

The inclusion of gender, ethnic background and parents' educational attainment serves another purpose. To the extent that the variable 'average mark' contains measurement error, these variables may be important. It is well known that boys (compared to girls), children with immigrant background (compared to Norwegians) and children with low educated parents (compared to children with high educated parents) are overrepresented among pupils with low average marks.

4. Empirical findings

This section informs about the results. First, we present six multilevel models and comment on the results. Second, we connect empirical findings to the hypotheses presented in section 3.3. Third, CP is a widespread entrepreneurship programme, and we will highlight the differences and similarities of our results for Norway with what is happening elsewhere in Europe.

4.1 Presentation of results

Table 2 reports estimates and significance for six multilevel models. Estimates show the average increase in the dependent variable with one measurement increase in X (independent variable) when other independent variables are held constant. Coefficients for which obtained p-values are less than 0.1 are marked as statistically significant with asterisks (*).

A common application of multilevel models is to apportion the variance in the response according to the different levels of the data. In our case we have the school level (level 2) and the individual level (level 1). A Variance Partition Coefficient of 1 % in all models tells

that only 1 % of the variation is at the school level. This is lower than most other educational research studies, in which between 5-15 % of the total variation in the dependent variable is variation between schools or classes, and 85-95% is at the individual level (Snijders & Bosker, 1999). In other words, school effects are very small when we consider pupils' attitudes towards entrepreneurs.

Variables	Attitude 1	Attitude 2	Attitude 3	Attitude 4	Attitude 5	Attitude 6
Intercept	3.77	3.12	3.25	3.53	3.21	3.04
Participation in CP	**0.14*** **	**-0.07**	**0.08**	**-0.14*** **	**-0.11***	**-0.20*** **
Average mark	0.08**	0.15***	0.02	-0.06	-0.20***	-0.20***
Norwegian	0.26***	0.11*	-0.00	0.06	-0.23***	-0.37**
Boy	-0.23***	-0.05	0.17***	0.00	0.20***	0.24***
Parents with low education	0.01	-0.08	-0.19***	-0.13*	-0.18***	-0.12*
VPC	1 %	1 %	1 %	1%	1 %	1 %

Reference categories: non-participation in CP; immigrant background; girl; parent(s) with high education
VPC = Variance Partition Coefficient
Notes: ***significant at 0.01, **significant at 0.05, *significant at 0.1
Attitude1 = An entrepreneur is someone who wants to use his/her creativity
Attitude2 = An entrepreneur is someone who wants to be his/her own boss
Attitude3 = An entrepreneur is someone who wants recognition by society
Attitude4 = An entrepreneur is someone who wants to work when he/she feels like it
Attitude5 = An entrepreneur is someone who is not well educated
Attitude6 = An entrepreneur is someone who cannot find other jobs

Table 2. The factors explaining attitudes towards entrepreneurs

The table follows a decision rule such as the following: reject H_0 and believe H_1 if $p < 0.1$. Through this test, we find statistically significant effects for participation in CP in three models: CP-participants are more likely than non-participants to agree that an entrepreneur is someone who wants to use his/her creativity, and they are less likely to agree that an entrepreneur is someone who cannot find other job, wants to work when he/she feels like it, and is not well educated.

It is also shown that the remaining variables are significant in various models. Average mark and Norwegian (ethnic background) are significant in four models: "who wants to use his/her creativity", "who wants to be his/her own boss", "who is not well educated" and "who cannot find other job". Boy (gender) is also significant in four models: "who wants to use his/her creativity", "who wants recognition by society", "who is not well educated" and "who cannot find other job". The variable parents` with low education (parents' education) is also significant in four models: "who wants recognition by society", "who wants to work when he/she feels like it", "who is not well educated" and "who cannot find other job".

4.2 Expectations and empirical findings

Our results have confirmed most of the hypotheses presented in section 3.3. Most importantly, CP-participants seem to have a more positive view on entrepreneurs than non-participants. Compared to non-participants, a higher share of CP-participants sees entrepreneurs as someone with a desire to be creative, well educated and driven by opportunity (i.e. they are not entrepreneurs out of necessity because they cannot find other jobs). We have also confirmed that parental background matters: native-born Norwegian pupils have a more positive image of entrepreneurs than pupils with immigrant backgrounds, and pupils with high educated parents are more positive towards entrepreneurs compared to pupils with parents with lower educational attainment. Both findings were expected since they draw a parallel to entrepreneurial activity, in which high educated Norwegians are overrepresented.

We did not confirm the expectation that boys would have a more positive image of entrepreneurs compared to girls. Actually, the correlation was the opposite. This was a surprise since men are considerably more often involved in entrepreneurial activity compared to women. To understand this finding, we need more research to follow up.

On the matter of academic skills, it seems that pupils with the best marks are considerably more positive towards entrepreneurs than those with the lowest marks. This is interesting since some schools choose to actively recruit pupils with low scholarly achievement to CP-participation. To increase the share of young people with a positive view towards entrepreneurs, this strategy might be favourable. In addition, we can hope that CP-participation can increase school motivation and improve the pupils' completion rates. A recent Norwegian study indicates that CP is particularly beneficial for pupils with the weakest academic skills (Johansen et al., 2011).

4.3 Other empirical studies of CP

There are few high quality quantitative studies examining the role of entrepreneurship education in secondary schools. Rather recently, some research projects about the impacts of entrepreneurship programmes in upper secondary schools have been put forth, both in Norway and other countries. Since CP is taught to more than 250,000 pupils in forty European countries, scholars investigating the upper secondary level have shown a particular interest in CP. We will give a short presentation of findings from seven research projects and how they fit with our empirical results.

In Norway, three robust effect studies of CP have been conducted. The first study looks into short-term impacts of CP. Johansen et al. (2011) investigates data on registered absence in a school year, and through multivariate analyses they show that CP-participants are likely to have lower school absence as compared to other pupils. This finding is contested in the second study investigated. More than 3000 pupils in secondary school responded to a survey about entrepreneurship education, and the researchers found that participation in CP had no impact on school motivation and a negative impact on the average grade. Furthermore, CP had no impact on creativity, knowledge about cooperation, and willingness to take the initiative (Johansen et al. 2008). The third research project assesses long-term impacts of CP (Johansen 2011). 1200 respondents aged 24 and 25 years participated in a telephone survey: 50 % of the sample were former CP-participants and

50 % had not participated in the programme. The survey also included questions on twelve background variables (e.g. experiences with other entrepreneurship programmes, gender, ethnic background and parents experiences with self employment). Controlling for 'competing explanations', the study indicates that CP has a positive impact on desire to be self-employed, entrepreneurial competence and entrepreneurial activity. Compared to non-participants, CP participants more often consider self-employment to be an interesting career option, more often judge that they have the necessary knowledge and skills to set up and run a new business, and they are overrepresented among those having set up their own company. The study also disclose that participation in CP seems to have no impact on employability, intrapreneurship, as well as high-growth ambitions among those having started an enterprise.

From other countries, we will highlight five studies investigating various effects of CP. First, Peterman and Kennedy (2003) explore changes in the perceptions of a sample of secondary school students enrolled in JAs programme in Australia. Using a pre-test post-test control group design, they find that enterprise participants reported significantly higher perceptions of both desirability and feasibility for entrepreneurship after the programme. Second, in a survey analyzed by van den Berghe (2010), 2300 former CP-participants from fifteen European countries answered a self-assessment survey about learning effects. Many respondents found that CP provided knowledge on what is needed to start a company, and some respondents had become more interested in starting up their own business later. Third, investigating approximately 1000 former CP-participants from 20 to 30 years of age in six European countries, it is found that the share of former CP-participants that have become entrepreneurs exceeds the share involved in entrepreneurial activities in national populations (Johansen, 2010). Furthermore, the study points out that CP increases the likelihood of starting up a company before turning 25 years of age and before the completion of a university degree. Fourth, Wennberg (2010) compares JA Sweden's register of CP-alumni with Statistics Sweden's register on individuals' labour market activities and enterprise information. He finds that former CP-participants are more likely than the control group to engage in entrepreneurship by starting a firm.

In the final study, 10000 young people between 15 and 19 years of age participated in a survey on entrepreneurship conducted in 26 European countries (Frydenlund 2005). 65 % of the respondents took part in CP and 35 % did not have any acquaintance with CP. This survey included a series of statements on why people make the choice to become an entrepreneur, and there are many similarities and some differences between our Norwegian results and the results from this comparative survey. In both studies, very few respondents think that entrepreneurs risk unemployment and are uneducated: the shares that think entrepreneurs cannot find other job are 6 % in the Norwegian survey and 8 % in the European survey, whilst 7 % in the Norwegian survey think entrepreneurs are not well educated compared to 6 % in the European survey. Furthermore, approximately 40 % in the Norwegian and European samples agree that an entrepreneur is someone who wants to work when he or she feels like, and between 60 and 70 % percent in both samples agree that entrepreneurs desire to be their own boss. However, results differ on whether or not entrepreneurs want to be recognised by society: "only" 43 % of the Norwegian sample agree that an entrepreneur is someone who wants recognition by society compared to 58 % in the European sample. In our Norwegian study, 85 % of the respondents agree that an

entrepreneur is someone who wants to use his or her creativity. Unfortunately, this statement was not included in the European survey.

Our results from multilevel models presented in section 4.1 indicate that Norwegian CP-participants have a more positive view towards entrepreneurs than non-participants. The report from the European survey from 2005 does not compare results for CP-participants and non-participants (Frydenlund, 2005), and that makes it impossible to compare findings. However, the other mentioned research projects point out that CP has different impacts. In the long term, CP seems to increase entrepreneurial activity (Johansen, 2010; 2011; Wennberg 2010). In the short-term, CP seems to increase the share of young people that desire self-employment, and the share that judge that they are competent to set up and run a new business (Peterman & Kennedy, 2003; van den Berghe, 2010). Such findings are in accordance with our study, in which we find that CP promotes more positive attitudes towards entrepreneurs among young people.

5. Conclusion

Initiating policies to increase peoples' propensity to consider and become entrepreneurs is a key challenge for policymakers. Long-term structural policies to create a culture for entrepreneurship have been an area of commitment for European countries for many years, and a particular focus has been on entrepreneurship education policy. When considering impacts of entrepreneurship programmes in upper secondary school, we must be aware that direct economic effects only will appear in the longer run. Pupils will have to complete their education and maybe even work some years as employed personnel, before they take steps towards creating their own firm.

Over the past decades there has been a vital increase of entrepreneurship at all levels of the education system in Europe. In Norway, the Ministry of Education and Research and the Norwegian Directorate of Education and Training have spent much time, energy and money to introduce and implement entrepreneurship education in Norwegian secondary schools. Thus, it is important to assess if this grand policy initiative has the expected impact on pupils' personal qualities, knowledge and skills concerning innovation and business, and their attitudes towards entrepreneurship. This chapter was focused on the final aim.

An assessment of the international literature on entrepreneurship education reveals several gaps in our knowledge about entrepreneurship education in secondary schools: there are few studies in general and particularly few high-quality quantitative effect studies. This chapter is interesting in this respect, since it examines entrepreneurship education in secondary schools and provides quantitative data aimed at examining whether entrepreneurship education affects attitudes towards entrepreneurs. Thus, this chapter has contributed to a less researched field in the literature on entrepreneurship education.

The empirical part referred to a pupil survey in Norwegian upper secondary schools. Examining attitudes towards entrepreneurs, we used six indicators regarding "who are entrepreneurs". According to these pupils, an entrepreneur is someone who desires to use his/her creativity and be his/her own boss. An entrepreneur is not someone who risks unemployment and is less well educated. These findings could be interpreted as indicating that most pupils in upper secondary schools have a positive image of entrepreneurs. Pupils

are divided over whether entrepreneurs want to be recognized by society and want to work when they feel like it.

We were particularly interested in the possible implications of CP, a programme provided by JA-YE. Results from the econometric analysis, reported in Table 2, indicate that exposure to CP in Norwegian upper secondary school has promoted more positive attitudes among young people towards entrepreneurs. We found that participants in CP are more likely than non-participants to think that entrepreneurs chose their career path because they wanted to be creative in their job. We also found that participants in CP are less likely than non-participants to think that entrepreneurs cannot find other jobs, have low education and want to work when they feel like it. Hence, the chapter illustrates that the implementation of high quality entrepreneurship education programmes within upper secondary schools have the potential to influence pupils to be positive towards entrepreneurs and self-employment in the future.

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8

Entrepreneurship, University Research, and Growth: European North vs. South

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1. Introduction

The problem that this chapter tries to solve, is to find the relation between entrepreneurship, university research, and economic growth. The contribution of the present analysis is that, we aim to underline a) the role of university entrepreneurship in economic growth, b) to identify the reasons why this role is underdeveloped in the European South compared to the European North and c) to suggest certain policy measures to exploit university entrepreneurship. More specifically, we propose that the theoretical background of university entrepreneurship is affected by five sectors. The first refers to the entrepreneurship opportunity theory. The second refers to the economies of information and the asymmetric information issues in relation to the transaction costs theory. Additionally it includes the principal agent theory, which provides some considerations on the moral hazard problems of the academics. The third includes the network theory as a part of the social capital theory referring to the terms of academic entrepreneurship activation. The fourth refers to the property rights theory, which can determine the procedures for the transformation of knowledge. Finally, the cultural theoritization could give some lights on the cultural background of university entrepreneurship development. Unfortunately, there are no reliable aggregate data portraying some form of activity for university entrepreneurship. This is why the empirical part of this chapter will cover the entire issue in three stages. Initially, we analyze the relation between the educational system and research activity, then the relation of research activity and research results and finally the relation of research results and academic spin offs. Next, we discuss the relationship between Academic Spin Offs and entrepreneurship. The case study used in the analysis is the comparison of the European South and North, so as to also create empirical images on the issues covered by this chapter.

The order of the chapter is as follows. Section 2, examines the theoretical background and the connection between entrepreneurship, university research, and economic growth and compares the patterns of activity of university entrepreneurship in the European South in relation to the European North. Section 3, presents five sectors that affect the theoretical background of university entrepreneurship. Next, Section 4 analyses that education system and academic research lead to research results that can contribute to the growth of academic entrepreneurship, through the creation of spin off companies, while Section 5 discusses the relationship between Academic Spin Offs and entrepreneurship. Finally, Section 6 presents

the conclusions, through a complete interpretation of the European South lag in comparison to the European North, suggesting specific policy measures.

2. Entrepreneurship, economic growth, and university research

Porter (2002) determined three stages for the growth of economies: a) the factor-driven stage, b) the efficiency-driven stage and c) the innovation-driven stage. The first stage (factor-driven stage) is characterized by the fact that countries in this stage compete through low-cost efficiency in product production or produce low added value products. This stage does not create the appropriate conditions for innovation growth and increase of exports. In the next stage (efficiency-driven stage), economies increase production efficiency and the educational level of their workforce. In the efficiency-driven stage, economies have efficient production practices, to be able to exploit economies of scale. Self-employment rates drop, while capital, work and technology seem to play the key role in productiveness. The transition to the next stage (innovation-driven stage) is noted by entrepreneurial activity based on human capital.

Academic entrepreneurship plays a role in both the efficiency-driven and the innovation-driven stages. In the first, because production of research results and their exploitation contributes to the improvement of efficiency, and in the second, because, of course, it produces innovations.

Thus, academic activity contributes to the growth of the economy while spin offs form the basic source of innovation creation and exploitation contributing to growth and employment (Audretsch et al., 2006). Indeed, the promotion of academic research forms the basic source of enhancement of entrepreneurial environment as it is based on the networking between the university community and the public and private sectors (OECD, 2000).

The growth of the entrepreneurial sector is not only dependant on its particular features (such as size, age, geographical location, etc.) but also on the rate of knowledge sharing from universities as access to knowledge affects the growth of companies (Audretsch and Lehmann, 2005).

Examining the contribution of universities to economic growth, Breznitz et al. (2008) stressed the process of technology transfer and its impact on growth. It seems that the production of new knowledge by universities has a positive impact on the growth of businesses as they are able to absorb knowledge and, finally, investments in research activities have a positive effect in business growth (Cassia & Colombelli, 2008).

3. The theoretical background of university entrepreneurship

Five theoretical fields offer the infrastructure for the study of academic entrepreneurship. These are the entrepreneurial opportunity theories, the economics of production of information, the networks theory as part of the social capital, the property rights and the social dimensions of the cultural background.

3.1 Entrepreneurial opportunity theories

The recognition of entrepreneurial opportunities and the decision for their commercialization leads to the creation of new businesses. Entrepreneurship may contribute

to economic growth as a mechanism connecting the channel of knowledge sharing with economic growth (Audretsch et al., 2006).

Entrepreneurial opportunities are situations by which products, services, raw material and production methods are harmonically combined, introduced to the market and sold, bringing more revenue than their production cost. They do not refer only to the creation of new products and services, but also to the better exploitation and the combination of existing resources, in order to produce a better product than the one covering a given need of the market. Therefore, the need of the market is crucial in the given definition of entrepreneurial opportunity. It is thus necessary for the entrepreneur to be able to realise and predict where the need is at any given time in the market for a new or sufficiently differentiated product. The spread of innovations within the economy and technological inconsistencies create entrepreneurial opportunities.

Yet, do all opportunities have the same potential of affecting economic activity? Obviously not. Thus, there are entrepreneurial "multivalent" opportunities and simple entrepreneurial opportunities. The latter do not include the potential for the creation of new entrepreneurial opportunities and therefore their social significance is limited. Of course, finally, profit-making from the exploitation of entrepreneurial opportunities is what urges to their search and discovery (Kirzner, 1973).

The theory of the existence and identification of entrepreneurial opportunities is mainly based on three schools of thought. Shane & Venkataraman (2000) representing the economic school claim that entrepreneurial opportunity is an objective phenomenon existent in time and space although not all may know of it. In essence it claims that opportunities do exist and wait to be identified by someone (Kirzner, 1973), attributing entrepreneurial opportunities to the allocation of information as to material opportunities existent in society. Based on the economic school, entrepreneurial opportunities offer a clear advantage to the first person to discover them (Lieberman & Montgomery, 1988). Furthermore, the economic school accepts that differences in economic information are crucial for the existence of entrepreneurial opportunities.

The cultural school claims that entrepreneurial opportunities are subjective and not objective creations-phenomena. According to Weick (1979), entrepreneurial opportunities exist as long as people understand their existence. Therefore, entrepreneurial opportunities do not objectively exist, waiting to be discovered. Protagonists – individuals – create them combining shapes and cognitive organizations to develop them. Thus, the existence of a particular cultural background forms the base for a maintainable competitive advantage (Pollock & Rindova, 2003).

Finally, the socio-political school is a combination of the previous two, stressing the significant role of administrative mechanisms in determining entrepreneurial opportunities (Granovetter, 1985). In agreement with the economic school, it underlines the objective properties of entrepreneurial opportunities, stressing the objective properties of entrepreneurial opportunities. It deems that entrepreneurial opportunities exist and grow within complex networks of social relations that shape economic activity. In that sense, it emphasises networks rather than resources (Aldrich & Fiol, 1994; Thornton, 1999). In these networks, social protagonists must activate resources in order to exploit objective opportunities. Within the socio-economic networks, structural opportunities available to the

protagonists are indicated. Therefore, the position that one has in the networks has a key role in whether he/she will be able to discover opportunities. The positioning of protagonists in a particular network determines the volume of the crucial resources and information that the protagonist may have in order to exploit opportunities (Burt, 1992).

In order to exploit the results of their research, scientists need to identify and understand market needs (Scholten, 2006). Vohora et al. (2004) stress that identification of opportunities plays an important role in the growth stage of a spin off company. Many studies have shown that experience (Shane & Venkataraman, 2000), social funding (Shane and Stuart, 2002) and information (Fiet, 1996), are contributing factors in identification of entrepreneurial opportunities.

The identification process of an entrepreneurial opportunity, in an academic environment, includes two stages. The first includes the identification of an idea that may evolve in an opportunity (Singh et al., 1999). This idea originates from new knowledge produced in the framework of academic research. The next stage includes the assessment of the idea, namely the identification of an opportunity through data accumulation on the market (Elfring & Hulsink, 2003).

Many researchers have also claimed that an important drawback in the commercialization of university research is the fear that businesses do not wish the spread and free exchange of scientific findings as they prefer their own exploitation and not their free spreading (Chakrabarti, 2003).

The above analysis shows that academic entrepreneurial activity is a process that might be deemed as included in the logic of the socio-political school on production of entrepreneurial opportunities and draws elements from almost all schools of thought. It is based mainly on asymmetric information and the advantage of priority of identification in entrepreneurial opportunities (economic school), while, in essence, its protagonists create it from scratch in the sense that opportunities do not exist just to be discovered but are "created". In this context, the cultural background plays a definitive role in the determination of entrepreneurial opportunities (cultural school). Yet, above all, processes and co-operation and information networks (socio-political school) play the definitive role in the growth of academic entrepreneurship. In the USA, entrepreneurial potential has always been produced through scientific research. However, the Bayh Dole law had to be created in the 90's, for academic entrepreneurship to grow.

Table 1 presents the "opportunity entrepreneurship" variable which is calculated as the rate of people 18-64 years old who are either aspiring entrepreneurs or owners – managers of new businesses, who state that a) they are driven by opportunity and not by need, and b) the driving force is independence and revenue growth rather than its stability. The data of Table 1 show clearly that budding or active entrepreneurs are proportionately more in the European North than in the European South.

3.2 The economics of university production of information

In the framework of academic entrepreneurship, asymmetrical information creates three issues:

Country	Opportunity entrepreneurship
Denmark	0.89
Ireland	0.80
Netherlands	0.88
Sweden	0.85
Finland	0.80
Greece	0.70
Spain	0.80
Italy	0.75
Portugal	0.72

Source: Global Entrepreneurship Monitor (GEM).

Table 1. Opportunity entrepreneurship (2001-2006)

Moral hazard problem: It appears when contracting parties avoid the process of technology-knowledge sharing, as they do not have all the necessary information available (Arora, 1996). Lowe (2002) realizes that asymmetrical information between the inventor and a private company increases licensing costs on the side of the business. He also notes that there are two forms of asymmetrical information, that of technological uncertainty and that of implied knowledge, which affect the funding potential for an invention of the academic community. Businesses that are founded to exploit university inventions may secure their sustainability by patenting the knowledge they produce so as to compete with already existing businesses (Nerkar & Shane, 2003). Uneven distribution of information is what leads to the creation of spin offs, providing then with a competitive advantage.

Adverse selection: It appears when sellers of low quality inventions present their inventions as high quality. The buyer in this case is at an adverse position, as he/she does not have all the necessary information available (Anton & Yao, 1994).

Hold-up: It occurs when the contracting parties of the transaction speculatively renegotiate the terms of the agreement to their benefit (Pisano, 1989).

Spin offs may have cost advantages due to the knowledge held by the researcher, resulting in limited transaction costs and information problems (Shane, 2002). Particularly, Shane (2002) showed that licensing to researchers is more effective, when the patents are ineffective in preventing information problems (such as moral hazard and adverse selection). This happens because the analyst's knowledge does not allow such problems in new businesses.

During knowledge transfer, asymmetrical information between buyer and seller on the value of the innovation may be observed. Buyers usually cannot evaluate the quality of the patents in advance, while it may be difficult for researchers to assess the potential commercial profit making of their inventions (Macho-Stadler et al., 2007). When drafting a contract with an academic spin off, factors such as the problem of the researcher's moral hazard, participation limitations of key researchers and the issue of asymmetrical information are important. Furthermore, when the moral hazard problem is pronounced, the need for the researcher's economic participation in the spin off leads to further ineffectiveness. Copyright and shares are

important means for dealing with moral hazard, participation limitations, as well as asymmetrical information problems (Macho-Stadler et al., 2008)

Moreover spin offs alter the information environment of businesses. Transaction costs and the impact on the prices of transactions are also higher. Indeed alterations in the information environment benefit more the parties who have the advantage in obtaining information (Huson & MacKinnon, 2003). Ultimately, the transaction uncertainty resulting from asymmetrical information gives an uncertainty premium to transaction costs. This situation increases risk in the economy by discouraging people from undertaking large-scale investment plans and encouraging smaller business ventures instead.

The general characteristics of the transaction cost theory, including the major concepts such as uncertainty, frequency and asset specificity, and the human aspects such as bounded rationality and opportunism, constitute components and factors that deeply affect the active cultural background in every society. Uncertainty avoidance deals with a society's tolerance for uncertainty and ambiguity, indicating to what extent a society programs its members to feel either uncomfortable or comfortable in unstructured situations. Southern European cultures seem to have lower uncertainty avoidance in comparison with the southern. Southern cultures are not to keen on uncertainty and try to reduce their risks to the minimum by introducing strict laws and rules, safety and security measures. As a result, entrepreneurship and innovation are mostly promoted in countries of low uncertainty avoidance (Herbig & Dunphy, 1998). Furthermore, as the needed transactions increase in an economy, so does the possibility of corruption (corruption perception index). The following table presents the corruption perceptions index, which is a snapshot of perceptions of public sector corruption. It uses the counter-variable, so the prices it can assume are between 0 (highly corrupt) and 10 (highly clean). This index demonstrates a clear indication on the difference between South and North countries. North countries rank top positions while, the South rank low.

Country	Starting a business[1]	Uncertainty Avoidance[2]	Corruption Perceptions Index[3]
Denmark	6	23	9.4
Ireland	14	35	7.7
Netherlands	10.2	53	8.9
Sweden	15	29	9.2
Finland	14	59	9.2
Greece	30.4	112	4.2
Spain	47	86	6.4
Italy	11.8	75	4.6
Portugal	16.2	104	6.2

Source: Doing business Reports, The World Bank Groups, Hofstede (1980), Transparency International.
Notes: [1]Time is recorded in calendar days. This measure captures the median duration that incorporation lawyers indicate is necessary to complete a procedure with a minimum follow-up with government agencies and no extra payments. Average for the period 2006-2010.
[2] Hofstede (1980).
[3] Average for the period 2006-2010.

Table 2. Characteristics of transactions in societies

Another significant index of high transaction costs in an economy is the time needed to start a business. Similar indicators can be calculated for a number of actions regarding entrepreneurial creativity in a particular external environment. The increase of a business' start or end time is likely to be a barrier to entrepreneurship opportunity. The following table presents the days needed in each country to start up a business. It is observed that North countries remain stably at low levels during the five-year period. In particular, 12 days in average are needed in Northern countries while in Southern countries the double are needed, although as years go by we note some improvement, particularly in Portugal.

3.3 The network and social capital aspects

In the previous part, we realized that the discovery of entrepreneurial opportunities depends on the information distribution process in society. Networks significantly contribute to such information (Granovetter, 1985).

The relevant literature stresses the importance of the creation of networks within the university community (Ring & Van de Ven, 1994, Nicolaou & Birley, 2003a, Shane, 2004). When establishing a spin off, obviously the original ties originate from the interpersonal relations of the researchers with members of the academic community. Yet their expansion towards the industrial and economic sector is necessary, in order to escape the narrow limits of an academic business (Vohora et al., 2004, Bekkers et al., 2006).

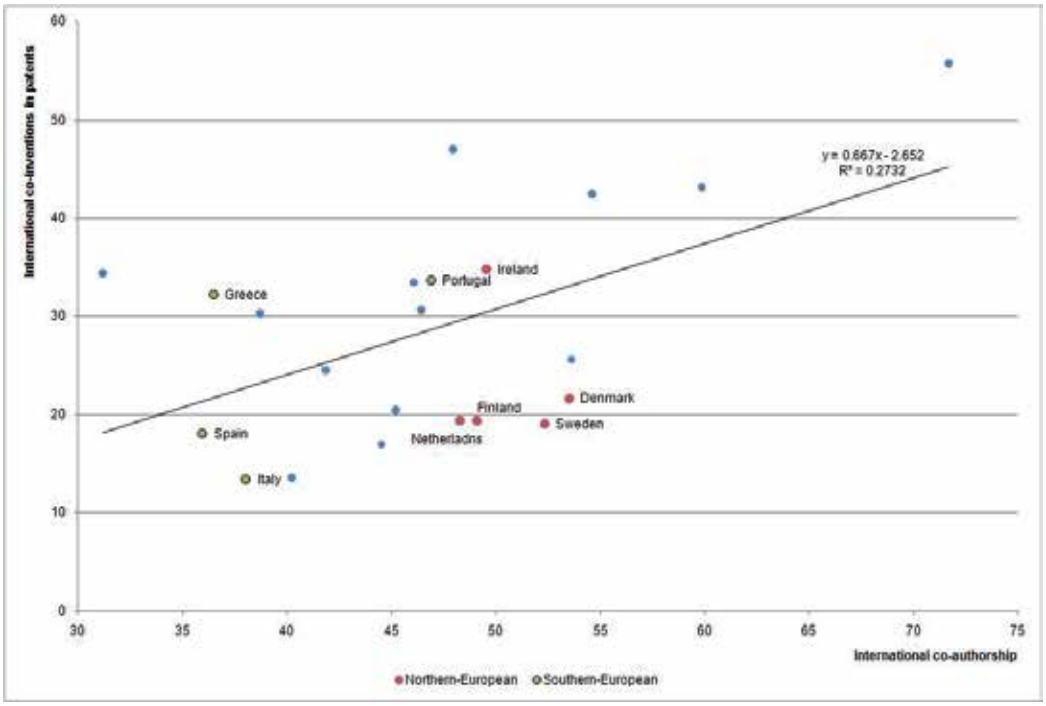
To secure the successful course of a researcher participating in a spin off company, he must attempt to integrate in networks. Indeed, researcher entrepreneurs do not have common characteristics with the lone Schumpeterian entrepreneur (Mustar, 1997). Academic entrepreneurs have minimum heterogeneity amongst them than other entrepreneur groups. This is a group with clear characteristics and limited entrepreneurial experience. In this framework, Nicolaou & Birley (2003b) stress the importance of networks, particularly as regards technology transfer through an organized network. They further note the importance of network organization by universities for the promotion of the technology that they produce.

Over the past years, the collaboration rate between institutions of most countries has increased. This fact is shown by the co-authorship and co-invention existent in scientific publications and in patents. Generally, there is a positive correlation between rates for international scientific collaboration and the applications for patents in all countries, which indicates the existence of common factors that urge research and the creation of patents. Smaller countries tend to have higher rates of international collaboration, something that justifies the need for search of opportunities of this kind (OECD, 2011).

On the issue of network development, Burg et al. (2008) stress that there are two phases in developing academic spin-offs. Originally, the existence of the appropriate infrastructure is required, which includes a collaboration network of investors, administrators and consultants. Then this network allows the support of separate entrepreneurial ventures (Burg et al., 2008).

Nicolaou & Birley (2003b) analyze the benefits and consequences of social networks on spin offs. The academic inventor is at an advantageous position as he identifies specialized parts of the market and can adjust his invention accordingly. Furthermore, he has immediate

access to information and sources while in the same time through his contacts with businesses, he may acquire market information in time, resulting in an enhancement of R&D. Moreover, references play a significant role in the entrepreneurial ventures of researchers. Thus venture capitalists and businesses are more likely to invest on spin offs which they know or have received positive references as in this way they also limit the issue of asymmetrical information (Shane & Stuart, 2002). Specifically, studying the importance of networks in spin off companies of the Massachusetts Institute of Technology (MIT), Shane & Stuart (2002) showed that owners who had direct and indirect relations with the venture capital companies are more likely to be funded and sustainable.



Source: OECD, Science, Technology And Industry Scoreboard, 2011
Note: International co-authorship of scientific publications is based on the share of articles with authors affiliated with foreign institutions in total articles produced by domestic institutions. Co-inventions are measured as the share of patent applications with at least one co-inventor located abroad in total patents invented domestically.

Fig. 1. International collaboration in science and innovation

Various factors have a significant impact on the operation and performance of a spin off company. Connections with financial institutions have multiple impacts on the technological potential and the finding of the economic resources invested on a start-up company (Lee et al., 2001). Furthermore, individuals belonging to an entrepreneurial network are more likely to identify opportunities than individuals who are independently active (Singh et al., 1999, Lee et al., 2001).

The networks of spin off companies are linked to social capital theory (Scholten, 2006). The key dimensions of social capital are networks in which it is integrated, as well as the

necessary trust for their sustainability. Networks can be classified into personal and broader social networks. According to this theory, external networks of a business are a significant source for the performance and growth of a company (Gabbay & Leenders, 1999).

Social capital refers to the benefits enhanced by participation and inclusion of individuals in social networks (Portes, 1998). Bourdieu (1986) defined it as the total of real and potential resources related to one being a member of a stable network of mutual familiarization. Putnam (1995) deems as social capital the characteristics of a social organization that "facilitate the coordination and collaboration to a common benefit". Those characteristics include three concepts: networks, rules and trust.

Trust is the second key dimension of social capital. The two basic forms of trust that are mostly related to social capital are the interpersonal trust and institutional trust (Cox, 2003). Both forms make it possible to expand and spread relations integrating social capital.

Table 3 shows the proportion of people who think that most people can be trusted according to the question: "generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?" There is an evident difference between Northern and Southern European countries, since this index is higher for Northern than Southern ones.

Country	Most people can be trusted
Denmark	66.50%*
Ireland	35.80%*
Netherlands	45.00%
Sweden	68.00%
Finland	58.90%
Greece	23.70%*
Spain	20.00%
Italy	29.20%
Portugal	10.00%*

Source: Values Survey Databank, 2005 – 2008.
Note: * Available data from previous survey (1999)

Table 3. Generalised interpersonal trust

3.4 Property rights considerations

Institutions, as the "rules of the game" in a society (North, 1990), are defined as society's collective choices. They usually express conflicts of interest and develop under the influence of history and cultural background. Generally, favourable economic institutions (with regard to entrepreneurship) are those that offer secure property rights in a wide range of social activities (Acemoglu et al., 2004). The relationship between institutions and entrepreneurship stems from three different sources, which are the following: a) their contribution to coordination and governance, b) their influence on the process of knowledge development and c) their effect on income distribution and the development of social coherence (Easterly et al., 2006). The main tools of economic institutions are property rights and contractual conditions.

The protection of property rights seems to be a fundamental part of economic growth (North, 1981; Rosenberg and Birdzell, 1986; Rodrik et al., 2004; Acemoglu & Johnson, 2005). Subsequently, entrepreneurship thrives through secure property rights which can be used in voluntary contract-based exchanges.

A high value for the property rights variable (as presented in Table 4) indicates that a country's laws protect private property rights, the government enforces those laws, the judiciary is independent, there is no corruption and it is easy to enforce contracts. These conditions are expected to encourage the foundation of new businesses. Northern countries have again higher rates (average of 90.6) than Southern.

Country	Property rights*
Denmark	91
Ireland	90
Netherlands	90
Sweden	91
Finland	91
Greece	52
Spain	70
Italy	51
Portugal	70

Source: The Heritage Foundation, Index of Economic Freedom (HER).
Note: * An assessment of the ability of individuals to accumulate private property, secured by clear laws that are fully enforced by the state. It is the mean for the period of 2006 - 2010.

Table 4. Property rights

A successful mean of intervention in the property rights regime is the law that changed their operational framework in the USA. The Bayh-Dole Patent and Trademark Amendments Act of 1980 is a US law on copyright (intellectual property) arising from funded research. Inter alia, it granted US universities, small businesses and non profit organizations the control of copyright on their inventions but also the copyright arising from public funding.

3.5 The cultural background aspect

The definition of entrepreneurial opportunities raises the question of the exact impact of culture on entrepreneurship, as indicated by disciplines such as economics (Schumpeter, 1934), sociology (Weber, 1930) and psychology (McClelland, 1961). Moreover, it involves several issues attributed to the social characteristics that constitute what we understand as "culture". "Culture is defined as a set of shared values, beliefs, and expected behaviours" (Hayton et al., 2002). The cultural characteristics of societies reflect psychological social stereotypes created over time, which are prior human constructs to the current conditions of transactions and institutions. The cultural background can be considered an endogenous product of human civilisation (Hong, 2009; Oyserman & Sorensen, 2009) consisting of cultural syndromes that can be considered as intermediate mental constructions that originate from the distant past, connecting it with the present (Hong, 2009). This view is in

line with cultural evolutionary theory, which stresses that individuals tend to adopt certain pre-existing cultural values (Bergh & Stagl, 2003).

McClelland (1961) attempted to relate societal values with entrepreneurial variables and economic dynamism in general. Furthermore, he attempted to quantify the impact of entrepreneurship culture in economic development without using an economic model. Lynn (1991), also without using a model, concluded that countries moving towards competing values are associated with higher levels of economic development. Scientific research also highlights other factors (Triandis, 2009), including cultural complexity, cultural austerity (Triandis, 1994) and value orientation theory (Kluckhohn & Strodtbeck, 1961). The different social and political procedures that shape the cultural background of each society guide human behaviour and the character of all of the stakeholders. Thus, Grief (1994) highlights the fact that different cultural values lead to different societal structures of economic relationships.

Many studies have quantified the "effects" of the cultural background and provided relevant data for a large number of countries (McClelland, 1961; Hofstede, 1980, 2001; House et al., 2004; Saving & Schwartz, 2007). Georgas and Berry (1995) and Inglehart (1997) have identified groups of countries that seem to share common cultural values. Cultural and institutional factors may explain cross-national differences in levels of entrepreneurial activity (Wennekers et al., 2002, Wennekers, 2005). Thomas and Meller (2000) found that differences in cultural orientation between countries affect the personality characteristics commonly associated with motivation for entrepreneurship. Furthermore, studying regional differences of entrepreneurial culture in Sweden using cultural values and belief data, Davidsson & Wiklund (1997) concluded that there is a weak relationship between entrepreneurial values and the formation of new regional new firms.

Shane (1993) and Grilo & Thurik (2008) argue that other factors beyond the economic ones play a role in shaping entrepreneurship. Shane (1993) found a strong influence of Hofstede's (1980) cultural value of uncertainty avoidance on the levels of innovativeness of societies. Morris et al. (1994) focused on the variable of individualism, which is related both to the desire of people to violate norms and to incentives for achievement (Hofstede 1980), which are characteristics associated with entrepreneurship. Wildeman et al. (1999) examined the effects of Hofstede's (1980) cultural variables of power distance and uncertainty avoidance on entrepreneurship and showed that they positively influence levels of self-employment.

In general, we may approach the relationship between cultural values and entrepreneurial activity from two different perspectives. These are the supply or "pull" perspectives and the demand or "push" perspectives. On the supply side, we have the "legitimation of entrepreneurship" and the "aggregate psychological traits", and on the demand side, we have the "dissatisfaction perspective" for business start-ups and entrepreneurship in general (Stanworth and Curran, 1973; Verheul et al., 2002; Thurik et al., 2008; Wennekers et al., 2008). The predicted relationship between the "push" and "pull" perspectives is the opposite (Hofstede et al., 2004; Wennekers et al., 2008).

The "legitimation of entrepreneurship", or the "legitimation" or "moral approval" of entrepreneurship, focuses on the impact of the norms and institutions on society at large (Etzioni, 1987). The cultural determinants of entrepreneurship may also include "aggregate psychological traits", as more entrepreneurial values in a society can lead to an increase in the number of people displaying entrepreneurial behaviour (Davidsson, 1995, 2004). A third

explanation for entrepreneurship is what is called the "dissatisfaction perspective", which, at the macro level, assumes that differences in values between the population as a whole and potential entrepreneurs form the basis for variation in entrepreneurship. Baum et al. (1993) concluded that countries with a high degree of uncertainty are associated with higher rates of self-employment, explaining that the cultural determinants of entrepreneurship as the "push explanation for entrepreneurship". Nooerderhaven et al. (2004), who used a sample of 22 OECD countries and described the countries with a low degree of uncertainty as "entrepreneurial economies", had the same conclusion. They concluded that per capita GDP has a strong, negative effect on the rate of business ownership in nine countries characterised by high uncertainty avoidance and no effect in countries with low uncertainty avoidance. On the level of business ownership, Wennekers et al. (2008) examined the influence of cultural attitudes towards uncertainty avoidance. They identified a strong, positive effect of uncertainty avoidance on business ownership, concluding that high levels of uncertainty avoidance push people into entrepreneurship through self-employment (in line with Baum's hypothesis).

The model of cultural values formed in the two groups of countries is roughly the following: Southern countries accept more widely the existence of greater inequalities and (according to Hofstede) demonstrate higher rates of uncertainty, when compared to Northern European countries. Individual achievements are not highly appreciated and at the same time the socially established organization rules and practices are not acceptable. Nevertheless, individuals express pride, faith, and cohesion with their families and any specific social group they belong to. Feminine values, such as quality of life, care for the weak, and solidarity play a small part and are characteristic features of Northern European countries. Accordingly, the values of imposition and of dispute do not seem to prevail. Regarding the cultural indicators there is a clear distinction between the two groups of countries. Southern countries have a lower ranking, implying lower uncertainty avoidance levels. The Southern countries examined here are characterized by limited future orientation, lack of scheduling and long-term planning and portray low efficiency and human orientation levels while their main focus is on short-term planning.

	Denmark	Ireland	Netherlands	Sweden	Finland	Greece	Spain	Italy	Portugal
Performance Orientation	4.22	4.36	4.32	3.7	3.8	3.2	4.01	3.58	3.6
Future Orientation	4.44	3.98	4.61	4.4	4.2	3.4	3.51	3.25	3.7
Gender Egalitarianism	3.93	3.21	3.5	3.8	3.4	3.5	3.01	3.24	3.7
Assertiveness	3.8	3.92	4.32	3.4	3.8	4.6	4.42	4.07	3.7
Institutional Collectivism	4.8	4.63	4.46	5.2	4.6	3.3	3.85	3.68	3.9
In-group Collectivism	3.53	5.14	3.7	3.7	4.1	5.3	5.45	4.94	5.5
Power Distance	3.89	5.15	4.11	4.9	4.9	5.4	5.52	5.43	5.4
Human Orientation	4.44	4.96	3.86	4.1	4	3.3	3.32	3.63	3.9
Uncertainty Avoidance	5.22	4.3	4.7	5.3	5	3.4	3.97	3.79	3.9

Source: House et al. (2004), (The data were collected in the period 1995 – 1997).

Table 5. The cultural dimensions

Based on the definitions of the variables used to express cultural background by House et al. (2004), we can assume that societies with high values for performance orientation should be associated with higher levels of entrepreneurship, given that they promote profit and performance improvement in their economies. Such societies value training, development, assertiveness, competitiveness, individual achievement and taking initiative, and entrepreneurship contributes towards these goals. High values for future orientation should be related to increases in entrepreneurship too. Indeed, such societies tend to achieve economic success, have flexible and adaptive organisations and managers, and favour financial prosperity, which can facilitate new businesses. Furthermore, a decrease in gender-based differences should reflect greater entrepreneurship because more women will have the chance to exercise their entrepreneurial skills. Such societies tend to afford women a greater role in community decision-making and have a higher percentage of women participating in the labour force and in positions of authority. Moreover, it is expected that a positive correlation exists between higher values of assertiveness and entrepreneurship given that aggression and austerity drive global competitiveness. Such societies value success, progress and competition and tend to act and think of others as opportunistic. Generally, collective activity in a society (institutional collectivism) should be positively related to entrepreneurship, as group loyalty is encouraged even if individual goals suffer. In contrast, in-group collectivism is expected to be associated with lower levels of entrepreneurship because, in essence, in-group collectivism is incompatible with competitiveness and the development of free entrepreneurship: it favours conceptualism and small, low-risk businesses. High levels of power distance indicate that economic development occurs only for those who (mainly) have economic power in societies. Consequently, it is expected to have a negative correlation with opportunity entrepreneurship. In such societies, only a few people have access to resources, skills and capabilities. Human orientation is expected to have a positive correlation with entrepreneurship because, in societies with a high level of human orientation and that have the primary aim being profits; the government's focus should be on individuals. There is expected to be a negative correlation, as it was said before, between uncertainty avoidance and entrepreneurship because lower levels of uncertainty avoidance have been repeatedly associated with higher levels of economic activity (Swierczek & Ha, 2003; Hofstede et al., 2008). Such societies tend to be less calculating when taking risks and show less resistance to change.

4. Education system, research and academic entrepreneurship

The education system and academic research lead to research results that can contribute to the growth of academic entrepreneurship through the creation of spin off companies.

4.1 Education system and research

The question raised is under what conditions different educational systems generate different performance levels in scientific research. We shall attempt a comprehensive analysis of the education system and the way in which it promotes the growth of research. Stressing the importance of the transformation of research results to research activity, we examine to what extent the growth of knowledge in the university and research community is transformed in research results (publications). We thus examine to what extent the education system (structure, motivation) provides satisfactory research results.

E.U. countries allocate on average 11% of their total public expenditure to education. North European countries (Sweden, Ireland, and Denmark) rank at the highest positions with an average of 15%. Table 6 presents the total public expenditure on education as a percentage on GDP, showing the increased expenditure for education by North European countries. Mediterranean countries have almost the same percentage as to GDP compared to that of the EU-27 (5.07%). Overall, in the EU, 22% of total educational expenditure regards higher education.

	Expenditure on tertiary education (% of total expenditure on education)		Expenditure for all levels of education (% of GDP)	
Country	2001	2008	2001	2008
Denmark	32	28	8,44	7,75
Ireland	29	23	4,27	5,62
Netherlands	27	28	5,06	5,46
Sweden	28	27	7,12	6,74
Finland	33	31	6,04	6,13
Greece	31	-	3,5	-
Spain	23	23	4,23	4,62
Italy	16	18	4,86	4,58
Portugal	18	19	5,61	4,89
EU -27	22	22	4,99	5,07

Source: Eurostat.

Table 6. Total public expenditure on education

The field of studies, as shown in Table 7, does not seem to be an inhibitor for research that may be commercialized. In particular it does not seem that there are significant differences between the weighted average of the number of graduates per educational field of Southern and Northern European countries. The only significant differentiation observed, refers to the predominance of fields of health and care in North countries (21%) in comparison to Southern countries (16%).

In 2009, seventeen EU members marked an increasing or stable trend in R&D expenditure, while in 2010 sixteen EU members forecast an increase of said index in relation to GDP. However, provisional data show that there has been a decrease in 2010 in most EU countries and the same trend seems to be mantained during 2011.

In Europe, almost 1 million students graduate annually from higher education and approximately 100,000 receive a PhD title, while indicatively in the USA the number of the latter is almost half. However, taking into consideration GDP, the USA invests 2.5 times more money in education in comparison to the EU. As expenditure per postgraduate or PhD student in Europe is smaller that in the US, the EU focuses more on quantity rather that quality, thus risking to fail the expectations of the entrepreneurial sector (European Commission, 2011). In Europe, 71% of the investment in R&D is made by its four bigger members (Germany, France, United Kingdom, and Italy). The 29% collected by all other members almost corresponds to the percentage held by Germany alone. The higher

percentage of investments on R&D per country is implemented by the private sector, with North European countries ranking a higher rate in comparison to the Mediterranean. In the public sector, the image is reversed, as only 28% of investments in R&D correspond to North European countries and 49% to the Mediterranean.

	Education	Humanities and Arts	Social sciences, business and law	Science	Engineering, manufacturing and construction	Agriculture	Health and welfare	Social services	Services	Total over all fields of study
Northern European countries	13%	11%	31%	8%	12%	1%	21%	5%	4%	100%
Southern European countries	10%	12%	31%	9%	15%	2%	16%	2%	4%	100%

Source: OECD, Education at a Glance 2011.

Table 7. Weighted average of the number of graduates per educational field for South and North European countries (data 2009)

Furthermore South countries have traditionally (2000-2009) lower participation rates for gross domestic expenditure in research and technological development (R&D) both in comparison to the EU total and to the average of North European countries.

During the period 1995-2008, the total investment of the EU in R&D in real prices increased by 50%. During the period 2000-2007, the tension of the R&D index remained stable as a result of the parallel increase of GDP and GERD (Gross Expenditure on R&D). During the 2007-2009 period, the index was increased as a GDP rate (from 1.85% to 2.01%) due to the GDP decrease and the priority given to R&D, financially and by private investments to R&D. This can be attributed to the positive impact of the Treaty of Lisbon and of the national reforms implemented since 2005 (European Commission, 2011).

Table 8 clearly shows that Southern countries lag in absolute terms in comparison to North European countries in the sector of investment expenditures on research and technological development, particularly in the private sector.

The capacity to produce effective basic research may be illustrated by the number if scientific publications presented by each country. Specifically, the US ranks at the highest position compared to the other OECD countries, producing 28% of all scientific publications, which has dropped in the last six years. The same course has been followed by the EU, which ranks immediately after the USA. On the contrary, China's rates have doubled during the same period (UNESCO, 2010). 12% of scientific publications correspond to the EU when the average of all countries is 10%. The United Kingdom, Germany, France, and Italy rank at the highest position and indeed are equally high in comparison to other countries globally.

	Private Sector - € R&D per resident (2009)	Public Sector - € R&D per resident (2009)	% GDP total R&D (2009)
Denmark	814.2	35	3.02
Netherlands	306.1	80.4	1.84
Sweden	802.6	50.5	3.62
Finland	910	115.9	3.96
Greece*	31.6	25.1	0.58
Spain	165.1	63.9	1.38
Italy	165.3	44.6	1.27
Portugal	122.6	19.3	1.66
Average	414.7	54.3	2.2

Source: Eurostat.
Note: *Available data 2007.

Table 8. Expenditure of the private and the public sector per resident and % on GDP on the R&D expenditure

The relevant index shows that the lowest position is held by Ireland and Portugal. In this case the developed countries of Northern Europe do not predominate in total. Moreover, we observe a significant increase of publications, of over 100%, in Portugal, Ireland and Greece.

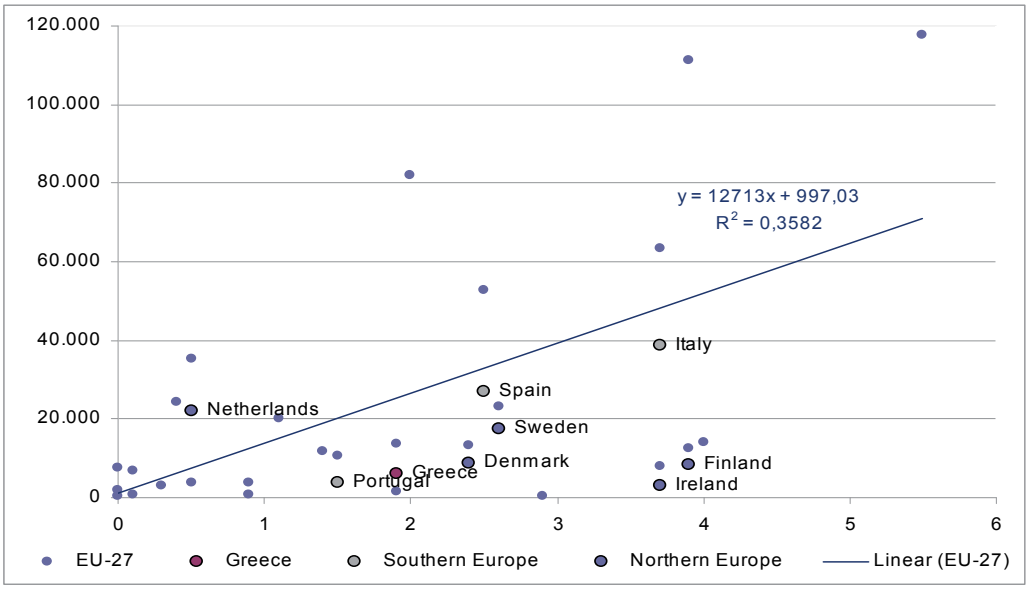
Country	Scientific publications		Change (%)
	2000	2008	
Denmark	8,896	13,260	49
Finland	8,358	12,606	51
Ireland	3,178	7,799	145
Netherlands	22,181	35,425	60
Sweden	17,409	22,976	32
Greece	5,924	13,855	134
Italy	38,708	63,408	64
Portugal	3,804	10,781	183
Spain	27,089	52,664	94

Source: European Commission, 2011.

Table 9. Number of scientific publications per million of population (data 2008)

Moreover, research activities differ significantly per university unit and scientific field. Comparison of research activity of universities shows that each university publicizes almost 250 articles referring to social studies and more than 5,100 articles on sciences (Audretsch, 2006).

Figure 2 depicts the relation between the expenditure for R&D and the number of publications per one million of population.



Sources: R&D: Eurostat, Publications: Innovation Union Competitiveness Report, European Commission, 2011

Fig. 2. Relation between expenditure for R&D[1] (vertical axis) and the number of publications per million of population (horizontal axis)

Figure 2 demonstrates the positive relationship between the two sizes. We conclude that countries that spend larger sums to invest in R&D have a higher proportion in the number of publications per million population.

4.2 Research activity and results

This unit aims to examine to what extent research results (publications) offer substantial added value. Added value is measured by citations and by register patents. In this process, a definitive role is played by the existing funding status of university research in order to promote entrepreneurial activity (Audretsch, 2007) and by the quantity of the research results produced. In essence, in this part we will analyze the relation between publications, citations and registered patents. Namely how different research systems "produce" different usable results (citations).

Patenting and copyrights help academic institutions by protecting them from the competition created by the availability of their intellectual property (Scott, 2004). It has been found that the number of publications does not affect the creation of spin-off companies (Landry et al., 2006) and that patents are not the key factors for the prediction of the number of publications, but are positively linked to citations (Agrawal & Henderson, 2002).

[1] R&D is calculated as a rate on GDP. To find the relation between this index and the publications data of 2008 were used for scientific publications and data of 2007 for R&D, as we assume that the expenditure for R&D brings results in the next year.

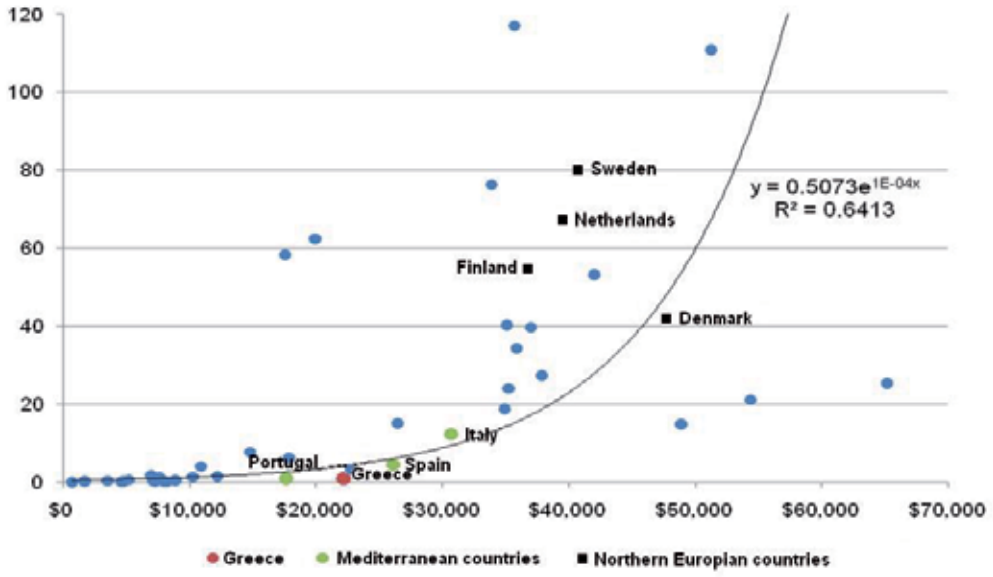
Through patenting, there is an increase in the interaction between scientists, who are active in the academic or industrial sector and in this way, the traditional scientific standards are enhanced. Moreover, if researchers are excluded from patents, then the technology dissemination mechanism will be characterised by ineffectiveness (Strandburg, 2005).

Table 10 depicts the number of registered patents per one million of population. Portugal, Greece and Spain rank in the lowest positions, a fact that is an indication that research results (publications) do not offer direct added value also presenting a smaller number of registered patents.

	1985	1990	1995	2000	2005
Denmark	15.94	24.04	35.22	43.21	42.24
Ireland	4.92	7.57	7.94	12.22	15.01
Netherlands	38.03	39.03	48.09	67.67	66.96
Sweden	51.06	50.82	83.57	77.24	80.85
Finland	11.28	30.01	60.77	67.26	53.03
Greece	0.15	0.45	0.16	0.69	1.00
Spain	0.89	1.83	2.02	3.48	4.55
Italy	8.98	11.32	10.65	11.63	12.44
Portugal	0.15	0.07	0.32	0.38	1.07

Source: OECD, Science Technology and Industry Scoreboard, 2007 edition, IMF World Economic Outlook database (last update April 2009), data process.

Table 10. Number of registered patents per one million of population



Source: OECD, Science Technology and Industry Scoreboard, 2007 edition, IMF World Economic Outlook database (last update April 2009), data process.

Fig. 3. Relation between GDP per capita (horizontal axis) and number of patents per one million of population

Table 10 shows a clearly higher number of registered patents by countries of Northern Europe as to patents registering. It is indicative that these countries show particularly satisfactory research results on an international scale, as they exceed the respective dynamic of the USA (which in 2005 presented almost 53 patents per one million of population), but are clearly behind Japan (more than 110 patents per one million of population in 2005).

Figure 3 depicts the relation between the domestic product per capita and the amount of expenditure for R&D. The number of patents registered shows the potential of production of applied research activity results.

The production of basic research does not refer so much to the quantity of publications, but mainly to their quality. Therefore, for a more thorough analysis, we shall examine the relevant significance of scientific work, as resulting from the number of references (citations) they receive from other scientific works. Table 11 shows the index of the relevant "distinction" of scientific works of each country.

Denmark	0.94
Ireland	0.76
Netherlands	0.97
Sweden	0.86
Finland	0.83
Greece	0.47
Italy	0.70
Spain	0.60
Portugal	0.51

Source: OECD, Science Technology and Industry Scoreboard, 2007.

Table 11. "Distinction" index of scientific works of each country[2]

As to distinct and recognized scientific publications North European countries present the highest "distinction" index (but for Ireland).

5. Academic spin offs and entrepreneurship

An academic spin off company is established in order to commercially exploit an intellectual property produced within the framework of the academic community. Usually patents, copyrights and the appropriate legitimation mechanisms are created to protect spin off companies (Scott, 2004). Universities create secondary technological results that become the object of exploitation by new businesses (Shane, 2001a, 2001b). In other words, academic spin offs are the externalities commercialised by businesses for which the university is the source of dissemination and for which it is not fully compensated (Harris, 2001). Spin off companies are the commercial aspect of scientific research, although studies on their establishment, the conditions of growth and comparative analysis between countries are scarce, particularly in the EU. Usually these concern case studies (Rabinow, 1997; Tuunainen, 2005) based on qualitative methods.

[2] The index is shaped as a percentage of each country's scientific works that receive references (citations) in relation to the total of scientific works, without taking into consideration same country references (Data refer to publications in sciences and technological sciences for 2003).

The issue of the production of basic applied research in Universities, of the transfer of the knowledge produced in Universities to the private sector and its effective commercialization, is an issue of concern for the academic community and scholars in recent years. Until the 1980's, mainly in the USA, the issue had been resolved based on the limiting version, namely the limitation of Universities to basic research (Hofstadter, 1995) and the promotion of "open science" (Argyres et al., 1998). "Open science" includes the acceptance of findings based on the impartiality of researchers, their systematic scepticism, and the minimization of copyright (communism of knowledge) (Meron, 1993). Thus the activity of Universities referring to teaching, research, publication and public service or transfer activity, does not have the nature of commercialised relations.

Moreover, there has been an effort to determine the reasons that some academic institutes exploit their intellectual property more in comparison to others. Basic reasons why this situation is shaped may be the availability of venture capital in universities, the commercial orientation of the university community, the intellectual superiority and the policy followed by the university community. Specifically in 101 universities in the world (530 spin off start ups), it was found that the factors associated with the quality of human resources as well as the ability of the university in finding funding sources increase the creation of new businesses (Gregorio & Shane, 2003). Finally, universities well established in the research sector present a larger number of spin off companies in comparison to "younger" universities that are characterised as less flexible in the process of taking business initiative (venture) (Franklin et al., 2001). After data accumulation by 47 academic spin off companies of the 8 greater Universities of Belgium, it seems that the policies implemented in academic institutes affect the growth potential of such businesses (Degroof & Edward, 2004).

The establishment of a spin off company is not necessarily implemented when its founder leaves the academic institute or graduates. It may need some years and this is because it is necessary that he/she acquire more skills or because there is the need to find partners. However, this process may be accelerated if its founder has direct access to the university unit, which will offer them – even informally – support for the transfer of knowledge and technology (Müller, 2008).

The moment of registering of a patent or license issuance for the exploitation of an invention is early and its commercial success from its immediate exploitation cannot be secured. Usually further improvement is needed as well as market data analysis (Jensen & Thursby, 2001). Besides, it has been found that it is not only the creation, but also the development process of this kind of businesses that play a significant role (Vohora et al., 2004). Indeed the participation of a member from the entrepreneurial world is deemed necessary as it will form the connecting link between science and market and will contribute to the minimization of the time between the registration of an idea and its commercial exploitation.

It is particularly interesting to examine the classification of academic spin offs that operate in academic entrepreneurship: a) technology scouts: post-doctorate researchers who have excellent knowledge of technology but do not have adequate entrepreneurial knowledge, b) teams led by an experience professor who is in contact with public authorities, c) "forefront" teams who develop in high paces as they do have the necessary entrepreneurial cognitive background, d) teams offering support and consulting at the process of drafting the

proposal for funding and finally, e) teams that include a network of external partners (banks, business funds investors, business partners) (Sassmannshausen, 2011).

Libecap (2007) classified academic spin offs based on the kind of start-up policy: a) absence of start-up policy, b) minimum selectiveness/support, c) medium selectiveness/support, and d) full selectiveness/ support. It has been proven that the latter case is the best form which can exploit entrepreneurial opportunities with a high growth potential. However it is clarified that the latter form may be characterized as ideal but it is not directly feasible due to limited resources.

Using the Robert & Malone (1996) model of support and selectiveness, it seems that if a University follows a low support/ low selectiveness policy (many spin offs with little support) and it is an academic institute that already has entrepreneurial activity, it has greater potential for entrepreneurial growth (e.g. MIT). On the contrary, a high support/ high selectiveness policy (few spin offs with great and orderly support for the University) is more appropriate for underdeveloped -as to entrepreneurial environment- universities (e.g. Yale). In this way, different approaches to technology transfer and commercialization may lead to similar positive effects for the local economy.

In a business, the separation and selection among many ideas, information and proposals is a difficult process. The process is made even more difficult when it refers to an academic unit that produces knowledge on its own. Thus, as important it is for a business to develop mechanisms in the framework of entrepreneurship, it is equally important for an academic spin off. This position is enhanced as academic institutes do not operate as "business of business" but as "business of education" despite the entrepreneurial nature that they often may demonstrate. When the only commercial mechanisms they have are patents and licenses, the academic staff must develop their entrepreneurial skills and the knowledge "filter". Besides, the majority of academic staff has limited experience in the entrepreneurial sector, ideas are sometimes vague, they use academic terminology and address an unknown market (Audretsch, 2007).

Differentiating the process of knowledge dissemination depending of the type of science it can be seen that the process is more implicit and less encoded in social sciences. On the contrary, in sciences the process is less implicit and more encoded, with expanded geographic proximity (Audretsch et al., 2006).

It has been noted that there are also differences between the motives given to researchers of various countries. Specifically in a survey held in Sweden it was noted that the motives for the commercialization of academic research results are different from those in USA. In the USA, the copyright of academic results belongs to academic units, while in Sweden it belongs to the researcher. Furthermore, in Sweden, academic institutes are funded by the state while in the USA mainly by the private sector[3].

A corresponding survey held in academic spin offs in Finland showed that there is not a significant interaction between them and the academic institutes. The total of spin-offs under examination concerned small enterprises, unable to invest in research and development. Moreover, such enterprises do not need direct R&D inputs as they have the

[3] Commercialization of Academic Research Results Författare , D. Nordfors et. Al, VINNOVA Forum – Innovation Policy in Focus VFI 2003:1, 2003.

know-how when established. It is also very likely that they seek for partners in other scientific fields[4].

However, the fear of technological backwardness for the economy of the USA in the 1980's led to the introduction of three basic instruments (Lee, 1996): The Bayh Dole Act (1980) that allowed Universities to licence the Federally financed R&D results to business, the Cooperative Research Act (1986) that allowed Universities and enterprises to organise technology-transfer alliances without undue fear of antitrust litigation and the Stevenson – Wedler Act (1986) to foster the exchange of scientific and technical personnel among universities, industry, and federal laboratories. The introduction of such instruments in the same time with the highlighting of the importance of the biotechnology sector in the relations between Universities and industries (Argyres et al., 1998; Hayton et al., 2002) created a new situation in the relations between Universities and industries throughout the 80's and the 90's at least in the USA, which however affected the relevant thinking internationally (European Commission, 1995).

Thus, in EU countries institutional changes are developed, such as the Business Innovation Centres (Fahey, 1997), the Industrial Liaison offices and similar legislative alterations are introduced to key economies. The role of the latter is particularly expanded in countries such as Sweden and Ireland and include the finding of funding, sponsorship, network development, etc. (Klofstenn & Jones-Evans, 1999).

The new perception of University relations, the so-called "neotransferism" (Lee, 1996), creates the conditions for a second revolution (the first referred to the integration of research in academic operation, apart from teaching). This perception includes the economic and social growth as part of the mission of academic institutes (Etzkowitz, 1998). The University technology transfer to industry those days can take four dimensions: a) industry - sponsored contact research, b) consulting, c) technology licensing, and d) technology development and commercialization (Shane, 2002). Each University, in the framework of national legislation in which it operates, chooses to enhance less or more one or more of the above dimensions. However, there is a remarkable difference among them. The two first could be deemed as of a nature that drastically limits the outflow of knowledge (the first one excludes it) while the third and fourth lead to an outflow at the cost of an induced inflow either to the University per se or to society.

In the last 20 years, many Universities across the world (mainly in the USA and in Europe) boost the development of spin off companies. The 90's, with the magnification of the role of economy of knowledge and the rise of capital markets, magnified the significance of spin offs as a method of knowledge transfer from universities to enterprises. This process was particularly beneficial for the financial state of Universities. In 1996 the sale of equity in spin off companies by U.S. Universities totalled $25,3 mil (Bray & Lee, 2000). In the same decade, it was found that this methodology was more effective that that of technology transfer through licensing. In 1996, the average annual income from a traditional licence was $63.832 while the average value of equity sold was $691.121 (10 times more than the average annual income from a traditional license). Well known examples of spin offs include companies

[4] Production of Knowledge Revisited: The Impact of Academic Spin-Offs on Public Research Performance in Europe (PROKNOW), Coordinator: Social Science Research Center Berlin (WZB) Research Group Science Policy Studies, Andreas Knie and Dagmar Simon, 2008.

such as Hewlett Packard from Stanford, Tracer from the University of Texas, Digital Equipment from MIT, etc.

The establishment of spin off companies by academic institutes is implemented at a slow pace outside the USA. In most OECD countries besides USA, 25 spin off companies maximum are created each year whose size, revenue and products production is of small, while only a small percentage of those belongs to high tech category. Indeed most of them come from top Universities of the world while the supporting structures are costly (Callan, 2001).

Spin offs contribute to national competitiveness, to the creation of jobs on a national level, while in the same time they ensure inflow to the academic community. The types of spin offs and the growth stages may differ (Wright et al., 2008). A study conducted on 109 spin off companies of Cambridge University (years of establishment 1979 – 2002) of which 18% were consulting companies, 34% technological, 21% products production and the remaining software development companies, showed that different types of spin offs have different needs and require different treatment by the state (Druilhe & Garnsey, 2004).

Table 12 verifies the fact that more spin off companies are established in the USA. Specifically for the 1980-2003 period 4,543 spin offs were established in total and in 2004 alone 462 were created. Furthermore during the same period the revenue from their operation was increased from $200 millions to $1,3 billions (Wright et al., 2007). In the EU a survey held on 172 university institutes from 17 countries, proved that 103 of them had spin off companies while only 50% of them established at least one spin off in 2004 (European Commission, 2005). Sweden and Germany ranked at very high positions as to the number of spin off companies, while the Netherlands ranked lower.

Country	Period	Number of spin-offs
France	1984-2005	1230*
Netherlands	1980-1990	300*
United Kingdom	1981-2003	1650*
Belgium	1980-2005	320*
USA	1980-2003	4543*
Italy	2000-2008	372**
Spain	2001-2005	380**

Sources: * Wright et al., 2007, ** OECD, 2003

Table 12. Number of university spin-off companies

However, the pace is different in the European South compared to the European North. A survey held by the Association of Spanish OTRIS[5] in Spain notes that 380 academic spin-offs were created up to 2005. Before 2001, this number counted only 18 spin-offs, therefore almost all academic spin-offs in Spain were created after 2001. One of Italy's greatest problems is the small number of researchers in universities, public research centers and, more specifically, in businesses. Specifically in Italy, from 2000 up to 2008, 372 spin offs were created in total. The upward trend is observed from 2003 onwards culminating in 2004 (65 spin offs) (Iacobucci et al., 2011). The number of spin offs that are active in Greece is almost 10.

[5] Manual for supporting the creation of spin-offs, BIC Minho – Oficina da Inovação, S.A., 2009.

6. Conclusion

Activation of academic entrepreneurship is a phenomenon dealt at the two more mature phases of development of economic systems (efficiency driven and innovation driven) with an emphasis on the latter phase where further development of the growth depends on the commercialisation of new products of knowledge. Comprehension of all of the above conditions leads to the conclusion that the USA, compared to Europe, is characterised by an environment that is more favourable to academic entrepreneurship and that the European North is characterised by a more favourable environment in comparison to the European South.

	European North	European South
Entrepreneurial Opportunities	Superiority	Hysteresis
Transaction Costs	Lower	Higher
Uncertainty	Lower	Higher
Social Capital Trust	High	Low
Scientific Networks	Satisfactory	Satisfactory
Property rights	High consolidation	Low consolidation
Cultural Background	Favourable	Unfavourable
Education System	High public expenditure	Lower public expenditure
Research Private Funding	High	Low
Scientific Publications per resident	High	High
Patents Number per one million of population	High	Very Low
Publications Distinction Index	High	Low
Number of Spin Offs	(Estimation) higher	(Estimation) lower

Table 13. Academic entrepreneurship in the European North and the European South

Entrepreneurial activity exploiting the conditions of asymmetrical information has the ability to identify new academic entrepreneurial opportunities. However, this presupposes an institutional (cultural and regulatory) framework that will reward and encourage this process. Certainly, the members of the academic community face the moral hazard of either concealing or exploiting the entrepreneurial opportunity, or of abandoning the main duty of research and knowledge dissemination.

Growth conditions of academic entrepreneurship are affected by the burden of the transaction costs which has as crucial feature the uncertainty and the burden of operation of the entrepreneurial activity.

The growth of social capital, of trust and of academic networks can have a positive effect on academic entrepreneurship. The manner in which property rights originating from research are produced and registered is equally important.

Naturally, the way in which property rights on the production of university innovation are recognized and registered is important. The brave move implemented in the USA by which the property of the innovation was transferred from the sponsors to the producers, played a

key role in the growth of the role of academic entrepreneurship in the growth of entrepreneurship and growth in the USA after 1990.

Simultaneously, the cultural environment affects the growth of academic entrepreneurship on two levels: on the level or researchers and potential entrepreneurs and on the level of university administrations which also carry the viewpoints of society. Thus if a society has cultural characteristics that do not favor the growth of entrepreneurship (like the European South for instance) then there is no reason for us to believe that part of the society (such as the university community) will feel otherwise no matter how the existence of a higher educational level may differentiate the separate characteristics of the academic environment. On the other hand the effect will be graver on the way that university administrations deal with academic entrepreneurship. A negative entrepreneurial atmosphere in society is certainly creating a negative "welcome" atmosphere of academic entrepreneurial opportunities on the side of University administrations.

Analyzing the relations between the academic system and research we discover the North countries have higher funding rate towards education system mainly through private funding. Despite this fact scientific publications in the North and the South are comparable, while the number of patents is much higher in the European North. The same also applies on publications distinction indexes. Namely in essence we realize that while scientific results are produced in the South, in the North they take a registered form (e.g. in the form of patents). This may means that the direction of scientific research in the South is not offered for further financial exploitation e.g. humanities, basic research not linked to commercial potential, etc. Finally, it all comes down to a low level of academic activity in the European South in comparison to the European North.

The limited academic entrepreneurship of the South has a complex interpretational background, which is disseminated in all aspects of social and economic activity of an economy. This image also characterizes the hardships faced by economies in their transition to a growth stage based on innovation.

Future research may investigate the relation between university entrepreneurship and other factors (such as the cultural background of the societies), testing for the direction for the causality. Furthermore, the analysis of the relation between entrepreneurship, university research, and economic growth and the suggestion of certain policy measures to exploit university entrepreneurship, could be realised comparing other group of countries, or a group of countries as a whole.

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9

Academic Entrepreneurship: What Changes When Scientists Become Academic Entrepreneurs?

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1. Introduction

The evolution of the academia has been extensively studied. The first academic revolution explained by Jencks and Riesman (1968) made research an additional function of the academia besides the traditional task of teaching. But in the last decades academia adopted another function – the "capitalization of knowledge". This second revolution created the entrepreneurial university which integrates economic development into the university as an academic function along with teaching and research (Etzkowitz, 1998). In recent years academia has become more involved in economic and social development, has more intensively commercialized their research results, patented and licensed activities. In addition, academic spin-off companies emerged and managerial and attitudinal changes occurred in respect to collaborative project with industries (Van Looy et al., 2004).

Academia and individual academic institutions are now a primary source of new knowledge production and innovation (Brennan & McGowan, 2007). It is widely acknowledged that the commercialization of scientific and technological knowledge produced in public-funded research institutions, including universities and research centres, and brought to the marketplace has a fundamental role in wealth creation, economic growth and technological innovation, and plays a significant role in new venture creation, growth of existing firms, and new job creation (Harmon et al., 1997; Mansfield, 1991; Ndonzuau et al., 2002; Siegel et al., 2003). Research by Jaffe (1989), Mansfield (1991), Acs et al. (1992), Mansfield (1998), and others indicates that in important segments of the economy technological change has been based significantly on knowledge that was spun from academic research.

The spin-off process is therefore one important means of transferring and commercializing technological innovations (Carayannis et al., 1998). Since the early 1980s, there has been a growing tide of commercial enterprise emerging from academic organizations (Sljivic, 1993). New technology-based firms established from academic research have been present in the USA for many decades (Brett et al., 1991; Roberts, 1991). In Europe, the establishment of new

technology-based firms from academic research is still in the initial stage of development. Although the first academic spin-offs in Europe appeared in the 1970s, they were not yet specifically encouraged since they diverted effort from basic research and academia usually did not pay any attention to them or often even opposed their development (Stankiewicz, 1994). Spinning off new ventures from academic laboratories gained acceptance in Europe as a valid method of technology transfer in the 1990s (Degroof & Roberts, 2004), although the entrepreneurial activities of scientists are by no means a totally new phenomenon. For example, entrepreneurial activities by scientists occurred in the 17th century in German pharmaceutical science; however, these activities did not affect academic research sites (Etzkowitz, 1998). In the 1990s, entrepreneurship was also recognized as a key instrument of technology innovation. This was an important change in Europe, where academic institutions have traditionally considered that technology transfer and commercialization were outside of their mission (Owen-Smith et al., 2002) and entrepreneurship has not been as developed as in the United States (Organisation for Economic Co-operation and Development, 1998).

Although the evolution of academia has been widely explored, different periods defined and the related changes explained, little research has focused on the crucial actor – the academic entrepreneur. We argue that analysing how entrepreneurs change their way of work after they become academic entrepreneurs, which is after they establish their academic spin-off company as a result of research activities at the university, is important for a better understanding of academic entrepreneurship in academic spin-off proliferation. Although this is an important research topic, only a few studies were related to this topic. Recently, Jain et al. (2009) compared role identity modification of university scientists involved in commercialization activity and found that scientists typically adopt a hybrid role identity that comprises a focal academic self and a secondary commercial persona. Besides that, previous studies addressed different topics, e.g. the patent activity of academic entrepreneurs (Krabel & Mueller, 2009; Wright et al., 2008), collaboration with industry (Cohen et al., 2002; Gulbrandsen & Smeby, 2005; Perkmann & Walsh, 2007, 2008), technology transfer from academia to industry (Shane, 2004), publication of papers and research results (Goldfarb & Henrekson, 2003; Ndonzuau et al., 2002), different types of academic consulting (Perkmann & Walsh, 2008), and basic versus applied research (Grandi & Grimaldi, 2005; Rahm, 1994; Van Looy et al., 2004).

The aim of this chapter is to make a further step into the investigation of changes in academics` way of work in terms of cooperation with the industry (consulting, industry-related projects), patent activities (applied and granted patents), publication of scientific papers, and research activities (basic versus applied research), after they become academic entrepreneurs. The sample consists only of academic entrepreneurs – academics that own their own company – since the chapter explores how they combine the two activities. Etzkowitz (1998) argues that academic entrepreneurs are often eager to conduct applied research at the academic laboratory and product development in the firm.

The rest of the chapter is structured as follows. In the next section, we develop the research hypotheses. We continue with the explanation of the methodology used in this research and the presentation of the results. In the last part, the conclusion and interpretation of results are presented.

2. Hypotheses development

This section presents the development of research hypotheses.

2.1 Cooperation with industry

Among collaborative forms of interaction between academics and industry, academic consulting is widely practiced (Perkmann & Walsh, 2008) and it is also by consulting that university research impacts on industrial R&D (Cohen et al., 2002). Consulting typically involves interaction between the academic and industry in order to find the best and most appropriate solution to a problem (Denis & Lomas, 2003). A lot of research has investigated the academia-industry cooperation relationship from different points of view (e.g. Blumenthal et al., 1996; Cohen et al., 2002; Gulbrandsen & Smeby, 2005; Landry et al., 2006; Mansfield, 1995; Perkmann & Walsh, 2008) but no research has yet analysed how academics change their attitude toward cooperation with industry after they establish their spin-off company. Thus, in the next paragraphs we summarize results of different authors about academia-industry cooperation relationship that will facilitate us in postulating the related research hypothesis.

Landry et al. (2006) argues that researchers which are active in consulting activities with private firms, government agencies, or organizations associated with their research field, will more likely engage in spin-off creation themselves. If we consider Gulbrandsen` and Smeby`s (2005) results that industry cooperation positively and significantly predicts the establishment of firms, we can also suppose that after academics establish their academic spin-off companies, they would practice consulting even more than prior spin-off establishment. In support of this preposition also Mansfield`s (1995) study of 66 U.S. firms as well as 200 U.S. academic researchers suggests that as a project matures, industry funding begins to grow and academics become more involved as industry consultants.

Further, Blumenthal et al. (1996) surveyed 2,052 academics at 50 U.S. universities in the life science field and found that industry-funded academics are more commercially productive than those who are not industry funded. From these results, it can be deducted that industry-funded and thus industry-related projects foster academics into collaboration with industry. Therefore, also academic entrepreneurs will presumably get more involved with industry in terms of industry-related projects and consulting after spin-off creation since they will be directly involved with industry and will presumably conduct more projects ordered by the industry. Based on this discussion we propose that academic entrepreneurs will be more involved in consulting to companies, in industry-related projects, and that they will devote more time to projects which are ordered by the industry than prior the establishment of their spin-off companies. The research hypotheses are proposed as follows.

Hypothesis H1a: *On average, after spin-off creation academic entrepreneurs will be more engaged in consulting to companies than prior spin-off creation.*

Hypothesis H1b: *On average, after spin-off creation academic entrepreneurs will devote more time for projects that are ordered by the industry than prior spin-off creation.*

Hypothesis H1c: *On average, after spin-off creation academic entrepreneurs will be more involved in industry-related projects than prior spin-off creation.*

2.2 Patent activities

At the invention stage, universities have an important role to play in the generation of new scientific and technological knowledge that has traditionally been codified in the form of a patent (Wright et al., 2008). In the past few decades there has been an increase in the number of patents granted to universities (Krabel & Mueller, 2009). Scientists are becoming more proactive in commercializing their research results. Eventually, patenting is a possible commercialization channel (Krabel & Mueller, 2009). In this section we present the literature review that will help us in postulating the hypotheses on changes that occur in regard to academic's attitude about patent activities after they become academic entrepreneurs.

Krabel and Mueller (2009) argue that patenting activity and joint research with industrial partners facilitate academics engagement in entrepreneurship. In her study about academic perceptions of university-firm technology transfer, Rahm (1994) found a moderate to strong correlation between being a spanning researcher and having filed for or been granted a patent. Researchers who have interacted with firms in an effort to transfer knowledge, know-how, or a technology (spanning researchers) differ from university-bound researchers (researchers with no technology transfer experience) in that they are more likely to hold patents than their colleagues (Rahm, 1994). Additionally, scientists also show interest to turn their ideas into products and to exploit them financially and those who hold a patent are four times more likely to be nascent entrepreneurs than those scientists without a patent (Krabel & Mueller, 2009).

Moreover, Gulbrandsen and Smeby (2005) showed that cooperation with the industry positively and significantly predicts patenting as an output of research and development activities. Blumenthal et al. (1996) demonstrated that industry-funded academics applied for more patents, issued more patents and licensed more patents than academics without industrial support. These contributions lead us into the consideration that academics that are more involved with industry are more active in the patenting field. They apply for and are granted more patents then academics with no industry connections. Further, we propose that also academics will carry out more patenting-related activities after they become academic entrepreneurs since engagement with industry and exploitation and commercialization of their knowledge will increase. On the basis of this discussion we postulate the next research hypotheses.

Hypothesis H2a: *On average, academics will apply for more patents after they establish their own company than prior the establishment.*

Hypothesis H2b: *On average, academics will be granted more patents after they establish their own company than prior the establishment.*

2.3 Publication of scientific papers

For most academics, publications are still the favoured and valued output of their work (Gulbrandsen & Smeby, 2005). According to Merton (1957 cited in Siegel et al., 2004), a primary motive of university scientists is recognition within the scientific community, which results from publications in top-tier journals, presentations at prestigious conferences, and federal research grants. Publishing articles in prestigious journals and international reviews

is particularly recommended to increase the likelihood of advancement. This strategy has been popularized within the academic community in the evocative slogan "publish or perish" (Ndonzuau et al., 2002). Researchers wish to have their papers cited because this is a signal that they have established a reputation within the academic community (Goldfarb & Henrekson, 2003), which is the primary motivation for university scientists (Siegel et al., 2003). Different scholars have argued that publishing papers and striving for citations is a central objective of academic research, as citation measures are associated with higher income and prestige (e.g. Dasgupta & David, 1994; Diamond, 1986; Stern, 2004) and also as a recognition from other scientists, which may lead to election to a national academy and the ultimate accolade, the Nobel prize (Etzkowitz, 1998).

Although logical in a "scientific" sense, incentives to publish research results extensively have perverse effects from the standpoint of the economically oriented exploitation of those results (Ndonzuau et al., 2002). Indeed, as soon as research results are published, results lose a major part of their economic attractiveness. That is why industry, concerned with keeping information from competitors, may demand that no publications come from collaborative efforts. A single publication may be enough to remove all of the information's originality value, since once it is in the public domain, it cannot benefit from legal protections such as patents, which are often decisive in a valorisation policy (Ndonzuau et al., 2002). These considerations lead us into proposing that academic entrepreneurs who have their own spin-off companies that are based on academic research results and are more embedded with industry will publish less than before they have establish their own company. Consequently, we also argue that fewer publications will result in fewer citations by other scholars. Thus, the following two research hypotheses are postulated.

Hypothesis H3a: *On average, academics will publish less after they establish their own company than prior the establishment.*

Hypothesis H3b: *On average, academics will receive fewer citations after they establish their own company than prior the establishment.*

2.4 Type of research

Basic research refers to experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view (Organisation for Economic Co-operation and Development, 2002). The primary aim of the investigator therefore is a fuller understanding of the subject under study (Axelrod & Hamilton, 1981). Commonly, academics are oriented more toward basic research than to applied research since scientists are driven by their curiosity or interest in a scientific question. On the other hand, applied research refers to original investigation undertaken in order to acquire new knowledge but is directed primarily toward a specific practical aim or objective (Organisation for Economic Co-operation and Development, 2002) with market potential, and thus it is more interesting for commercialization than basic research. Therefore, industry is interested in application and development (Rahm, 1994) rather than conducting basic research. Applied research assures a more rapid return from developing marketable products, which is of great importance for small spin-off companies.

In their study of industry funding and university professors' research performance, Gulbrandsen and Smeby (2005) found evidence that professors with industrial funding describe their research as applied to a larger extent. Researchers who have interacted with firms in an effort to transfer knowledge, know-how, or a technology are a bit more likely than other researchers to feel pressured to become involved with applied industrial research efforts since they sense that granting agencies, as well as university, department, or central administration, will look favourably upon such activity.

Further, Mansfield (1995) found positive effects between research productivity and involvement with industry. This leads us into consideration that academic entrepreneurs who are also more involved with industry will conduct more applied research and less basic research. In their study on academics' organizational characteristics and the generation of successful business ideas Grandi and Grimaldi (2005) suggest that non-academic partners joining the initial academic team bring a more detailed knowledge of the market and customers and more practical knowledge. Consequently, scholars devoted to applied research generally pay much more attention to industry requirements and to understanding the potential for market applications of academic research results. Thus, the spin-off company that also has non-academic partners will presumably conduct more applied research than basic research.

Based on this discussion we argue that academics will be more involved in applied research and less involved in basic research after they establish their own company since empirical evidence suggests that involvement with industry implies more applied than basic research. Therefore, we postulate the last four research hypotheses.

Hypothesis H4a: *On average, academics will be less involved in basic research after they establish their own company than prior the establishment.*

Hypothesis H4b: *On average, academics will be more involved in applied research after they establish their own company than prior the establishment.*

Hypothesis H4c: *On average, percentage of research funds for basic research in complement to total research funds will be lower after academics establish their own company than prior the establishment.*

Hypothesis H4d: *On average, percentage of research funds from industry will be higher after academics establish their own company than prior the establishment.*

3. Methodology

The methodology is discussed in terms of questionnaire development, sampling and data analysis, and measures.

3.1 Questionnaire development

The study was based on data that were collected by self-administered questionnaire. For the purposes of cross-cultural generalization Hills and LaForge (1992) have emphasized the importance of conducting entrepreneurship research in international contexts. In line with this suggestion the questionnaire was mailed at three different European universities, namely University of Cambridge (United Kingdom), Eindhoven University of Technology (The Netherlands), and University of Ljubljana (Slovenia).

Dillman's (2000) tailored design method, which is a set of procedures for conducting successful self-administered surveys that produce both high-quality information and high response rates, was used. Dillman (2000) points out that questionnaire's design (respondent-friendly questionnaire) have an impact on response rates and on measurement error. Poor questionnaire layout can cause questions to be overlooked or can bias the offered responses. A respondent-friendly questionnaire is attractive and encourages people to read words in the same order as other respondents read them. People are guided by graphic layout features, from the cover page through the last question. A well-designed layout prevents items or answer categories from being missed (Dillman, 2000). Moreover, a light yellow paper was used for the questionnaire to ensure that the questionnaire was distinguishable from all other questionnaires that a respondent might receive and also from other papers on the respondent's desk.

The questionnaire was initially prepared in English. In the United Kingdom (Cambridge University) and in The Netherlands (Eindhoven University of Technology), where the understanding of English among academics is excellent, the survey was administered in English. In the case of Slovenia (University of Ljubljana), the survey instrument was first translated into Slovenian language and then back-translated (Brislin, 1970, 1980; Hambleton, 1993) into English.

A survey package contained an eight-page questionnaire, a personalized cover letter, a token of appreciation, and a stamped return envelope. Approximately one week after the survey package was sent, a personalized thank you e-mail was sent to express appreciation to the respondents if they had returned the questionnaire, and to urge a response from those who had not responded yet. To reduce costs and to enable respondents who prefer to fill out the questionnaire using internet, a unique identification number and a link to the Slovenian or English internet version of the questionnaire were provided in the first and the second follow-up e-mail. To prevent duplicates, each respondent had an identification number that allowed him or her to complete the questionnaire only once. Dillman (2000) assumes that certain populations—such as university professors, government employees, workers in many companies and corporations, and members of some professional organizations—generally have e-mail addresses and internet access and are therefore good candidates for web surveys. The internet version of the questionnaire was identical to the paper version in terms of the contents, numbering, and positioning of questions. The internet version of the questionnaire was also very similar to the paper version in terms of the visual appearance (e.g. background/paper colour). If, after three weeks, the survey had not been returned or filled out using the internet version of the questionnaire, a personalized e-mail reminder was sent. In the event that a questionnaire had been misplaced, a PDF version of the questionnaire was attached to the e-mail. For those respondents who preferred to fill out the questionnaire using the internet, an identification number and a link to the internet version of the questionnaire were provided via the e-mail.

3.2 Sample and data analysis

Out of the 3,152 surveys mailed (946 in Slovenia, 1,171 in The Netherlands, and 1,035 in the United Kingdom) 133 (4.2%) were returned as undeliverable (23 (2.2%) in Slovenia, 53 (4.5%) in The Netherlands, and 57 (5.5%) in the United Kingdom). No pattern could be observed among undelivered surveys. Respondents were asked to return the blank questionnaire if

for some reason they preferred not to respond. There were 115 (3.8%) blank questionnaires returned by those who were unwilling to participate in the study (54 (5.9%) in Slovenia, 32 (2.9%) in The Netherlands, and 29 (3.0%) in the United Kingdom). One questionnaire from a Slovenian respondent had a high proportion (more than 20%) of missing data and was therefore excluded. The Tailored design method (Dillman, 2000), which was used to guide and support the survey process, thus resulted in an overall response rate of 35.0% (48.3% in Slovenia, 30.7% in The Netherlands, and 27.4% in the United Kingdom) and a valid response rate of 31.2% (42.4% in Slovenia, 27.8% in The Netherlands, and 24.4% in the United Kingdom).

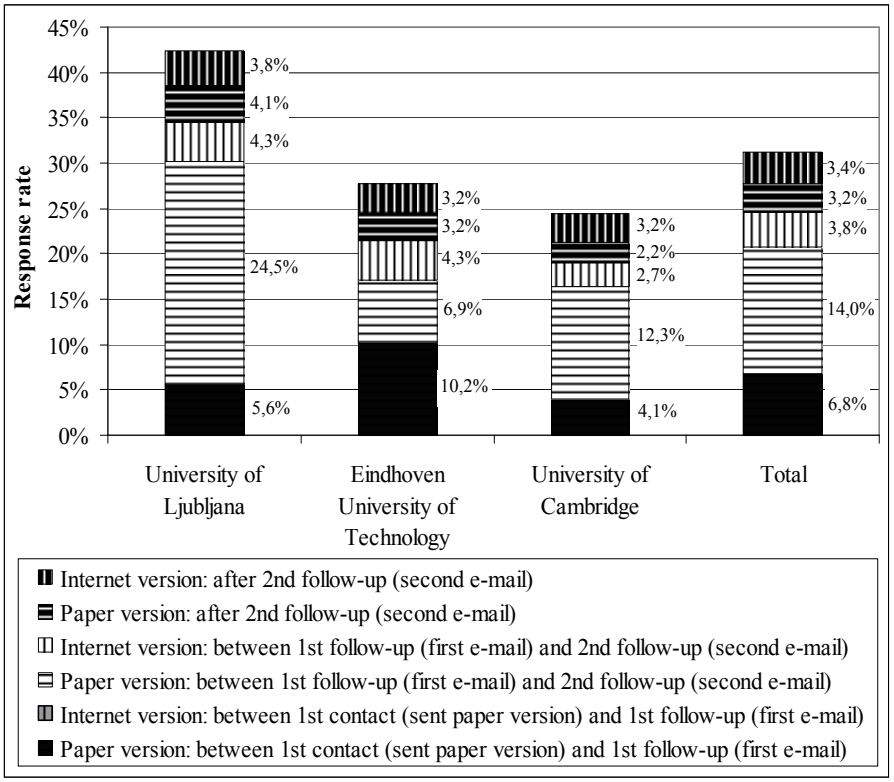

Fig. 1. Valid response rates after each contact (divided between responses by postal mail and through the internet) for the three different universities

Figure 1 details the valid response rates after each contact (divided between responses by postal mail and through the internet) for the three different universities. An average valid response rate before the first follow-up was 6.8% (all respondents responded using the paper version of the questionnaire, because the link to the internet version of the questionnaire was not included until the first follow-up). An average valid response rate before the second follow-up was 24.6% (20.8% – paper version; 3.8% – internet version). An average total valid response rate was 31.2% (24.0% – paper version; 7.2% – internet version).

Not all respondents were academic-entrepreneurs (most of them were non-entrepreneurial academics). A sample for this study consisted of 98 academic-entrepreneurs which

answered to the questionnaire. The average academic-entrepreneur was 43 years old, was married (68.0%), worked an average of 52.6 hours per week, and has had a total of 18.1 years of professional experience (12.6 years at the academic institution[s] and 5.5 years at other institutions). Detailed respondents' personal characteristics are presented in Table 1.

Gender	
Male (in %)	90.8
Female (in %)	9.2
Married	
No (in %)	32.0
Yes (in %)	68.0
Average number of children	1.3
Parents own business	
No (in %)	68.4
Yes (in %)	31.6
Close friends own business	
No (in %)	16.3
Yes (in %)	83.7
Average number of working hours per week (in hours)	52.6
Average age (in years)	43
Average number of years of employment	
Total (in years)	18.1
At the academic institution(s) (in years)	12.6
Total minus at the academic institutions(s) (in years)	5.5
Highest degree attained at the academic institution	
PhD student/Researcher/ Assistant (in %)	37.1
Lecturer/Instructor (in %)	8.2
Assistant professor/ Assistant research scientist (in %)	13.4
Associate professor/ Associate research scientist (in %)	12.4
Full professor/ Research scientist (in %)	21.6
Honor research scientist/ Senior research scientist (in %)	5.2
Other (in %)	2.1

Table 1. Respondents' personal characteristics

The potential nonresponse bias was assessed by comparing responses of early and late waves of returned surveys (Armstrong & Overton, 1977). Results suggested that non-response bias does not appear to be a problem in the dataset. The overall number of questionnaires with missing data was small. In the sample of academic-entrepreneurs, there was 1.8% missing values. The pattern of missing data was also examined. Based on the low percentage of overall missing data and no pattern in the missing data spread across variables, the missing data can be considered to be missing completely at random (Hair et al., 1998; Rubin, 1976).

Paper and internet versions of the questionnaire were compared using a two-sample Kolmogorov-Smirnov test. Out of 98 received questionnaires from academic-entrepreneurs,

75 (76.5%) questionnaires were received by postal mail and 23 (23.5%) were received through the internet. For most of the items, there was no statistically significant difference ($p < 0.05$) in the respondents' answers. However, it seems that those who responded through the internet are more involved in consulting with their own company and have received fewer citations to their scholarly publications in the last three years. Since, after the first follow-up, the respondents were able to choose between the paper version and the internet version of the questionnaire (both were available to them), these minor differences between the paper version and the internet version of the questionnaire do not seem to threaten data validity.

A one-sample t-test was used to determine whether the mean for each construct is significantly different from the midpoint of the scale. The midpoint of the scale indicates a neutral position. The results were analysed using SPSS.

3.3 Measures

All items measured the difference between the way of academics work before they have established their own company and after the establishment. All items were measured on a five-point scale ranging from "1"-much less to "5"-much more.

Cooperation with the industry was measured with the following three items: (1) "On average, I am now (much less / less / the same / more / much more) involved in consulting to companies than before I have established my own company." (2) "On average, I now spend (much less / less / the same / more / much more) time for projects which are ordered by the industry than before I have established my own company." (3) "I am now (much less / less / the same / more / much more) involved in industry-related projects (number of projects) than before I have established my own company."

Patent activities were measured with the following two items: (1) "In last three years I have applied for (much less / less / the same / more / much more) patents than in the last three years before I have established my own company." (2) "In last three years I have been granted (much less / less / the same / more / much more) patents than in the last three years before I have established my own company." Following Coombs et al. (2006), a three-year period was used to measure the academic's patent activity rather than an aggregated measure of the academic's total patent library. If an academic established a company less than three years ago, a time period since establishment and the same time period before establishment was used.

Publication of scientific papers was measured with the following two items: (1) "In last three years I have published (much less / less / the same / more / much more) scientific papers in peer-review journals than in last three years before I have established my own company." (2) "In last three years I have been cited (much less / less / the same / more / much more) than in the last three years before I have established my own company."

Type of research was measured with four items: (1) "On average, I am now (much less / less / the same / more / much more) involved in basic research than before I have established my own company." (2) "On average, I am now (much less / less / the same / more / much more) involved in applied research than before I have established my own company." (3) "Percentage of research funds for my basic research in complement to my total research

funds is now (much lower / lower / the same / higher / much higher) than before I have established my own company." (4) "Percentage of research funds from industry for my research projects is now (much lower / lower / the same / higher / much higher) than before I have established my own company."

4. Results

Table 2 shows an analysis of the responses regarding each hypothesis. Examination of the hypotheses is presented in the following paragraphs.

Item	Related hypothesis	Mean	Std. dev.	t-value	Sig.
Cooperation with the industry					
Consulting to companies	H1a	3.32*	1.03	3.10	0.003
Time devoted for projects which are ordered by the industry	H1b	3.48*	1.07	4.41	0.000
Involved in industry-related projects	H1c	3.55*	1.08	5.03	0.000
Patent activities					
Applied for patents	H2a	3.11	0.89	1.18	0.240
Granted patents	H2b	3.05	0.89	0.59	0.554
Publication of scientific papers					
Published scientific papers	H3a	2.94	1.07	-0.56	0.573
Number of citations	H3b	3.04	0.95	0.37	0.710
Type of research					
Involved in basic research	H4a	2.54*	0.93	-4.88	0.000
Involved in applied research	H4b	3.31*	0.84	3.60	0.001
Percentage of research funds for basic research in complement to total research funds	H4c	2.66*	0.84	-4.02	0.000
Percentage of research funds from industry	H4d	3.29*	0.85	3.39	0.001

Note: N = 98; * Sig. < 0.05; Scale = 1-much less; 2-less; 3-the same; 4-more; 5-much more

Table 2. Research results (test value = 3-"the same")

The first three hypotheses (H1a, H1b, and H1c) which were related to cooperation with the industry were supported. Hypothesis H1a which predicted that after spin-off creation academic entrepreneurs would be more engaged in consulting to companies than prior spin-off creation was supported (mean value of 3.32 that is statistically significantly larger than the test value of 3.00 on 5-point scale). Hypothesis H1b which proposed that after spin-off creation academic entrepreneurs will devote more time for projects that are ordered by the industry than prior spin-off creation was supported as well (mean value of 3.48 that is statistically significant larger that the test value). Hypothesis H1c which predicted that academic entrepreneurs would be more involved in industry-related projects after they establish their spin-off company was supported (mean value of 3.55).

The results presented in Table 2 shows that hypotheses related to patenting and publication of scientific papers were not supported. Based on research results we cannot argue that there are any changes in the way academics work after they establish their own company in terms of the number of applications for patents (H2a), number of granted patents (H2b), number of published scientific papers (H3a), and number of citations (H3b).

Last four hypotheses (H4a, H4b, H4c, and H4d) that were related to the type of research were supported. Hypothesis H4a which predicted that after spin-off creation academic entrepreneurs would be less involved in basic research than prior spin-off creation was supported (mean value of 2.54). Hypothesis H4b which proposed that after spin-off creation academic entrepreneurs would be more involved in applied research than prior spin-off creation was supported (mean value of 3.31). Hypotheses H4c and H4d which were related to percentage of research fund for basic research (H4c) and percentage of research funds from industry (H4d) were also supported. Mean value of 2.66 for the percentage of research funds for basic research was statistically significantly lower than the test value of 3.00. Mean value of 3.29 for the percentage of research funds from industry was statistically significantly higher than the test value of 3.00.

5. Conclusion

Although spin-off creation and knowledge transfer from academia to industry has been widely investigated, there are still little studies focused on the key actor – the academic entrepreneur. Therefore, this chapter has analysed how do academics change their way of work after they become academic entrepreneurs. With this study, we contribute to the literature by performing an analysis about changes in academia-industry cooperation relationship, patent activities, publications activities and research activities after academics establish their own companies.

The study reveals that academic entrepreneurs are on average statistically significant more active in cooperation with industry in terms of consulting to companies, time spent for projects ordered by the industry and involvement in industry-related projects than before they have established their spin-off company. The result is not surprising since academic entrepreneurs are by virtue of having established their spin-off companies more involved in business activities than traditional academics with no or little connections with industry. Academic entrepreneurs spend more time on business matters and are more in contact with industry. This avails them with avenues for conducting industry-related project more than their non-industry-related colleagues from universities since they have also practical-business experiences, social ties, and relevant contacts. Thus, our findings suggest that academic entrepreneurs will be involved in consulting to companies more than prior spin-off establishment. The reason may be found in industry-and-business-related experience and entrance in real business with their spin-off companies which provides them reputation and experience. Since academic entrepreneurs are more involved in the real economy and have more contacts in the industry, they easily gain industry-related projects and are presumably also more interested in more applied project then academics that are not connected with the industry. Our results are consistent with scholars (Blumenthal et al., 1996; Gulbrandsen & Smeby, 2005; Landry et al., 2006; Mansfield, 1995) that argue that academics` cooperation with industry fosters spin-off creation and commercialization

productivity of academics which suggests that academics who are more involved with industry will cooperate even more after their spin-off establishment.

It is also interesting that academics after spin-off establishment are on average statistically significant more involved in applied research and less in basic research than prior spin-off establishment. This result shows that it is common for academic entrepreneurs that are more interested in research which is more connected with industry and has direct applicable value. This is reasonable since these academics are also entrepreneurs at the same time and consecutively practically business oriented. This finding is consistent with authors that found a positive relationship between industry-funding and applied research (Gulbrandsen & Smeby, 2005; Poyago-Theotoky et al., 2002; Rahm, 1994; Van Looy et al., 2004). Our results also reveal that academic entrepreneurs after they establish their spin-off companies employ more funds for applied research then before which coincides with more applied research conducted after the spin-off creation. In consequence, it also arises that academics also employ a minor percentage of research funds for their basic research after they become academic entrepreneurs. Based on these research results, we can argue, that those academics that establish their own companies do not stop research; they just shift their research interest from basic to more applied research.

There seem to be almost no changes in patent and publication activities of academics after they become academic entrepreneurs. After the spin-off creation, academic entrepreneur on average publish the same amount of papers and receive on average the same number of citation then prior becoming academic entrepreneurs.

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10

University's Entrepreneurship Education: Creating Meaningful Impression for New Generation

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1. Introduction

For the past three decades, the world experienced the impact of entrepreneurship in the creation of creative and innovative new ventures. Who would have thought that as the world becomes connected through the internet, as precisely predicted by Friedman (2005); products like Facebook revolutionise social networking to another level. Who would have thought that Facebook, which originated from a college room to cater connection amongst college's students, has become the most used social networking site in the world! Amongst other successful entrepreneurship ventures like Microsoft Corporation, Google Inc., Apple, Virgin Group and Wal-mart; Facebook is a fine example of how entrepreneurship can bring positive impacts to the world.

Behind every successful business venture, there is an entrepreneur who visualises and transforms an unpolished idea into commercial success. Becoming an entrepreneur is never easy. It requires a unique blend of creativity, innovation, self-confidence, leadership, and multi-skills, all of which determines the success and failure of a new venture. There are many intertwining factors that determine an individual's plight to become an entrepreneur. These so-called antecedents can be both natural and circumstantial. Various research projects have been undertaken to establish and reaffirm the ideas of what makes an entrepreneur; i.e. whether they are born (natural-tendency), or made and educated to become one (circumstantial-tendency). In another interesting development, many business schools took the initiative to offer entrepreneurship education to the public.

In this chapter, the author's perspective of entrepreneurship education in universities is discussed in detail. The chapter is arranged according to sub-topics of:

1. The background of entrepreneurship,
2. Definitions of entrepreneurship,
3. Entrepreneurial trajectories,
4. The nature of entrepreneurial intention,
5. The relationship of graduate career-making and entrepreneurship education,
6. Entrepreneurship education issues, and
7. Integrated Strategic Entrepreneurship Education Delivery (ISEED).

1.1 Entrepreneurship background

Until today, there is no single agreement amongst scholars in the entrepreneurship academia pertaining to the actual definition of an entrepreneur and entrepreneurship due to its complex multi-facets nature (Sexton & Bowman, 1984; J.L. Thompson, 2004). Earlier, Vesper (1980) proposed that in order to manage any potential confusion; the definitions of 'entrepreneurship' and 'an entrepreneur' need to be treated differently altogether depending on which perspectives an individual subscribed to (e.g. academician, economist, psychologist, business persons and politicians). For that logical reason, the definition of an entrepreneur and entrepreneurship need to be addressed and corresponded as according to the situation, audience and its user respectively.

According to Praag & Versloot (2007), the study of entrepreneurship is still evolving and those working in the field continue to be engaged in conceptual and methodological debates. Various issues such as whether entrepreneurship can be taught to others (Henry, Hill, & Leitch, 2005); and if yes, what is the potential outcome (Matlay, 2008) dominated discussions amongst entrepreneurship academia in the past few years. Meanwhile, taking into consideration the recent economic crisis, an issue of whether the nature of entrepreneurship can respond to social and cultural movements in the new economic era especially after the latest economic crisis in 2008 (Rae, 2010) became the latest viewpoint.

2. Definition of entrepreneur

As an individual who is centred in any entrepreneurship endeavour, entrepreneur is someone that is regarded as a chosen one who possessed special abilities to spot and exploit commercial opportunity(D. F. Kuratko, Morris, & Covin, 2011). Shane (2003) described an entrepreneur as a key unit of analysis of an entrepreneurial organisation.

In this regard, there are two schools of thoughts regarding the definition of entrepreneur. The former revolves around the economic concept and the latter revolves around the social psychology concept.

The definition of an entrepreneur according to economists mainly focuses on an entrepreneur as one of the factors of production of economy. They further explained an entrepreneur's position, roles and functions in the economic landscape as compared to other employment positions. The compilations of entrepreneur definitions based on economic scholars are as follows:-

- An individual who undertakes the risk of new ventures by investing, transforming and making profits after the resale stages. Sources from Richard Cantillon (Schaper & Volery, 2004)
- A person who forms an organisation for commercial purpose (Smith, 1776)
- An assembler of the other factors of production (labour, land and capital) and act as an agent to further bring in an economic change to the society. (Menger, 1871; Mills, 1848)
- An act of 'creative destruction' by an individual (innovator) that develops untried technology and at the same time manages the risk involved. (Schumpeter, 1934)

Meanwhile, the latter entrepreneur definition comes from the social psychologist scholars. They look at personality dimensions of an entrepreneur. The compilation of psychology-driven entrepreneur's definition is as follows:-

- As a process where an energetic person (entrepreneur) with high locus of control but a moderate risk taker, who also has strong need for achievement, maximises opportunities, takes initiative, and organises some social and economic mechanisms and at the same time accepting risks of failure (Drucker, 1964; McClleland, 1961, 1965; Rotter, 1966; A. Shapero, 1975).
- A person cognitively recognises opportunity through his or her psychosocial traits (Katz, 1992).
- The action taken by the individual or firm in order to cash-in the opportunity by the ability to create and build something from practicality nothing (Timmons, 1989).
- An act of opportunity exploitation by an individual as a necessary step in creating a successful business in the entrepreneurial process (Choi & Shepherd, 2004).

Nonetheless, an effort to come up with a comprehensive definition of entrepreneur was provided by Shane (2003), whereby he defines entrepreneur as "an individual who involves in an activity of discovery, evaluation and exploitation of opportunities to introduce new goods and services, ways of organising markets, processes, and raw materials through organisation efforts that previously had not existed." His definition was based on five assumptions namely;

- Entrepreneurship requires opportunities, where it expresses the effect upon which individual take action on an opportunity, therefore intention can be regarded as a catalyst to action;
- Entrepreneurship requires variance amongst individuals; this is better explained through the demonstrations of an individual's ability to recognise an opportunity, either through experience, access to resources or information, as well as through volition of individuals to champion an opportunity through the entrepreneurial process;
- Risk bearing decision is made to act on opportunity that is unknown and uncertain (whether profit or loss);
- Formation of an organisation, whereby the entrepreneurial process requires organising and / or creating of a new way of exploiting the opportunity and;
- Innovation activity was held, either Schumpeterian or Kirznerian.

Despite of various entrepreneur typologies amongst the scholars, there is a single beneficial value that an entrepreneur cans offers. Many scholars acknowledge that entrepreneurship plays a prominent role as a social adjuster (Jack & Anderson, 1999) within a domestic economy that can bring economic development worldwide (Dana, 2001; Garavan & O'Cinneide, 1994; Ibrahim & Soufani, 2002).

In the light of dynamic economic changes, the interest on entrepreneurship and entrepreneurs are becoming very noticeable. Many studies were performed to understand the dimensions of an entrepreneur in the form of; (1) effect of family characteristics (Djankov, Qian , Roland, & Zhuravskaya, 2005) , (2) gender effects (Gupta, Turban, Wasti, & Sikdar, 2009) and (3) motivation to become an entrepreneur (Segal, Borgia, & Schoenfeld, 2005)

Perhaps, this phenomenal is an answer to many socio-economic issues. However, the entrepreneur as an individual who is a centre of entrepreneurship is likely to consider as a rare breed. In this chapter, issues of whether entrepreneur is born, made or educated will be discussed in detail.

3. The trajectories of an entrepreneur's

Based on literature, there are six types of entrepreneurial trajectories identified in explaining the action of an individual choosing to become entrepreneur. The six trajectories factors are namely; (1) traits & characteristics, (2) cognition, (3) career-selection, (4) push-pull factors, (5) demographic and (6) economic.

All these trajectory variables can later be divided into 2 main groups of; (1) natural tendency (born) and (2) circumstantial tendency (made and educated)

Natural Tendency Variables	Circumstantial Tendency Variables
Demographic	Cognition
Traits & Characteristics	Push-pull factors
Career-selection	Economic

Table 1.1. Compilations of Tendency Variable

3.1 Natural tendency to become an entrepreneur

In recent years, natural or biological variables (e.g. demographic, traits and characteristics and career-selection) deemed to be too deterministic and often results in small explanatory power (N. F. Krueger, Reilly, & Carsrud, 2000) and these exogenous factors cannot work in isolation (Prediger & Vansickle, 1992). Thus, eventually these variables were held in reserve list by scholars for quite a period of time. However, these variables gained new perspectives along with the advancement of biological science when several pieces of research confirmed that these variables genetically influenced entrepreneurial behaviour (Shane, Nicolaou, Cherkas, & Spector, 2010; Zhang et al., 2009).

Amongst others, Nikolaou et al., (2008) suggests that it is important to consider genetic factors to explain why people engage in entrepreneurial activities because they have found evidence that indicates relatively high heritabilities for entrepreneurship in genes, with little effect of family environment and upbringing. With this indication, we can argue that the natural tendency variables are somehow still important to explain entrepreneurial behaviour.

- *Demographic Variable*
  Based on literature, there are three prominent models of natural tendency variables:
  This model proposes that demographic factors like age, gender, race and others impacts the entrepreneurial decision of an individual (R.D Hisrich & Brush, 1985; Light & Rosenstein, 1995; Ronstadt, 1987). An example of push factors can be found in Hisrich and Brush (1985), where they found out that female entrepreneurs, especially married women, were influenced by push factor such as job dissatisfactions to be a common catalyst to their entrepreneurial activity.
- *Traits and Characteristics Variable*
  This model theorises that an individual becomes an entrepreneur because of his or her unique personality traits and personal characteristics such as need of achievement, high internal locus-of-control, risk-taking propensity, and personal values of independence (Brockhaus, 1982).
- *Career-selection Variable*
  This model points out that the decision to become an entrepreneur is actually derived from the development of career anchors and the fits between the individual skills sets

and jobs requirements such as dynamic career typology (Holland, 1959) and Career Anchor theory (E.H. Schein, 1978). The approach was explored as early as the late 1950s. Holland (1959) came up with dynamic career typology by setting out the theory of an individual seeking vocational satisfaction by matching their specific personalities and traits to one of six career types: Realistic, Investigative, Artistic, Social, Enterprising and Conventional (RIASEC Model). In addition, Schein (1978), then introduced the Career Anchor theory where he theorised that a person's career self-concept revolves around eight career anchors consisting of; (1) autonomy, (2) security, (3) technical, (4) creativity, (5) managerial, (6) basic values, (7) motives, and (8) needs. These anchors were then categorised and paired under categories of basic values, motives and needs, technical competence, autonomy or independence, security or stability.

3.2 Circumstantial tendency to become an entrepreneur

Meanwhile, circumstantial tendency factors explained that an entrepreneur is made from the socio-economic system where he or she experienced several stimulant factors that derived from social and economic setting. These factors will then trigger the tendency to become an entrepreneur. The variables from circumstantial tendency (e.g. cognition, push-pull factors and economic model) are amongst topics that extensively research prior to the emergence of socio-psychological models of Theory of Reasoned Action (Ajzen, 1987), Theory of Planned Behaviour (Ajzen, 1991) and Entrepreneurial Event Model (A. Shapero & Sokol, 1982). The socio-psychological models were found to be more in parsimony yet robust and were capable to explained both natural and circumstantial trajectories into a single research framework.

Based on literature, there are three models that represent natural tendency trajectories namely:-

- *Cognition Model*
  This model described entrepreneurial action as derived from the unique cognitive processes, (Baron, 1998), effectuation-oriented (Sarasvathy, 1998) and cognized as a series of 'interesting projects' by an individual (Meyer, 2004). The Cognition Model describes an entrepreneurial action as derived from the human cognitive process. These antecedents then predispose them to an entrepreneurial activity. Firstly, Baron (1998) stated that an entrepreneur possesses unique cognitive processes (mind sets, biases and habitual heuristics). Then, Sarasvathy (1998) found out that an entrepreneur is more often effectuation-oriented whereas an non-entrepreneur tends to be more causal-oriented. In addition, Meyer (2004) found out that entrepreneurial venture cognized as a series of 'interesting projects' by an individual. Finally, Lee & Venkataraman (2006) proposed that every individual has two different opportunities; entrepreneurial that is defined as uncertain opportunities and non-entrepreneurial that is defined as less uncertain opportunities. The market for non-entrepreneurial options generally operates more efficiently than the market for entrepreneurial options. They held that people, who have higher level of Individual Aspiration Vector (IAV), tend to search for entrepreneurial opportunities.
- *Push-pull Factors Model*
  This model theorised the powerful motivations of perceived opportunity and the powerful force of necessity leading an individual to become entrepreneur (Alstete, 2002;

Birley & Westhead, 1994; Cooper & Dunkelberg, 1981; Denison & Alexander, 1986; Orhan & Scott, 2001; P Reynolds et al., 2004; Shane, Kolvereid, & Westhead, 1991). For an example, in one of the study, Hisrich and Brush (1985) found out that female entrepreneurs, especially married women, were influenced by push factors to be a common catalyst to their entrepreneurial activity

- *Economic Model*
  This model proposes that a rational individual will perform subjective utility analyses to evaluate the benefits of career options. Therefore, if the result of the analyses shows that the entrepreneurial related career will bring more economic benefit to the individual, he or she will choose to be an entrepreneur (Kirzner, 1973).

4. Entrepreneurial intention: Bridge of entrepreneurial tendency to entrepreneurial action

The emergence of the socio-psychological perspective in explaining action of individuals to become entrepreneur has encourage more related research determining the effect of both natural and circumstantial effects towards entrepreneurial behaviour (Kolvereid & Isaksen, 2006; Lin, 2006).

One of the prominent independent variable introduced from the socio-psychological model is Entrepreneurial Intention variable introduced in Entrepreneurial Intention Model (N. F. Krueger, et al., 2000).

This variable is indeed a very important finding because firstly, according to Bird (1988), intention actually can capture and explained of how an individual thinks as it is structurally rational and intuitive resulting from: (1) social, (2) political, (3) economic, (4) personal history, (5) personality and (6) personal ability factors. Interestingly, she (Bird) argued that entrepreneurial intention is something that is unique for an individual, yet it can also be cultured and nurtured through the aforementioned variables. Secondly, Learned (1992) proposed that the formation of intentions is the result of the interaction of psychological traits and background experiences of the individual with situations that are favourable to entrepreneurship. Intention to found assumes that some individuals will encounter situations that will interact with their traits and backgrounds that cause the intention to become self-employed. Intentioned individuals will ultimately make the decision to start a business or abandon the attempt to start the business depending upon the sense made of the attempt. This variable reflects the missing link between entrepreneurial recognition and entrepreneurial action.

It can explain here whereby, the entrepreneurial intentions process may begin with the individual's personal needs, values, wants, habits, and beliefs (Bird, 1988). Along the process, there are a lot of natural and circumstantial factors that interact with each other's (e.g. demographic, traits and characteristics, career-selection, cognition, push and pull and economic factors) that may affect individual's intentions to become an entrepreneur or to start a business.

Furthermore, according to Ajzen (1991), an opportunity recognition activity (behaviour) would not translate into an action if the individual does not purposely think about it in the first place (intention) because human action is guided by certain considerations. He further

argued that in its simplest form, intentions predict behaviour, while in turn, certain specific variables predict intention. Thus, intention serves as a conduit to better understanding the act itself. Prior to that,(Ajzen & Fishbein, 1980) proved that there is a relationship between an opportunity and intention as they found out that opportunity perceptions reflect an intentional process; in short, intentions are driven by perceptions of controllability and by perceptions of desirability. Later, Shapero (1982) established research frameworks that test the relationship of an entrepreneurial intention and opportunity-exploitation. He found out that an entrepreneurial intention is basically formed when someone perceives there is a potential and opportunity that needs to be exploited.

It can be described by Kuratko (2005) that the opportunity-spotting itself does not permeate an individual as an entrepreneur if he or she did not act on it. The entrepreneurial-act involves the initiative and exploitative traits (Blawatt, 1998; Bridge, O'Neill, & Cromie, 1998; A. Gibb, 1987; Hamilton & Harper, 1994; J.L Thompson, 1999) and planning to achieve the outcome because he or she possesses high internal locus of control (Cromie, 1998; Cromie & Johns, 1983; Rotter, 1966).

There is much literature on why people start their own businesses. However as stated by Reynolds (1995), little is known about why people create new businesses or what antecedents factors support the start-up decision. Scholars have come up with various reasons like businesses are created as a result of the purposeful intent and resolute action of courageous individuals (Learned, 1992; E.H. Schein, 1983). The common motives that were proposed by previous scholars were classic profit motivation (Drucker, 1953; McClleland, 1961; Penrose, 1959); opportunistic profit seekers (Williamson, 1975); autonomy and creativity (E.H. Schein, 1978); individual attributes and environmental factors (Gartner, 1985); and wealth creation (Scheinberg, 1988).

This leads to a comprehension that entrepreneurial intentions are actually central to the understanding of the entrepreneurship process because entrepreneurial intentions form the footing for the founding of new organisations (N.F. Krueger, 1993). The logical explanations are that individuals can come up with various reasons why he or she wants to be self-employed and start new business ventures (e.g. Drucker, 1953, Penrose, 1959, McClelland, 1961, Liechenstein, 1966, Williamson, 1975, Schein, 1978, Gartner, 1985, Scheinberg and MacMillan, 1988, Venkataraman, 1994) but without intention, action is unlikely. Therefore, entrepreneurial intentions are crucial to understand the overall process of entrepreneurship as they serve as the key initial instrument for subsequent actions and events that are related to opportunity recognition, organisational founding and self-employment (B.J. Bird, 1988; 1992; Boyd & Vozikis, 1994; Crant, 1996; N.F. Krueger, 1993).

5. Graduate-career making theories & entrepreneurship education

5.1 Relationship of career-choice models and university's setting

Socio-psychological model (i.e. Entrepreneurial Intention Model) verifies that by combining natural and circumstantial trajectories, entrepreneurial intention of its receiver will be significantly increased (Liñán & Chen, 2006; M.N. Zainuddin & Mohd Rejab, 2010). There is a sense of realisation by policy makers and scholars who are looking for the best avenue to apply entrepreneurial intention model in the university confinement. This move is based upon belief that potential students who will receive entrepreneurship education may

possess a natural tendency to become an entrepreneur (born) and universities may be able to generate the situation that exposes the students to become an entrepreneur (made); and these move will be execute through entrepreneurship education (educated entrepreneur).

This move seems to be an ideal win-win situation, where the supply and demand of entrepreneurship programme in the higher education market were met. According to Mwasalwiba (2010), this relationship exists through mutual perspective that policy makers, on the demand side believed that entrepreneurship education can create new ventures and job creation to the economy; and potential students can pursue their vocational interest to become self-employed or to assume family business traditions; while on the supply side, ambitious universities together with their academicians that seek academic advancement can provide innovative entrepreneurship education to cater to the needs at the opposite end.

Over time, universities have been seen as platforms to cultivate entrepreneurial behaviour and activities in many part of the globe especially in promoting self-employment (Basu & Virick, 2008; Kolvereid, 1996; M. N. Zainuddin & Ismail, 2011). Perhaps, this activity seems to be consistent with career-choice models that being proposed by scholars namely: (1) Savickas's (2002) Career Construction Theory, (2) Gottfredson's (2002) Circumscription, Compromise and Self Creation Theory (3) Krumboltz et al.(1976) Social Learning Theory and (4) Vroom's (1964) Expectancy Theory. Amongst others, Savickas argued that the vital stage of students' engagement with entrepreneurship came at the stage of "exploration," whereby their personality traits were explored rigorously with the education process. In this stage, students through "social learning" will observe and influenced by positive and consistent reinforcement from observing significant occupational role models (e.g. family, close friends, idols) and being exposed to images related to specific career. In addition, their perception about their career will be eventually taking shape through their "expectancy" instrumentality and valence. Once they discovered their potential, they will proceed with what they believed their good at and abandon unacceptable alternatives or "circumscription" as proposed by Gottfredson.

6. Entrepreneurship education issues: Creating meaningful impression for new generation

As entrepreneurship education paved its way into university syllabi, there were both supports and critics regarding its implementation.

6.1 Supports

Accordingly, there were many studies conducted in universities in determining the effectiveness of entrepreneurship education towards the students. Lüthje & Franke (2003) found the importance of contextual factors in the university environment which then (1) play a role in facilitating the occurrence and the intensity of entrepreneurial behaviours and (2) providing orientations to the behaviours of students through internal and external factors. Varela & Jimenez (2001) study has confirmed that the more universities invest in entrepreneurship education, the higher the entrepreneurship rates. Souitaris et al.,(2007) conceptualized good entrepreneurship programmes by suggesting balanced, 'good practice' programme grouped under four components namely (1) a taught component, (2) a business

planning component, (3) an interaction practice component, and (4) university support component.

Amongst others, studies established the relationship between entrepreneurship education and entrepreneurial self-efficacy. This is due to the fact that education directly affects self-efficacy (Per Davidsson, 1995; N. Krueger & Brazeal, 1994) because educational settings appear to be the fertile ground for the development of perceived self-efficacy. Krueger & Carsrud (1993) found out that training programmes can have an impact on the antecedents of intention identified, which includes entrepreneurial self-efficacy. They found that perceived self-efficacy is influenced by the acquisition of management tools and exposure to entrepreneurial situations. In addition, other scholars e.g.(Ehrlich, De Noble, Jung, & Pearson, 2000; Hansemark, 1998; Wilson, Kickul, & Marlino, 2007) found that entrepreneurship education had a positive impact, enhancing variables such as need of achievements, locus of control and self-efficacy and the likelihood of action at some point in the future. Moreover, Noel (2001) found out that entrepreneurship education affects propensity to act as an entrepreneur, entrepreneurial intention and entrepreneurial self-efficacy.

6.2 Critics

In contrast, scholars criticised limitations of entrepreneurship education programmes. Firstly, Dilts & Fowler (1999) argued that only certain teaching methods (i.e. traineeships and field learning) are more successful than others at preparing students for an entrepreneurial career. Therefore, if the educators and practitioners lack pedagogical knowledge and skills, it might affect the delivery of entrepreneurship education to the students thus affect their self-efficacy. It was confirmed when firstly Ooi & Ali (2004) found out that the lecturers without prior business experience and or involvement in family running businesses had low level of inclination to teach entrepreneurship and later Bennett (2006) found out that lecturers' definitions of entrepreneurship were indeed influenced by their backgrounds and by the number of years they had worked in the business sector. Therefore, if lecturers lacked experience in enterprise ownership and management, they were unable to precisely illustrate the entrepreneurship environment; and worst still, they would provide the wrong perceptions of entrepreneurship to students. The level of efficacy transferred to students from lecturers was less substantial.

In addition, empirical researches carried out by Davidsson (1989) and Storey (1994) found out that the relationship between education and entrepreneurship were mixed especially on the status of education. Othman et al., (2006) found out that there was not much difference in terms of personality traits including self-efficacy between the graduate and non-graduate entrepreneurs in urban Malaysia.

Pittaway & Cope (2007) through their systematic review of entrepreneurship education came out with the pressing problem statement that what is unclear is the extent to which such education impacts graduate entrepreneurship or whether it enables graduates to become more effective entrepreneurs.

In addition, the location of entrepreneurship education being situated also became an issue. Hindle (2007) argued whether business school is the right place to teach entrepreneurship

due to tendency of educators synonymising entrepreneurship with management practises (Binks, Starkey, & Mahon, 2006; A. Gibb, 1987).

Perhaps some of the above issues are limiting the potential of entrepreneurship education to its prime receiver. Collectively, all these issue can lead into a bigger issue of whether the positive entrepreneurial intention that is derived from entrepreneurial self-efficacy (from entrepreneurship education) can be translated further into solid entrepreneurial action? Bridging the gap between classroom's theories and real world's practical experiences became a major issue that inviting creative intervention by all stakeholders. Furthermore, the new generation of undergraduates who are exposed to many knowledge and information through new information technology available; altering their learning recognition process that demands fresh approaches to become relevant as one of the deciding factor in creating a new venture.

Again, perhaps all the supports and critics received pertaining to entrepreneurship education can be considered and addressed in a more integrated manner.

Based on above discussion, there is obvious gap between motive of and the delivery of entrepreneurship education. Considering the issues affecting entrepreneurship education; an author suggested that implementation of Integrated Strategic Entrepreneurship Education Delivery (ISEED) concept that comprises of two-tier holistic and specific approaches operated synergistically should be seriously considered.

6.3 Integrated Strategic Entrepreneurship Education Delivery (ISEED) implementation concept

This implementation concept will be a direct effect in integrating both holistic and specific approaches of entrepreneurship education that consists of 4Ps elements of Philosophy, Policy, Pedagogy and Practice (please refer to Figure 1.1)

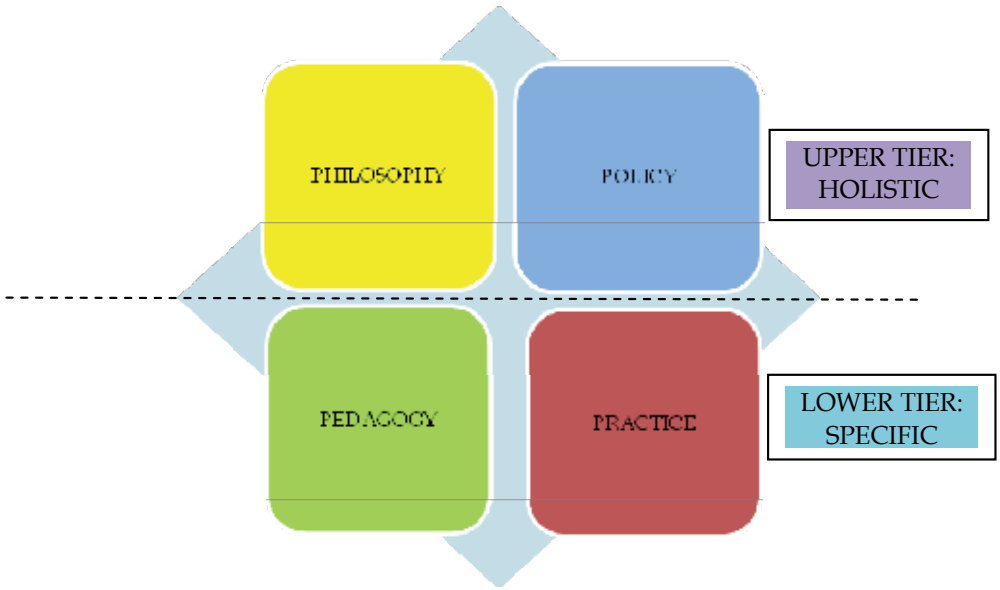

Fig. 1.1. Integrated Strategic Entrepreneurship Education Delivery (ISEED)

The discussion of all four components are organised into two sections. Firstly, each component will be reviewed and secondly, the suggestions on how to improve each component will be proposed respectively.

6.3.1 Philosophy

In general, scholars found that the current entrepreneurship education philosophy embraced by universities were inconclusive. As a multidisciplinary subject, the major challenges facing by university's academicians amongst others are; (1) an urgent need to shift their paradigm from providing instructions (the teaching paradigm) to providing learning (the learning paradigm) and emphasises on educational processes which actively engages students in the learning and a learning environment which cares for the learners (Fink, 2003); (2) difficulty to integrate and explain fully the different traditional social science disciplinary perspectives; economic, sociological, psychological and anthropological to the students effectively into a single platform (A. Gibb, 2005); (3) there were lack efforts in reviewing at the philosophical, theoretical and normative links that linked entrepreneurship education and education science as part of entrepreneurial culture. As a result, three education preoccupations remain under addressed namely social cognitive, psycho-cognitive and ethical theories (Bechard & Gregoire, 2005); and (4) there was a dominant pattern that entrepreneurship education has been based on an individual –centred mindset, that resulted in a strategy that aims to give general education to individuals on how to become entrepreneurs, missing the other ingredient of know-who element completely (Laukkanen, 2000). As a result, the tasks of academicians extracting suitable theories, designing syllabi and later deliver entrepreneurship education to the students becoming very enormous indeed.

In relation to inconclusive philosophy, the relevant strategic actions should be considered:

- In order to expedite the transition from the teaching paradigm to learning paradigm, universities need to transform their role of being a real incubator for students by gathering resources to provide experienced entrepreneurship education's academicians from both the industry and academia that are capable to expose students with what they can expect from the world of entrepreneurship.
- It is vital to change the current intellectual learning philosophy in the university from ''produce'' and ''perform,'' to ''pause'' and ''reflect'' (Cherwitz & Sullivan, 2002). Universities need to make space for students to contemplate their personal, professional and intellectual identities based on the experience they acquire; the kind of reflection that can yield sustained productivity and satisfaction in the long run. By doing so, universities can simulate the real entrepreneur world of tacit knowledge and heuristics judgment.
- In addition, universities need to introduce trajectory of ''discovery-ownership-accountability'' (Cherwitz & Hurtado, 2007; Shaver & Scott, 1991). From the outset, students are encouraged to discover their personal, intellectual, and professional interests and to make explicit and thoughtful connections amongst these goals. Perhaps the adult learning philosophy (P. D. Hannon, 2005) that provides the foundation for reflection and analysis of current approaches against philosophical beliefs, through discussion about the potential contrasts and conflicts, between underpinning foundations and purpose-in-action can be a good blueprint.

6.3.2 Policy

Meanwhile, the most obvious critic singled out to universities regarding entrepreneurship education is pertaining to the choice of location to deliver its entrepreneurship education (Birch, 2004; McMullan & Long, 1987; Solomon, 2007).

Not only are business school profoundly associated with entrepreneurship education but according to Gibb (2007), what is more challenging is that business schools have been urged by many of universities to actually capture the entrepreneurship education phenomenon and attempt to deal with it within the conventional (and largely corporate business) ways to organise this explicit knowledge. In fact, this viewed already echoed before by Birch (2004) as :-

"Quite a few business schools teach you exactly the opposite of entrepreneurship. They teach you to do the quarterly numbers for Wall Street, teach you to conserve, teach all the wrong motivations for being an entrepreneur, teach you to take something that is there and make certain that it does well on Wall Street. Basically, business schools teach you to work for somebody"

The initial policy of placing entrepreneurship education in business schools has resulted the teaching of entrepreneurship to be essentially derived from a corporate model which values order, formality, transparency, control, accountability, information processing, planning, rational decision making, clear demarcation, responsibilities and definitions (A. Gibb, 2005). By adopting business organisation style of learning, limited enterprise culture is created because such a culture will have to embrace all types of organisations that should include stakeholders and wider social community. The ideal policy should revolve in Wider contextual relevance stimulation of an 'enterprise culture' in society wide variety of different initiatives and programmes covering such diverse areas as financial literacy, industrial understanding, economic awareness, business education, small business education, business start up and personal transferable skills (A. Gibb & Cotton, 1998).

Based on various issue discovered, some related strategies are suggested:

- A radical yet practical approach is to separate entrepreneurship education initiatives from business schools by creating a unique entrepreneurship centre parked under a strategic division that oversees the entrepreneurship development activities at faculties, including Engineering, IT, Humanity, Arts and others (Hindle, 2007).
- In addition, adaptation to changes in a multidisciplinary area, requires continuous and frequent adjustments to what people do and how people do it (Lüsher & Lewis, 2008) and this requires the university management to embrace the Learning Organisation policies.
- There needs to be less emphasis on organisational structure and concurrently emphasis on systems for facilitating and implementing change. By having a flexible, organic structure and system, a university's management will be more receptive to adopt and manage new technologies, especially ICT, due to less cumbersome procedures and rules that they have to adhere to (Gephart, Marsick, Van Buren, & Spiro, 1996) and it is considered as the primary condition influencing a university's ability to acquire new knowledge (Kang & Snell, 2009).
- Take attention and action of growing literature that emphasises on the effectiveness and the roles of mentors and professional people that influence students (Turker & Selcuk,

2009), thus university management should practise flexible staffing and appointment policies (A. Gibb, 2005). This can be done by including professorships of practice, adjunct professors, fellowship secondments for members of the stakeholder community, and visiting entrepreneur teaching fellowships to increase the pool of experts. Students will become more respectful and interested to acquire knowledge from well known experts. Next, educators should be allowed to take sabbatical leave and attend industrial attachment to oversee the development of entrepreneurship practices in the industry and for the educators (Omar & Mohamed, 2009) to adapt and upgrade themselves to become specialist mentors. Besides, educators should be given time flexibility to serve three pillars of academic enterprise of teaching, research and outreach, therefore they will become mutually complementary with students' expectations (Carayannis, 2009).

- There should be more research and development with small firms, larger corporations and government agencies. These parties can contribute grants for entrepreneurship practicum and students' consulting project. At the same time, they can absorb successful student entrepreneurs into their organisation as intrapreneurs.

6.3.3 Pedagogy

In terms of entrepreneurship education's pedagogy, it can be argued that currently it will be minimal issue of whether entrepreneurship can be taught or not, since it was proven it can (Henry, et al., 2005; D.F. Kuratko, 2005). However there are three pressing issues involving pedagogy; (1) How should the academician teach entrepreneurship? (2) Does the conventional business style works in exposing students to entrepreneurship? And (3) How the perception of academicians regarding the nature of entrepreneurship can influence their pedagogy style?

In the first issue, earlier on, Davies and Gibb (1991) argued that adoption of traditional education methods which focus mainly on theory and didactic approach were not significant in teaching entrepreneurship. Gibb (2007) cautioned that in most entrepreneurship educations, it seems like the dominant teaching methods are lectures, cases, projects and entrepreneur/stakeholder presentations, which may or may not be delivered in a manner designed to stimulate entrepreneurial behaviour; these teaching methods can be an anti-entrepreneurial mode because usually it was delivered in the confinement of classroom (Shepherd & Douglas, 1996). Earlier, Gibb (1993), classified what are the major differences between business school learning focus and entrepreneurship education/learning focus (Refer Table 1.2 below). Later, according to Hisrich and Peters (1998) there are three components of skills to be cover in entrepreneurship education pedagogical aspects namely technical, business management and personal entrepreneurial skills.

Meanwhile, in relation to second issue, most entrepreneurship courses are focused upon business and business concepts. According to Gibb (2005; 2007), the concepts are hard to resist that even when they are applied to non-business situations, for example, medical practitioners, schools, health services, social and community services, and even local government, it is generally business principles that are taught. Most business school programmes embrace the conventional project piece of work, usually towards the end of a core plus modular course. This may be undertaken on a group or individual basis and may

take the form of a case study, a somewhat disguised consultancy (with academic references) or the exploration of an academic concept in a small (often growing) business context. The context is dominantly that of business, the culture is that of corporate business, the pedagogical range used is narrow and over-focused upon cases.

A fine example is the usage of business plan as the central learning tool in entrepreneurship education (Hills, 1988; Solomon, 2007). What can be transpiring here is that yet there is little evidence that the notion of a plan is derived from entrepreneurial practice (invented by entrepreneurs). The overall problem therefore in giving the business plan a central place is that it creates the wrong metaphor for entrepreneurship. As with all instruments, however, it depends upon how it is used: but it cannot be a substitute for, and indeed should not form a barrier to, plunging into the waters of customer/stakeholder needs and demands and learning to adapt quickly to this experience (A. Gibb, 2007).

Finally, According to Bennett (2006), there was a positive relationship between the types pedagogy subscribed by academicians and their perception of the nature of entrepreneurship. Thus, it leads to different styles of pedagogy employed by academician in delivering entrepreneurship education. As an example, for academicians with business experience prior to joining universities, he or she may employ more real business approaches pedagogy and for those who are not, then learning may be focused more on case studies and problem solving the classroom.

University/Business School Learning Focus	Entrepreneurial Education/ Training Learning Focus
Critical judgement after analysis of large amounts of information	"Gut feel" decision making with limited information
Understanding and recalling the information itself	Understanding the values of those who transmit and filter information
Assuming goals away	Recognise the widely varied goals of others
Seeking (impersonally) to verify absolute truth by study of information	Making decisions on the basis of judgement of trust and competence of people
Understanding basic principles of society in the metaphysical sense	Seeking to apply and adjust in practise to basic principles of society
Seeking the correct answer with time to do it.	Developing the most appropriate solution under pressure
Learning in the classroom	Learning while and through doing
Gleaning information from experts and authoritative sources	Gleaning information personally from any and everywhere, and weighting it
Evaluation through written assessment	Evaluation by judgement of people and events through direct feedback
Success in learning measured by knowledge-based examination pass	Success in learning by solving problems and learning from failure.

Table 1.2. (1993) University Business School versus Entrepreneurial Education/Training Focus

From all the issues above, we can observe that current entrepreneurship education's pedagogy is a functional rather than a relationship/development stage organisation of the knowledge base. There is little evidence overall that project work is specifically designed to enhance the entrepreneurial capacity and disposition of students rather than to follow the business techniques (know-how). Therefore, amongst the suggestions are:

- Academicians should teach entrepreneurship through learning focus that is upon 'know how' and 'need to know' rather than functional expertise. The 'need to know' stems from the development problems and opportunities of the business. The challenge to academician is therefore to organise knowledge around organisation development processes, radically different from the conventional functional paradigms. In guiding them to the survival of a business in the early years, the target might, for example, be to anticipate the problems that lead to business failure and 'bring forward' the knowledge in such a way as to enable entrepreneurs to anticipate development problems before they occur and take remedial action. Bear in mind that such a problem-centered approach does not mean that conceptual analysis is sacrificed but only that concept is led by problem. Teaching focus should include action learning, problem-based learning and discovery teaching to develop entrepreneurial-focused students (Richardson & Hynes, 2008)
- Furthermore, one of the way to instil entrepreneurship knowledge is through non-conventional way of students' consulting project (Heriot, Cook, Jones, & Simpson, 2008) through social enterprise chapters like Students in Free Enterprise (SIFE) www.sife.org . This approach will somehow provide macro experiential learning (Wani, Garg, & Sharma, 2004) that not just affects their cognitive learning but also affective learning too. According to Kolb and Kolb (2005), by engaging students through experiential learning students can learn through feedback, conflict, differences, and disagreements that draw out their beliefs and ideas about a topic through holistic process that encompasses a person's cognition, thinking, feeling, perceiving, and behaving.
- In addition, there is a need to shift academic roles from "the sage on stage" to "a guide on the side," (P. D. Hannon, 2005). Anderson (2003) proposed entrepreneurship education and meaningful formal learning, supporting one of the three forms of interaction (i.e. student–teacher; student-student; student-content interactions) at a high level. The other two may be offered at minimal levels, or even eliminated, without degrading the educational experience. High levels of more than one of these three modes will likely provide a more satisfying educational experience, though these experiences may not be as cost or timely effective as less interactive learning sequences.

6.3.4 Practices

According to Gibb (2007), much of entrepreneurial learning takes place by processes of trial and error and subsequent incremental improvement. However, there seems little room in much of the academic curriculum of universities' for learning to do (and about) something by a process of repeated practice. This is due to the fact that entrepreneurs seek knowledge on a "need to know," "know how" and "know who" basis rather than just merely the "know how" basis. All these three element of knowledge will bring forwards recognisable

contextual experience to them and helps them to conceptualise and give broader meaning to their existing problems and opportunities. Therefore, there is a need to distinguish teaching concerning the phenomenon itself (the vocational domain) from teaching *about* the phenomenon (its meta aspects; its theory and the way that this phenomenon impacts on other phenomena). In addition, entrepreneurship practice coalesce a variety of roles, each demanding different skills, knowledge and capabilities (A. R. Anderson & Jack, 2008), thus there is a requirement to enable that process through some sort of integration. Thus, the author suggested the following:

- An increased focus on the context and learning by doing implies greater student involvement during the study. Involving the students in working on real business cases could range from case-based teaching, to involving the students in real start-ups and finally by letting the students start their own company. In addition to the degree of individual involvement from the students, the nature of the opportunity or business idea is important in entrepreneurship (Shane, 2003). The students could work on projects ranging from practical exercises which do not have any business potential, to real business projects with limited potential (e.g. regional scope), and finally high-potential global business ideas. Erikson and Gjellan, 2003;Johannisson et al., 2001

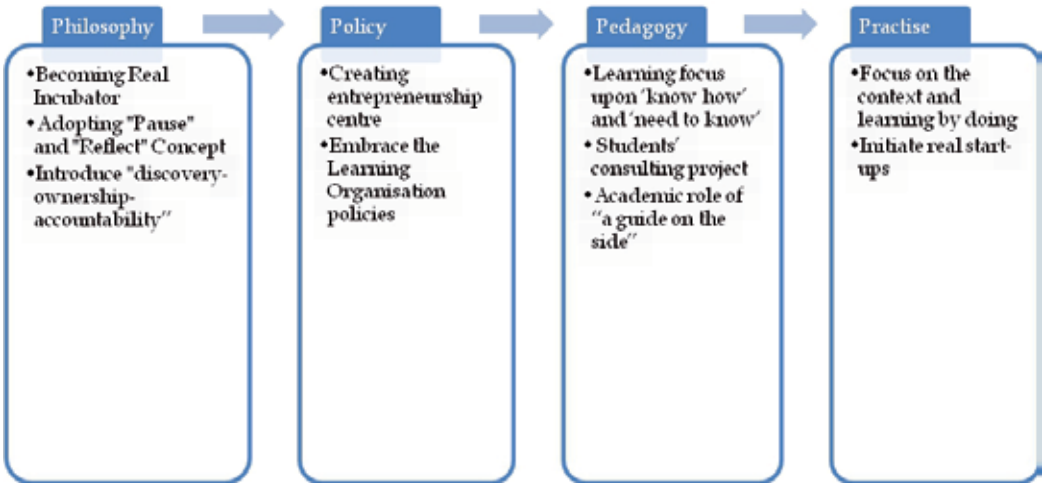

Fig. 1.2. Summary of ISEED Implementation

7. Conclusion

This chapter tackles the issue of entrepreneurship education phenomenon in universities. Subject to whether an entrepreneur is born, made and educated were discussed in details. Amongst others, the chapter discuss background of entrepreneurship, definition of entrepreneurship, entrepreneurial trajectories, nature of entrepreneurial intention, relationship of graduate career-making and entrepreneurship education, entrepreneurship education issues and finally Integrated Strategic Entrepreneurship Education Delivery (ISEED).

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11

Critical Development Paths of University Spinoff Ventures

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1. Introduction

University spinoffs (USOs) are seen as important and a potential means of generating wealth through the commercialisation of research (Bray & Lee, 2000; Etzkowitz, 1998; Shane, 2002; Vohora et al., 2004). They are becoming a significant global phenomenon with spinoff activity increasing in many different regions, including the United States and Western Europe (Shane, 2004). Recognising the economic contribution that these firms can make, disparate groups are increasingly interested in spinoff activity, including university administrators, policy-makers, venture capitalists (VCs) and entrepreneurs, both internal and external to the university environ. This has led to the creation of Technology Transfer Offices (TTOs) in many universities across Europe and the United States, and the availability of funding for USOs from business angels and VCs.

In Ireland, the Government recently published a report detailing the requirements of a knowledge based society, where the importance of research and commercialisation were seen as central to economic recovery (Department of the Taoiseach, 2010:7). But despite the growing importance of USOs in this roadmap, there has been very little research into the many issues faced by Irish spinoffs and their impact on entrepreneurs and the academic community.

This paper aims to address these issues by investigating how spinoffs develop by using a Resource-Based View (RBV) of firms and a life-cycle/ development model developed by Vohora et al. (2004). It will fulfil three research objectives:

1. Examine the stages that a USO experiences;
2. Detail the main barriers faced by spinoffs;
3. Use a grounded theory approach to develop a conceptual framework for detailing USO development.

This research draws on two literature themes used to analyse new firm development. The first is around stage-based models (Greiner, 1998; Miller & Friesen, 1984; Smith et al., 1985; Van de Ven et al., 1984; Wernerfelt, 1984) and the model developed by Vohora et al. (2004) in particular, as detailed in Figure 1. It shows how USOs go through a number of distinct phases of development. Each phase involves an iterative, non-linear process of development where earlier decisions and activities may have to be re-visited. Additionally, at the boundaries between each phase, junctures exist in terms of the resources and capabilities that are needed

to proceed to the next phase. The junctures are critical because they have to be surmounted in order to progress.

The second theme is RBV, a framework for understanding how resources within a firm can be used to achieve sustained competitive advantage (Barney, 1991; Eisenhardt & Martin, 2000; Teece et al., 1997; Wernerfelt, 1984). It assumes a firm can be thought of as a bundle of resources, spread in a heterogeneous manner across the enterprise, and that competitive advantage depends on this heterogeneity (West III & DeCastro, 2001). Internal resources, such as knowledge, learning, culture, teamwork and human capital, play a vital role in the RBV and are likely sources of sustained competitive advantage (Barney, 2001b; Wright et al., 2001), particularly when they are embedded in value-creating strategies (Barney, 1991; Daft, 1989). Resource deficiencies and weaknesses may constrain the development of a USO and may be exacerbated by an non-entrepreneurial university environment (Vohora et al., 2004; West III & DeCastro, 2001). Therefore, as suggested in the literature, USOs need to nurture resources over time in order to progress through the different phases of development.

2. Research methodology

To gain an understanding of the development stages of a USO, the barriers that have to be surmounted and the resources needed to sustain growth, the research methodology makes use of inductive investigation. To create a conceptual framework of USO development and enhance the theory proposed by Vohora et al. (2004), spinoff case studies are used to explore the various dynamics at work. This inductive methodology allowed for the correspondence between theory and data, resulting in theory enrichment through a grounded approach (Bryman & Bell, 2007; Strauss & Cobin, 1990:487). The outcome is a thorough examination of theory through replication logic (Eisenhardt, 1989).

USOs in Ireland were chosen as the research population. Spinoffs were chosen from physics and chemistry based-fields because the firms need similar resources and substantial investment to bring the technology from an initial concept stage to generating a commercial return (Vohora et al., 2004). USOs were chosen that were at different stages of development. Representatives from relevant TTO(s) (Technology Transfer Office) and business development managers also contributed to the research.

Primary data was recorded using in-depth, semi-structured interviews, ensuring cross-case comparability (Bryman & Bell, 2007). Four interviews were face-to-face; another four were carried out over the telephone. Each lasted approximately one hour, recorded and later transcribed. Detailed case studies were prepared for each USO making it possible to develop a database that included table shells to record the data (Miles & Huberman, 1984). Relevant trends were extracted using cross-case analysis techniques suggested by Eisenhardt (1989) and Miles & Huberman (1984). The outcome was accurate and reliable information (Eisenhardt, 1989).

For a grounded theory approach to work effectively, it was necessary to use theoretical sampling to select the desired cases. Glaser & Strauss (1967) described theoretical sampling as a data collection process for the generation of theory where analysts jointly collect, code and analyse the data. Subsequently, they decide what data to collect next and where to find

it in order to develop the theory. By focusing on USOs at varying stages of development, and looking at extremes, the emergent theory will be replicated or extended (Pettigrew, 1990).

3. Literature review

3.1 University spinoffs

Shane (2004) defines a spinoff as a new company created to exploit a piece of intellectual property (IP) created in an academic institution. Patents, copyrights and other legal mechanisms can be used to protect IP. At other times, IP may take the form of trade secrets and know-how. Faculty staff and/or students can be involved in the creation of USOs. The leader of the spinoff may be a surrogate entrepreneur and not necessarily a member of the university community.

The economic impact of spinoffs has been widely recognised. O'Shea et al. (2008); Shane (2004) identify how spinoffs encourage economic development in three different ways. Firstly, spinoffs generate significant economic value. In the United States, according to the Association of University Technology Managers, American universities generated $33.5 billion of economic value from 1980 to 1999, and the indirect value may be even greater (Shane, 2004). Secondly, university spinoffs create employment, particularly for highly educated people. Lastly, spinoffs create new industries and stimulate economies by contributing to employment and wealth creation.

Clarysse et al. (2007) detailed the growing importance of TTO ownership of IP rights which has increased relative to that of university faculties. This is a seen as a step towards professionalising the spinoff process (Siegel et al., 2003). There is also increasing pressure on universities to commercialise research, evident in Ireland where the Prime Minister's office reported that the generation of knowledge is most beneficial to the Irish economy (Department of the Taoiseach, 2010). Lastly, many universities are facing crises in budgets, placing enormous pressure on governing bodies. Therefore, the TTO has the role of formalising the transfer of technology by licensing or through the creation of spinoff ventures in a bid to realise and collect possible economic rents associated with the technology, product or service (Siegel et al., 2003).

Hindle & Yencken (2004) identify two inputs that facilitate technology absorptive capacity, which, in the long run, will determine the survival and growth of new ventures. The first input is finding ideas convertible into opportunities; the second is the ability to access resources and knowledge. Therefore, opportunity identification is one of the most critical factors in a technical transfer and is dependent on prior knowledge and personal history of the entrepreneur, where the trait of lateral thinking proves to be advantageous (Hindle & Yencken, 2004; Shane, 2000). Knowledge inputs also play a role in the early stages of new ventures, including prior knowledge in the discovery stage, background and both codified and explicit knowledge. Codified knowledge inputs include the published knowledge base of the science or engineering involved in the discovery, new knowledge contained in patents, copyrights, registered designs, etc., and the codified content of postgraduate or undergraduate training in entrepreneurship and/or technology management (Hindle & Yencken, 2004).

Tacit knowledge inputs are also seen as important and include entrepreneurial expertise, experience in managing a spinoff, a track record of original inventions and the ability to come up with ideas that can be converted into commercial opportunities (Hindle & Yencken, 2004).

3.2 The resource-based view of the firm

RBV is a framework for understanding how resources within a firm can be used to achieve sustained competitive advantage (Barney, 1991; Eisenhardt & Martin, 2000; Teece et al., 1997; Wernerfelt, 1984). It assumes that a firm can be thought of as a bundle of internal resources, such as knowledge, learning, culture, teamwork and human capital, spread in a heterogeneous manner across the enterprise. Competitive advantage depends on the heterogeneity (West III & DeCastro, 2001). Because they are not mobile resources they are more likely to be long lasting (Barney, 1991) and leveraged across the organisation to create and sustain value for all the stakeholders involved.

First mover advantage in the RBV approach is also important for USOs because it gives some protection in the form of a resource position barrier. Just like entry barriers, resource position barriers indicate the possibility of high returns. Also, for a resource position to be of value, it should translate into an entry barrier in at least one market. In the case of a spinoff, this offers some protection from possible competitors for a limited amount of time (Wernerfelt, 1984). An entry barrier without a resource-based barrier leaves the organisation vulnerable. Because many USOs are limited in the availability of resources, Wernerfelt (1984) explains that it is better to develop the resource in one particular market and then to enter other markets from a position of strength.

Alvarez & Busenitz (2001) highlight the importance of entrepreneurship in USOs and suggest that it is the entrepreneurial process of cognition, discovery, knowledge and the understanding of markets that results in heterogeneous research resources and outputs. Rangone (1999) outlines three key entrepreneurial concepts relating to the use of resources in small enterprises: innovation capability, production capability and marketing management capability. Under the correct conditions, with these concepts in place, the entrepreneur can give an organisation a sustained competitive advantage. Therefore, entrepreneurs can be regarded as heterogeneous and unique and enhance the possibility of sustained competitive advantage. Alvarez & Busenitz (2001) also explore the role of entrepreneurs in USOs, focussing on their social capital as a determinant of successful business outcomes. One example of such social capital and how it might help achieve success is when an entrepreneur has a relationship (direct or indirect) with VCs prior to the formation of the firm.

3.3 Dynamic capabilities

Eisenhardt & Martin (2000) argue that dynamic capabilities are a set of specific and identifiable processes such as product development, strategic decision-making and alliancing. In fast moving, unpredictable markets, these resources become a source of competitive advantage when integrated into the culture of the company. They are not vague and recursive as has been suggested, but dynamic processes that make a difference by their ability to alter a resource base (Barney, 2001a; Deeds et al., 2000).

In a high-tech venture it is noted that the rapid development of new products is viewed as a key determinant of success. Their development generates cash flow for new ventures, grows market share and increases the chance of survival. Zahra et al. (1999) observed that technology and strategy influence one another in a continuous loop and it is this interplay that fosters organisational learning and knowledge. Know-how and embedded processes eventually drive organisational strategy (Kusunoki, 1997). It has been noted that the tension that is created between an organisation's technological capabilities and possible strategic decisions is often the most difficult dilemma for senior management (M.M.J & Taggart, 1998). Successful managers realise that the interplay between technology and strategy offers an opportunity to develop the firm's competitive capabilities (Zahra et al., 1999). To gain an advantage from the available technical and strategy choices, the firm needs to make use of the relationship between these variables. Success depends on simultaneously managing the company's internal forces and the external environment. The external forces are defined by the rate of change of technology in the firm. The internal forces are usually reflected strategically in a company's ability to develop and deploy new products and technology (Zahra et al., 1999).

3.4 Development of university spinoffs

A stage-based development model of USOs, proposed by Vohora et al. (2004) will be used as part of this research. By drawing on other stage-based models (Miller & Friesen, 1984; Van de Ven et al., 1984) and taking a RBV (Barney, 1991; Lockett & Thompson, 2001; Penrose, 1959; Wernerfelt, 1984), Vohora et al. (2004) was able to identify the particular stages of firm development and the key challenges the spinoff faces. Five stages were identified: research, opportunity framing, pre-organisation, re-orientation and sustainable returns. Specific barriers or junctures are also identified that must be overcome in order

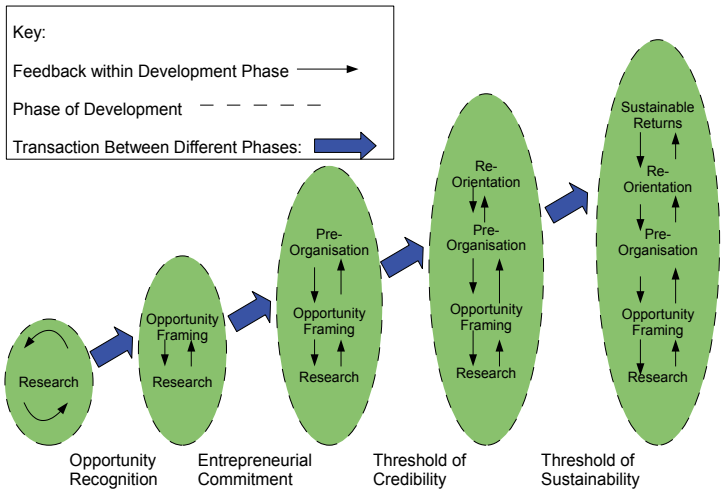

Fig. 1. The critical junctures in the development of university spinoff companies (Vohora et al., 2004:152).

to move from one stage to the next: opportunity recognition, entrepreneurial commitment, threshold of credibility and threshold of sustainability.

An outline of the model as seen in Figure 1 shows how each spinoff must pass through a particular phase before progressing. Each phase involves an iterative, non-linear process of development and there is often a need to return to some of the earlier processes or decisions. Vohora et al. (2004) recognise that the most successful spinoffs were those that were capable of transforming existing capabilities and resources, thereby achieving a clear route to market and profitability.

4. Empirical evidence

4.1 Development stages of USOs

The USOs in this analysis and subsequent discussion are denoted by the Greek letters, Alpha, Beta, Gamma, Sigma, Pi and Theta. All the USOs investigated were founded by men where the average number of founders was two. Two academics working in the USOs, Alpha and Theta, appeared to be serial entrepreneurs with track records in startups.

The majority of founding academics associated with the USOs retained their academic posts and are not full-time employees of the spinoffs. Alpha was the exception, where the academic took leave from their position to work with the company before recently returning to the university. The number of employees employed by the USOs varied from 2-16 employees, with the average being eight. Interviews were carried out with informants as well as academics, including a TTO employee directly involved in licensing and spinning out technology. In one instance, a partner in a company that licenses and helps commercialise technology was also interviewed. This company will be denoted by the term Evolution.

4.1.1 Research phase

The data shows that in all cases USOs emerged from scientific research that had occurred over a number of years within various university departments. For example, the initial research carried out by Sigma was part of a European Consortium that the academics were already involved in. In the case of Beta, the research group have, over a 15 year period, published extensively in the area of optical sensors. Additionally, the associated academic developed many contacts within industry, pursued patents and licensing agreements and was searching for a USO opportunity.

The academic associated with Pi had worked previously in industry and brought that experience to his research group. This individual was of the opinion that the creation of a spinoff "should be very important" and that academics should "go and work in the real world first", sharpening their research objectives. This academic also noted that a lack of funding and equipment in Irish universities has led to "third world science". Developing a USO was one way, in his view, to overcome such obstacles.

It is evident from the data that all the academics involved in the USOs were at the forefront of research in their associated fields. Many are highly productive individuals with useful experience gained from previous interactions with industry, giving them characteristics associated with repeat commercialisers (Hoye & Pries, 2009).

4.1.2 Opportunity framing phase

With the help of the TTO, academics take the first step in creating a spinoff to leverage the inherent value in commercialising their research. During this framing phase, the technology must show sufficient commercial promise and be seen to work. Additionally, the academic and the TTO will attempt to identify suitable markets which the spinoff and its proposed technology could approach and attempt to enter. It's a phase that many USOs find difficult. Sigma, for example, identified what was perceived as two very promising markets when "two industrial partners on the project highlighted particular market spaces". But after developing the product for these markets the opportunity "didn't take off like they expected". There were "already competitors in the highlighted spaces...this forced us to move out of this space very quickly".

A different approach was taken by the academic associated with Pi. He was relying on prior industry experience to create a market, but at this moment has "probably have not done a great deal of initial work in terms of planning, marketing etc". He was preoccupied with the engineering physics rather than "framing a possible market". An academic with Gamma admitted to a similar mistake, not spending enough time exploring the market opportunity before setting up the company.

Representatives of the TTO noted that many academics have good scientific ability but poor business experience. "A strong technical focus but who was doing the marketing?" as one put it. The interviewee from Evolution also spoke of how many academics do not understand how to properly frame an opportunity and miss "the key issue about the technology...trying to discover what is it about the technology that is new or novel". He noted that the fundamental question was not who is going to pay the most for the technology but who is going to pay first. Failure to answer the question suggests the technology has been incorrectly framed for a particular application reflecting "a misunderstanding of the market".

A noted exception was the approach taken by Alpha and its academic who "had pretty much a marketing plan prior to starting the company", having gone to six or seven potential customers and spent up to an hour with them. He also rang up potential competitors.

The academic from Theta took a similar approach, gathering information on the "framed market opportunity". He saw this stage as a way of identifying and then providing a solution to a particular problem found in the marketplace.

4.1.3 Pre-organisation phase

At this stage, the opportunity has been framed, all the stakeholders are committed to commercially exploiting the opportunity and the management team is ready to make strategic decisions. Such strategic plans involve a number of factors which include making decisions on the use of existing resources and capabilities, how such factors could be used now and in the future, and what further resources would be needed (Vohora et al., 2004).

The academic entrepreneur of Sigma attempted to surround himself with people who had prior experience in spinoffs or startups, a resource of benefit to the organisation. He also believes that having people with more than one talent is a key criteria, "people wearing

multiple hats...scientists who are also carrying out engineering and manufacturing, and admin people who are covering anything from accounting to HR".

The sourcing of human capital for Beta did not prove as troublesome compared to the other USOs. This company hired the university researchers who had created the codified knowledge: "We had at our fingertips access to researchers who wanted to work for us and move away from the university environment". The academic in Gamma developed a business plan with help from Enterprise Ireland (government agency body in Ireland), but currently sees the most important resource in the company as himself. He readily admits that a weakness in his business is that he is consistently torn between his university work and committing time to his spinoff.

Alpha recognised the need to continue to work with the customer in this phase and to prepare the spinoff for product development. However, the academic cautioned that USOs sometimes start product development too early before gaining an understanding of the technology in an industrial setting. "This is a complete disaster and should not happen." he said.

Confirming research by Vohora et al. (2004), this phase is the steepest learning curve for academic entrepreneurs, particularly if the spinoff and the associated academic have little experience of the market, VCs and business angels. Alpha, Beta and Sigma went some way to addressing this by spending considerable time identifying and contacting potential customers.

4.1.4 Re-orientation phase

At this phase the companies has gained sufficient resources to start the venture and attempt to generate something of value. The management teams now face the challenge of continuously accessing, identifying, configuring and reconfiguring resources (Eisenhardt & Martin, 2000; Galunic & Eisenhardt, 2001; Newbert et al., 2008; Peteraf, 1993; Teece et al., 1997). Such re-configuration was often required because of incorrect identification of markets. At Sigma, the spinoff launch did not go as expected. There were already competitors in the marketplace and the company had to re-organise and change its strategy to the extent that the organisation is focused on entirely different customers today.

Beta also experienced problems at this stage. The sales team found it difficult to access the required markets resulting in little or no sales. Simultaneously, product development was also taking longer than expected. "When the technology was transferred from the university, we didn't realise just how much work was required to turn it into a product which could be sold to customers" said the company's entrepreneurial lead.

A number of staff were made redundant as the spinoff took a change in direction. After the change in business strategy, the company recognised that it did not have the required funds to acquire the skills and resources needed to push itself into its newly defined market, so they actively looked to be acquired. Such a drastic step, going from attempting to build the company to seeking a buyer, was forced upon them as they "needed somebody who had funds to help". The former manager from Beta explained their case further: "Because of no sales, the investors were disappointed and costs were cut along with wages. This meant that the organisation underwent a large restructuring and a large number of staff were made redundant".

New practices and regimes had to be introduced into several of the other USOs during the re-orientation phase. Once a spinoff had developed a product and was ready to introduce it to the market, the company was forced to introduce further resources in a bid to support the new products and customers. The academic from Alpha believed that the creation of such supports was essential: "You will survive if you support your customer. You won't if you don't support your customer". The structures required to do this were the ability to "make use of your channels" and "proper profit and loss, balance sheets with inventory control, quality assurance...proper company structures".

4.1.5 Sustainable returns phase

This final phase is generally characterised by USOs attaining sustainable returns. It is the aim of the management team involved in USOs to reach such a phase by the careful configuration and re-configuration of resources and the correct use of such resources and capabilities. In arriving at this phase, USOs will have come through each of the previous stages and overcome the barriers in moving from one stage to another (Vohora et al., 2004).

The academic associated with Alpha knew that ongoing sales placed the firm in a very strong position. The company was investigating the possibility of further expanding its product range but the academic was aware of the risks associated with such a move: "A poorly defined product developed in the product development stage is very difficult to sell...it kills spinoffs". Alpha believes that this is the stage that the entrepreneur should make way for management with business experience.

Another company that reached this phase of development was Sigma. Although the business was sustainable with a given amount of revenue, the company continued to undergo re-orientation as predicated by (Vohora et al., 2004), resulting in changes and reconfigurations in resources and capabilities. The CEO of the Sigma had to re-evaluate and re-orientate because sales didn't reach the levels expected by the investors. With re-evaluation and re-orientation the organisation expects to continue thanks to sustainable revenues.

4.2 The critical junctures

In order to ensure growth as a spinoff, organisations have to progress through the different stages (Vohora et al., 2004). As evident from Figure 1, a spinoff has to make a transition from one phase to another. These transitions are barriers or critical junctures preventing the firm from progressing into later stages of development. The critical junctures are identified as: 1) opportunity recognition; 2) entrepreneurial commitment; 3) venture credibility, and 4) venture sustainability (Vohora et al., 2004).

4.2.1 Critical juncture A: Opportunity recognition

The opportunity recognition juncture is found at the barrier between the research phase and the opportunity framing phase. Opportunity recognition can be described as the match between a solution and the market requirement it fulfils (Bhave, 1994). There is a skill in looking at a piece of research and being able to draw from it a sense of what market

it can service. It is recognised that such an ability requires skills, aptitudes, insights and circumstances that are not widely found (Venkataraman, 1997).

From case evidence, this author noted that the majority of academics interviewed appeared to have a good grasp of the markets or had previously worked in industry, providing them with valuable insights. A number of people from outside the university environment had a different view. The interviewee from Evolution spoke of how academics in many cases have "great technology but no idea in the slightest to what to actually do with it". This opinion was also found in the TTO where the informant spoke of how academics are very strong technically but do not have the ability to see how or what has to be undertaken to sell the idea

A number of respondents spoke of how Irish universities had too little contact with industry, both multi-nationals and Irish SMEs. Alpha described how "universities have got to start trusting Irish SMEs...not just the multinationals", and the importance of finding ways for Irish universities to work closely with industry.

The TTO interviewee said that this situation was currently changing for the better. She also noted that traditional businesses that do not undertake much R&D are feeling the competition and need to diversify, fueling the possibility of closer ties with third-level research.

4.2.2 Critical junction B: Entrepreneurial commitment

To move from the opportunity phase to the pre-organisational phase, the entrepreneurial commitment barrier has to be overcome. The academic who founded Alpha believed that entrepreneurial commitment should come from the academic surrounded by an experienced management team. This stance stems from the fact that "academics do not understand market penetration". To overcome this barrier, this academic "ideally want[s] people with experience in working in a spinoff environment". The informant from Evolution shared this view because academics, "usually don't have the experience for the technology management role".

From the analysed cases, many academics believed that the TTO should play a stronger role in ensuring and aiding entrepreneurial commitment. It was evident from a number of different interviews that academics think that the TTOs are introducing barriers to the progression of the spinoff and preventing the progression from the opportunity framing to the pre-organisation phase. The academic with Alpha thinks "universities are counter-productive...universities don't understand spinoffs...a spinoff is alien to an university", because universities "don't understand the time required to develop products from lab research". However, the academic believed that things are slowly changing within the university environment in Ireland. This change stemmed from the fact that people working within universities and the TTO now have industrial experience. The TTO informant echoed this, noting how "everybody in [the TTO] has worked in industry and understands that side of things".

The academic founder of Pi also spoke of his frustration with university structures and a culture where he gets "no credit from the university". The CEO of Sigma believed that TTOs and universities in general have attempted to force the same structure and policies on all spinoffs resulting in difficulties in negotiations between the TTO and the USOs. One size does not fit all, he argued, and more flexibility is needed.

4.2.3 Critical juncture C: Credibility

At this stage, the academic or his associated management and technical team have conceived the opportunity, spotted a particular gap in the market and have moved forward in their attempts to develop the company. The critical juncture that faced all the spinoffs at this stage was acquiring the resources for the business to move from the pre-organisation phase to the re-orientation stage. A key factor in the pre-organisation phase was raising financial resources or seed finance necessary to acquire the required resources.

Many of the contacted USOs highlighted problems with securing sufficient seed capital. In many cases, the USOs management team cited the characteristics of VCs in Ireland as a problem when it came to securing funding. The academic associated with Alpha put this down to the business background of the VCs: "In Ireland they are very much part of the banking community and know how to handle money but don't understand the required business models". The academic in Pi also spoke of his frustration in working with local VCs who "don't support anything in Ireland associated with risk. There is no venture".

The CEO of Sigma spoke of how VCs in Ireland don't understand the available technology in universities research laboratories. A solution, according to the same respondent, was to diversify the VCs base here to better "understand sophisticated opportunities". The respondent from Evolution described it as "risk averse venture capitalism due to a lack of understanding [of the technology] by investors in Ireland".

Alpha looked at this phase from a different angle and highlighted the importance of building customer relationships to ensure that revenues are forthcoming, self-financing further investment in resources to overcome the critical juncture of credibility, speeding up the move into the sustainable returns phase. At every stage this USO was taking into account what the customer required and what the spinoff could do to sell more products. The CEO of Sigma also highlighted that "customer relationship building is tricky", a sentiment echoed by Alpha which said it could be hard for a spinoff to engage effectively.

4.2.4 Critical juncture D: Sustainable returns

The final barrier to overcome, the juncture of sustainable returns, may take a number of different forms, including revenues from customers for products or services sold and possible further investment funds from VCs. By overcoming this juncture, it is a strong sign that the USO and its management team have acquired the appropriate resources and reconfigured to ensure sustainable growth (Vohora et al., 2004).

At the previous barrier, the juncture of credibility, the spinoffs were required to acquire, assemble and suitably employ resources to ensure that the spinoff reaches a credible position. However, the sustainable returns juncture required the management team to use and reconfigure existing resources to meet the challenges.

Alpha and Sigma have proved their ability to use acquired resources, create value and ensure sustained growth. Alpha placed great importance on developing capabilities to overcome weaknesses and inadequacies as they arise. The CEO of Sigma describes a stepping stone approach, thinking in terms of "rolling six month blocks". By re-configuring resources in earlier stages they are always ready for what comes next.

This point highlights Sigma's ability to continually re-orientate their business model to satisfy the needs of any given time, finishing up with a suitable business model that meets market needs. Sigma recognised all the changes that it had to undertake to ensure investors were kept interested in the venture. Much of this was focussed on product and providing better customer support.

The juncture of sustainability proved to be troublesome for other USOs. At this stage Beta had received four years of funding but was unable to make an impression in the marketplace. The spinoff had developed a product and IP portfolio but lack of sales resulted in the investors refusing to invest further money. The academic associated with Theta also experienced problems. Inadequate funding led to resource weakness. Investment was required because the developed product was "not what the general market wanted". Therefore this spinoff wasted time raising money when it should have been concentrating on getting the product right. The spinoff was unable to raise extra investment and the academic decided to bring the technology back to the university for further development.

5. Discussion

5.1 Stages of USO Development

5.1.1 Research stage

In this phase it was evident from the analysed cases that academics involved in university spinoffs also continued in high-end research, winning research grants, publishing their work and presenting it at conferences. The academic associated with Beta, for example, had in excess of 35 researchers, one of the largest groups in the university. Other academics had close relationships with industry which was reflected in their research activities. In the analysed cases, the academics could be described as "star-scientists", a "breed" of academic who align themselves with the need or desire to create spinoffs, license technology and undertake collaboration with industrial partners (Shane, 2004).

All of the contacted USOs acknowledged the importance of building relationships with industry especially in terms of their own academic research. It was observed from the cases that such relationships took on the form of working in European projects with industrial partners or being part of a research group carrying out specific work for industry.

The analysed cases highlight the importance of the research phase for generating knowledge, IP and know-how. Other authors have also highlighted research as being paramount in the creation of knowledge. Dosi (1988); Godoe (2000); Sternitzke (2010) show that the emergence of new technologies is in many cases triggered by scientific discoveries which have occurred both in public institutions and private companies. Sternitzke (2010) discusses how such discoveries and research go hand in hand with the development of new technology fields, leading to the development of new products and new spinoffs to develop these products.

The Irish government also recognises the importance of research in generating knowledge, investing *e*2.4billion in science, technology and innovation programmes, which in turn will drive "commercialisation of research outputs...transforming the enterprise base to drive economic renewal" (Department of Finance,2010:IX).

5.1.2 Opportunity-framing stage

A number of different observations were made from the case notes about how academics and management teams frame opportunities. Pi and Gamma, for example, were under the impression that the development of a new organisation was all about the technology. These spinoffs were in their very earliest stages and were still developing the required technology and did not appear to be developing the networks needed to develop a market space for the final product.

This was in complete contrast with spinoffs Alpha, Beta, Sigma and Theta. Specific markets were identified for each of these USOs and the associated management teams had aligned the business to target these markets. However, it was evident from the analysed cases that incorrect markets were frequently targeted. Unfortunately this mistake was not noticed until the organisation had progressed into the later stage of development, perhaps a sign of an inability to frame the opportunity and technology correctly.

The incorrect framing of the technology and markets meant that a number of the analysed USOs were unable to overcome the resulting issues and money was wasted incorrectly aligning resources. Beta, for example, appeared to never adequately highlight the target market, which resulted in poor sales and the eventual closing of the company. After developing a product for a specific customer, Theta realised that the developed product was not required by the wider market.

But it was not just entrepreneurial academics who had difficultly in framing the proper market. Despite having an experienced management team, Sigma also went through massive changes in later development stages due to improper opportunity framing. Alpha did not appear to have problems in identifying markets and the academic did not talk of having to re-organise company structure because of in-correct opportunity framing. However, this was a very experienced individual who had previously been involved in at least four different spinoffs/startups, developing the required networks to make success more likely.

It can be seen that the framing of the technology, regardless of the presence of an experienced team, proved difficult. Opportunities were defined imprecisely, targeted ambiguously and often turned out to be impracticable. Perhaps one reason why academics had problems in framing their research is that it required them to think in a very different way, alien to the academic and university environment (Etzkowitz, 1998; Ndonzuau et al., 2002). The main problem is reconciling the scientific conception, where science is a goal in itself, with the economic conception, where making money is paramount. Ndonzuau et al. (2002) details how "in the assessment of ideas" both the technology and the economic imperative have to be assessed in addition to the potential markets.

An important factor in this stage was ensuring that the technology works and was capable of meeting the specific needs of the customer. However, whilst the interviewed USOs never doubted that their associated technology would work, many failed to undertake a proof of principal at this stage to ensure that the research could be framed correctly and therefore provide a solution to a problem found in the market place. This proof of principal would consist of two important details. Firstly, that the research and science had the capacity to be developed into a product. Secondly, the product or service would solve a customer problem (Shane, 2004).

Generally, it was at this stage that the spinoffs discovered if they had a product that could satisfy a market need. From a RBV perspective, a number of authors have also recognised that this knowledge can prove to be an important resource leading to heterogeneous outputs (Barney et al., 2001; Wright et al., 2001).

5.1.3 Pre-organisational stage

All the interviewed USOs at this stage had framed their opportunity and had committed themselves to the new venture. Many of the strategic decisions concerned the use of existing resources and capabilities, and how they could be used now and into the future. Alpha, Beta, Sigma, Pi and Theta attempted to acquire the required human resources during this stage of development, hiring people with prior spinoff/startup venture experience. To cope with competitive pressures, Ndonzuau et al. (2002) observe how it is vital that competent people are acquired, ideally people who have prior experience in such an environment. Acquiring such a resource goes further than just gaining the right people to fill technical positions. The academic and surrogate entrepreneurs sought management expertise (know-how) and good social networks (know-who). Such an approach was recognised in the analysed cases, particularly by Alpha, Sigma and Theta who used such networks and key people to fill the resource requirements. Such an approach is important in the development of USOs (Ndonzuau et al., 2002).

As a consequence of acquiring suitable human resources, the spinoff was also now in a position to use and generate knowledge or intellectual capital which, as described by Barney (2001a), is seen as an internal resource from a RBV of the firm. It is tacit knowledge that people bring to the USOs and coded knowledge generated through venture operation and technology transfer from the university research laboratory. Beta, Theta and Sigma, for example, were undertaking considerable basic research during the pre- organisation stage resulting in large amounts of knowledge being generated, whilst simultaneously undertaking product development. Many of the USOs appeared to encourage the development of knowledge at this stage.

Knowledge plays a vital role in the RBV of a firm and the value creation process (Johannessen et al., 2005; Wernerfelt, 1984). Johannessen et al. (2005) detail how, through the use of knowledge, a USO has the capability to develop resources and create competitive advantage. Cooper (2000) also highlights the importance of resources in technology development, and, in particular, having the resources in place to develop and drive product innovation. All the USOs attempted to locate and hire human capital which ensured they met a further aspect of the RBV, the identification of weakness. West III & DeCastro (2001) observe that if weaknesses were not identified or taken into account then human capital would not be a source of competitive advantage.

Beta, Sigma, Pi and Theta acquired excellent resources in terms of human capital to develop the technology and proceed into product development, but in the cases of Beta and Theta, some weaknesses were not observed by management teams. One way to identify weaknesses is through the development of suitable business plans. All the USOs had developed business plans but the aspect of the plan and the means through which it was carried out were seen to be mostly informal, a characteristic observed by Smith et al. (1985) in early stage organisations.

Although all the analysed spinoffs had a business plan, whether informal or otherwise, they emphasised the technology and overlooked the marketing requirement. This was confirmed when two of the academics spoke of the importance of technology and implied that the marketing would fall into place without any real planning.

The importance of a business plan and how it plays a vital role in accessing the market is recognised by Chesbrough & Rosenbloom (2002). They say that a successful business model creates a heuristic logic that culminates in connecting technical potential with the realisation of economic value. A successful business model is one that, firstly, articulates a value proposition based on the value created for users by using the product. Secondly, it must identify a suitable market segment. Thirdly, it must define the stricture of the value chain within the firm required to create and distribute the product offering or service. Lastly, the business plan should estimate the product offering and cost structure of producing the product or service (Chesbrough & Rosenbloom, 2002).

But a number of interviewed academics did not understand the logic of a connection between technical potential and economic value, fueled by the customer and the market. This was in contrast to others who continued to talk to potential customers and competitors, gaining the required information to implement a suitable business plan that would determine the best way to access customers. The USOs that attempted to build a relationship with stakeholders were the most successful in using and re-configuring resources as required by the market.

As a consequence of over-zealous management teams and technically minded academics, the USOs (with the notable exception of Alpha) had started product development in the opportunity framing stage or early in the pre-organisational stage. This could be due to an ill-conceived business plan with little or no information gained from the market. Starting product development too early in the life-cycle of the spinoff appeared to have been a mistake.

5.1.4 Re-orientation phase

According to Vohora et al. (2004), USOs have at this stage gained the required resources to start the venture and will attempt to offer some product or service to its customers. As a consequence, USOs must continuously identify, acquire, integrate, and reconfigure resources ((Eisenhardt & Martin, 2000; Galunic & Eisenhardt, 2001; Teece et al., 1997). Such re-configuration was evident among a number of USOs that had attempted to enter incorrect markets early in the USO life-cycle and then had to change direction. Beta, Sigma and Theta made this mistake. This is a consequence of inexperienced management and a sales team unable to make any impact on the customer base with the developed technology. Such spinoffs lack the innovation leaders that are required to cultivate the strategic fit of an organisation with its environment. Carmeli et al. (2010) demonstrate that proper managerial leadership of the organisation is essential in finding the right fit in a global business world that is becoming more complex.

Reconfiguration is also required when product development is started too early, in the opportunity framing or pre-organisational stage, when there is a poor understanding of the market and the place for the developed technology. Gruner & Homburg (2000) emphasise a link between strong customer interaction and success in product development. They

note how such involvement can play a vital role in the marketing of the product, and how interactions between a spinoff and a customer provide invaluable information that will inform the business going forward.

A lack of experienced management and market knowledge means many USOs fail to find the right "fit" for their technology. This explains why Beta, Sigma and Theta had misguided expectations about how their USO was going to perform. Verhees et al. (2010) detail how small firms can improve their performance by monitoring customer needs and by having the resources in place to respond to them as required. Alpha successfully overcame barriers by ensuring resources were in place at each stage of development, whether it was in product development, marketing or sales. Product development did not even start until there was a full understanding of a customer needs.

An observation at this stage was the introduction of more formal structures in all of the analysed cases, which resulted in further re-configuration of resources. These included the introduction of ISO standards and more formal structures around HR and accounting. Alpha, Beta and Sigma introduced such practices, following a pattern observed by Davenport et al. (2002) that notes procedures within spinoffs became more formal as time progresses.

5.1.5 Sustainable returns

The final stage, according to Vohora et al. (2004), is sustainable returns. At this point the spinoff has configured and re-configured capabilities and resources and overcome many barriers. It has used internal resources such as knowledge, learning, culture, teamwork and human capital to drive development.

Alpha reached this stage in a strong position. The academic spoke of continuing to expand its product portfolio and working on customer relationships to ensure sustained competitive advantage. Sigma was also seeking new market opportunities to expand. By continually looking at how resources can be used and new resources acquired, such spinoffs have met the required factors for sustained competitive advantage. Both of the USOs that reached this stage have built up a knowledge base and a strong portfolio of products, valuable resources of a highly technical nature that are difficult to imitate. This give the spinoff sustained competitive advantage and a platform for further growth in the future (Barney, 1991).

5.2 Critical junctures prohibiting the growth of university spinoffs

5.2.1 Opportunity recognition

Many of the academics involved in the analysed USOs were high achievers in their chosen academic fields. They were heads of large research groups, had specific contacts with industry or previous experience in spinoff/startup companies. Prodan & Drnovsek (2010) observe how entrepreneurial self-efficacy was an important driver when it came to academics interest in creating spinoff opportunities. It was clear that many of the involved academics, and even the management teams they had put in place, do not have the required experience. Consequently, many of the USOs identified opportunities that turned out to be unsuitable. This was true for Beta, Sigma and Theta who were unable to grow and progress.

These problems occurred even though two of the spinoffs, Sigma and Theta, spoke to potential customers in the early stages. This author believes that the technology output from these USOs had been improperly framed, requiring major reconfiguration of acquired resources at a later stage. Spending capital on correcting these errors would prevent further growth and development. The opportunity was possibly not recognised correctly because of a lack of market knowledge. Though many of the USOs attempted to gain information on the market by contacting potential customers and competitors, it wasn't enough to prevent pitfalls. Van Geenhuizen & Soetanto (2009) observe that the number one obstacle to growth in spinoffs is lack of marketing knowledge. Perhaps one reason why it is difficult to acquire the relevant market information is because of the highly specialised areas in which the spinoffs were operating.

The TTO respondent believed that one way of overcoming the framing problem would be through the creation of networks between the USOs, SMEs and multinational companies in Ireland. This notion was also put forward by other Alpha, Evolution and Enterprise Ireland. Van Geenhuizen & Soetanto (2009) claim that the main ingredient in firm enhancement is the creation of networks where there is openness between partners as well as variation among the participants. Li & Tang (2010) iterate how external network linkages provide an opportunity to learn more about customers and markets, gaining knowledge and information that becomes a valuable resource and critical source of competitive advantage. ***

5.2.2 Entrepreneurial commitment

This critical juncture prevents a spinoff moving from the opportunity framing stage to the pre-organisation stage. It is evident that the TTOs have put in place certain measures to aid the USOs. Mentors, for example, are made available to many of the academics. Additionally, USOs are given advice on developing business plans, on how to approach VCs and the way to incorporate proper measures to ensure spinoff development.

However, many of the USOs believed that the TTO does not do enough to aid the development of the organisation. All of the USO respondents spoke of their frustration at some level of the interaction between the TTO/university and the USO. Degroof & Roberts (2004) emphasise the difficulties in achieving commitment when weak entrepreneurial infrastructure for academics spinoff ventures are in place.

From this research it was noted that a perceived lack of know-how from the TTO frustrated many academics. However, the respondent from the TTO office spoke of how policies have been introduced to encourage academics to commit to spinoff ventures, measures that ensure the offices are committed to their development.

From this analysis, and in agreement with Vohora et al. (2004), one of the features of this juncture is the failure of the university to provide sufficient resources, clear policies and a network of external relationships with key stakeholders, such as mentors, surrogate entrepreneurs and industry. But this author believes that the spinoffs have unrealistic expectations in the type of help they will receive from the TTO.

A further barrier at this critical juncture is the attitude of many academics in Irish universities. Those who undertake spinoff activity believe that there is a general lack of motivation from

other academics when it comes to entrepreneurial activities because they are in a "public job". Therefore, it can be said that Irish universities are not doing enough to encourage scientists in developing commercialisable research, and perhaps Irish universities should be doing more to change this culture.

5.2.3 Credibility

Credibility is recognised as a general problem for new ventures and in particular USOs. It manifests itself in a number of ways but acquiring funding is a major source of concern at this juncture. Capital is required to finance the resources that will drive the spinoff forward to sustained competitive advantage.

In raising capital from VCs the majority of the academics spoke of the risk adverse nature of VCs in Ireland. Many of the management teams associated with the USOs noted how VCs had no interest in giving finance and taking risks. This led to many of the investigated USOs feeling frustrated in their attempts to raise capital.

VCs goes through various stages before deciding to invest in a project (Kollmann & Kuckertz, 2010). One of these steps is deal evaluation (Kollmann & Kuckertz, 2010). During this process, the investors carefully analyse the potential spinoff company. Therefore, if USOs have had difficulties in framing their technology it will become evident to experienced investors and VCs. This problem of framing the technology as described in previous stages has been shown to come about because of the inability of the USO to realise what problems the technology can service, what markets equate to this problem and how to enter the market.

The personality of the academic or the surrogate entrepreneur also appears to play a major role in dealing with VCs. Macmillan et al. (1985) propose that five out of ten of the most important decision criteria are related to the personality or experience of the entrepreneurs. This appears to again work against the academic entrepreneur, who, because of his professional background, has worked in the academic world with little or no exposure to business development and entrepreneurship.

The trickle effect of funding also led to difficulty in acquiring resources for the USO. Many of the USOs spoke of facing problems in acquiring resources, dealing with customers and product development because the spinoff has only received six to eight months of funding. The USOs believed that this is a result of the risk-adverse nature of VCs in Ireland, prohibiting the growth of the spinoff. However, there is little current research to back this up.

Van Geenhuizen & Soetanto (2009) did, however, detail a factor that was observed in this research, the credibility of the firm within the marketplace. This manifests itself in the failure to create a market because of no prior history in dealing with customers. Highly-innovative firms, however, appeared to overcome this credibility issue. Another way to build credibility is though long lasting relationships with customers. To do this a USO must build protocols and systems to deal with customer and sales issues. Secondly, they must hire sales teams that understand the required market and the importance of customer relations. The spinoffs that have acquired the resources to overcome these highlighted credibility issues will progress to the final stage of spinoff development (Van Geenhuizen & Soetanto, 2009; Vohora et al., 2004).

5.2.4 Sustainability returns juncture

The main difference between those USOs that overcame this critical juncture and those that remained in preceding stages was their ability to continuously use and reconfigure available resources and their ability to acquire other resources when needed. The proper use of these resources ensured sustained revenue. Alpha and Sigma achieved this and were able to increase their product portfolio to attract new as well as existing customers.

A further observation within the analysed cases, especially with Sigma, was the ability of the USOs to overcome weakness and mistakes made in previous stages of development. By gaining resources to overcome such weaknesses, to grow and ensure the correct use of resources it was made certain that the USO overcame each juncture leading to growth and development. Spinoffs like Beta and Theta failed because they did not correctly deal with social capital deficiencies, resources weaknesses and inadequate internal capabilities (Cohen & Levinthal, 1990; Zahra & George, 2002). Gurdon & Samsom (2010) observe that an effective combination of management team processes and the availability of capital lead to the best use of the resources and capabilities.

6. Using grounded theory in creating theory associated with USO development

Grounded theory can be used to improve upon already accepted theory. Therefore, this author will attempt to improve upon the stage-based model as proposed by Vohora et al. (2004). During this work a number of important features were observed in the development of USOs. However, in this author's opinion, one central point appeared to have a major role in USO development, the correct framing of the opportunity. To investigate this observation further a mind-map was created to clarify the observed results, as shown in Figure 2.

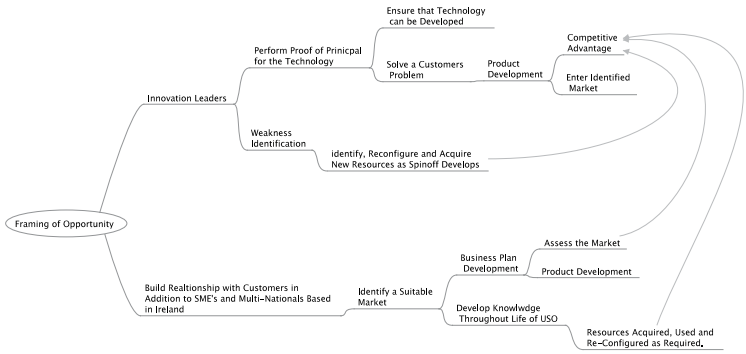

Fig. 2. A mind-map showing the importance of framing the technology correctly

Developed using two main arms or trains of thought, the first arms represented the internal forces affecting the firm, the second represented the external environment (Zahra et al., 1999). This author believes that internal factors and the external environment, as observed by Zahra et al. (1999), play a major role in the long term success of the USOs and that it was the proper framing of technology that determines whether the venture will succeed or fail. By developing relationships with customers, SMEs and multi-nationals, a need within the marketplace will be identified. This need will drive on the development of knowledge within the USOs through

the use and acquisition of resources. Additionally, business plan development will signpost the best routes to market and appropriate product development.

Secondly, the framing of an opportunity will mean that the innovation leaders and management team will drive the USO in a particular direction. In addition to acquiring, configuring and correctly using resources, the management team should undertake a proof of principal for the technology, ensuring that customer needs are met, leading to the correct approach in terms of product development. Additionally, weakness identification will be undertaken, which, in turn, will lead to the acquisition of required resources. Both of these arms within the mind-map have the potential to lead a USO to competitive advantage.

Using this mind-map, a stage-based approach was developed using the proper framing of the technology as an initial step I, as shown in Figure 3

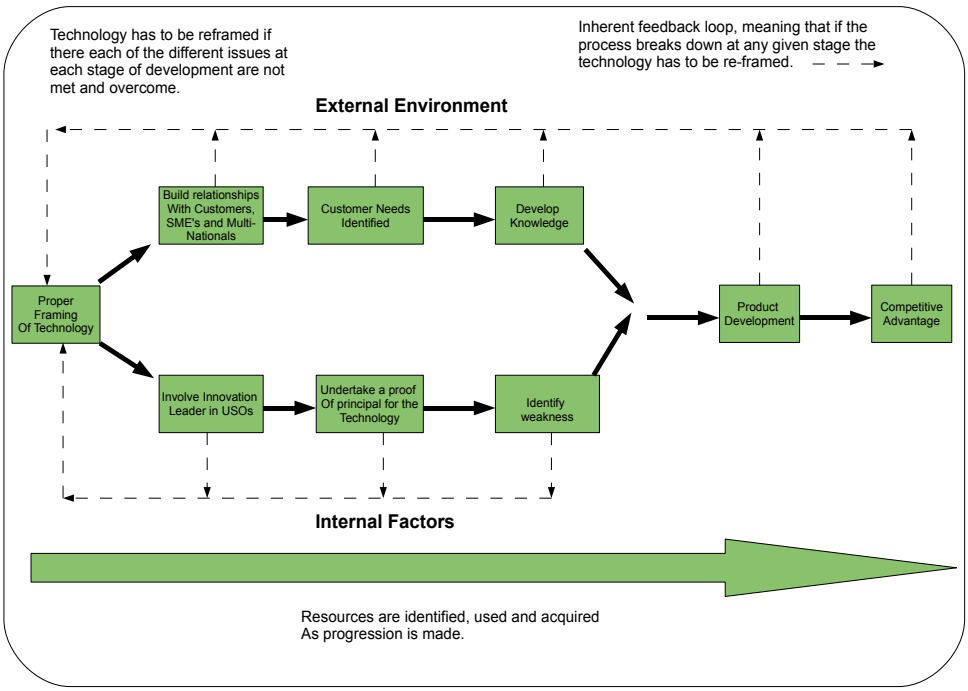

Fig. 3. Importance of proper framing of technology in university spinoff ventures.

The first step in the success of a USO is the correct framing of the technology. After this has occurred, internal and external factors affecting the USO should be aligned. The dynamic interplay between the two emphasises the importance of building relationships with stakeholders and identifying weaknesses while simultaneously acquiring and configuring resources. Such actions ensure appropriate products will be developed for the identified markets, resulting in sustained competitive advantage and the emergence of dynamic capabilities. However, as seen in Figure 3, if any stage of the process breaks down there is an inherent feedback loop and the technology has to be re-framed. The USO must return to the initial stage of opportunity framing.

7. The European Context

In February 2004, the European Commission published "Action Plan: The European agenda for Entrepreneurship" (European Commission, 2004) highlighting a number of strategic areas which could be used to enhance entrepreneurship across the EU, including, promoting the entrepreneurial mindset, encouraging more people to become entrepreneurs, gearing entrepreneurs for growth and competitiveness, improving the flow of finance, and creating a more SME-friendly regulatory and administrative framework. The highlighted challenges in the report are similar to the barriers to academic entrepreneurs identified in this research.

The EU commission and governments throughout Europe continue highlight the importance of innovation and entrepreneurship. The recent FP7 funding programme suggested measures to drive innovation, highlighting the importance of incorporating SMEs and the need to ensure that research projects have a definable impact. The agenda is about transformative mechanisms for translating knowledge into growth, which has been a problem for Europe to date. One example is the AEGIS FP7 project (European Commission, 2011), where analytic findings will be translated into diagnostics tools for country or sector-specific assessment of knowledge-intensive entrepreneurship. The outcome will be operational policy recommendations for advancing key aspects of knowledge-intensive entrepreneurship in Europe.

8. Summary

The economic importance of university spinoffs has generated significant interest in this area amongst VCs, academics and university and government research policy makers. To aid such activity it is important that the creation and development of university spinoffs is fully understood. The purpose of this research was to analyse the development of USOs using the development model as proposed by Vohora et al. (2004) and in doing so complete the defined objectives. Each of these research objectives will now be concluded upon.

Objective I Examine the stages that a USO experiences

In this research it was decided that the stages of growth within USOs would be compared to the non-linear model as developed by (Vohora et al., 2004). As can be seen from the analysed cases, the development of USOs associated with Irish universities are characterised by a number of distinct stages. Each stage had particular characteristics, which resulted in USOs behaving in a specific manner, requiring re-configuration and acquirement of various resources throughout the various stages. In addition, the non-linear nature and the role of feedback was present. This was particularly evident when USOs had to return to earlier decisions made in previous stages.

How resources were used throughout the development of the spinoffs was also evident. Initially USOs attempted to make use of resources available to them within the university environment through the use of staff within the university and the use of university equipment. However as USOs developed further resources had to be acquired. It appeared that it was those spinoffs which had access to these resources, human capital for example, were in a position to progress. These resources were acquired through social networks the entrepreneur team had developed and through capital provided from various sources, for example, business angels, VCs and funds available to the entrepreneur.

Objective II: Detail the main barriers faced by spinoffs.

As seen by Vohora (2004), critical junctures or barriers were observed to exist between the varying stages of development. In order to progress to the next stage of development, USOs had to overcome these barriers. There were many varying reasons in USO development that resulted in the presence of such barriers. But the totality of these deficiencies is due to a number of reasons. Inadequate human resources, inadequate capital and inadequate capabilities. Each of these factors combined in a very evident manner in the form of resource weaknesses. Unless the USOs were in a position to overcome these resources weaknesses, the USOs did not have the capabilities to progress through the differing stages of development.

Inadequate resources were seen to be due to poor planning on behalf of the USO entrepreneurial team. Such a factor resulted in the USO not knowing what resources are required now but more importantly in the future. This resulted as observed from the analysed cases, the technology been developed for the wrong markets, sales teams with insufficient experience been hired and an inability to acquire the required funding.Therefore capabilities of the USO, in particular, the entrepreneurial management team showed how important it was to have innovation leaders involved with the venture. Having such team members involved in the USO will ensure that weakness will be identified.

Objective III: Use a grounded theory approach to develop a conceptual framework for detailing USO development.

An attempt was made to improve on Vohora's (2004) stage-based model using observations made in this work. This entailed the hypothesis that it was the correct framing of the technology that would in the long term ensure that the USOs would reach a stage of sustainable returns. Framing of the technology, through relationship building with industry, in a particular manner would result in internal resources and the external environment being correctly aligned so as to allow for the development of resources, development of a product/service and a sustained competitive advantage.

An important fact to acknowledge is the inherent feedback loop in this process. As the USOs progresses through each process resources are used, acquired and re-configured. However if a particular process fails, the technology associated with USOs will have to be re-framed. This will result in having to return back to the first stage again and acquire the resources required to "re-frame" the technology.

By identifying weaknesses the USO will be in a position to overcome the fact that a USO is a resource limited venture. Therefore by identifying the inherent weaknesses in a USO, the entrepreneurial team will be in a position to use the available resources and acquire the required.

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12

Fostering Entrepreneurship by Developing a New Learning Environment Within a Finnish University of Applied Sciences

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1. Introduction

The rapidly escalating change requires new types of organizations, in which the continuous learning is seen as essential asset for organizations success (Marquardt 2002, 2009; Senge 1990, 2006; Easterby-Smith et al, 1999). The sooner the learners are familiar with ongoing change and the principle of lifelong learning the better they are able to succeed with their studies and their future career. Educators all over the world have to consider how to provide university students with appropriate skills that give them an opportunity to be successful during their studies and also after graduation. To be honest, no one exactly knows what will be the challenges we have to deal with in a couple of years. The need of new type of organizations, hot groups and innovative learning methods has been emphasized also in management and business literature (c.f. Lipman-Blumen & Leavitt 1999; Hamel & Green 2007; Marquardt 2009).

Instead of only transferring existing information to the students, we should create learning environments where the students will want to take own responsibility for their learning by themselves by creating knowledge via shared practice. Furthermore students can build their self confidence by taking risks in within an environment where there will be no real financial loss in case of failure. Within these learning environments learning will take place by methods the learners will find useful, within a cooperative which they own by themselves, or within a project group. In both cases, the students study theory by reading books and apply the knowledge by carrying out projects for customer companies. Studying is supported by teachers who act as mentors and coaches. Learning by doing is emphasized in these kinds of learning environments. The teachers' role and responsibility will be in this kind of learning environment to facilitate learning by maintaining and further developing the learning environment.

This article will present how a learning environment that fosters entrepreneurship is being created for Information Technology (IT) Bachelor education in Saimaa University of Applied Sciences (SUAS). The study has been started in February 2010 and it will continue until December 2013. There are no final results available at this stage, however, some observations related to learning experiences of students utilizing team learning methods can already be shared. The study will also suggest that entrepreneurship can be supported by

developing a learning environment where students can select learning with the methods that they feel appropriate for themselves.

1.1 Motivation for the study

The primary objective for developing the learning environment has been to better prepare the IT bachelor students for challenges of ongoing change that they will meet during their future careers. Lenses used for the study are:

How could we foster entrepreneurship by developing learning environment for IT Bachelor education?

This will also serve as a research question.

The Finnish Ministry of Education and Culture (former Finnish Ministry of Education) has set the objectives for supporting entrepreneurship in Finnish Universities at national level (Ministry of Education 2003; 2004; 2009). The author has translated the objectives based on the original Finnish materials. A summary of the objectives set by the Ministry of Education and Culture is presented here:

- University level entrepreneurship is encouraged by integrating entrepreneurship broadly to studies at Universities of Applied Sciences. (Ministry of Education 2004,p. 23)
- The Universities of Applied Sciences will act as cooperation coordinators between students and working life and will see to that cooperation will be systematically deepened during university studies (Ministry of Education, 2008, p. 50)
- Promotion of internal and external entrepreneurship, the creation of new business, and innovation. (Ministry of Education 2009, p. 14)
- Creation of an entrepreneurship culture and a mindset and climate conducive to entrepreneurship. (Ministry of Education 2009, p. 14)

To define "entrepreneurship" the following definition by European Commission is used:

"Entrepreneurship refers to an individual's *ability to turn ideas into action*. It includes *creativity*, *innovation* and *risk taking*, as well as the *ability to plan* and *manage* projects in order to *achieve objectives*. This supports everyone in day to day life at home and in society, employees in being aware of the context of their work and being *able to seize opportunities*, and is a foundation for more specific skills and knowledge needed by entrepreneurs establishing social or commercial activity." (COMMISSION OF THE EUROPEAN COMMUNITIES, 2005, emphasis added by the author).

So far the effects of the tools and methods with the new learning environment have been only discussed on practical level. They have not yet been analyzed from the viewpoint of entrepreneurship based on any theoretical framework. Now the definition of entrepreneurship by Commission of the European Communities and the objectives set by Ministry of Education and Culture are used as the framework to discuss the benefits of the learning environment created for IT Bachelor education.

2. Background

This chapter will shortly present the theories on which understanding of a proper current and future learning environment is based. The theories presented here have something in

common. They all see an individual as a social being and learning as a social and communal phenomenon. They also see learners as active subjects (rather than passive objects who need to be taught) who will take responsibility for their own learning process when they have an opportunity to do it. These theories consist of Experimental Learning by David Kolb, Social learning theory by Etienne Wenger, Knowledge theory by Ikujiro Nonaka and Hirotaka Takeuchi, theory of learning organization by Peter M. Senge and associates, principles of Organizational learning by Chris Argyris and Donald A. Schön and Action learning theory by Michael J. Marquardt. These theories are presented and discussed below.

2.1 Social learning theory

Etienne Wenger argues that learning is a social participation (Wenger, 1998). It consists of meaning (learning as experience), identity (learning as becoming), practice (learning as doing) and community (learning as belonging). Brown and Duguid define communities of practice (CoP) as social constructs of individuals that connect together people sharing the same interests, objectives – even beliefs and values (Brown and Duguid 1991). They argue that CoPs explain how shared learning is entrenched in complex collaborating environment. The social theory of learning, presented by Wenger combines all the structures presented above. All these social constructs are made in a way that they enable learning in a more efficient way (Wenger 1998).

By creating appropriate circumstances communities of practice may emerge, develop and flourish. By allowing peripheral participation (Lave & Wenger, 1991), learners may slowly move from peripherality to full membership of CoP. The peripherality could be compared to pre-industrial communities where newcomers of a practice where first apprentices and finally became masters of that practice. IT Bachelor students in our degree programme study usually four years before graduate. During this time most of them they will move from peripheral participation to full membership of being IT bachelor student or being a team entrepreneur.

2.2 Knowledge theory

The knowledge has been separated into explicit knowledge and tacit knowledge. Explicit knowledge can be learned from books or other similar sources. Tacit knowledge can be expanded through an individual's experiences. Nonaka defines knowledge creation as a spiraling process between explicit and tacit knowledge. This interaction will create new knowledge. Nonaka goes on by arguing that organizational knowledge is created through a continuous dialogue between tacit and explicit knowledge. Four patterns of interactions, socialization (sharing and creating tacit knowledge through direct experience), combination (combing explicit knowledge with help of information systems), internalization (converting explicit knowledge to tacit knowledge through practice) and externalization (converting tacit knowledge to explicit knowledge trough dialogue and reflection) are used to implement organizational knowledge creation. These stages are nowadays well known as the SECI process (Nonaka 1994; Nonaka & Takeuchi 1995; Nonaka & Toyama 2003; Von Krogh et al. 2000).

2.3 Experimental learning

The SECI process presented above has much in common with the model presented by David Kolb a decade earlier. Kolb's work is based on John Dewey's and Kurt Lewin's studies, those who highlighted the role of democratic values like cooperative leadership and dialogue in experimental learning (Kolb 1984, 17). Kolb defines experimental learning as a "central process of human adaptation to the social and physical environment." (Kolb 1984, 31). The process of experimental learning has four structural dimensions: 1) Active experimentation 2) Divergent knowledge 3) Reflective observation 4) Abstract conceptualization. Each of these dimensions will generate different type of knowledge and they all are necessary to a learner (Kolb 1984, 42).

Kolb defines affectively complex learning environments as "ones in which the emphasis is on experiencing what is actually like to be a professional in the field under study. Learners are engaged in activities that simulate or mirror what they would do as graduates, or they are courage to reflect upon an experience to generate these insides and feelings. The information discussed and generated is more often current / immediate. It often comes from expressions of feelings, values and opinions by the learner in discussions with peers or the teacher. Such expressions of feelings are encouraged and seen as productive inputs to the learning process. The learner's activities often vary from any prior schedule as a result of the learner's needs. The teacher serves as a role model for the field of profession, relating to learners on a personal basis and more often as a colleague than an authority. Feedback is personalized with regard to each individual's needs and goals, as opposed to comparative. It can come from both peers and the teacher. There is accepted discussion and critique of how the course is proceeding, and thus, specific events within a single class session are often more emergent than prescribed" (Kolb 1984, p. 198). Other types of learning environments are 2) Perceptually complex learning environment where multiple methods are preferred and process of doing is emphasized rather that outcome. 3) Symbolically complex learning environment where students are trying to solve a problem for which there is a right answer or a best solution. 4) Behaviorally complex learning environments are those in which the emphasis is upon actively applying knowledge or skills to a practical problem.

Kolb's thoughts of an affectively complex learning environment have been in this study applied into practice with IT Bachelor education and expanded from the level of single academic course to whole the curriculum of IT Bachelor students. The learning environment that has been created also utilizes the ideas of a perceptually complex learning environment and a behaviorally complex learning environment. The ideas of symbolically complex learning environment have not been emphasized.

2.4 Studies on learning organization

The concept of learning organization has been presented to wider audience by Peter M. Senge. In his studies of learning organization (cf. Senge 1990, 2006; Senge at al 1994, 1999, 2000), Senge presents five disciplines with help of which a learning organization could be created. These five disciplines are: 1) Systems thinking 2) Personal Mastery 3) Mental models 4) Building shared vision 5) Team learning.

Systems thinking has been defined as an ability to see invisible fabrics, patterns of behavior and connections between interrelated actions. It is the ability to see the conceptual

framework of "what is happening?" and it is not easy to recognize the system if one is part of the system that he wants to analyze and understand. *Personal mastery* means that an individual is committed to become better in whatever he is committed to do in his professional life. With support from one's organization an individual commits to his personal lifelong learning. *Mental models* are everyone's hidden assumptions that affect to how we think and act; and one way to diminish their effect is trying to make them visible. To be able to develop as individuals and as a team, everyone should share one's ingrained assumptions, generalizations and other phenomena that affect to our way of understanding the world and our actions as part of it. Building a *shared vision* deals with "picture of the future", where the team or group wants to go. Shared vision cannot be a vision that some individual has, it is rather build up from personal visions melted together in course of time and with shared practice between individuals. *Team learning* is crucial because a team has for a long time been the basic unit of learning.

Team learning deals with patterns of defensiveness in human beings and tries to lift self-defence patterns up to the surface to eliminate them. This will require time and patience. In a longer run mutual trust may develop between team members if they will commit themselves to the process. By practicing dialogue it is in a longer run possible for normal people to achieve extra-ordinary results by really thinking together (Senge 1990; Isaacs 1999).

The learning organization combines people, technology, organization and knowledge with learning. Due to ongoing change caused by globalization only organizations which will succeed in combining these elements will sustain (Marquardt 2002).

2.5 Organizational learning defined

Organizations are seen as collectivities that in ideal situation learn when their members learn. (Argyris and Schön 1996, 6-7) When learning organization theorists like Peter M. Senge with his associates and Micheal J. Marquardt describe an ideal organization, its characteristics and means how it could be created, theories of organizational learning mostly deal with human defensive reasoning and the ways of overcoming it with planned interventions (Argyris and Schön, 1996, 150-176). Argyris has also been first author to make concepts single-loop and double-loop learning famous for wider public. Single-loop learning means that we learn to make current operations more effectively without questioning the governing variables underlying the operations. Double-loop learning instead concentrates to questioning the underlying beliefs and values and asks if we are doing right things or not.

Furthermore, according to Argyris and Schön argue that there is a difference what individuals say what they are doing (espoused theory) differs from what they actually do in practice (theory-in-action). Without noticing this difference individuals tend to make decisions based on their espoused theories (Argyris and Schön 1996, 13-15). When Senge and other learning organization authors discuss mental models, they mostly refer to Argyris' work on humans' habit of defensive reasoning. Argyris and Schön have also studied the use of dialogue; and their work has been further developed by William Isaacs (Isaacs, 1999) who´s outsanding book on dialogue also combines the theories presented within this article.

Another well known author on organizational learning is Nancy Dixon. She introduced three types of meaning structures among organizations members. These structures are: private, accessible and collective. The flexibility of boundaries between these meaning structures has an influence to organizations ability to learn (Dixon 1984, 36-43). By moving these boundaries with proper interventions and collective learning methods the share of collective meaning could be expanded.

2.6 Action learning

The concept of action learning has been recently emphasized by Micheal J. Marquardt. There have been several variations of the concept but they all share some common elements. The action learning requires real people solving real problems in real time and learning while doing so.

Action learning method consists of six components: 1) Problem 2) Group 3) Questions 4) Action 5) Learning 6) Coach. The problem should be significant and urgent and it should be the responsibility of the team (group) to solve it (Marquardt 2009, 2-3). Asking right questions rather than providing answers is essential in action learning. This will help individuals to separate what they don't already know. Asking questions is also seen as an instrument of a good leader (Marquardt 2009, 74). Asking questions and planning responses to them develops the individuals' ability to reflective inquiry. If learning is not intervened by questions, reflection of what has been learned is easily overshadowed by the urgency of the problem itself (Marquardt 2009, 137 – 140). This suggests that the coach should now and then make an intervention to problem solving for the sake of learning even in situations where everything seems to be running smoothly. Maybe the intervention should be done especially in those situations?

Action learning is seen as a continuous process where the phases follow each other. From this viewpoint the methods overlaps with Kolb's experimental learning cycle, Nonaka's knowledge theory and team learning cycle by Senge et al. Action learning also overlap with some other widely used learning methods, such problem based learning, project learning and learning by development. All of these methods are based on real problems, teamwork, and learning as a social and communal phenomenon. They all also utilize learning by doing as main source of knowledge and combine theories and best practices from several disciplines, such as group dynamics, management science, and psychology and pedagogy.

2.7 Pedagogical fundamentals for the school of future

Pedagogical background for the school of future will be based on learning as social and communal process, teaching as facilitating this process and knowledge as a fuel and also as a product of the learning process. The basis for the future school is presented in figure 1.

The fundamentals presented in figure 1 are based on the studies made in elementary school (Smeds et al. 2010) but they are also applicable to university level education. Smeds et al. have summarized several theories that exist behind the development of new kinds of learning environments.

2.8 Summary of the background

Why to put effort on presenting the theoretical background related to learning? The answer is that the theoretical background presented here lies behind the most team learning methods commonly used in education. Any theory presented in the previous chapters would deserve much closer look and discussion. Fortunately there are plenty of textbooks available on any of the topics.

Theme	Author(s)	Key assumption(s)
Social learning theory	Lave & Wenger 1991; Wenger, 1998.	Learning is a social and a context related process. Knowledge is always situated. Human beings learn from peers via shared practice and by observing masters.
The knowledge theory	Nonaka, 1994; Nonaka & Takeuchi 1995; Nonaka & Toyama 2003.	Tacit knowledge is created and transferred through shared practice and codified with a dialogue and reflection. Codified knowledge will be again utilized into practice by utilizing information systems. By following this process the total amount of organizational knowledge can be expanded.
Experimental learning	Kolb, 1984.	A learning process includes various stages where different kinds of approaches for learning are required.
Learning organization	Senge, 1990, 1996; Senge et al. 1994, 1996 2000; Marquardt, 2002:	A learning organization is built from various elements, such as team learning and shared vision. The learning organization combines people, technology, organization and knowledge with learning.
Organizational learning	Argyris & Schön 1996; Dixon 1984.	Learning within organizations could be made more productive by increased communication (dialogue) and surfacing hidden mental models to diminish human defensive reasoning. Increased communication will also help to diminish ambiguity related to learning of individuals within the organizations. Learning process in organizations should be supported by planned interventions made by researchers or consultants.
Action learning	Marquardt 2009.	Learning takes place through solving real problems in real environment within a team supported by a coach. Asking questions and reflecting of the learnt are essential.
Pedagogical background for the school of future	Smeds et al. 2010.	The schools of future will provide a learning environment where learning, teaching and knowledge will be combined in a way that formal schoolwork and informal learning are both emphasized.

Table 1. A summary of the theoretical background related to guiding ideas behind the development of the learning environment.

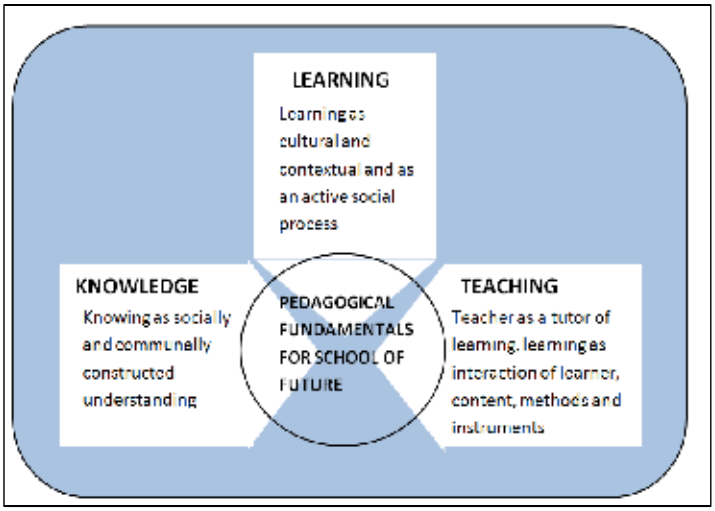

Fig. 1. Pedagogical fundamentals for school of future (modified from Smeds et al. 2010).

There are lots of whole disciplines of research such as organizational psychology, group dynamics, motivation theories and pedagogy which are more or less related to the subject of this study, but they are not presented here. The authors' goal was to clarify the theoretical background behind the learning environment that has been created and also to illustrate the multi-faceted environment where university level IT Bachelor education nowadays operates. A short summary of the theoretical background related to guiding ideas behind development of the learning environment is presented in table 1.

3. The research process

This chapter will describe how the research is being conducted. It will also clarify the methods used both in data collection and data analysis.

3.1 Methods of data collection

The students studying IT in our degree programme are divided into four different groups from the viewpoint of this study. These groups are IT team entrepreneurs (teampreneurs), members of the game team, students studying within the international team learning path, and students studying within the project learning path (in more detail, see figure 3).

Data for the article was collected between April 2010 and September 2011 and it consisted of theme-based interviews, observation of team learning sessions "trainings" and analysis of documents in the information repository used by teampreneurs and their coach. The teampreneurs were interviewed first time in April 2010 and second time in February 2011, and total of 25 theme-based interviews were carried out. Interviews lasted from 30 to 120 minutes. To be able to verify how interviewees express their arguments and emotions in team learning sessions, a total of 22 team learning sessions were observed between May 2010 and September 2011. These team learning sessions lasted from 2 to 8 hours. In addition, the author has observed two so-called kickstart events where the teampreneurs were negotiating their leading thoughts, values and mission. Both of these events lasted for two days.

The author had also access to information repository used by teampreneurs and could follow both the written documentation made by teampreneurs and their coach. Both the coaches of the two IT cooperatives and the author are working as lecturers in IT Bachelor degree programme so there have all the time been possibilities to validate in this way the interpretations with the coaches. Some of the questions asked from the teampreneurs during the theme-based interviews were also discussed later in trainings and other team learning situations by teampreneurs themselves. The author has also been able to have access to the students' transcript of records, in order to find out how the studies for IT Bachelor degree are progressing.

The members of the game team were interviewed twice. The first interview was carried out in October 2010 and the second in April 2011. The members of the game team wanted to be interviewed as a team, and therefore both interviews were carried out as group interviews. The interviews were theme-based with some predefined general level themes. Discussions with the coach of the game team has been a secondary source of data.

Students who study within the international group have had development discussions with their tutoring teacher once a year. The author of the article has been the tutoring teacher for the international groups since 2009 and this way the author has been able to interview also these students regularly. We have also organized feedback dialogues twice a term for the international group. These events have also been a fruitful source of data. In addition, the author is involved in planning and organizing education for the international groups. Discussions and email conversations with other colleagues who are involved in organizing courses for the international group, have offered a secondary source of data.

The students who have chosen the project learning study path have been investigated mostly by development discussions. Discussions and weekly dialogues with colleagues have served as a secondary source of data. The author has also had access to students' transcription of records on the basis of which some evaluation of overall progress of studies could be made.

Summary of data collection

Observing the students who have chosen the ICT entrepreneurship study path has been emphasized in data collection. The decision was made because this study path was seen as a remarkably different compared to the other two paths (international team learning and project learning). It was also estimated that with the ICT entrepreneur study path we would face also so far unknown challenges and would be able to learn from solving those challenges. Therefore it was seen as a rich target for closer investigation.

3.2 Methods for data analysis

The interviews were first transcribed to ASCII text and then analyzed utilizing grounded theory (Strauss & Corbin 1990; Corbin & Strauss 2008) and case study (Yin 2003; Flick 2009) methods. The field notes during the observation of trainings and other team learning sessions were written to files and complemented with a research diary with memos of the researcher's comments, questions and drafts of analysis.

Based on Flick qualitative research is of specific relevance to the study of social relations (Flick 2009, 12). For this study qualitative methods were selected because they help to build a richer description of the phenomena studied. For qualitative studies it is typical that multiple methods are used in order to gain more validity for the study.

The grounded theory analysis started with an open coding phase. The open coding phase was based on certain seed categories that in other words meant an interesting phenomenon related to selected research questions. The original seed categories for the analysis were: learning experiences, future challenges, risk taking and team development. Based on the methodological instructions which are related to grounded theory method, the data collection should be continued at least until the data is theoretically saturated (Corbin & Strauss 2008, 263). In other words, when the same phenomena start to repeat themselves in the extra interviews made, there is no reason to continue data collection for that category. After eleven theme-based interviews all the seed categories were well saturated and it became evident that the future challenges and risk taking seed categories were very close to each other.

Open coding was followed by an axial coding phase, which in practice went on almost in parallel with the open coding phase. During axial coding the observations were grouped and relations between them were analyzed. During the open coding and axial coding phases theoretical sampling (Denzin & Lincoln 2003; Corbin & Strauss 2008) was used (both with interviews and observation) to get better understanding of the interesting phenomena and their relations that were expressed by teampreneurs. Theoretical sampling based on the data with original seed categories guided further data collection. Two new seed categories, shared goals and working approach, and handling of crisis situations were established based on the theoretical sampling.

The last phase of the analysis was a selective coding. In selective coding the core of the results was formed, and "a story of the case" (Flick 2008) was written. In other words after the selective coding it was possible to say what was going on with the students who are studying IT bachelor degree within the learning environment. A summary of the research methods used in the study is presented in table 2.

Critical incident technology (CIT) is a qualitative analysis method that helps researcher to dig in to critical positive and negative incidents that interviewees have experienced based on their own expressions (Symon & Cassell 1998). With CIT it will be possible to capture the most (i.e. 5 – 10%) critical positive and negative that have happened and possibly separate them for further analysis. By especially concentrating to critical incidents CIT might also provide an interviewee a possibility to reflect personal development and learning experiences as a team member. CIT was used during the theme-based interviews to help the interviewees to recall and reflect on their learning experiences, and it turned out to be a useful method for the ongoing study and it provided a richness of useful insights for further data collection.

The study has been a cyclic process, where data collection, data analysis, planning actions, and implementing the actions into practice, are all repeating themselves. The length of a cycle has so far varied from a few weeks to several months depending on themes under investigation. The study follows the structure typical for action research (Herr & Anderson,

2005; Stringer 2007). Furthermore, there are several parallel processes such as individual learning, team learning and performance measures of the cooperative going on with several groups of students. Therefore several cyclic processes are running in parallel within the study.

Method	A short description	Reference(s)
Action Research	Action research examines the phenomena in their natural settings. Action research as a method has emerged from different traditions and covers several different approaches, i.e. practioners research, action science, participatory rural appraisal, teacher research, participatory action research and feminist participatory action research.	Herr & Anderson, 2005.
Case study	Case study is an empirical inquiry that investigates a phenomenon within its real-life context. Case study research means single and / or multiple case studies, that can include either quantitative or qualitative evidence, even both. It usually relies on multiple sources of evidence and benefits from the prior development of theories.	Eisenhardt 1989; Eisenhardt & Graebner (2007); Yin 1994, 2003.
Grounded theory	Grounded theory is a research method that has its origins in social sciences. Grounded theory is an inductive research method where the research starts with almost no a priori knowledge about the subject studied. The theory emerges from the data during the data is being analyzed.	Strauss, A. & Corbin, J. 1990; Corbin & Strauss, 2008.

Table 2. Summary of the research methods used in the study (modified from Juvonen & Ovaska, 2010)

Summary of data analysis

In general this study is a typical exploratory case study where construct validity is achieved through the use of multiple sources of evidence. The use of multiple sources of evidence is called data triangulation (Flick 2009, 444). The author being the only researcher in the study no official investigator triangulation was used (Flick 2009, 445). However, the author has worked in close cooperation with coaches of the two IT cooperatives, this has offered possibilities for tens of unofficial discussions related to the subjects under investigation. The study will get more internal validity. This will be in a longer run achieved by comparisons of student groups studying within different study paths of the learning environment.

4. Description of the learning environment

The theoretical background of learning as a social phenomenon and knowledge as product of cooperation was discussed in previous chapters. This chapter aims to clarify how these thoughts have been taken into practice by planning and implementing a learning environment with IT Bachelor education in SUAS. Firstly, the objectives for learning environment that would support entrepreneurship set by Finnish Ministry of Education and Culture are presented. After that, the structure behind the realization of the learning environment is presented. Thirdly, some examples of team learning methods used within the learning environment are presented.

4.1 Objectives for the learning environment that would support entrepreneurship

The Ministry of Education and Culture has defined a set of criteria for learning environment which will support entrepreneurship. The criteria are as follows:

- "Student's own activity is emphasized
- Learning takes place also in simulated or real-life situations
- Students have a possibility to interact with real entrepreneurship
- Learning is based on problem solving and interaction
- Learners are supported by a network of specialists
- The teachers role develops from delivering information to organizing, tutoring, supervising and developing the learning environment" (Ministry of Education, 2009, translated by author)

The first realization based on authors' current knowledge of learning environment that is based on the theories presented above in university level education was carried out by the Tiimiakatemia. The Tiimiakatemia started with marketing education in 1993 and nowadays it's a unit of education that is specialized in entrepreneurship. Its objectives are to develop individual and team abilities in three areas: team entrepreneurship (teampreneurship), team learning, and team leadership (Partus methods).

Our one of the learning environment applies and further develops the solution originally developed in the Tiimiakatemia to IT Bachelor education. Based on the author's current best knowledge (and a literature study made in April 2011) any similar learning environment has not been implemented in practice with IT Bachelor education before our realization.

Learning environments will in future combine teaching, learning and knowledge. Teaching is no longer seen purely as transmission where teacher tries to transfer existing knowledge to students. Teachers will rather act as tutors or coaches who facilitate how learners utilize each other and the instruments of the learning environment. The other role of teachers' is to actively and continuously experiment and develop methods and instruments used in community and team learning.

4.2 The overall structure of our realization of the learning environment

All students in the IT degree programme in SUAS have identical curricula during their first year of study. They will have courses in subjects like basic Information and Communications Technology (ICT) skills, mathematics, physics, languages and methods for learning. During their first spring semester they will decide how they want to continue their studies after the first year. The overall structure of the curriculum and the study paths in our IT degree program are presented in figure 2.

Those who choose the international team learning study path will study in English with international exchange students coming from several countries such as Czech Republic, Russia and China. This group that we call InnoSet, utilizes team-learning methods in international environment and works in teams by doing projects for local companies and other organizations. The tasks they perform usually require complex inquiry to existing knowledge with multiple methods. The projects are steered in cooperation with teachers of SUAS and representatives from cooperation organizations.

The Finnish students who study within this InnoSet group usually choose to study their third year abroad in one of our cooperation Universities. Most of them will also do their practical training (30 ECTS points) during their exchange period. For the fourth year the students will come back to SUAS to finish their studies and to write their Bachelor Thesis.

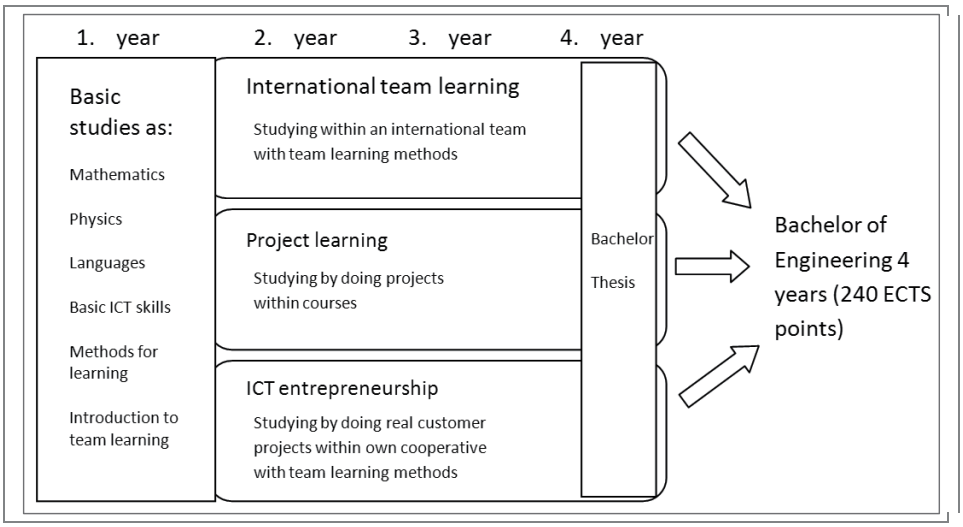

Fig. 2. The overall structure and the study paths of the curriculum in Information Technology degree programme in SUAS.

Students who study 60 ECTS points abroad at our cooperation university will get a Double Degree (DD) when they graduate. In practice they will get a bachelor's diploma both from the SUAS and the cooperation university.

Students who will decide to study by participating to courses and carrying out projects within the courses usually select the project learning study path. The students will have more conventional courses and the projects are included in the courses. In this way, learning by doing is emphasized here too. Students are also encouraged to find projects themselves. The projects are steered in cooperation with the teachers of SUAS and representatives from the cooperation organizations.

In case the students choose to continue their studies as ICT entrepreneurs, they will establish an IT cooperative in the end of their first academic year and start operating the cooperative in the beginning of their second academic year. They will then run the operations of their cooperative for three years until they graduate. We call these students teampreneurs.

There is also a so-called game team, which is a group of four students who study for their Bachelor's degree by designing and deploying games for PC computer and portable devices. The game team could be described as a special case of ICT entrepreneurship. The students of the game team will also establish a company to be able to sell their products. The game team has a coach, who reflects the learning experiences with the team and inspires them with their studies. The overall setting for the study and the authors' role in it is described in figure 3.

4.3 A cooperative as a structure for organizing and as a vehicle of team learning and team development

First IT cooperative in Saimaa University of Applied Sciences, Icaros, was established in 2010 and it is 100 percent owned by nine IT degree programme students of Saimaa University of Applied Sciences (SUAS). The cooperative helps students to organize their actions, mitigate the risk as being an entrepreneur and deal with money gained from the customer projects. Above of these basic practical issues, the cooperative acts as a vehicle for team learning. The team learning methods provide a practice-oriented way to study IT in SUAS. The methods used in team learning are based on research related to learning organization, team building and development, organizational knowledge creation and knowledge sharing. During the autumn 2011 the second IT cooperative, Ideatech, was established and it started operating in September 2011.

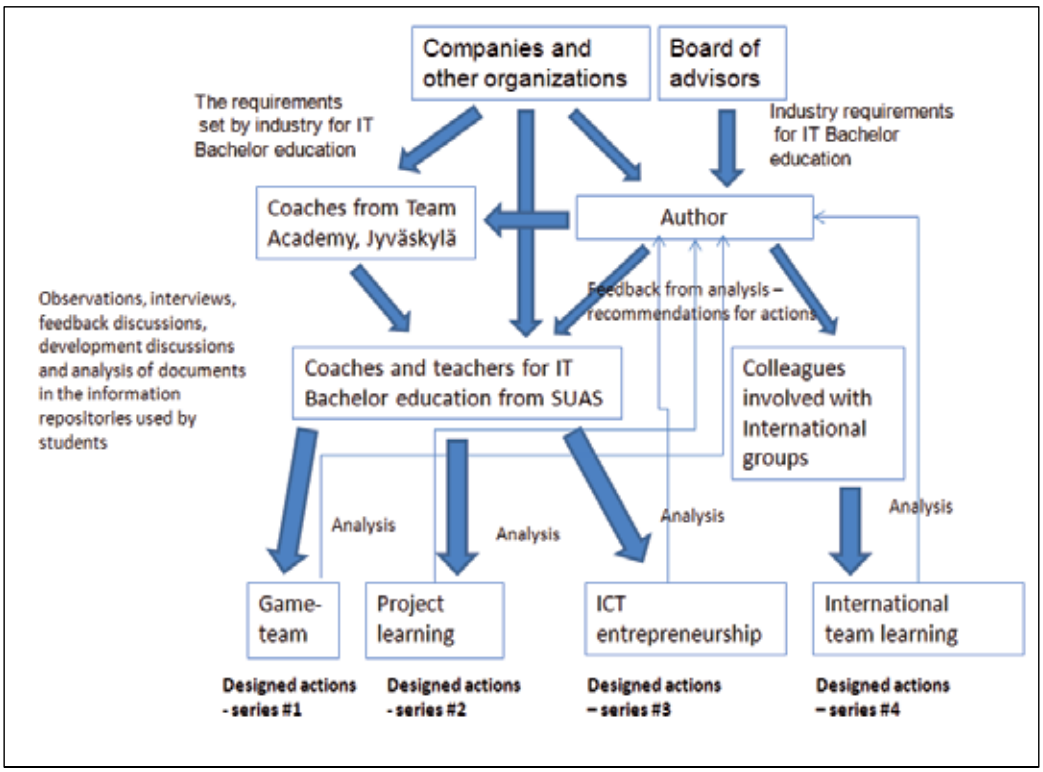

Fig. 3. A description of the overall setting for the study.

4.4 Examples of used methods within our learning environment

There are plenty of tools and methods for individual and team learning and for creating new ideas and developing them to innovations. Within the study paths new methods are also explored now and then by combining the existing ones. Most of these methods are based on the literature that was previously discussed and many of them have a number of versions. The most commonly used team learning methods are shortly presented in table 3.

Name (that we are using)	A short description	Background/ Reference(s)
Team role test	Team role test by Belbin is made for students in the beginning of their first year and again for those who choose to continue their studies ICT entrepreneurs in the end of first year. The results of the test are used later to help students to reflect on themselves as team workers.	Belbin, 2003.
Tryouts / Trainings / Retreats	Students share information about their learning experiences in team learning sessions twice a week. These sessions usually last for 3 – 4 hours. Retreats last 1 – 2 days. During the retreat there are 1 – 2 bigger themes that students will work with.	Isaacs, 1999; Nonaka & Takeuchi 1995; Kolb, 1984.
Learning café / World Café	The objectives are set either by the coach or by students. Students will work in small groups and every group may have its own sub-objective. One student per group will act as a host and will stay in the same group and others will visit to every group for 15 – 30 minutes. The host presents the results gained so far to new students.	Commonly utilized method, origin so far unknown.
Competing parallel groups	Several small groups work with for the same object. The results of a group are compared and discussed together and challenged by other groups.	de Bono, 1970.
Learning agreement	Students practice how to set objectives for themselves and to reflect their individual learning experiences.	Partus methods.
Theory	Every student will read 30 - 90 books during their studies. The books relate to for example ICT, entrepreneurship, and personal development. New insights are discussed on special "book trainings".	Isaacs, 1999; Nonaka & Takeuchi 1995; Kolb, 1984.
Quality check	Yearly event for checking how processes such as individual learning, communal learning and measured of cooperative have developed. There are three levels for each 12 process. Every level of measures has to be passed every time to sustain the achieved levels.	Partus methods. Modified for IT Bachelor education by coaches in SUAS.
Cross fertilization	Students visit to other cooperatives trainings and other events. Learning experiences are later shared to members of the own team.	Concept from Partus methods. The principle has been commonly utilized.
Six Thinking hats	Tools for innovation, usually used in problem solving related to projects to get new insights. Six thinking hats help learners to change their viewpoint when searching for new ideas or solving problematic situations.	de Bono, 1999.

Table 3. Examples of team learning methods utilized with the learning environment.

In addition to the methods listed in table 3 development discussions are carried out with all of the students in the IT degree programme once per year.

Evaluation of learning

Practices for evaluating students' results and the learning process while achieving the results have been discussed and developed within all our study paths. We emphasize self evaluation and peer evaluation in parallel with teachers' or coaches' evaluation. Customer projects are also evaluated by customers. This practice is called 360 degree evaluation.

In some of the courses within the project learning path the conventional tests are used as well as instructors' evaluation of practical assignments. Our goal is to continuously learn from the evaluation, therefore the evaluation criteria and justifications for the evaluations are always open for discussion.

5. Observations on current and future challenges

5.1 Examples of designed actions based on the analysis of the data

After analyzing the data gathered by interviews, observations and analyzing documents in information repositories used by teampreneurs, suggestions were made to the coach of the first IT cooperative. Based on the suggestions for actions the coach has deployed designed actions with the teampreneurs. Here are some examples of the designed action put into practice:

- During the interviews the students of the game team expressed their interest in increasing cooperation with other student groups. The students of the game team were later invited to a two day retreat and they have been participating in the trainings of the second IT cooperative
- Challenges in leadership and feeling of ongoing "rush" expressed by teampreneurs was discussed and analyzed together with the coach of the first IT cooperative. Based on the analysis of the situation the coach took the topics leadership of the team, and teampreneurs feeling of rush and where it comes from to the next training for discussion
- The bias towards internal development projects and avoiding customer visits was analyzed with the coach of the first IT cooperative. Based on the analysis teampreneurs were challenged to visit a certain amount of potential customers within the next two weeks to get new and versatile projects that would help them to achieve their learning objectives.
- The lack of leadership within the first IT cooperative has been discussed for several times. The issue has been recognized and actions based on it are currently in process.

5.2 Challenges related to students and their learning

Based on gathered data - mostly observation and reading documents from information repository - it seems that some of the students have chosen their study path for reasons that we were not able to predict. It seems that in those cases students have selected "the easiest way" to get a degree. One possible explanation that relates to any student in any university is a suggestion that whenever students are able to decide whether they put extra effort to some issue or not, they will not. Based on the author's experience as being a lecturer this

suggestion seems to be valid, at least to some extent. In practice this means that from the student's point of view they avoid any tasks in which they will not be rewarded with ECTS units or money.

Another challenge emerged mostly with IT entrepreneurs is the lack of commitment. Teampreneurs have had quite a vast scope of freedom while agreeing on the rules of conduct and working approach. They have so far preferred to have great freedom but most of the students are not familiar with taking responsibility for their own or with teams work. Based on tens of observations they have violated the basic rules of conduct that they have mutually agreed, such as keeping a deadline for a teams' joint task like visiting potential customers or reading a book.

Based on these findings one possible explanation of teampreneurs' challenges is that unlearning from the working approach of traditional school where teachers will tell students what to do, seems to be difficult and time consuming. An alternative explanation is that students just want to "chill out" (as described above) if no one requires anything more from them. Based on the interviews and observations conducted with the first IT cooperative, there was a severe lack of leadership within the team. Rules that the teampreneurs have mutually agreed on have been repeatedly violated without any consequences and promises have been given but not kept, over and over again.

To summarize, the teampreneurs don't have enough experience and therefore lack of courage to deal with crisis situations; they rather tend to avoid them. In those situations where teampreneurs lack leadership or courage to face difficult or unpleasant situations, the role of the coach is crucial. When difficult issues are continuously avoided by the teampreneurs, it will be the coach' unpleasant task to take the dialogue back to the track and take care that the teampreneurs will not avoid of solving the issues that prevent them from developing as a team. When the teampreneurs will get more experienced and by that means find the courage to solve their challenges independently the coach can step aside again.

5.3 Challenges related to personnel and their learning

A challenge we have to bear in mind all the time is related to the way how students and colleagues within the IT degree programme value themselves as members of the community of practice.

In the course of development of the learning environment the curriculum for IT bachelor degree has gone through remarkable changes. In the beginning of this radical change process it was noticed that among students and also among colleagues there emerged lot of tensions and not all of the tensions were positive. These tensions could partly be described as normal resistance to change. Another very important element of any change process is adequate communication between all parties involved. In the beginning of the change process the importance of communication was probably not fully realized or its role in the change process was underestimated.

When listening to coffee room and other unofficial discussions at the starting phase of the change process, it soon became evident that some students who were not interested in studying as ICT entrepreneurs or were not interested studying within an international team

learning path had sometimes felt themselves "leftovers". The same kind of atmosphere was in the beginning recognized also among personnel of the IT degree programme. It took several months, required many discussions and also some arguing before a common view on the way to go on forward with the changes and how to communicate about them was agreed.

Because any change always means destroying something that has existed before, it is essential that the current situation and those involved in constructing it are valued in a polite manner. Through ongoing dialogue with colleagues we have been able to see the change as a possibility to develop something new instead of only rejecting or destroying existing structures for learning.

5.4 Minor success stories during the way

For already two years we have been learning to have dialogue with all the colleagues within the IT degree programme. In the beginning these meetings were more or less discussions and not always even polite at all. Individuals acted with "skilled incompetence" trying to remain in unilateral control of situations and to avoid feeling vulnerable (Argyris and Schön 1996, 90). After two years and tens of continuous weekly dialogues with colleagues the situation started to change little by little. Based on these changes in communication with colleagues it seems that we are already beginning to have some kind of shared vision of what we want to achieve together with the new learning environment for IT Bachelor education.

Another observation that could be described as a minor success story is related to students who study in international team learning path. Those who have 120 ECTS credits may study for Double Degree during their third academic year. This requirement seems to work as a stick and the Double Degree as a carrot for those who want to study abroad.

Students within all three study paths have been satisfied with learning in projects. We have also got lot of positive feedback about the increased flexibility in studies and practice-orientation of the content that has been offered for IT Bachelor students. Partly based on the positive feedback from students several colleagues have found more courage to explore and apply new methods of learning in IT Bachelor education.

Most colleagues within the IT degree programme have been involved in the development project called TULKKI where a cooperation model between Saimaa University of Applied Sciences and other organizations in South Eastern Finland has been developed. The cooperation model complements the learning environment that has been developed by clarifying each parties' (student, teacher, company representative) role in acquiring new projects and steering them. The development project has also provided possibilities to explore and implement new team learning methods into practice simultaneously with the development of the learning environment.

6. Discussion

It has been interesting to observe how individuals act in a learning environment where they have much freedom to choose how they learn and in some extent also what to learn. So far most of the data supports the finding that students feel more motivated when they have

more possibilities and freedom to choose. However, they have not so far much grasped these possibilities but rather enjoyed the freedom to study in their own rhythm. This interpretation was supported when reviewing the students' transcription of records. Students tend to study issues that they prefer and postpone the issues they feel challenging or even boring. From this point of view students are similar regardless of the study path they have chosen.

The issue that was widely expressed during interviews and later also validated through observations was that teampreneurs tend to discuss and plan but they will not act. The hardest part is always the path from idea to innovation, in other words how to put ideas and decisions into practice. Learning by doing requires practice on the individual level and shared practice in team level. Without these crucial elements there will be no basis for team learning. When there are not enough versatile projects available, there will not be enough versatile learning guaranteeing that studies will progress in an appropriate way.

An objective	**Solutions in our learning environment**
Student's own activity is emphasized.	The methods are used within the learning environment make a student an active subject rather than passive object.
Learning is carried out also in simulated or real-life situations.	In every study path project learning is utilized in real customer projects with cooperation organizations. Currently there are over thirty parallel projects where our IT students are learning with the support of teachers and representatives of the customer organizations.
Students have a possibility to interact with real entrepreneurship.	Within the ICT entrepreneurship study path students study as teampreneurs for three years.
Learning is based on problem solving and interaction.	Team learning is emphasized within all three study paths. Problem based learning is commonly used in courses and customer projects.
Learners are supported by network of specialists.	Information sharing between all colleagues in the IT degree programme about progress of learning objectives of students is ongoing. Dialogues 2-4 hours per week with colleagues will guarantee that the learners are supported with their learning objectives.
The teachers' role develops from delivering information to organizer, tutor, supervisor and developer of the learning environment.	Teachers act on several roles, such as lecturers, project steering group members, supervisors, specialists, facilitators, and coaches. Teachers are also responsible for development of the learning environment and exploring and applying new methods and instruments for learning.

Table 4. Summary of objectives for learning environment and our solutions for achieving them.

Students who have decided to study in English within the international team learning study path have committed themselves to study at least 120 ECTS credits during their first two academic years. The limit was originally set to guarantee that the students who will go abroad for a year will not drop out during their studies. Based on experiences so far, the

limit has been "an accidental carrot" and it has had a strong positive effect to the students' motivation for studies overall. Based on the observations with three international groups it seems that students will learn a language and do a project work on a practical level. It requires a few weeks to "defrost" after which students will work with projects in international teams more fluently.

A short summary of the objectives set for a learning environment that will support entrepreneurship set by the Ministry of Education and Culture and examples of how they have been solved in our learning environment are presented in table 4.

7. Summary

The trajectory for building the learning environment for the IT Bachelor education at Saimaa University of Applied Sciences described in this article started three years ago. Some changes in personnel and increased dialogue and cooperation between colleagues laid the cornerstones for the radical change process in developing the learning environment for IT Bachelor education in Saimaa University of Applied Sciences.

These changes had not happened without individuals who had enough courage to work with uncertainty and unknown. By slowly increased mutual trust between colleagues involved in the development of the learning environment there have been enough strength and stamina to overcome resistance and even moments of despair. Realization of transformational change in education is not an easy task but based on the analysis so far it can be achieved. At the same time the objectives for a learning environment that supports entrepreneurship in the way set by the Ministry of Education and Culture have been achieved.

When the study started in February 2010, there was one IT cooperative and a small group of international students. Now, in October 2011, there are already two IT cooperatives, the third international group (19 students) and the amount of Double Degree students is steadily increasing. The Double Degree cooperation has awaken an interest for other partner Universities in Europe as a result of which two new double degree agreements are currently in process. There is also been some more students who are interested in studying by developing games, a fact that could lead to establishment of another game team. Based on the facts above and the interest that the learning environment has created on national level it seems that the learning environment we have created might somehow meet the challenges that we nowadays face in the IT Bachelor education in Finland.

Unfortunately it seems that our degree program will run out of time. On 5th of October 2011 we got the breaking news from the Ministry of Education and Culture, a suggestion of discontinuation of our degree programme. If this will happen, the results achieved with the learning environment described in this article will come too late. In spite of this, it has been a very interesting and challenging time to participate in the creation of the learning environment. Who knows if the learning environment described in the article could be implemented somewhere else with people with the same kinds of courage and leading thoughts that we have in the IT degree program of Saimaa University of Applied Sciences.

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Studying the IT students utilizing team learning methods and describing the learning environment that has been built in cooperation with colleagues has been an interesting and challenging task. It has given the author a possibility to investigate theoretical background of several disciplines and to interview and observe students who have been studying within the learning environment.

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Part 3

Macro Effects of Entrepreneurship

13

Entrepreneurship and Economic Growth: Macroeconomic Analysis and Effects of Social Capital in the EU

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1. Introduction

Measuring the wealth of Nations, the quantification of the factors that determine it, as well as the elements that can contribute to it is an underlying concern in the economy since the first schools of economic thought. In this regard, there have been significant advances in which has been called "growth accounting", the classical factors of production, capital and labor, to the inclusion of human capital, or others that might be included as determinants of investment (entrepreneurship) as well as explanatory factors of what has been called "Solow residual", such as social capital. Since the 1970s in which begins to strengthen the need to "measure" human capital and to include it as a factor of production, it will be several decades until it heals like a real "capital", so that is no longer questionable its effect on development.

One of the essential elements to consider was the human capital. After 1970 it begins to arise as a key element in the development of the economies. For a review of the literature, see Guisán, M.C. & Neira, I., 2006.

From the beginning of the XXI century, extends the inclusion of issues such as trust, governance or corruption, elements which the sociology and psychology had been trying since ancient, but begin to form part of the concern of economists.

All forms of capital may be understood to be assets of varying types that provide benefits and make productive processes more efficient. In this sense, social capital may be interpreted as an agglomeration of corporate, psychological, cultural and institutional assets. These increase the amount (or the probability) of mutually beneficial or co-operative behavior for the people involved and for society in general, Neira, et al., 2009.

The starting hypothesis of the economic theory of entrepreneurship is that the economy is endowed with certain factors, so entrepreneurship contributes to production through a combination of productive factors (capital and labor), and therefore more entrepreneurial resource allocation implies greater production and well-being. This feature is taken as exogenous in the model, and more recent work now seek to identify particular aspects of the contribution factor of entrepreneurship in economic growth. Koo & Kim, 2009, say that R&D policies need to be discussed in the broader context of related regional issues, such as

entrepreneurship, university research, human capital, social capital and industry structures. These are interrelated policy issues that need to be examined in a more comprehensive policy framework.

On the empirical level there are some works that assume the total productivity of production factors with explanatory variables the business dynamic (Callejón & Segarra, 1999); while others used proxies of the business activity (Petrakis, 2004). A set of empirical studies using measures that relate to the production or productivity with the proportion of the self-employment population in the total employed population (Carree et al., 2002). Finally, we must consider recent empirical studies using data from the Global Entrepreneurship Monitor (GEM) repeating for several countries.

In this chapter, there will be a review of the empirical literature, models of economic growth, considering the above mentioned production factors, physical capital, human capital and social capital, innovation and entrepreneurship. After doing this we present results for several European countries taking account two basic ways, the effect that the entrepreneurship generates in the development of the Western economies, as well as factors macro that can be reached to determine it.

In the entrepreneurship studies one of the key aspects is the subject of measurement. In this sense, the business literature on multiple measures of entrepreneurship, focus on the number of new companies, the self-employment population in the total employed population, public and private spending on R & D in GDP of a country or region. It is commonly used indicators provided by the GEM methodology or OECD-EUROSTAT in studies of entrepreneurship. However, there is no consensus among the authors on the most appropriate methodology to be used in the study of the phenomenon of entrepreneurship. Therefore, it is necessary to revise some measures and the methodology used in measuring it.

In this chapter, in addition to analyzing the literature on the subject, we propose different indicators for OECD countries, analyzing their determinants at the macro level, as the effects of the entrepreneurship, along with other factors, such as education or social capital, have in OECD countries.

2. Definition and importance of entrepreneurship

Interest in the study of entrepreneurship re-emerged with greater intensity in the late '70s, with an emphasis on economic theories through empirical findings and theoretical reflections. In empirical terms, it was found that several developed countries, mainly in Europe, launched new initiatives, after years of economic downturn and decline in business creation. On the other hand, widespread theoretical reflections about events that marked the world economy are reflected in national economies. These changes indicate that economic growth was not only sustained in economies of scale or scope, but that the companies had an important role in growth. Thus, Audretsch & Thurik, 2004, concluded that the change in consumption patterns, the rise of more flexible production processes and more competition among small and medium enterprises were striking in the transition from an economy of management to an entrepreneurial economy.

There are different definitions of entrepreneurship that have evolved over time. According to several authors (Kilby, 1971, Carland et al., 1984; Leite, 2002), the concept of entrepreneurship was first mentioned by Richard Cantillon in the eighteenth century. For him the function of entrepreneurship in the economy was the purchase of services and inputs at a certain price, and its subsequently sale at an unknown price and, therefore, assuming a risk. Later, Jean Baptiste Say offered a broader definition that combined capital, physical resources and manpower in an original and innovative way. For Adam Smith ("father" of the economy), the concept of entrepreneurship is confused with capitalism, whose function was providing the resources for entrepreneurs and capital accumulation. So, Wennekers & Thurik, 1999, mentioned three definitions of entrepreneurship. For example, entrepreneurship may lead to an economic function, a resource allocation or an innovation. Also it may report a particular behavior, it has intrinsic characteristics, it implies the creation of new businesses or the importance of an entrepreneur within a company. For Shane & Venkataraman, 2000, entrepreneurship is a response to economic issues: "How, by whom and with what effect are discovered, evaluated and exploited opportunities to create goods and services in the future." Davidsson et al., 2001, argued that entrepreneurship can be seen as an emergence of new economic activity, which includes imitation and innovation. Henderson, 2002, ultimately sees entrepreneurship as the discovery and development of opportunities for value creation through innovation.

OECD, 2009, said that "Entrepreneurship is a multifaceted concept that manifests itself in many different ways, with the result that various definitions have emerged and no single definition has been generally agreed upon. Several definitions have an essentially theoretical basis and are not concerned with measurement. Another strand of research has largely bypassed the question of definition by "defining" entrepreneurship in terms of a specific empirical measure, such as self-employment or the number of small firms. Not surprisingly, these are measures that are readily available." So, the OECD and Eurostat propose "combine the more conceptual definitions of entrepreneurship with (available) empirical indicators".

Building on the theoretical contributions of Richard Cantillon, Adam Smith, Jean Baptiste Say, Alfred Marshall, Joseph Schumpeter, Israel Kirzner and Frank Knight, among others, the following definitions were established:

- Entrepreneurs are those persons (business owners) who seek to generate value through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.
- Entrepreneurial activity is enterprising human action in pursuit of the generation of value through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.
- Entrepreneurship is the phenomenon associated with entrepreneurial activity."

Therefore several indicators to measure the entrepreneurial activity can be found in the literature (please refer to Godin et al., 2008). We can highlight the Total Entrepreneurial Activity (TEA) from the GEM, that indicates the proportion of individuals who are starting new businesses at the time of the survey; the OECD – Eurostat Entrepreneurship Indicators Programme (EIP), started in 2006 with the objective to "develop internationally comparable data on entrepreneurship and to make international comparisons possible and meaningful"; Kauffman's Index for the USA, which measures the proportion of adults "No owner of a

business" creating a new business each month; Denmark's entrepreneurship index, that also take into account business growth; the Database of Entrepreneurship by the World Bank, that monitors the implementation of new business. One interesting measurement is the net business creation index that also considers the disappearance of businesses. Other measure useful is the number of patents like a proxy of innovation on entrepreneurship. Other measurements are self-employment, creation of small business, expenditure in research and development, investment expenditure, and other indicators related to personal intentions regarding the establishment of a business.

In this work we use as measures of entrepreneurship Total Entrepreneurial Activity (TEA) from GEM database and entry density, the number of newly registered limited liability companies per 1,000 working-age people (those ages 15-64)) derived from World Bank.

3. Definition and importance of social capital

The study of social capital has shown significant growth in recent years. Following the works of the French sociologist Bourdieu, 1986; those of James Coleman, 1988, in sociology of education and, in particular, the work of Robert Putnam, 1993, in the field of political sciences, the term has acquired an important dimension and captured the interest of many researchers.

The introduction of social capital in economics is more recent, and the first contributions in this field are known to be those by Helliwell & Putnam, 1995, or Knack & Keefer, 1997. Since the turn of the century, the economic literature has begun to attach importance to this factor as one of the production functions, and –in this sense– its measurement provides one of the key elements to be considered. There are numerous studies confirming the importance of social capital in growth and development (Whiteley, 2000; Zak & Knack, 2001; Grootaer & Narayan, 2004; Tabellini, 2005; Beugelsdijk & Van Schaik, 2005; Roth, 2007; Dinda, 2008; Akçomak & ter Weel, 2008; Neira et al, 2009; Guisán, 2009; Dincer & Uslaner, 2010).

Social capital can be defined as trust, both interpersonal and institutional, and the positive aspects of the networks and social norms that facilitate the creation and maintenance of an adequate social structure, together with other capitals, to lay the foundations to facilitate long-term growth and sustainable development. This definition contains the three dimensions in which social capital is typically divided and they are: trust, networks and social norms. Those will be the elements we suggest as possible determinants for subjective well-being. We use one of these three dimensions because in the literature, several authors establish social capital indicators around these three groups. They are the basic elements and the most commonly used indicators, as we can see in the relevant literature. Grootaert & Van Bastelaer, 2001, p. 23, point out that, after reviewing several studies, they have found that social capital indicators "should be on three types of proxy indicators: membership in local associations and networks, indicators of trust and adherence to norms, and an indicator of collective action." Likewise et al., 2004, p. 4, also claim "that empirical indicators of social capital can be grouped into three broad categories: 1) social networks: relations within and between families and friends (informal sociability); involvement in community and organizational life (e.g. volunteering); public engagement (e.g. voting), 2) social norms: shared civic values, norms and habits of cooperation, and 3) social trust: generalized trust in social institutions and in other people."

Quillian, 2006, describes three types of measures used in empirical studies, similar to those previously mentioned. The first aims to measure social relationships by assessing the number, structure or properties of relationships among individuals. Thus, we can measure the intensity of contact and the frequency of interaction, as well as the characteristics of a whole social network. The second one is based on measuring individuals' beliefs about their relationships with others, where attitude, expectations and trust are the parameters more regularly measured. The third uses measures of membership in certain voluntary organizations and, in general, it is considered an indirect measure of social ties believed to be fostered by voluntary organizations, as direct measures of social ties are unavailable. We shall subsequently use different indicators reflecting these dimensions in order to measure social capital.

In most studies on social capital, one of the main variables used is trust (Knack & Keefer, 1997; Whiteley, 2000; Beugelsdijk & Van Schaik, 2001; Helliwell, 1996). In the absence of other indicators, the OECD (OECD, 2001) believes that "trust may be an acceptable proxy for social capital in the absence of a wider and more comprehensive set of indicators" The variable usually includes different types of trust, from trust in family members, neighbors, people of your country,... Trust is the variable that we select in order to measure social capital in this work.

4. Social capital, entrepreneurship and economic growth

As mentioned above, social capital has an impact on development and growth through various mechanisms. For example, Knowles, 2005, identifies four main groups, which cover the different ways in which social capital helps economic growth. The first refers to "increasing the number of mutually beneficial trades" illustrated with various examples of co-operation based on trust and information. The second major group refers to "the resolution of collective action problems" which states that societies with a high degree of social capital solve the problems of collective action more easily than those with low levels of it. "Reducing monitoring and transaction costs" is another mechanism for social capital to operate with, primarily through trust. Finally, social capital helps to "improve the flow of information" through social groups or networks too.

Also Greve et al., 2006, point out that "social capital has four main effects. 1) getting information; 2) transfer of knowledge, innovation, and diffusion of technology or practices; 3) combining complementary knowledge and helping solving problems; and 4) brokerage." They show other aspects in which social capital helps to increase productivity and helps to foster entrepreneurship: "One is using social relations to mobilize people to contribute to a project. Established social relations contain the necessary trust and knowledge about each other that facilitate communication and enhance cooperation (...). The other is using team members' social capital to augment and complement the knowledge of the team. A network of individuals has a collective knowledge base that possesses more knowledge than that residing within any single individual. Each person's network position, the network structure, and composition of participants determine the degree of shared knowledge and to what extent knowledge can be combined or coordinated among a set of experts." Using the social capital of members of these social networks, the resources of the company or team can be enhanced and complemented, because a community of individuals always gathers more resources than one person alone. It therefore shows the value of social capital as productive

capital depends not only on the number of contacts in these social relations, but also influence indirect contacts that will be reflected in the structure of the network. These contacts tend to be increasingly of a virtual nature and hence the importance of the new variable to analyze social capital.

Lin, 2001, gives us four reasons why social capital influencing outcomes. The first is that "facilitates the flow of information" through the use of social ties that can provide information on opportunities and choices which are should not access for social capital. The second is that "these social ties may exert influence on the agents who play a critical role in decisions". Third "social tie resources, and their acknowledged relationships to the individual, may be conceived by the organization or its agents as certifications of the individual's social credentials", i.e., resources that the organization can use in case of need. Finally "social relations are expect to reinforce the identity and recognition" with which the individual obtains the social recognition that it possesses certain resources and that belongs to a social group that will provide support.

Spellerberg, 2001, said that the "access to social capital can be said to have three key functions: processing information, assessing risks and opportunities and "checking out" situations, individuals and agencies". These three functions are important in the society that we live, because information is a key element for entrepreneurship and growth.

There are several studies that establish a direct link between entrepreneurship and economic growth. For example, Salgado-Banda, 2005, presented a new variable based on patent data as a proxy for productive entrepreneurship and, alternatively, a proxy based on data of self-employment. The main conclusions they obtain were that exist a positive relationship between the proposed measure to productive entrepreneurship and economic growth and the alternative measure based on self-employment appears negatively correlated with economic growth .

Van Stel et al. , 2004, 2005, using the Global Enterpreneurship Monitor (GEM) database at different periods conclude that the effect of the activity entrepreneurship rate on economic growth affects the level of economic development positively. Wenneker et al., 2005, used the country's entrepreneurship level as an independent variable, expressed by the Rate of Embryonic entrepreneurs, defined in the GEM 2002 database on 36 countries. The main conclusion was that the flow of new entrepreneurs tends to decrease with a development level at a certain point, only to grow again from that point (U function). With data from GEM 2008, Bosma et al., 2008, achieve the same conclusions. On the other hand, Wennekers et al., 2008, provides an alternative analysis of the "income-entrepreneurship" relationship in a group of developed countries. They employ OCDE data and an entrepreneurship rate based on the total proportion between businesses owners and the active population between the years 1972 and 2004. In this case, the graphic is L-shaped in the long term, so the proportion of entrepreneurial activity would not increase according to income levels, instead it would tend to remain stable. Using the GEM 2002 database concerning 37 countries, Wong et a.l, 2005, start from a Cobb-Douglas production function to explain entrepreneurship and technological innovation as determining factors of growth and concluded that a rapid growth of new enterprises generates job creation in small and medium business in developed countries. M. Martin et al., 2010, examined the relationship between entrepreneurship, income distribution and economic growth by developing the

ideas of Schumpeter and testing them empirically through the GEM database. The main conclusions of the paper are: fiscal policy has a positive effect on investment in different ways: increased public investment and reduces imperfections in the credit market or end up with restrictions that adversely affect investment in physical and human capital and that there is a negative effect of interest rate and the positive effects of public services and the rate of entrepreneurship.

The authors Li et al., 2009, analyzed the impact of entrepreneurship on economic growth using panel data for 29 regions of China in a period of 20 years. Combining the theoretical definition of entrepreneurship with the characteristics of Chinese entrepreneurs, the authors defined two measures: (1) employment ratio of people with jobs or own businesses in total employment (ratio or measure of private employment) and (2) employment ratio owners own business in total employment (ratio or measure of private businesses). Both measures were defined to capture the entrepreneurial spirit. The results suggest a positive impact of entrepreneurship on economic growth, and this result is more robust when the institutional and demographic variables are controlled.

In the article by Mojica et al., 2009, the connection between entrepreneurship and economic growth is achieved through the adoption by the regional economic growth models of measures of entrepreneurship. Thus, these models capture the influence of the level of entrepreneurship in economic growth while measuring the effects of other factors that have traditionally made the link between entrepreneurship and development. They concluded that there is positive contribution of entrepreneurial activity to economic growth. The regions with the highest number of new business owners and exhibit higher levels of population growth. The growing number of owners and the largest number of jobs in new business demonstrates its positive influence on employment growth..

So, as we can see, social capital and entrepreneurship plays a key role in development. Social capital is an important factor in the disseminating knowledge across the society in general, and business in particular, by to facilitate the flows of information and the transfer of innovation and entrepreneurship affect to economic development increasing the income level or reducing the level of unemployment. Koo & Kim, 2009, they say that R&D policies need to be discussed in the broader context of related regional issues, such as entrepreneurship, university research, human capital, social capital and industry structures. These are interrelated policy issues that need to be examined in a more comprehensive policy framework. They proposed a model of economic growth in which the rate of regional economic growth is a function of the growth rate of economically useful local knowledge, combined with the growth rates of capital and labor. The growth of economically useful local knowledge is a function of R&D, entrepreneurship, university research, human capital, social capital and the industry's structure. Their results indicate that entrepreneurship plays a significant role in regional growth. Moreover, for any given level of industry R&D spending, the level of entrepreneurial activity determines how much benefit a state can garner from its research activity.

Vázquez-Rozas et al., 2010, in order to test the effect of entrepreneurship on economic growth use the ratio of businesses created in each region over the total number of businesses for nine years (2000 to 2008) as a proxy of entrepreneurial capital, with data from Iberian Balance Sheet Analytical System. They estimate a regional panel econometric model, and they find a positive

effect of the entrepreneurship variable on GDP growth, in per capita terms and in absolute values. Also they find that Human capital and social capital are significant.

5. Data

Regarding social capital, our empirical analysis is based on the data from the European Social Survey. In order to maximize statistical efficiency, we pool the data from the four waves of the ESS (ESS Round 1: European Social Survey Round 1 Data , 2002; ESS Round 2: European Social Survey Round 2 Data, 2004; ESS Round 3: European Social Survey Round 3 Data , 2006; ESS Round 4: European Social Survey Round 4 Data, 2008). Due to data availability and comparability, we have chosen the following countries: Austria, Belgium, Switzerland, Germany, Denmark, Estonia, Spain, Finland, France, the United Kingdom, Hungary, Ireland, the Netherlands, Norway, Poland, Portugal, Sweden, Slovenia and Slovakia. For all of these countries there is information, at least, on three waves and for all variables that we have selected.

We shall use variables for one of its three dimensions (trust) because it's an important dimension and it's much related with entrepreneurship and economic growth. Due to the complexity entailed in the calculation of that dimension, we perform a factorial analysis with the different variables available in the survey for each dimension.

DIMENSION	QUESTION ON SURVEY	To measure
TRUST	Generally speaking, would you say that most people can be trusted, or that you can't be too careful in dealing with people? (0 means you can't be too careful and 10 means that most people can be trusted)	Interpersonal trust
	Do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair? (0 means Most people would try to take advantage of me and 10 means Most people would try to be fair)	Social trust
	Would you say that most of the time people try to be helpful or that they are mostly looking out for themselves? (0 means People mostly look out for themselves and 10 means People mostly try to be helpful)	
	Please tell me on a score of 0-10 how much you personally trust each of the institutions... (0 means you do not trust an institution at all and 10 means you have complete trust) …[country]'s parliament? …the legal system? …the police? …politicians? …the European Parliament? …the United Nations?	Institutional trust

Table 1. Selected variables to measure social capital (trust)

These selected variables in order to analyze trust are:

Thus, we have 9 variables that measure several aspects of trust: interpersonal trust, social trust and institutional trust. The variables selected reflect different aspects of trust and measure interpersonal trust, honesty, whether people help each other, trust in various institutions: the country's Parliament, the legal system, the police, politicians, the European Parliament and the United Nations.

We select this dimensions of trust based on the three dimensional approach proposes by Kholyakov, 2009, that says there are three types of trust: "Thick interpersonal trust is the first type of trust people develop in their lives. It is the trust that people have in their family members, relatives, and close friends. Thick interpersonal trust is necessary for developing an optimistic attitude towards others, which makes social interaction possible." The second type is called "Thin Interpersonal Trust is created through interacting with people whom we do not know well and depends on the reputation of either a potential trustee or a trust intermediary. It represents reliance on weak ties and is based on the assumption that another person would reciprocate and comply with our expectations of his or her behavior, as well as with existing formal and ethical rules. Although thin interpersonal trust is always directly associated with high risks – the ever-present possibility of lack of reciprocity, unmet expectations, and uncertainty – it is also able to provide us with more benefits if our trust is reciprocated." Finally, the third type is "Trust in institutions has the potential to encourage voluntary deference to the decisions made by institutions and increase public compliance with existing rules and regulations".

The results obtained after applying the principal component analysis to these variables are two components: one of them is called "institutional trust" and it includes the variables referring to institutional aspects; and the other one is "social trust", covering the three remaining variables (interpersonal trust, honesty, whether people help each other).

Rotated Component Matrix

	Component	
KMO=0,852	Institutional Trust	Social Trust
Trust in the country's Parliament	0,783	
Trust in politicians	0,762	
Trust in the legal system	0,739	
Trust in the European Parliament	0,790	
Trust in the United Nations	0,763	
Trust in the police	0,629	
Honest people		0,797
Interpersonal trust		0,809
Helpful people		0,760
Variance percentage	47,88	14,80

Table 2. Factor loading matrix for the trust dimension

In order to use these variables in empirical approach and subsequent to factorial analysis, the factorial values for each observation are computed. Aggregation on a national level for each wave of survey is achieved by taking the averages of the individual values in the

countries and waves under scrutiny. These values, automatically scaled to unit standard deviation and mean equal to cero, are used for the analysis of the situation of social capital in Europe.

In the next section we use these variables in empirical approach.

6. Empirical approach

Since the appearance of the first works by Solow, 1956, 1957, in which the function of production is related to savings (i.e., capital investment), population growth (i.e., labor) and technological advancement, the number of factors to be considered have increased.

With a similar approach to the aforementioned works that portrays the characteristics of entrepreneurial activity, this paper analyzes the effect of entrepreneurship on growth in European regions. In particular, our model is based on the idea of Audrestsch et al., 2006, and Koo & Kim, 2009, about the importance of adding economically useful local knowledge variables to the classical model of economic growth that only included labor and capital. These variables are: research and development, human capital, entrepreneurship and social capital. In this sense, Westlund, 2006, has launched the hypothesis that stable conditions –of which trust can be regarded as a measure– were of greatest importance for economic growth during the late manufacturing-industrial economy, while the current knowledge economy has a greater need for qualities like entrepreneurship, creativity and tolerance.

The economic growth model is:

$$GDPH_{it} = f(KH_{it}, EC_{it}, HC_{it}, SC_{it}) \quad (1)$$

Dependent variable is Gross Domestic Product per inhabitant (GDPH). Data from Eurostat are quantified in constant Euros prices (year 2000).

SC_{it} represent the variables of social capital cited above (interpersonal trust, social trust derived by PCA and institutional trust derived by PCA).

Selected variables to measure entrepreneurship (EC_{it}) are:

- Gross domestic expenditure on R&D (GDERD) includes expenditure on research and development by business enterprises, higher education institutions, as well as government and private non-profit organizations. This data comes Eurostat and is quantified in constant Euros prices (year 2000)
- Total early-stage Entrepreneurial Activity (TEA) - Percentage of 18-64 population who are either a nascent entrepreneur or owner-manager of a new business, i.e., owning and managing a running business that has paid salaries, wages, or any other payments to the owners for more than three months, but not more than 42 months. This data comes from Global Entrepreneurship Monitor (GEM)
- Entry Density (Entry), calculated as the number of newly registered limited-liability firms in the corresponding year as a percentage of the country's working age population (ages 15-65), normalized by 1,000. Data comes from World Bank Group Entrepreneurship Snapshots (WBGES)

The other variables we use in the empirical approach are the next:

HC: Human capital measured by the percentage of the population, aged 25 to 64, which have completed secondary school or better. Data was taken of Eurostat.

LT: level of employment (all persons who worked at least one hour for pay or profit during the reference week or were temporarily absent from such work). Data was taken of Eurostat.

POP: population (The inhabitants of a given area on 1 January of the year in question). Data was taken of Eurostat.

Estimation Procedure

The analysis of the determinants of growth and convergence of regions implies the possibility of raising a dynamic model that takes into consideration the need to employ instrumentals variables to avoid the problems of endogeneity. This implies the need to use alternatives to OLS estimates, the estimation of model (1) GMM by Arellano and Bond being the most appropriate

$$y_{it} = \alpha\, y_{i,t-1} + \beta' x_{it}^{*} + \eta_i + v_{it} = \partial' x_{it} + \eta_i + v_{it} \tag{2}$$

Where x_{it} and the v_{it} are not serially correlated. We contrast this hypothesis using the m2 statistic tests to compensate for the lack of second-order serial correlation in the first-difference residuals. Tests of specification are applicable in the same context. One of them is a Sargan test for over-identifying restrictions (cf. Sargan (1958, 1988).

Arellano and Bond (1991) suggest that a random sample of N individual time series (yi,... ., YiT) is available. T is small and N is large. The vi are assumed to have finite moments and in particular E(vit) = E(vitvij) =0 for t ·s. That is, we assume a lack of serial correlations but not necessarily independence over time. With these assumptions, values of y falling two or more periods behind are valid instruments in the equations in first differences.

Table 3 results correspond to the estimate of a panel data model with fixed effects, correcting the heteroskedasticity using cross-section weights. Initial GDP per capita has been included in order to evaluate the conditional convergence in the sample analyzed.

The results of table 3 show us that the entrepreneurship variables have a positive and significant effect in GDP growth. Regarding social capital variables are significant the institutional and interpersonal trust, but no social trust. The estimation (1) analyzes the relationship between GDP per capita and use as variable of entrepreneurship entry density and as variable of social capital the interpersonal trust. We can see that human capital, social capital and entrepreneurship are positive and significant, so these variables have an influence in GDP per capital. The estimation (2) use as variable of entrepreneurship Total early-stage Entrepreneurial Activity and the other variables are the same as the previous estimation. The effect of TEA is also positive and significant, but smaller than the entry density. Estimations 3 and 4 used as a variable of social capital the institutional trust and other variables used above. Again, the result indicates that both the institutional trust as the two variables of entrepreneurship have a positive and significant influence in GDP per capita. The estimations 5 and 6 are used more explanatory variables that they include the effect of employment and Gross domestic expenditure on R&D. In this case the variables that measure entrepreneurship (TEA) and the employment are not significant. It is possible that part of the effect of tea is seen reflected in the new variable

that includes investment in R & D. Finally, in the estimation (7) a new variable of social capital is included, social trust, together with institutional trust. Social trust is not significant, as well as the employment. The other variables retain their significant and its positive effect on GDP per capita.

So, in brief, Total early-stage Entrepreneurial Activity (TEA) has a positive and significant effect when the variables of social capital reflects the institutional and interpersonal trust. The Gross domestic expenditure on R&D (GDERD) has an important and positive effect in GDP growth. Finally the third of variables we choose in order to measure the entrepreneurship, Entry Density (Entry), has a positive and significant effect too.

These results confirm the importance of entrepreneurship and social capital in the economic growth.

Dependent variable	Log (GDP/POP)	Log (GDP/POP)	Log (GDP/POP)	Log (GDP/POP)	Log (GDP/POP)	Log (GDP/POP)	Log (GDP/POP)
(2002-2008)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total pool (unbalanced) observations	34	28	28	36	26	26	34
Log $(GDP/POP)_{-1}$	0.438***	0.540***	0.522***	0.541***	0.821***	0.791***	0.217***
Log(K/POP)	0.127**	0.079**	0.156**	0.149**	0.123***	0.127***	0.169***
Log (L/POP)					0.023	0.033	0.002
EC: LOG (GDERD)					0.043**	0.046**	0.172***
EC: Entry	0.013***			0.007***			0.006***
EC: TEA		0.005***	0.002***		0.0008	0.0005	
HC	0.003*	0.003*	0.003*	0.003*	0.003***	0.003***	0.003***
SC : Interpersonal trust	0.450***	0.440***					
SC: Institutional trust PCA			0.079***	0.078***	0.068***	0.068***	0.075***
SC: Social trust PCA						0.017	-0.008
Sargan test[a]		0.193	0.02	0.299	0.101	0.344	0.27
Serial Correlation[b]	0.12	0.69	0.83	0.206	0.591	0.627	0.020
* significant at 1%, ** at 5%, *** at 10%.							
a: p-value of Sargan´s test for over-identifying restrictions b: p-value of test for second-order serial correlation in the residual of the differenced equation							

Table 3. Results

7. Conclusions

In this work we analyze the relationship between entrepreneurship, social capital and economic growth. At the aggregate level, both theoretical and empirical studies acknowledge the need to extend the economic growth model adding variables like R&D expenditure, industrial structure, , university research, social capital and entrepreneurship.

Entrepreneurship and social capital have been considered as key elements in economic growth but still remaining the problem of how they are measured. The empirical applications at an aggregate level do not always use the same variables to measure the factors of entrepreneurship and social capital, as studies of regional or national level depends largely on the basis of available data.

There is not a unique indicator that reflects the multidimensional aspects of social capital, but trust is an acceptable proxy variable. Using the European Social Survey, we have selected different types of trust and we carry a PCA analysis in order to obtain new variables we use in empirical analysis. Two new variables have been obtained "institutional trust" and "social trust". The values are aggregate on a national level and wave, and scaled to unit standard deviation and mean equal to cero to be used for the empirical analysis. These variables, together with interpersonal trust, are used in econometric model.

Entrepreneurship is a factor related to aspects of personal motivation and the development of business initiatives and the socioeconomic environment. The difficulty of obtaining a good proxy at the aggregate level is observed by reviewing the empirical literature.

Regarding entrepreneurship we are aware of the difficulty involved in measuring many of the components of entrepreneurship, but we use different variables that reflect different aspects of these components: Gross domestic expenditure on R&D, Total early-stage Entrepreneurial Activity and Entry Density.

Most of the empirical findings point to a highly positive relation either in countries or regions and in this paper our main conclusions are consistent with this background.

We have confirmed the positive and significant relationship between entrepreneurship, social capital and economic growth.

The effect of "interpersonal trust" and "institutional trust" are more important than "social trust". So, it would be necessary that the public policies invest in these types of trust in order to promote economic growth. Increasing trust in institutions is fundamental to economic growth, it provides an improvement of the socioeconomic environment, which is essential to promote risk-taking by economic agents

It is also essential that the government invest in research and development, because public spending on research and development is shown as an important element in economic growth.

Finally, it is necessary to facilitate the creation of new businesses since the two measures that reflect this activity (Total early-stage Entrepreneurial Activity and Entry Density) also show a positive relationship with economic growth.

We will continue working on this line to take into account the other two dimensions of social capital and other measures of entrepreneurship. We believe that social networks and social norms may also be important for entrepreneurship and economic growth and we hope to develop in the future more tests in order to confirm this relationship.

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14

Types of Entrepreneurial Action and Societal Provision for the Future: An Inquiry

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1. Introduction

Let us explore the ways in which societal provision for the future is affected by different types of entrepreneurial action. While individuals provide for the future through the act of saving, private entrepreneurs employ the resources provided by savers to profitably maintain the resource base that makes future consumption possible.[2] The maintenance of this resource base represents capital maintenance on the part of entrepreneurs. Entrepreneurs are motivated to maintain capital by the urgency of sustaining of future enterprise income (Brätland 2006, 30). This income is earned through the competitive process of better serving consumers through the sale of desired goods and services. Moreover, entrepreneurial income is critical in providing the means by which salaries and wages are paid and, in this sense, represents a critical provision for society's future. This happy symbiosis is made possible by institutions that support private property and voluntary monetary transactions.

Can these fundamentally entrepreneurial institutions have broader potential implications in addressing society's concerns about the future quality of life? The entrepreneur can only function effectively in a market economy in which business enterprises are able to obtain secure rights of private property and in which transactions are conducted in a commonly accepted medium of exchange. To the extent that these conditions are realized, private entrepreneurial enterprises can play a critical and decisive role in (1) warding off what some see as global resource exhaustion, and (2) maintaining what is currently viewed as public infrastructure.

But with respect to replenishing exhausting resources and the maintenance of infrastructure, the operative institutions are not designed to support this entrepreneurial process of

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[2] A reviewer of this paper has noted the need to clarify the use of the term *resources*. In the first part of the paper dealing with extractive resources, the use of the term is refers to those extractive resources commonly thought to be 'exhaustible.' However, in the latter part of the paper dealing with issues bearing on infrastructure maintenance, the intended use of the term 'resources' could include strategic capabilities that may emerge from complementarity uses of factors of production (Mathews 1996, 88-92).

providing for society's future. This inquiry reveals that attenuated and constrained property rights represent impediments to resource renewal (Brätland 2006, 34-35). Also, governmental institutions and career oriented entrepreneurial activity on the part of legislators and bureaucrats can be detrimental to the attainment of infrastructure maintenance. Moreover, these latter institutions and activities are obstacles to the role that entrepreneurial action can play in their attainment.

The paper addresses the following question: can the private entrepreneur play a more decisive role in addressing society's long term concerns for the future? In answering this question, this paper explores the broader potential social benefits of private entrepreneurial capital maintenance activities and the institutional impediments that currently thwart the capacity of market activity to perform that beneficent role. Societal provision for the future is found to be contingent on the degree to which the relevant resources can become privatized income earning property. The monetized income stream assures their maintenance and replacement by private entrepreneurs.

2. Resource exhaustion or entrepreneurial capital maintenance?

The role of extractive resources in the economy has been obscured by a myth of exhaustion. By looking at resources from a global perspective, the certainty of exhaustion would seem to be self evident. Extractive resources must exist in fixed ultimate supply just as the crust of the earth itself is finite. However, viewed at the microeconomic level, different insights begin to emerge. Some writers have correctly noted that at the microeconomic level there is a replacement process that occurs as individual deposits are depleted. However, there has been little attention paid to the fundamentally entrepreneurial nature of this process and the way in which it is, in essence, a matter of capital maintenance for the individual extractive enterprise. A fuller understanding of this capital maintenance process highlights one of the ways in which the entrepreneur is critical to societal provision for the future. However, this understanding also reveals the extent to which man made institutions are impediments to this particular aspect of capital maintenance.

2.1 The neglected role of the entrepreneur in resource renewal

The entrepreneur does not appear in the economics of exhaustible resources. This absence is implicitly evident in the common assumption that a pre-defined global stock of a particular the extractive resource is fixed. Moreover, the economic theory of exhaustible resources is cast in an equilibrium mode in which the entrepreneur does not exist in any meaningful sense. But in reality, the economics of exhaustible resource availability is fundamentally entrepreneurial. In an entrepreneurial world, the notion of an aggregate fixed stock of a resource has no coherent meaning. Extractive enterprises are by definition entrepreneurial and the known extractive deposits under the enterprise's management are among the capital goods employed by the firm to maintain or increase the firm's income (Brätland 2008, 386-393). Hence, the feared phenomenon of aggregate exhaustion has no particular validity in a market environment in which entrepreneurs, with secure access to exploratory ventures seek to maintain enterprise capital by replacing depleting deposits through investments in exploration and development of new deposits. The efficacy of this process is demonstrated by the fact that proven reserves of virtually all extractive resources are higher

today than they were 50 or even 100 years ago. In those rare instances in which reserves have not increased, the reason is found in the fact that the resource is no longer demanded.

Entrepreneurial replacement of exhausting resources is one example of capital maintenance for the extractive enterprise (Brätland 2008, 376). It occurs routinely because gradual depletion of deposits reduces the operating revenue margins of extractive enterprises. Since capital maintenance is always about maintaining enterprise income, the firm is constantly replacing its depleting resource deposits through acquisition of exploration rights, discovery and development of new deposits. Hence, replacement of resource deposits is only contingent on the prospective profitability of doing so. In this sense, the process of resource replacement is not dissimilar from the conventional replacement of depreciated capital goods. But this reality means that anticipated shortages of extractive resources reflected in prices would be a principal inducement of deposit replacement. The means by which resources are replaced emerges out of the entrepreneur's judgment of how enterprise income is affected by alternative prospective replacement strategies. This resource-replacement process is fundamentally entrepreneurial and is dependent upon access to land and managerial flexibility in maintaining capital and entrepreneurial income.

2.2 Strategies of capital maintenance by extractive enterprises

Social concern over so called exhaustible resources has been conditioned by the notion that there is a global stock that once depleted is gone forever (Bradley 2007, 87). However, in reality, the idea of an existing global stock of an extractive resource is really meaningless. The actual relevance of depleting stocks is found in the actions and strategies of entrepreneurs to maintain enterprise capital. Alternative strategies to maintain entrepreneurial capital would include a comparison of the expected present worth of income that may accrue over differing time horizons. In making these comparisons, the entrepreneurial enterprise would make subjective judgments of the respective risks and uncertainties associated with each strategy. At any moment in time, the extractive firm has numerous investment opportunities that involve immediate efforts to explore, develop and extract resources. The following investment strategies would be a form of capital maintenance that reflects societal provision for the future:

1. Engage in entrepreneurial delay with respect to (a) acquisition of additional exploration rights (leases), (b) additional exploratory efforts on owned leases,[3] (c) investment in development on owned leases, and (d) production of the resource from developed leases already owned by the extractive enterprise (Brätland 2008, 390).
2. Extract deposits but maintain capital by reinvesting proceeds in competing capital goods offering a greater rate of return but which *may not* be directly related to the extraction of resources (Brätland 2008, 392).

As noted, these strategies for capital maintenance involve an uncertain time profile of prospective revenues and financial outlays which means that choices made from among these options will involve due allowance for time preference and uncertainty. Moreover, opportunity costs of these alternatives will be subjective and unique to the individual

[3] An exploratory effort can be viewed as successful if the firm making the discovery considers it to be a realistic candidate for eventual development and production.

extractive firm. In fact, for the extractive firm making a choice of one of these strategies, the opportunity costs will necessarily include a subjective reckoning of the entrepreneurial income thought to be obtainable from the next most profitable relinquished strategy (Buchanan 1969, 49-50).

A few additional words of clarification may be important with respect to these options. Firms engaged in extraction are always in search of new and more profitable deposits to replace depleting extractive-resource deposits. In choosing a capital maintenance strategy, the extractive firm compares the marginal expected opportunity cost of finding, developing and exploiting *new* deposits with the marginal expected opportunity cost of developing and extracting an *existing* known deposit. If the former costs are less that the latter, a decision to find new deposits promises a greater yield in terms of entrepreneurial income. The extractive firm would be inclined to pursue this strategy if the quality (lower cost) of new deposits were superior to those already under the firm's immediate control. One important aspect of this strategy is that it would reflect a decision on the part of the extractive firm to deliberately delay exploration or development of the property and resources to which it already has access on existing leases. In other words, the firm would be exercising entrepreneurial latitude in the timing of exploration or development on its existing leases. Also the extractive firm could purchase from other firms leases containing discovered but undeveloped deposits and then immediately embarking upon development and extraction of these deposits. But again, such a strategy may reflect a decision to exercise entrepreneurial delay with respect to prospects on leases already under the firm's control. Deposits already under the firm's control may be low-quality, high-cost properties in which case delay may well be the best course of action.

Delay as noted in strategy **(1)** would commonly be premised on an expectation that the capital value of a project would be greater if it were delayed until some time in the future. While such deliberate delay could be based on expectations of longer-term rising trends in the price of the resources itself, it may also reflect the extractive enterprise's efforts to manage costs of a prospective project. Delay may enhance the income of the extractive enterprise by lowering the opportunity costs associated with the respective stages of investment in a planned project. In particular, such delay may be helpful in avoiding cost increases from bottlenecks that are likely to be encountered in regulatory efforts to expedite exploration and development. [4] In the context of capital maintenance by the extractive firm, any reduction in cost may significantly enhance prospective entrepreneurial income and in the process make provision for the future by conserving resources. But again, in a disequilibrium setting, such delaying actions would be undertaken strictly on the basis of entrepreneurial judgments.

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[4] As this insight applies to production in general, see Alchian (1959, 23-40). Alchian's observation is borne out in the research on leasing of Federal offshore lands on the Outer Continental Shelf (OCS); Walter Mead and his colleagues note the following:...

"If development of the resource is required in a short period of time, bottlenecks would surely develop in acquiring the skilled labor and specialized capital equipment ... by allowing more time for lease development, the labor and capital equipment markets can respond to increased demand for these inputs with increased production at prices lower than those that would prevail under more pressing time constraints" (Mead et.al. 1985, 110-112).

But an extractive enterprise may choose delay for reasons bearing largely on volatility in the price of the resource. The different stages of the production process accord ownership of successive series of capital goods each of which represents a type of investment 'option.' Ownership of any investment option represents a right but not an obligation to proceed further with the next in a sequence of investment opportunities. In this case, this sequence of capital goods includes (a) exploration rights for particular lands, (b) discovered resources (c) developed resources, and (d) extracted resources ready to be sold. Each of these capital goods has a market value. Volatility in the price of the resource itself would be reflected in volatility in the market worth of each of these capital goods. The volatility in the price of the resource would enhance the market value of each of these four capital goods but this increase in value is contingent on the extractive firm's ability to delay action on each next phase of investment. For example, in undertaking investment in exploration, the capital good sought would be *discovered resources*. These discovered but undeveloped resources are marketable and have a price and represent a type of option to acquire developed resources. And, in turn, by committing to subsequent investment in development, the entrepreneurial enterprise would be seeking capital goods in the form of *developed resources*. At each successive stage, the extractive firm will find it advantageous to delay any further commitment to the project until evolving market conditions reveal more information about the future and the potential profitability of the next investment option.[5] This advantage is reflected in an enhanced market value of each of the capital goods and the extraction project as a whole (Dixit and Pindyck 1994, 4: Cowen 1997, 26). Hence, decisions to delay are critical in maintaining the capital value of the extractive firm and in conserving affected resources.

Strategy **(2)** emphasizes the point that capital maintenance for all entrepreneurial enterprises requires investment in those capital goods that offer the greatest likelihood of attaining or maintaining profitability. The strategy highlights the reason that cost minimization in the replacement of physical capital goods is not necessarily equivalent to capital maintenance. The real motivation for investment to maintain capital is not to minimize cost of replacing particular capital goods but to increase income (Hayek 2007 [1941], 277-278). In the case of strategy **(2)**, the two may be quite different since 'cost' minimization (or expense minimization) does not take into account returns that could be achievable by investment in capital goods that may not be directly related to the firm's historical specialization.

Such a shift in the physical composition of capital goods sought in capital maintenance could be prompted by newly revealed changes or previously unrecognized entrepreneurial opportunities in other markets. F.A. Hayek captures the entrepreneurial motivations for such shifts in investment: "… when we proceed to consider in detail the reaction of capitalists to unforeseen changes, … we go back to the *rationale* of maintaining capital intact, the quantity of capital drops right out of the picture as a directly relevant magnitude. Its place is taken by a direct consideration of the size of the income streams that may be expected at different dates" (Hayek. 2007 [1941], 280): italics in the original text). It is in this sense that a focus on the physical replacement of resource deposits conveys a misleading interpretation of the investments necessary to maintain capital for the extractive firm. But the converse of these preceding observations is that investment by all firms, within or

[5] Interestingly enough, each successive stage of investment in the project imparts a successively higher market price to the project itself since these properties are traded between firms.

outside of the extractive industries, will be sensitive to any anticipated higher returns that may be achievable as a consequence of anticipated scarcities of particular extractive resources.

The extractive firm may be constrained in its choice of replacement investments by realities of 'capital-good complementarity.' An extractive enterprise's grouping of capital goods would normally be in the form of resource deposits or assets related to the extractive activity such as processing or transportation. If the enterprise were to invest in capital goods not necessarily related to extraction, it would be mindful of the degree to which such capital goods were complementary to assets comprising its existing operations. The most important issue would not necessarily be an issue of physical complementarity of capital goods. Expected profitability would always establish *economic* complementarity and would supersede issues that may bear on physical complementarity of capital goods already within the enterprise. The central concern for the enterprise is the extent to which the particular investment alternative promises the largest addition to entrepreneurial income for the enterprise as a whole (Brätland 2008, 393). But while the individual enterprise is focused on future income, the societal consequence is that resources are conserved for the future.

2.3 Impediments to entrepreneurial capital maintenance by extractive firms

Although capital maintenance refutes the exhaustion myth, this refutation hinges on access to lands, entrepreneurial latitude in managing resources, and secure rights of private property. But institutions of governmental control and jurisprudence hinder entrepreneurial actions of extractive firms striving to maintain capital. These hindrances include: (a) foreclosure of land access because of government control of mineral lands; (b) curtailment of entrepreneurial latitude arising from court-imposed covenants that define and enforce obligations to surface owners; and (c) in the case of petroleum, the extractive firm's inability to acquire full control and ownership of reservoirs that it has discovered. The first of these impediments bears on access to land and the latter two impede extractive firms' ability to manage resources as capital assets.

- Land access by entrepreneurs foreclosed by government ownership

Maintenance of entrepreneurial income requires a replacement of the capital goods critical to continued operation within the same industry. This entrepreneurial process requires that the firm have access to new resources that may be extractible at lower cost. Resource replacement is usually dependent upon leasing arrangements between surface owners and entrepreneurial firms seeking to find and develop new deposits. Through an unhampered market process, resources tend to gravitate to their highest valued use. The one obstacle facing the entrepreneurial extractive firm in its efforts to maintain capital is that properties are controlled by landowners that totally foreclose access rights to extractive firms. These owners are invariably governments that have merely nationalized lands through acts of political power without any actions establishing legitimate ownership (Bradley 1996, 76). Once these lands are under the political control of governments, access is established through a political process. In modern democracies, this conflict is manifested in political struggles to marshal the power of legislatures to assure certain politically popular uses of lands and foreclose less popular uses.

This political selection of popular uses of nationalized lands is one of the more pernicious features of democratic processes. Once lands are nationalized, alternative uses of these lands are chosen with the intent of appeasing 'stakeholders.' For the purposes of this inquiry, the important question is: who is a stakeholder with respect to the use of public lands? Unfortunately, political self-selection is the only criterion used to establish who has a legitimate 'stake' in decisions on alternative uses of government lands. Stakeholders are voters with diverse and subjective views on what for them constitutes an environmental amenity and the way in which they are affected by its presence or absence. But this political process takes the focus off legitimate environmental issues and, instead, motivates allocative decisions on the basis of the political placation of certain self-selected political constituencies (Brätland 2004, 528-532). This participatory process has little to do with rational environmental policy or the commitment of resources to their highest valued use.

Political advocates of policies that foreclose access are unencumbered by the opportunity costs of such sanctions. In this sense, choosing and hence forsaking the value of the next most highly valued opportunity never impinges upon the actions of non-owning bureaucrats, politicians or environmentalists seeking to foreclose certain uses of government lands. Problems of resource exhaustion and a failure of firms to replace resources deposits can arise from the fact that the weighing of opportunity costs by political constituencies plays virtually no role in foreclosing lands to exploration and development. In bearing little of the opportunity costs of political foreclosure of access, self-selected stakeholders have incentives to become extremists in exaggerating preferences and overstating claims. Whatever the benefits of foreclosing exploration and development may be, these benefits are provided as 'free goods' through the process of political control that forecloses actions that provide for the future.

- Entrepreneurial latitude foreclosed by obligations to surface owners

The preceding discussion also highlights the fact that the extractive firm must have ample timing latitude if resource replacement is to be successful. But an early juridical declaration of surface owner rights has tended to preclude this entrepreneurial latitude in maintaining capital. An interpretation of the land surface owner's rights to subsurface minerals was first enunciated by the British jurist, William Blackstone: "land hath also, in its legal specification, an indefinite extent, upwards as well as downwards....downwards, whatever is in direct line between the surface of any land and the center of the earth....if a man grants all his lands, he thereby grants all mines of metal and other fossils. This [principle of ownership] is incorporated in the fundamental law of the land" (Blackstone. 1983, 18; also quoted in Bradley 1996, 70).

The modern day implication of this interpretation of the surface owner's rights is that the surface owner is entitled to a fixed percentage royalty on the gross proceeds from the sale of the extracted mineral.[6] But under this entitlement, the surface owner and the extractive enterprise are confronted with mutually and fundamentally incompatible objectives.

[6] Usually the surface owner is the also the owner of royalties; however, situations exist in which royalty streams are sold as investment assets. In other instances, the surface owner's property rights may not include mineral rights in which case presumptive royalty obligations are owed to the owner of those rights.

Uncertainty and economic change mean that entrepreneurial latitude is always critical in managing capital goods including mineral leases. The management of mineral leases as capital goods requires timing of lease activities so that capital value of entrepreneurial income is maximized. However, the fixed percentage royalty on gross proceeds to which the surface owner is 'entitled' means that present value of royalty income is almost always diminished by entrepreneurial timing decisions on the part of lessees. Hence, any the surface owner will want to see the extraction operation managed so that royalty revenue is captured as quickly as possible (Brätland. 2001, 694-695).[7] In brief, entrepreneurial timing of activity on the part of the lessee is critical to the maintenance of capital but is anathema to surface-owner interests. But the surface owner's financial rights are protected by court-imposed implied covenants that foreclose any action or lack of action that delays or diminishes the surface owner's receipt of royalties. Hence, by not allowing entrepreneurial latitude in the timing of these activities, the covenants reduce the net present value of mineral resources and impede the ability of the extractive enterprise to maintain capital and conserve the resource for future use (Brätland 2001, 694).

- Blockage to entrepreneurial ownership of petroleum discoveries

The Blackstone declaration of surface ownership rights presented difficulties in its application to *in situ* petroleum and the unusual characteristics of petroleum deposits. The migratory nature of petroleum means that resources can be extracted from the reservoir in a manner that draws the resource from beneath the land of several different surface owners. Hence, a *rule-of-capture* has evolved such that a discovered reservoir *never becomes a capital good to be managed by the entrepreneurial firm.* The rule of capture applies irrespective of the fact that the petroleum resources may have migrated from beneath another surface owner's property.

In the case of petroleum lands, the application of Blackstonian Principles has not meant that the owner of the surface also owns subsurface petroleum (Bradley 1996, 60-62). However, it does mean that the surface owner is always entitled to a percentage share of gross production or a percentage share of the gross sales proceeds of production. Again, to this end, the courts have imposed the covenants mentioned above to protect the financial interests of the surface owner. The consequence of the covenants is that the royalty-owning surface owner essentially precludes the management of petroleum leases as capital assets which, in turn, retards the entrepreneurial replacement of the resource. In so doing, the implied covenants dissipate entrepreneurial income by compelling exploration, development and production on expedited schedules that may be inconsistent with the conservation of the resource. Moreover, mandates to undertake these activities at an earlier moment in time means that the opportunity cost associated with these activities will, in almost all cases, be increased (Mead, et. al. 1985, 110-112). Under circumstances unimpeded by the covenants, a decision to expedite exploration or development would only be made if expediting these investments were to increase the estimated capital value of the project. The corrected sentence should read: Clearly any attempt to impose artificial schedules on decision makers can only create confusion, chaos and economic waste**.**

[7] The surface owner's economic interests are defined by the attainment a rate of revenue recovery that maximizes the present value of the royalty-receivables revenue stream. Delay only diminishes this present value (Brätland 2001, 694-695).

The conflict, ethical breeches and implied covenants devolving from current property law would not exist if the discovered petroleum deposit were to become the sole, exclusive property of the extractive enterprise making the discovery. In this latter case, ethically and functionally legitimate ownership would be achieved by applying the principle of 'original appropriation;' this principle would supplant the Blackstonian perspective on the scope of the surface owner's property rights.[8] Of course, in this situation, some consent to surface access would still be required from a surface owner to make exploration possible.[9] Court-imposed covenants would no longer impinge on the discovering firm's ability to engage in entrepreneurial timing in the scheduling of investments in the project. In this case, the surface owner would have no contingent claim on production. This situation would represent the normative ideal from both an allocative and ethical perspective.

Secure access to exploratory prospects is impeded that by governmental regulation and control of lands. While governmental constraints on land use are rationalized as actions required to serve the environmental interest of the public, their imposition is a key stumbling block to this entrepreneurial role of resource replacement. With full rights of private property, those parties motivated by environmental concerns could pay a competitive price for committing lands to alternative uses. Such parties may purchase lands in question or may pay owners of resource properties to refrain from exploration and development. In either case, the party pursuing environmental objectives would be paying an amount at least equal to the opportunity cost of forsaking development (von Mises 1998, 650-651). In essence, secure property rights are critical to a rational provision for the future.

3. Governmental v. private entrepreneurship in infrastructure maintenance

One of the fallacies of infrastructure maintenance is the implicit presumption that a major part of this infrastructure must be publicly controlled and maintained by government.[10] Having made the financial outlay for the facilities that comprise public infrastructure, government takes on the responsibility of maintaining public infrastructure. Unfortunately, there appears to be a pattern of historical inevitability to the neglect of public infrastructure that is endemic to its governmental provision and management. The American economist, Felix Rohatyn, has noted the widespread phenomenon of public infrastructure decay (Rohatyn 2009, 1-5). But, save for the occasional business failure, there is clearly no such pattern of neglect with respect to *private infrastructure*. What accounts for the contrast in patterns of maintenance? One answer may lie in the unexamined presumption that the

[8] This proposal was first put forward by Murray Rothbard (1998 [1982], 71-72). A version of the Rothbard proposal has been provided by Robert Bradley (1996, 69-74).

[9] In most cases, a single surface owner would not be able to extort a royalty concession from an exploring entrepreneur establishing ownership of a subsurface discovery. Directional drilling would be permitted such that a particular subsurface structure could be accessed from a multiplicity of surface locations. Competition between surface owners would weaken the bargaining power of any single surface owner (Bradley 1996, 72).

[10] The assumption of government's maintenance responsibility no doubt arises from the notion that the services these facilities yield are public goods that cannot be provided privately. However, evidence suggests that public infrastructure's services can be provided through private entrepreneurial undertakings Niskanen 1971; Wollstein 1974; Foldvary 1993, 1–15; Rothbard 2004, 1029–41; Hoppe [1993] 2006, 7; Block 2009, 232).

facilities comprising public infrastructure can be viewed as *public capital* and that a government can act in a sufficiently unified, coordinated way to somehow mimic the action of private entrepreneurs in maintaining this 'capital.' If not, a compelling case be made that that this public capital should be privatized and maintained by private entrepreneurs. But a second answer is that legislators and bureaucrats who are instrumental in providing and expending funds for infrastructure maintenance may employ their own entrepreneurial strategies in assuring the attainment of their own career (Loasby 1976, 190). These entrepreneurial actions may well divert attention and resources away from infrastructure maintenance. These officials include legislators and bureaucrats who view their own capital maintenance as those entrepreneurial actions that strengthen and promote their own careers.

3.1 Viability of government action to mimic entrepreneurial maintenance

Assume that the government is able to act as a unitary entity making maintenance decisions with the intent of 'maintaining total public benefits.' The adjective 'unitary' is used here simply to mean that the government's plans are formulated and undertaken as though prompted by one mind. In other words, the assumption is made that the government *is not* comprised of individual bureaucrats and legislators with self-seeking but frequently conflicting aspirations. Rather, the government is assumed to act in a unified way to maintain public infrastructure on the basis *of some attempted imputation of the net benefits that accrue to the public*.[11] The emphasis on maintaining net public benefits is critically important because it represents *the only* legitimate analogue of the entrepreneur's income.

Given the above assumptions, can public infrastructure be legitimately viewed as a form of 'public capital?' Is this label apt? In an economic sense, the legitimate concept of capital is premised on the ability of an acting entity to manage a *combination of resources* with the intent of earning an income for an *enterprise as whole.*[12] Private property and monetary exchange afford the entrepreneur this ability. Hence, the aptness of the label, 'public capital,' hinges directly on the extent to which public infrastructure can be managed in a way that is functionally analogous to the maintaining of private capital. For the private entrepreneur, capital maintenance is ultimately about actions undertaken to maintain or enhance expected enterprise income. But what would be the counterpart of enterprise income for a government in attempting to establish requisite maintenance of public infrastructure?

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[11] This assumption is only made for purposes of discussion and not with the intent of defending its legitimacy or feasibility. The assumption represents what Ludwig von Mises refers to as 'hypostatization. He notes: "The worst enemy of clear thinking is the propensity to hypostatize, i.e., to ascribe substance or real existence to mental constructs or concepts. … Only individuals act." See: Ludwig von Mises ([1962] 2006, 70-71) [1962].

[12] Joseph Schumpeter observes: "capital is then an agent in the exchange economy. A process of the exchange economy is given expression in the capital aspect, namely the transfer of productive means to the entrepreneur. There is therefore in this sense only private and no 'social' capital" ([1934] 1959, 122–23). Schumpeter's use of the word "social" in this context would be more accurately read as "public." Although Schumpeter's reference to social capital does not necessarily refer to public infrastructure as such, his intent is clearly to emphasize the idea that capital is inherently in the province of the entrepreneur who functions in an environment of private property and implied freedom of exchange.

Metaphorically, the income counterpart would be the total benefits yielded by all components of infrastructure *as a totality*. The maintenance issue arises from the fact that the benefits of infrastructure yield no appropriable sales revenue that would serve as guide to maintenance.[13] Hence, the absence of a comprehensive and appropriable future monetary income means that the government is left without a unified guide in planning maintenance expenditures for the disparate facilities under its purview.[14] The government is left with no means of reckoning a rational tradeoff between maintenance projects. Another aspect of this problem is that there is a 'disconnect' between marginal intended use of infrastructure by the public and any planned maintenance that may be considered by the government. Users of individual facilities in public infrastructure and the governmental entity responsible for maintenance are necessarily different acting entities. To summarize, the following inferences highlight the inability of governments to mimic entrepreneurial maintenance and, hence, underscore the misleading nature of the 'public capital' label for public infrastructure:

- No non-political means are available for a government to weigh the relative tradeoffs of investment in *new* total infrastructure and maintenance of *existing* infrastructure as a whole.
- Also, the benefits of total infrastructure maintenance are not appropriable by those bearing the economic burden of total outlay.
- Means are unavailable to reckon the changing tradeoffs between current investment in infrastructure, as a whole, and the prospective future benefits.
- In general, means do not exist for government decision makers to reckon the *relative* tradeoffs between maintenance of some existing facilities of public infrastructure as opposed to maintenance of other facilities.
- Maintenance decisions for public infrastructure are based largely on physical deterioration with little rational reckoning of benefits or opportunity costs involved; the result is that some complementary facilities are neglected that should be maintained while other facilities that should be abandoned are maintained.

As these inferences suggest, an implicit concern is the maintenance of the functional complementarities that exist between different components of the infrastructure. If tolls are not collected for each such facility, the government is left with an imputation problem that would tend to preclude a balanced maintenance that preserves these complementarities. No calculational means of charging tolls that would account for the complementarities existing between the services yielded by groupings of such facilities. The critical issue is the fact that even with the collection of user fees or tolls on *some* facilities, physical deterioration would be the only inducement for the maintaining complementarities (Brätland 2010, 41-42).

[13] In his *Wealth of Nations,* Adam Smith wrestled with the practical aspects of financing and maintaining public infrastructure. He was well aware of the importance of privatization as a means to infrastructure maintenance. But Smith seems to have been unable to arrive at a consistent and coherent perspective with respect to public policy. In having discussed the requisite incentives for maintenance achievable by privatizing a canal in France, he then proceeded to discuss the incentives for neglect that would be consequent to a similar policy with respect to 'high roads' in England (Smith 1982 [1976], 724).

[14] While in some narrow instances, tolls can be collected for marginal use of some facilities, the problem of imputing maintenance tradeoffs for all components of public infrastructure still remains.

Hence, there is no reason to believe that government could ever mimic the actions of private entrepreneurs in the maintenance of infrastructure.

3.2 Neglect arising from bureaucratic and political entrepreneurship

If governments, considered as institutions, are unable act as unified decision making entities in maintaining infrastructure, how effective are the actions of individual legislators and bureaucrats in achieving this objective? Evidence suggests that legislators and bureaucrats act in an entrepreneurial manner in fostering their own careers (Brätland 2010, 42-43). In other words, for legislators and bureaucrats, careers become the capital they maintain or enhance by the personal strategies they pursue. But what are the consequences of such behavior for the maintenance of infrastructure? Since bureaucratic and political entrepreneurs are endemic to the workings of government institutions, the maintenance of bureaucratic and political capital becomes a source of infrastructure neglect.

- Perverse consequences of political entrepreneurship by legislators

For the legislator, entrepreneurship refers to the time-structured strategies employed in pursuit of political careers. "Capital maintenance," in this context, refers to the actions that legislators take to maintain their power, influence, and job satisfaction. In maintaining this metaphorical capital, legislators may direct their actions toward objectives largely or totally divorced from public-infrastructure maintenance. In their pursuit of personally chosen ends, they must husband tools or metaphorical capital goods to implement their plans. The metaphorical capital goods that legislators must employ depend directly on the respective constituencies they must serve and on their own career objectives. These capital goods may be intangibles that involve subjective judgments about the future actions required to achieve career ends.

Neglect of public infrastructure may arise from the legislator's failure to consider the complementarities between the two political capital goods—power and re-electability (Brätland 2010, 45). This neglect may be reflected in the legislator's failure to assure budget funding for the maintenance of existing public infrastructure in his district. For example, such neglect may be prompted by a legislator's focus on the construction of *new* infrastructure. Although the legislator may neglect budget funding for *existing* infrastructure maintenance, he may have established sufficient power and re-electability to remain in office and pursue legislative objectives unrelated to infrastructure maintenance. But such neglect may also arise from the legislator's shortage of power, reflecting his failure or inability to generate support in the legislature for budgets that will finance infrastructure maintenance in his home district. This power shortage may be manifested in a failed logrolling negotiation or a lack of sufficiently strong alliances in the legislature. The consequence may be the neglect of highways, streets, sewerage systems, and bridges in the legislator's home district. If the legislator lacks seniority in the legislature, this neglect may occur even though he is a well-intentioned champion of efforts to maintain these infrastructure facilities.

A legislator's time preference is also critical in the timing and allocation of his two political capital goods—power and re-electability. One consequence is that any time structured resource allocation for maintenance that derives from his actions may be totally divorced

from any time cycle of deterioration or loss in usability that the public infrastructure facilities may experience (Brätland 2010, 46). Hence, in the absence of an overt threat to his reelection, the legislator's actions over time may well result in chronic neglect of such facilities.

- Bureaucratic entrepreneurship as source of infrastructure neglect

Like political capital, bureaucratic capital is a metaphor that can shed light on public officials' entrepreneurial actions or inaction over the course of time. The entrepreneurial bureaucrat of concern here is the senior executive with some direct or indirect responsibility for public infrastructure and with the power to affect how a bureau allocates its resources. As in the case of the legislator whose capital takes the form of a career, in this case the metaphorical capital in question is the bureaucrat's career. The bureaucrat's view of his career may take into account several subjectively defined sources of appeal.[15] In any case, the career is the overarching metaphorical capital that governs the bureaucrat's entrepreneurial actions and the use of the resources at his disposal. This metaphorical capital suggests a time structure of maintenance that may be at odds with concerns over the maintenance of public infrastructure.

Although the bureaucrat is not an elected official, he must realistically face his own benefactors, constituencies, and power blocs in managing the capital defined by his own career aspirations. These parties include: appointing officials to whom the bureaucrat reports; sponsoring legislators; subordinates in the bureau;[16] that segment of the public most sensitive to the bureau's activities (that is, self-selected "stakeholders"); and prospective future nongovernmental employers. The latter group in this list would especially concern appointed executive bureaucrats whose long-term career objectives may lie outside of government.[17] The bureaucrat's ability to deal with and satisfy these constituencies' determines the nature of the metaphorical capital goods he must employ in managing the capital represented by his own career.

What are these metaphorical capital goods? The question pertains to the resources he must employ to succeed. The capital goods required to give the bureaucrat at least the appearance of success include: (1) budgets, (2) reputation, and (3) control. Although these aspects of

[15] William Niskanen mentions salary, perquisites of office, public reputation, power, patronage, the bureau's output, ease of making changes, and ease of managing the bureau (1971, 38). Anthony Downs gives a similar list, including power, income, prestige, security, convenience, loyalty, pride in work, and desire to serve the public interest (1967, 2). Both of these economists take a rather static approach to defining the arguments of a utility function in that they do not emphasize the time-structured strategies that may define the bureaucrat's actions.

[16] Although the bureaucrat has managerial authority over subordinates, he is unlikely to experience sustained success in his position if he ignores the career aspirations of those under his organizational control.

[17] James Q. Wilson observes that the appointed bureaucrat's career may involve relatively brief stints in a particular government position. For the executive bureaucrat, longer-term career goals would no doubt involve employment in the private sector and perhaps in academic institutions. Even though the appointed official's actions may not directly affect the interests of such prospective employers, the official must at the same time be sensitive to reputational issues connected with his actions in public office (1989, 209).

employment do not necessarily include everything that the bureaucrat might want in a particular governmental position, they comprise the resources required to establish the appearance of success. These metaphorical capital goods present the bureaucrat with both complementarities and trade-offs in defining and constraining the actions that best enhance his longer-term career aspirations (Brätland 2010, 46-47). In considering these actions, how will infrastructure maintenance weigh into the bureaucrat's employment of these metaphorical capital goods? The bureaucrat will employ these capital goods to foster the maintenance of public infrastructure if such action maintains or enhances the prospects of attaining the goals that define his career ambitions. Otherwise, passive neglect of infrastructure may well be 'rational' for the bureaucrat.

But there would be mitigating concerns for the bureaucratic entrepreneur. The bureaucrat must be sensitive to the general public in considering programs of infrastructure maintenance that the bureau might undertake. Infrastructure neglect might conceivably draw unfavorable press, affecting the bureaucrat's reputation among the general public. However, unless the affected infrastructure involves roads or bridges, public reaction to neglect may well be tepid or nonexistent. In short, given the bureaucrat's possible motivations, larger government and expanding public budgets do not necessarily imply the availability of more resources for maintenance of depreciating infrastructure. If the relative neglect of infrastructure occurs without significant negative feedback from the public, the bureaucrat may perceive greater career advantage in pursuing ventures that are more likely to draw favorable reaction from appointing officials and sponsoring legislators. For example, new infrastructure may offer the bureaucrat more reputation-enhancing ways of dealing with his constituencies.

Although new infrastructure projects find favor with the constituencies that the bureaucrat must please, they tend to crowd out funding for maintenance of existing infrastructure. The bureaucrat may not be particularly concerned with the net social benefits of one infrastructure project as opposed to another competing project (Brätland 2010, 48). He will not reckon opportunity costs in terms of forgone or relinquished social benefits associated with another, competing project. Moreover, as he chooses his action, he is **unlikely** to employ a planning horizon congruent with the realization of any benefits afforded by publicly supported maintenance projects.

3.3 The possible role of private entrepreneurs in maintaining infrastructure

Entrepreneurial privatization of infrastructure would have several *implicitly interrelated but critically distinct features.* For example, entrepreneurial enterprises would not be dependent on the vagaries of governmental appropriations in attempting to allocate investment funds for maintenance of facilities. Also, private enterprises would not have maintenance plans stifled by officials beholding to political pressures and aspirations of public officials. Choices between competing investments in infrastructure would not be prompted by the influences of certain politically powerful constituencies. Moreover, schedules of infrastructure maintenance would not be disrupted by the legislative and bureaucratic delays common in political decision-making.

We can glean an important insight into public-infrastructure maintenance from the process by which a business firm maintains its own infrastructure. Private property and monetary exchange would enable the entrepreneurial enterprise to use market prices to subjectively

evaluate the prospective opportunity costs and benefits associated with alternative schedules of maintenance for its privatized infrastructure facilities.[18] Implicit in this reckoning would be the entrepreneur's ability to distinguish capital and income. Income is a way of looking at capital in terms of its expected return over the entrepreneur's planning time horizon. At the same time, capital, as the enterprise's judgment of net present worth, is a way of looking at the totality of future income from the point of view of the entrepreneur's reaction to market uncertainty and of his time preference, or rate of discount. For the enterprise, income would be the amount that could be consumed within a definite period without lowering the expected or desired investment worth of capital as reckoned by the entrepreneurial enterprise (Friedman 1957, 10; von Mises [1949] 1998, 261; Hayek [1941] 2007, 277–78).

For the entrepreneurial enterprise, investment in maintenance would not necessarily be focused on particular resources, but rather on how the entire complementary combination of facilities would affect the enterprise's profitability (Mathews 1996, 88-90). The resources at the business entrepreneur's disposal would be capital goods that could take the form of buildings, equipment, tools, goods of any kind and order, claims, receivables, cash reserves (von Mises [1949] 1998, 262). The critical distinction is that specific infrastructure facilities (its capital goods) would not in themselves constitute capital, and their existence would not necessarily assure income or imply anything with respect to their maintenance of affected facilities. These things would become an aspect of capital only when they were owned, deployed, and maintained in the coherent pursuit of a single, unified plan undertaken by a specific entrepreneurial enterprise. Hence, for the enterprise, capital would emerge as the entrepreneurial reckoning of the net present monetary worth of its own plan to employ its own facilities (Lachmann [1956] 1978, 13).

Within this calculational context, the entrepreneurial enterprise would be able to make rational choices to maintain its capital as reflected in changes in the enterprise's prospective worth. Hence, for the entrepreneurial enterprise, depreciation would be always a matter of entrepreneurial judgment with respect to its effect on future capitalized income (Lachmann 1986, 66–67; Osterfeld 1992, 23–30). Maintenance of capital would focus on a desired stream of future income. Therefore, depreciation would always be judged within the context of the complementarities between various facilities. Maintenance decisions would always be on a facility's effectiveness in serving the complementary function of attaining the desired level of current and future profitability. Each maintenance decision ultimately would relate to the most profitable complementarity within a chosen combination of facilities employed in pursuing an entrepreneurial plan (Hayek [1941] 2007, 277-282; Lachmann 1986, 63; von Mises [1949] 1998, 512). Hence, with respect to maintenance, the privatization of infrastructure would have the following implicitly interrelated but critically distinct features:

- Prospective monetary benefits of maintenance would be appropriable by the entrepreneurial enterprises undertaking the maintenance of the infrastructure facilities that it owns (that is, costs and monetary benefits would be borne by the same entity).

[18] The task of economic calculation for the individual, according to Mises, "is to adjust his actions as well as possible to his present opinion concerning want satisfaction in the future." Mises also notes: "The question . . . is whether a certain course of conduct increases or decreases the productivity of our future exertions" ([1949] 1998, 232, 511).

- Business entrepreneurs would be able to evaluate the anticipated, yet uncertain, monetary trade-offs between current investments in maintenance and the desired future income return earned by providing infrastructure services.
- The entrepreneurial enterprises would be able to integrate plans for the maintenance of their infrastructure facilities into a comprehensive business plan focused on the maintenance of a desired time profile of future net revenue earned from the provision of services (Hayek [1941] 2007, 277).
- Physical deterioration of a particular infrastructure facility would be of concern only to the extent that the enterprise judged it to reduce the future monetary income yielded by the complementary combination of facilities that it owns.
- Business entrepreneurs would be able to rank maintenance priorities and assess the extent to which total revenue productivity of its infrastructure facilities as a complementary combination is affected.
- Maintenance plans for particular facilities would be unique to individual entrepreneurial enterprises, reflecting the enterprise's market expectations and the particular complementarities that would be sought in its chosen combinations of infrastructure facilities.
- Because maintenance would be tied to a monetary income, the enterprise would be able to link its maintenance investments to the demand for its infrastructure services as expressed by its transactions with customers (Lachmann 1986, 67–71).

Privately held infrastructure would be maintained by profitable entrepreneurial business enterprises that own them. With the elements of public infrastructure in private hands, entrepreneurial owners would be able derive an income stream from the provision of their services? Maintenance of this privatized income stream would constitute capital maintenance for the firms owning infrastructure facilities. Individual entrepreneurial enterprises owning infrastructure would be acting on their own behalf but in the process would be serving the interest of society as a whole in undertaking the maintenance of its own capital. These judgments of entrepreneurial success would be made with a degree of rationality that would be impossible in the absence of private property and monetary exchange. The success of private-infrastructure maintenance would be reckoned only in the context of individual entrepreneurial efforts to profitably serve users of owned infrastructure facilities. Hence, the success of infrastructure maintenance would be a judgment that each enterprise would make in assessing the profitability of its own business plan.

4. Conclusion

Resource exhaustion and infrastructure neglect are perennial social concerns that do not have workable governmental solutions. However, the institutions most capable of dealing with these issues are to be found in the incentives that are faced by private entrepreneurs availed of privatized resources. Extractive resource renewal and infrastructure maintenance are activities that could become routine by according private entrepreneurs a less regulated role in societal provision for the future. For extractive enterprises, the entrepreneurial efforts to maintain capital could result in the systematic and orderly replacement of exhausting resources. However, this process is stymied by the institutional constraints imposed by government. These institutional constraints include foreclosure of land access, regulatory

encumbrances to entrepreneurial management of resources, and, in the case of petroleum, an inability to acquire full property rights in resources discovered by the entrepreneurial enterprise. While the entrepreneur is crucial to warding off resource exhaustion, these impediments mean that the entrepreneur's role in resource replacement is only partially fulfilled.

Neglect of what is labeled public infrastructure seems to be endemic to government's assumed responsibility with respect to maintenance. First the absence of secure ownership rights and the nonexistence of an integrated revenue stream from the sale of services mean that governments are unable to mimic the actions of private entrepreneurs in maintaining capital through the maintenance of private infrastructure. The reason is that although public infrastructure ostensibly yields benefits, the absence of secure ownership and an integrated income stream mean that governments cannot implement a coherent program of maintenance as could be implemented by the private entrepreneur. Second, career oriented entrepreneurial behavior on the part of legislators and bureaucrats undermine the governmental function of maintaining infrastructure. While maintenance of public infrastructure may, in some instances, be congruent with the career aspirations of legislators and bureaucrats, other goals may intervene in the allocation of public funds.

Governmental failures with respect to infrastructure maintenance offer grounds for privatizing what has been public infrastructure. As private property, the services of infrastructure would be marketed thus placing the process of maintenance under the discipline of entrepreneurial capital maintenance. The marketing of infrastructure services would allow the owning enterprise to focus on the maintenance of an integrated income stream.

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15

Examining the Bidirectional Relationship Between Entrepreneurship and Economic Growth: Is Entrepreneurship Endogenous?

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1. Introduction

Many scholars and professionals believe that entrepreneurship is critical to maintain an economy's health and that business creation in low income areas is essential for economic development (Goetz and Freshwater, 2001; Acs, 2006; Lichtenstein and Lyons, 2001; Smilor, 1997). As Minniti (1999) argues, entrepreneurs are catalysts for economic growth as they generate a networking innovation that promotes the creation of new ideas and new market formations. Schumpeter (1934) also states that the success of markets lies in the spirit of entrepreneurs who persist in developing new products and technologies and succeed, ultimately, resulting in lower production costs. He also described five cases in which innovative activity increases economic growth. First is the introduction of a new good, which is a new product or an improvement of a product which is not yet known by the consumers in the market; a new method of production, the one that is not yet used in the manufacturing of the product; a new market that has not been entered for a particular product; a new source of supply for raw materials whether it already exists and is eventually discovered or it has to be created; and the evolution of a new organization in an industry like the formation of a monopoly. According to Schumpeter, these activities result in economic opportunities which eventually lead to economic growth. In addition, the works of entrepreneurs lead to more innovations and more profit opportunities and, hence, more growth which becomes a cycle of economic opportunities and for maximizing profit.

Wennekers and Thurik (1999) summarized the influence of entrepreneurship on regional economic growth in two ways. First, entrepreneurship increases the start-up rate of new firms and therefore increases employment. Second, entrepreneurial activities yield efficiency advantages within the existing firms. These result in a social structure that influences the absorptive capacity of a country and promote its ability to adopt new technologies. Hence, when entrepreneurs reap the benefits of their abilities, within the firm and in relation to other firms, their activities are likely to enhance economic growth and development.

Over the years, policymakers have shown great interest in exploring the role of entrepreneurship in generating economic growth and development. Kreft and Sobel (2005) state that economic development policies in the past two decades have been diverted from

attracting large manufacturing firms towards encouraging internal entrepreneurship. Understanding economic development and identifying appropriate policies to foster development requires an understanding of entrepreneurship in a particular environment. In this era of globalization, supporting entrepreneurship becomes indispensable for the United States to regain a competitive lead in the world economy (Baumol, Litan, and Schramm, 2007). An understanding of entrepreneurship becomes important to know how entrepreneurship matters in economic growth and development, and furthermore, how entrepreneurial capacity can be expanded to increase the chance of achieving economic development. Exploring the characteristics of entrepreneurship and its contributions to the local economy can help develop a map for designing specific development policies for a region. The target of these policies is to improve and expand community-based economic development capabilities and initiatives to assist small towns and rural areas in creating new firms, retaining and expanding local businesses, and expanding entrepreneurial development, and eventually helping to alleviate poverty.

Understanding the relationship between entrepreneurship and economic development is crucial for two reasons. First, the international economic development community has learned that the one-size-fits-all approach does not work (Easterly, 2001). Second, economic importance of entrepreneurship and its role in economic development has received significant emphasis in research work in recent years. This suggests that public policy needs to emphasize the dynamics of entrepreneurship and economic development as well as relevant local institutional conditions and region-specific characteristics.

Though considerable attention has been given to examining the links between entrepreneurship and economic development, the central focus of this study is to determine the importance of entrepreneurship in economic development on a regional perspective, specifically in the Appalachian region. The region has been considered by many studies as an area symbolized by underdevelopment and poverty (Pollard, 2003). Forty-two percent of the population is in rural areas compared to the national average of twenty percent. In addition, many parts of the region can be considered remote due to poor infrastructure and topography. Median family income in Appalachia remains substantially below the national average. The poverty rate is higher and labor force participation is lower in the region compared to the United States as a whole. For instance, the poverty rate in the US was 13.2 percent in 1990 and 12.4 percent in 2000. In Appalachia, the poverty rate was from 15.4 percent in 1990 to 13.6 percent in 2000 (US Census). Moreover, the region was concluded to be different from the other parts of the U.S. not only because of its geographical location but because of its social and economic development status relative to the other regions of the country (Isserman, 1996). Therefore, there is a need to determine how entrepreneurship contributes to the well-being of the economy for policy makers to develop appropriate policies to improve the Appalachian environment for business formation that leads to economic development. This study will provide evidence as to whether entrepreneurship contributes to regional economic development. The main objective of this study is to increase the understanding of entrepreneurship, its contributions to economic growth, and its potential as a development strategy for a region characterized by poverty and underdevelopment such as Appalachia. It also examines whether entrepreneurship is endogenous with economic growth. That is, whether entrepreneurship causes economic growth and vice versa.

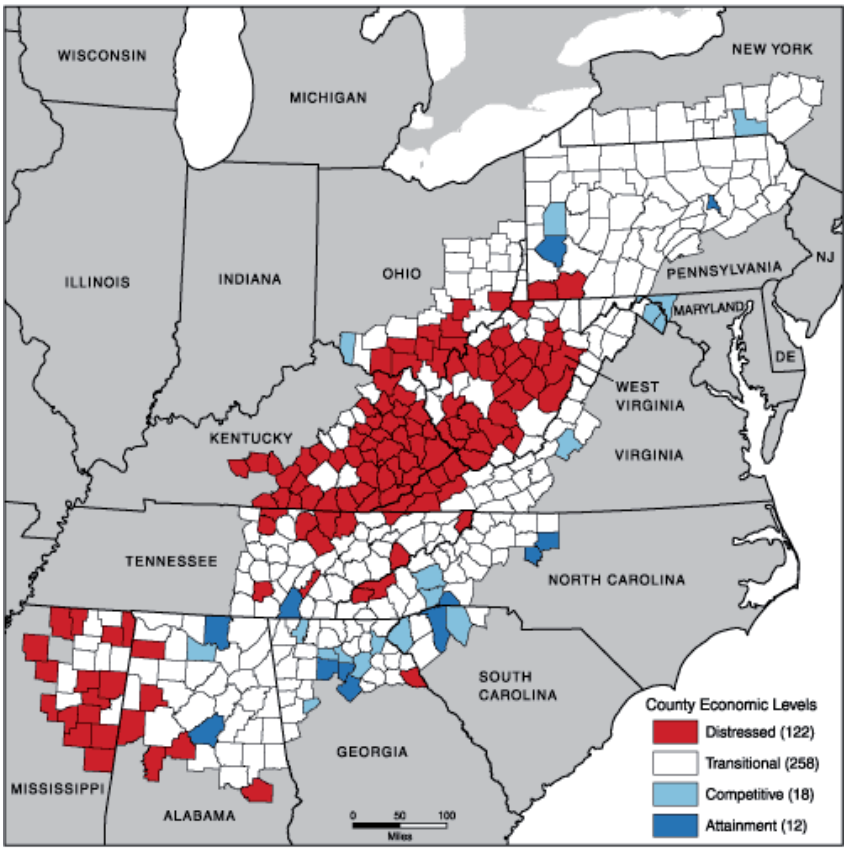
1.1 The study area

The study area comprises the Appalachian region where the relationship between entrepreneurship and economic development is examined. The region, as defined by the Appalachian Regional Commission (ARC), is composed of 13 states with a total of 410 counties as shown in Figure 1. The area includes the whole of West Virginia, most of Pennsylvania, the southern part of New York, southeastern Ohio, the western portions of Maryland, South Carolina and North Carolina, the eastern portions of Kentucky and Tennessee, the northern areas of Alabama and Geogia, and the northeastern part of Mississippi.

Fig. 1. Map of Appalachia

The region has received considerable attention in the literature as it is recognized to have unique characteristics particularly with respect to its economic situation relative to the other parts of the U.S. The region's economy in the past was based on manufacturing, agriculture, and the extraction of natural resources, while it is now diversifying into services, retailing, and tourism (Appalachian Regional Commission, 2008). Considering the economic diversity of the region, the commission has developed a classification system that identifies and monitors the economic status of its counties. The system involves an index of county economic status based on economic indicators including unemployment rate, poverty rate, and per capita income. Using the composite index value, each county is classified into one of five categories of economic status: distressed, at-risk, transitional, competitive, and

attainment. Distressed counties are the most economically depressed counties; at-risk are those at risk of becoming economically distressed; transitional are those transitioning between weak and strong economies; competitive are those who can compete in the national economy, but are not at the top levels of economic status; and attainment are the ones which are economically strongest. As shown in Figures 2 and 3, distressed counties are mostly in central Appalachia. However, between 2002 and 2008, some counties in central Appalachia attained the "at-risk" category. The northern part of Appalachia was mostly in the transitional category between 2002 and 2008 while the southern portion shows diverse changes.

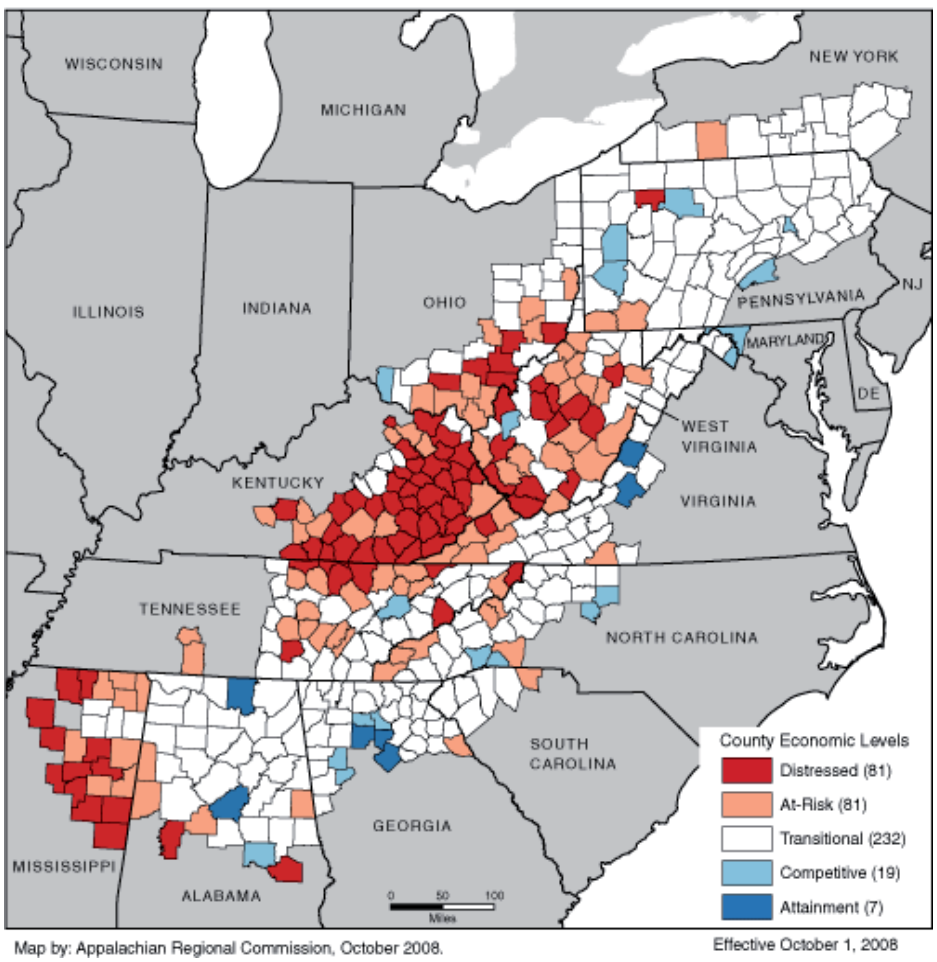


Source: Appalachian Regional Commission, www.arc.gov

Fig. 2. County Economic Levels in Appalachia, 2002

Appalachia is chosen as the area of study considering its economic situation compared to other regions in the country. It has a number of rural states that could show evidence of the effectiveness of supporting entrepreneurship as a development strategy in areas with rural characteristics. The variability in economic status across the region provides variation in data which should enable a viable quantitative analysis leading to the identification of valuable econometric relationships between variables in the model.

In terms of entrepreneurship, despite the region's geographical and economic disadvantages, Appalachia has many entrepreneurial assets including small, home-grown businesses that play an important role in creating self-sustaining local economies and improving quality of life. The Appalachian Regional Commission (ARC) started an Entrepreneurial Initiative with the goal of promoting the formation of businesses owned by local residents to increase local wealth and provide employment opportunities to the local community. Figures 4 and 5, constructed using data from the Bureau of Economic Analysis (BEA), present the variation in the numbers of self-employed throughout the Appalachia for years 1995 and 2005. Self-employment is one of the most popular measures of entrepreneurship used in the literature. The maps show the heterogeneity of entrepreneurial capacity in the region for the years covered in the data which facilitates the econometric analyses. Counties with higher levels of entrepreneurial capacity are expected to have higher levels of growth compared to the less entrepreneurial counties.



Source: Appalachian Regional Commission, 2008

Fig. 3. County Economic Levels in Appalachia, 2008

The number of firm start-ups is another popular measure of entrepreneurial activity. Figures 6 and 7 present the variation in the number of firm births throughout the Appalachia for years 1998 and 2005 since data on firm births in 1995 is not available. The maps are created using published data from Statistics of U.S. Businesses (U.S. Census Bureau).

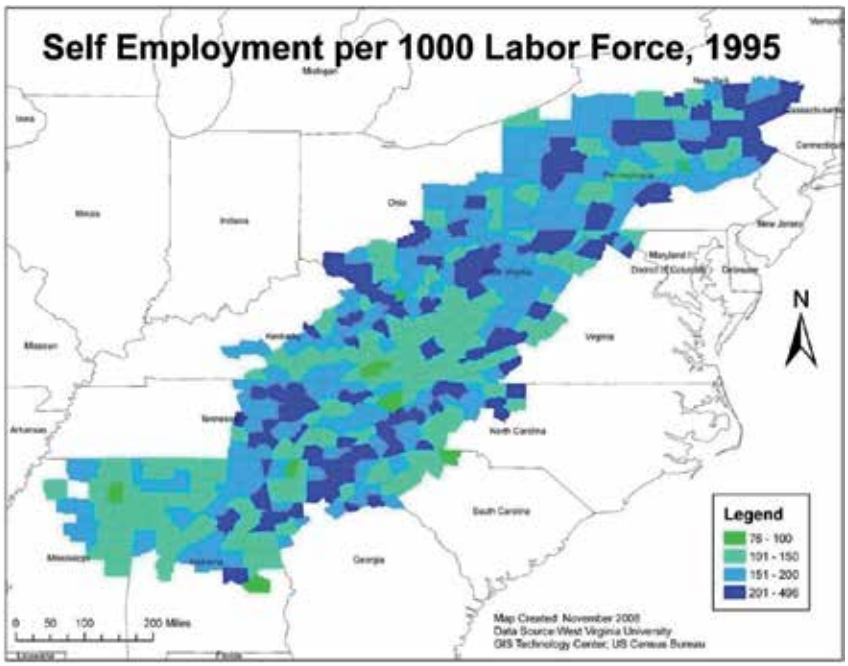


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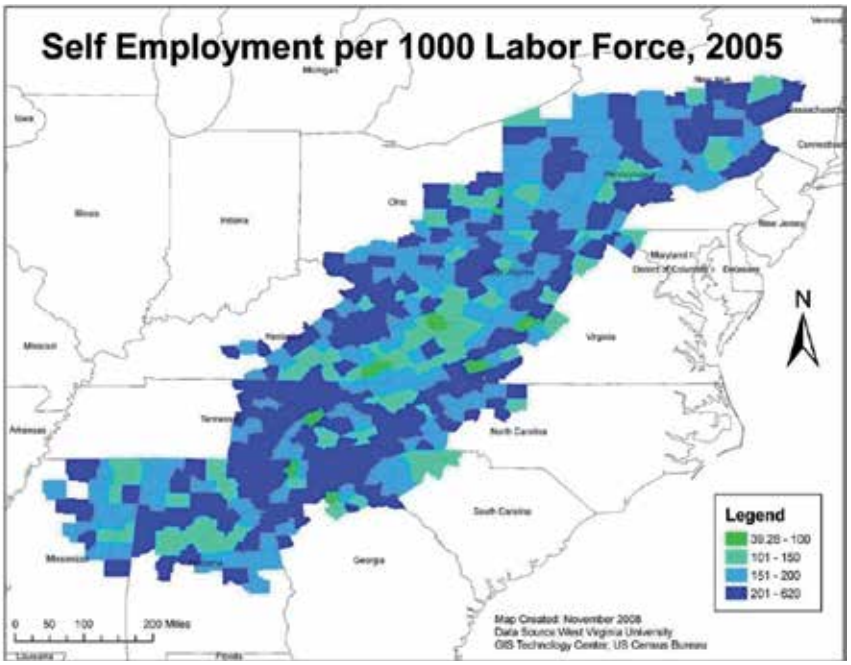
Fig. 4.



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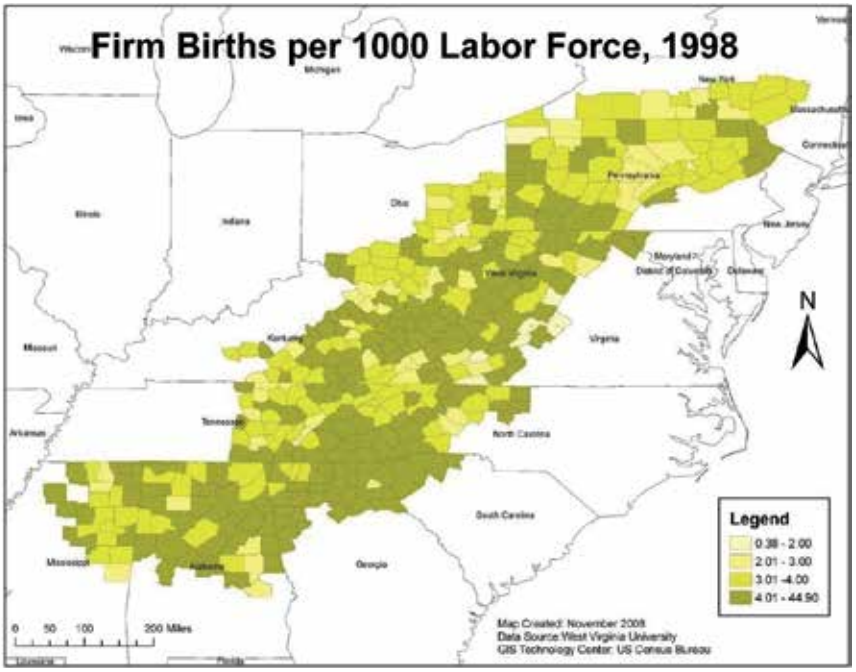

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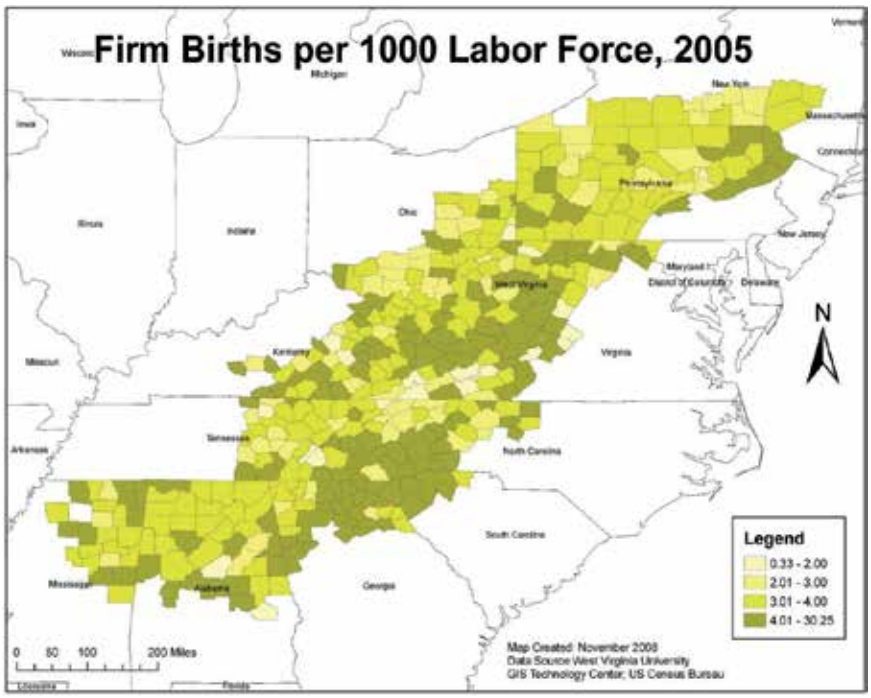

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Fig. 7.

1.2 Literature review

Although empirical research on the role of entrepreneurship is not well-developed, the literature has paid considerable attention to the link between entrepreneurship and economic growth. The first issue in examining the relationship between entrepreneurship and economic growth is the definition of the term "entrepreneurship." Since entrepreneurship is a multidimensional concept and there is no general agreement on the economic theory of entrepreneurship, previous studies have defined and used the term in different ways. Beginning with Schumpeter (1934), he defines an "entrepreneur" as an individual marked with innovative ideas, utilizing new combinations of means of production. Kirzner (1979) emphasized the entrepreneur as an enthusiast in discovering opportunities to make profit. Knight (1921) and Schultz (1980), supporting neo-classical economic theory, described an entrepreneur as an individual who is willing to take risks in performing economic functions, while others (Hagen, 1962; McClelland, 1961; Kihlstrom and Laffont, 1979) argued that an entrepreneur is a person with certain unique psychological characteristics. Although these concepts have contributed greatly to the understanding of entrepreneurship, a universally accepted explanation or measure of the concept has not yet been found. Hence, previous studies have used different concepts according to the purpose of the study, the theory applied, and the availability of information needed for empirical research.

To investigate the link between entrepreneurship and economic growth, Wennekers and Thurik (1999) presented a framework consisting of three parts as a starting point in the field of studying entrepreneurship and economic development. Using theories developed in previous studies on the subject, they argued that the beginning of entrepreneurship is about the characteristics and roles of individuals and the typology of entrepreneurship should start at the micro level. Entrepreneurship takes place in the firm where the entrepreneur transforms his personal traits, attitudes and skills into actions. These actions at the firm level are reflected through "newness" by new products, innovations, and entry to new markets or business start-ups. At the aggregate level, these many entrepreneurs create variety in the industries, regions, and national economies and through competition lead to survival of the most viable firms and industries. This process then transforms the regional and national economies by replacing obsolete firms with highly productive ones which eventually increase international competitiveness and increase profits. Wennekers and Thurik (1999) assumed that the result of this chain linking the entrepreneur to the national economy is economic growth. In addition, their framework suggests that the outcome of this dynamic process depends on a set of conditions where the entrepreneur operates. These conditions refer to the cultural environment in the region and in the national economy as well as the institutional framework defining the incentives and the barriers in transforming entrepreneurial ambitions into actions. Their conclusions suggested to operate in the multidimensional concept of entrepreneurship at higher dimensions such as the industries and national economies, as well as possibly devising a scale to monitor the level of entrepreneurship over time and/or comparing entrepreneurship levels between economies. They also emphasized the conditions for entrepreneurship including cultural and institutional factors, as well as technological, demographic, and economic forces. The last part of the framework linking entrepreneurship and economic development is an attempt to answer why some new start-ups fail, what are the roles of institutions and policies in the performance of entrepreneurship in the national economies, and how to incorporate the results in econometric models which can be used for policy analysis.

Acs et al. (2005) used start-ups of new firms as a measure of entrepreneurship that facilitates spillover of knowledge. This is based on the theory of endogenous growth where knowledge was added as a factor explaining economic growth aside from the traditional factors of production, capital and labor. Entrepreneurship was used as a mechanism that transforms knowledge into growth. The study used a fixed effects and simultaneous equations model to empirically examine the impacts of entrepreneurship on economic growth using country-level data for years 1981-1998. The models used lagged values of Gross Domestic Product (GDP) as a measure of economic growth regressed against variables explaining economic growth such as investments in knowledge, level of entrepreneurship, and a set of other variables. The level of entrepreneurship was represented by using the self-employment rate and was found to have a positive impact on economic growth in both models. Countries with higher degrees of entrepreneurial activity were found to have higher rates of economic growth.

Another cross-country analysis was performed by Beck, Demirguc-Kunt, and Levine (2005) who found a positive and statistically significant relationship between small and medium enterprises (SMEs) and economic growth. SMEs are found to have high levels of innovation in skill intensive industries (Acs and Audretsch, 1987) and are used to measure

entrepreneurial levels in the literature. The study used a database on the share of SME labor in the total manufacturing sector of the countries as a variable to explain economic growth measured by real GDP per capita. Several policy variables were included in the growth model such as government expenditures as a share of GDP, share of exports and imports in GDP, inflation rate, share of credit to the private sector by financial institutions in GDP, and variables measuring business environment. Using ordinary least squares (OLS) regression, the results revealed that the share of SME employment in total manufacturing employment is associated with greater levels of growth in GDP per capita. To control for endogeneity, a second model using instrumental variables (IVs) was employed. Though the result yielded a positive relationship between SMEs and GDP per capita, it was not statistically significant.

Audretsch and Keilbach (2005) introduced the concept of entrepreneurship capital, referring to the society's capacity to create entrepreneurial activity specifically to generate new firms. The study hypothesized that a region with more entrepreneurship capital shows a higher economic performance. This is based on the theory of entrepreneurship serving as a mechanism to transform knowledge spillovers to economic growth. Specifically, the study measured the impact of entrepreneurship on regional labor productivity and on the regional growth of labor productivity in Germany. Entrepreneurship capital was measured using the number of startup enterprises relative to the region's population. In addition, entrepreneurship capital was classified into three types: startups in all industries, high-technology startups, and startups in Information Communication and Technology (ICT) industries. This was done to capture the effects of the two latter measures on economic performance since they involve R&D as well as greater financial risks. The results of the regression revealed that all three measures of entrepreneurship capital significantly affect the region's labor productivity. However, the results for the second model on the effect of entrepreneurship capital on the growth of labor productivity showed statistically significant effects only on the R&D intensive industries.

Acs and Armington (2005) also examined the relationship between entrepreneurship and economic growth, using the Census Business Information Tracking Series (BITS) dataset. These data cover US private sector businesses and track their employment and firm ownership. They were used to estimate a regression model of regional variation in rates of employment growth as determined by entrepreneurship. Economic growth was represented by average annual employment growth while entrepreneurial activity was measured using the formation rate of firms with less than 500 employees and the business-owner share of the labor force. In addition, measures of agglomeration effects and human capital were included in the model. As hypothesized, the results revealed a positive and statistically significant coefficient on the firm birth rate. Business-owner share of the labor force was also found to make a positive and statistically significant contribution to employment growth. Specifically, the study reported that an increase in the new firm formation rate of one standard deviation from its mean causes the employment growth rate to increase by one-half standard deviation from its mean.

Van Stel and Suddle (2005) used regional data in the Netherlands to examine the relationship between new firm formation and change in regional employment. In addition, they investigated the relationship considering the difference in time period, sector, and degree of urbanization. They found that the maximum effect of new firms on regional development is reached after about six years. Fixed effects estimation was employed using

employment growth as the dependent variable regressed against startup rate, wage growth, and population density. To control for differences in time periods, the sample was divided into two time periods and the results showed that the impact of new firm formation to employment growth has been stable and exactly the same in both periods. Moreover, the study investigated the relationship between employment growth and startup rates across different sectors. They found that the effect of startup rate is highest in the manufacturing sector. Finally, they also found that the degree of urbanization significantly affects the growth of employment. The effect of startup rate was bigger in the Western side compared to the Northern provinces where the average degree of urbanization is 51 percent and 12 percent, respectively.

Another study which used employment as the dependent variable was done by Folster (2000) utilizing simultaneous equations to determine whether entrepreneurs create jobs. The first equation captures the individual's choice to pursue self-employment due to a fall in employment or as a result of demand fluctuation in the market and structural changes in business conditions. The second equation represented demand for labor as a function of wage rate, business environment, and the share of self-employed. The data set is a pooled time-series cross section data on 24 Swedish counties for years 1976 to 1995. Simultaneity issues between self-employment and total employment was addressed by employing instrumental variables and estimating the equations using 2-stage least squares regression. Results show a statistically significant and positive relationship between self-employment and total employment.

Using 54 European regions, Beugelsdijk and Noorderhaven (2004) empirically estimated the relationship between entrepreneurial attitude and economic growth. This is based on Wennekers and Thurik's (1999) summary of the influence of entrepreneurial activity on regional economic growth that when entrepreneurs benefit from their actions, the result is enhanced growth at a macro level. The study used data on European Values Studies (EVS) which is a large scale, cross-national survey program on basic human values. Entrepreneurial characteristics were estimated using the answers to questions such as ascribed reasons for personal failure or success, values instilled in children, attitudes towards future developments, preference for equality versus freedom, and the attitude towards a number of social issues. The answers were used as proxies to measure need for entrepreneurial characteristics such as need for achievement, ability to control and taking risks, and an innovative attitude, while economic growth was measured using GDP per capita. They tested whether regions characterized as "entrepreneurial" grow faster than regions that score lower on entrepreneurial characteristics. Entrepreneurial attitude was determined by comparing the characteristics of self-employed individuals with the general population and with wage earners. The variation in entrepreneurial characteristics was found to have an important role in explaining growth differentials across the regions. High scores for entrepreneurial characteristics were correlated with high rates of regional economic growth.

Henderson (2006) also considered differences between rural and urban areas in examining the relationship between entrepreneurial activity and economic growth. Using county level data, entrepreneurship activity in the first model was represented by using business startup measures such as the number of business startups, the number of new businesses that survived five years, and the number of new business startups that survived and achieved

high growth. In the second model, business ownership factors such as the average share of non-farm employment and the average annual growth rate in entrepreneurs were used as indicators of entrepreneurial activity. In addition to entrepreneurship measures, employment growth was regressed against other factors that are believed to be affecting economic growth such as transportation infrastructure, labor characteristics, agglomeration forces, natural amenities, property taxes, and regional dummy variables. The results of testing the model using business ownership variables support the notion that entrepreneurial activity positively affects employment growth. This is also true for the models using business startup indicators. However, when all three measures of business startups were tested in one model, only the coefficient for the number of new firms with high growth was found to be positive and significant. Considering the analysis between metropolitan and non-metropolitan areas, the study found that employment growth was stronger in metro counties in relation to the number of business startups and the number of new businesses that survived. However, there was no significant difference for the relationship between high growth business startups and employment growth between metro and non-metro counties.

Camp (2005) reported that the most entrepreneurial regions in the U.S. had 125 percent higher employment growth, 58 percent higher wage growth, and 109 percent higher productivity. The study supports the view that entrepreneurship is the link between innovation and regional economic growth and development. Regression results revealed that a four-year lag between measures of entrepreneurship and economic growth, the positive and significant coefficients for entrepreneurship activity and the high levels of expected variation in the analyses suggest that entrepreneurship is a driver of regional economic growth. Moreover, Kreft and Sobel (2005) support entrepreneurship as the "missing link" between economic freedom and economic growth. Economic freedom generates growth as it promotes entrepreneurial activity. This relationship was studied using sole proprietorship and patent activity as measures of entrepreneurship and the freedom index. The freedom index is composed of a number of public policies affecting economic freedom. The results further support entrepreneurship as a conduit towards economic growth.

These studies have supported the theory that entrepreneurship contributes positively to economic growth. However, empirical analyses examining the role of entrepreneurship in fostering economic growth at a county-level perspective are lacking, particularly for specific regions of the US. Most studies have used cross-country analysis and regions in a particular country while some recent research used labor market areas (LMAs) as the geographical unit of empirical analyses. A labor market area is a central city surrounded by counties which is considered to have integrated economic activities. By using county-level data in a specific region like Appalachia, this study will examine more closely the relationships between entrepreneurship and economic growth. This will investigate the impacts of entrepreneurial activity on economic progress in the Appalachian region and will verify the impacts of entrepreneurship as a strategy to achieve economic progress in communities that are continuously in search for new engines of growth. Furthermore, this study will add information to the literature on linking entrepreneurship and economic growth by employing changes in population and income levels as additional measures of economic growth. Most studies have used change in employment as endogenous variable, while

country-level studies have used GDP growth. Using increases in population and per capita income will add a different dimension to measuring economic progress, in addition to employing change in employment as a measure of growth. In addition, this study will contribute to the existing literature by using different methods to empirically analyze the relationship between entrepreneurial activity and economic growth.

1.3 Defining entrepreneurship

Though entrepreneurship has gained significant attention in previous studies, there is no general consensus on the definition of the concept. Within the entrepreneurship literature, the definitions have been problematic and "the failure to establish definitions has disrupted the evolution of a framework for the entrepreneurship discipline" as quoted by Carland et al. (1995) which has resulted in a study of the entrepreneurial process in different approaches. In search of the meaning of entrepreneurship, Hebert and Link (1989) summarized three intellectual traditions in the conceptual development of entrepreneurship in the literature. These include the German tradition based on von Thünen, Schumpeter, and Baumol, the Austrian tradition of Kirzner, von Mises, and Menger, and the neo-classical tradition of Schultz, Knight, and Marshall. The Schumpeterian concept emphasized the entrepreneur as an initiator of creative destruction which is a beneficial phenomenon leading to disequilibrium. Schumpeter's theory argued that new firms with entrepreneurial characteristics displace less innovative firms which eventually results in higher economic growth (Schumpeter, 1934). On the other hand, the neo-classical tradition highlighted the entrepreneur as a leader towards equilibrium in the markets through entrepreneurial activities. The Austrian tradition stressed the abilities of the entrepreneur in perceiving profit opportunities.

The Schumpeterian tradition had the greatest impact on the economic literature. However, despite its significant influence in the field of entrepreneurship studies and its emphasis on startup enterprises, there is no generally accepted definition of entrepreneurship. Hebert and Link (1989, p.47) then proposed a "synthetic" definition of an entrepreneur as "someone who specializes in taking responsibility for and making judgmental decisions that affect the location, form, and the use of goods, resources, or institutions."

The literature has characterized the entrepreneur in many different ways. Low, Henderson, and Weiler (2005) described the entrepreneur as an individual who started his own business with several characteristics distinguishing him from other persons in the business world. These qualities include risk bearing, ability to make decisions, and being innovative. However, entrepreneurs vary in terms of their qualities measured through the impacts they make in a locality. Lifestyle entrepreneurs, referring to business starters who built businesses to achieve a certain lifestyle, mainly contribute to the region's entrepreneurial breadth by adding to the number of entrepreneurs in the region while improving local quality of life. On the other hand, high-value entrepreneurs focus on creating wealth, increasing profits, and adding jobs leading to economic growth. Describing these contrasting types of entrepreneurs creates a diversity of entrepreneurship.

Montanye (2006) defined entrepreneurship as "the process by which individuals acquire ownership (property rights) in economic rents of their creation." The creation and capture of economic rent are the individual's objectives, not only in business enterprise but in all

aspects of life. The emphasis in the definition is in the actions of an entrepreneur generating economic rent as well as ownership interest which define entrepreneurship. Entrepreneurship, according to Montanye, is defined by the individual's objective success in acquiring property rights to some economic benefit leaving the individual better off than if he is under a system of perfect competition. The definition provides a useful basis for distinguishing theories of entrepreneurship from the many distinct variations within the economic literature and also serves as a distinguishing factor between entrepreneurship and management. The key to the definition is the holistic appreciation of entrepreneurial profit also conventionally known as economic rent. Economic rent is "that portion of a payment to an input which elicits no increase in output, that is, whose marginal product yield to the economy is zero" (Baumol, 1993). The point that is not emphasized in neoclassical economics is that unlike the incentive to produce goods and services under perfect competition, which is unaffected by the removal of economic rent, the incentive to act entrepreneurially diminishes as prospects for rent production and capture decrease. In sum, he defines entrepreneurship as "the successful creation and capture of economic rents in the face of uncertainty and scarcity, enables talented individuals to realize rewards that exceed the equilibrium level of perfect competition and so to live better than others as gauged in subjective utility terms."

Still other authors in the literature recommend different approaches of defining an entrepreneur. Gartner (1988) in his article "Who is an 'Entrepreneur' is a Wrong Question" discussed the trait approach of defining an entrepreneur. In the trait approach, the entrepreneur is characterized to have a particular personality and a fixed state of existence. However, he concluded that this definition is inadequate and that behavioral approaches will be a more productive perspective for future research in entrepreneurship. The behavioral approach defines an entrepreneur as part of a complex process of creating an organization. This approach to the study of entrepreneurship shows the organization as the primary level of analysis and the entrepreneur is viewed in terms of his actions for the organization to come into existence. The emphasis of the behavioral approach is on what the entrepreneur does and not who the entrepreneur is. This supports Cole's behavioral viewpoint by quoting Say (1816) who defined the entrepreneur as an economic agent who "unites all means of production and who finds in the value of products which result in their employment the reconstitution of the entire capital he utilizes, and the value of the wages, the interest, and the rent which he pays, as well as profits belonging to himself" (Cole, 1946). Gartner concluded that organization creation is the idea that separates entrepreneurship from other disciplines. He believes that to truly understand entrepreneurship and in order to encourage its growth, the focus should be on the process by which organizations are created. The individual who creates the organization is the entrepreneur who takes other functions at each possible stage of the life of the organization. The entrepreneur becomes the innovator, the manager, the small business owner, the vice president, and other roles identified by a set of behaviors linking them to organization creation.

On linking entrepreneurship and economic growth, Wennekers and Thurik (1999, p. 46) defined entrepreneurship as the "ability and willingness of individuals to perceive and create new economic opportunities and introduce their ideas in the market, in the face of uncertainty and other obstacles, by making decisions on location, form and the use of resources and institutions." This definition takes a holistic approach of defining

entrepreneurship as it considers newness, uncertainty, and the use of resources in taking the action to fulfill economic opportunities. They also emphasized that the entrepreneur is not a fixed state of existence but rather entrepreneurship is a role that individuals undertake to create organizations, a behavior to create opportunities for entrepreneurial activities.

For the purpose of this study, entrepreneurship will be viewed under the economic perspective of the Schumpeterian tradition. Wennekers and Thurik's definition of entrepreneurship will be adopted, in addition to the synthetic definition of Hebert and Link from which the discussion as well as the selection of variables for the analyses is based upon.

1.4 Measuring entrepreneurship

To analyze the relationship between entrepreneurship and regional economic growth, it becomes necessary to first identify measures of entrepreneurship. This has challenged professionals as defining entrepreneurship has not been an easy task. There is a growing desire to understand the entrepreneurship process and the literature has shown indicators which helped researchers in quantifying entrepreneurship. Measurement is critical for comparing entrepreneurial capacities in different regions and countries and will enable policy makers to identify sound policies that work. However, the development of indicators to assist the analysis and exploration of entrepreneurship has been limited by the availability of data. Though the importance of entrepreneurship is recognized in various fields of study, the term remains ill-defined and interpreted in many ways. As a result, the existing literature on entrepreneurship studies shows that researchers have used different variables as proxies in measuring entrepreneurship. For instance, a number of studies measured entrepreneurship activity using the number of startup businesses (Audretsch and Keilbach, 2005; Camp, 2005; van Stel and Suddle, 2005; Baptista, Escaria, and Madruga, 2005; Acs et al., 2005; and Acs and Armington, 2004). Recently, the number of startups became the most popular indicator used in measuring the level of entrepreneurship. Acs and Armington (2005) used firm formation rate and business-owner share of the labor force as indicators of entrepreneurship.

Self-employment is another popular measure of entrepreneurship used in the literature because of data availability (Acs et al., 2005; Henderson, 2006; Evans and Leighton, 1989; Folster, 2000). Other approximations of entrepreneurship include employment share of surviving young firms in the manufacturing industries (Audretsch, 1995) and share of small firms (Audretsch and Thurik, 1997; Carree and Thurik, 1998). To obtain estimates on the effects of government policies on entrepreneurship across the states of the US, Garrett and Wall (2006) defined the rate of entrepreneurship as the share of the working population (16 to 64 years) who are proprietors.

Low, Henderson, and Weiler (2005) used proxies to measure breadth and depth of entrepreneurial capacity in the U.S. Breadth characterizes quantity reflecting the size and variety of small businesses in a region that employ local resources, generate local income, and improve the quality of life. Entrepreneurial depth, on the other hand, measures quality which represents value created by the entrepreneurs for themselves and the local economy. Measures of entrepreneurship were used as dependent variables in regression equations to examine the factors determining entrepreneurial capacity in U.S. counties.

Entrepreneurial breadth is measured using self-employment to total employment ratio calculated by dividing the number of self-employed by total employment. This measure makes it possible to compare quantities of entrepreneurs in different areas with varying populations. Another measure used in the article is assessing entrepreneurial depth to gauge whether entrepreneurs add value to a region by creating wealth, income, and jobs. Average income and revenue capture were both used as measures of depth of entrepreneurship used to determine the heterogeneity of entrepreneurial depth in different regions. Average income is the ratio of proprietor income to proprietor employment in a county. As a measure of depth, it assumes that entrepreneurs with higher incomes add more value in the local economy. Revenue capture, a second measure of entrepreneurial depth, is calculated by dividing income by total sales which gives the percentage of total sales that ends up as income for the entrepreneurs. Data on nonfarm proprietor income over nonemployer receipt data were used to calculate revenue capture. It assumes that by generating more income per dollar of revenue, entrepreneurs add more value in the local economy.

Firm birth is another popular measure used to quantify entrepreneurship. One important factor in defining business births is timing – that is, whether births should be identified at the time when employees are hired or sometime before that. Another factor is whether the "employment" concept should be the basis of measuring business birth. If employment is the basis, self-employed individuals are counted as recommended by the EUROSTAT, the statistical arm of European Union. On the other hand, the Organization for Economic Cooperation and Development uses only businesses with hired employees as the basis of birth counts. In the U.S., the Census Bureau's Statistics of U.S. Businesses publishes data on firm births and deaths with definitions that are different than the Bureau of Labor Statistics (BLS). The Census estimates of births exclude self-employment and define births as "establishments that have zero employment in the first quarter of the initial year and positive employment in the first quarter of the subsequent year." However, a more precise measure is entrepreneurship rate defined as the number of business births per 1000 persons in the labor force. This also allows comparison of entrepreneurial capacities between regions. Sadeghi (2008) analyzed the merits of five possible definitions of establishment birth based on two concepts. First is establishment birth based on the first appearance in the registry and second is on the basis of positive employment reported. The first basis includes new businesses registered with positive employment for the first time while the latter includes not only births but also businesses that have not been active for more than one year but reported positive employment again in the current quarter. Sadeghi (2008) estimated alternative measures and the results were compared over time. Results showed some differences in the magnitude of births using different methods but no significant differences in the pattern of change over time. The study concluded the estimation of births of positive employment in the third month of a quarter and a zero employment in the previous four quarters as the preferred measure of births. The same estimation was done with establishment deaths and the preferred measure is the record with positive employment in the third month of a quarter followed by four consecutive quarters with zero employment during the third month. The advantages of the preferred measures include consistency with published data and symmetry in dealing with establishment births and deaths.

In an effort to come up with a more reasonable measure of entrepreneurship, Xue (2007) used a confirmatory factor analysis where entrepreneurship was treated as a latent variable, that is, a variable that is not directly observed but can be represented by a set of indirectly observed variables. He included variables such as technology patents, small business innovation rewards, venture capital disbursements, and technology firm establishments as indicators of entrepreneurship. Confirmatory factor analysis was employed to come up with an index called performing technology entrepreneurship index (PEI) based on the four indicators used in the analysis.

In his article "How many entrepreneurs does it take to change a nation?" Davis (2006) explained the need for measures of entrepreneurship that can be used and compared among different countries. He concluded that it is possible for all methods of measuring entrepreneurial capacity to converge into an agreed-upon method that can be used on a national basis. He suggested a Danish approach with three components including a model of framework for the entrepreneurship process; a method that permits comparisons of performance based on various measures that relate policies to factors affecting entrepreneurship; and government objectives defined in quantifiable terms. The framework is suggested as a foundation to enable development or adjustment of policies that relate to the factors affecting entrepreneurship. The model shows that market demand for goods and services interacts with the supply of ideas, skills, and capital that constitute the supply of potential entrepreneurs. The supply and demand forces operate in the market defined in terms of the incentive structure and the motivation of people to engage in entrepreneurial activity. Using the framework is expected to help guide the work on measurement and analysis of entrepreneurial capacity in different countries.

Following Acs et al. (2005), Henderson (2006), Evans and Leighton (1989), and Folster, (2000), this study employs self-employment as a measure of entrepreneurial activity. Although this may not be the ideal measure of entrepreneurial activity, this measure as specifically represented by the number of nonfarm proprietors is available for county-level analysis in various years. Furthermore, the self-employment rate has been used as a standard measure of entrepreneurship in the literature. In addition, measures of entrepreneurship derived from published data in US Census Bureau's Statistics of U.S. Businesses on firm births are used to construct entrepreneurship variables included in the analyses.

2. Empirical model and data description

2.1 Growth model

The main objective of this study is to examine the role of entrepreneurship in economic development represented by changes in employment, income, and population. In addition to entrepreneurship, the empirical tests include several socio-economic variables affecting economic growth. Based on previous studies, this study adopts the use of regional economic growth models in examining the relationship between entrepreneurship and economic growth. The simultaneous equation model in this study is based on the classic two-equation model of Carlino and Mills (1987). Their model employs population and employment dynamics in determining how regional factors affect patterns of growth. The emphasis is that households and firms aim to maximize utility by consuming goods and services,

residential location relative to the place of work, and non-market amenities. The Carlino-Mills model recognizes that population growth interacts with employment growth in the same field. That is, without constraints on capital mobility and other barriers among regions, equilibrium of population and employment growth is reached when factors of production in all regions get the same economic return. The model has been widely used in estimating how different regional factors affect long-run economic growth.

Deller et al. (2001) expanded the model into a three-equation framework by incorporating the role of income in regional economic growth. This is based on the assumption that households and firms also consider labor quality to maximize utility. In sum, the model represents that firms choose an optimal location based on location cost and revenue advantages, agglomeration benefits, and labor quality.

Following Deller et al. (2001) and Deller (2007), this study employs the model representing the relationship among population (P), employment (E), and income (I). The general form of the three-equation model is:

$$P^* = f\left(E^*, I^* / \Omega^P\right) \tag{1}$$

$$E^* = g\left(P^*, I^* / \Omega^E\right) \tag{2}$$

$$I^* = h\left(P^*, E^* / \Omega^I\right) \tag{3}$$

where P^* *, E^* , and I^* represent the equilibrium levels of population, employment, and per capita income, respectively, and Ω^P , Ω^E ,and Ω^I are a set of variables describing initial conditions, measures of entrepreneurship, and other variables that are traditionally linked to economic growth. From the equilibrium framework of the model, a simple linear relationship among the variables can be presented as:

$$P^* = \alpha_{0P} + \beta_{1P}E^* + \beta_{2P}I^* + \sum \delta_{IP}\Omega^P \tag{4}$$

$$E^* = \alpha_{0E} + \beta_{1E}P^* + \beta_{2E}I^* + \sum \delta_{IE}\Omega^E \tag{5}$$

$$I^* = \alpha_{0I} + \beta_{1I}P^* + \beta_{2I}E^* + \sum \delta_{II}\Omega^I \tag{6}$$

Furthermore, population, employment, and income are likely to adjust to their equilibrium levels with initial conditions (Mills and Price, 1984). These distributed lag adjustments are incorporated to the model expressed as:

$$P_t = P_{t-1} + \lambda_P(P^* - P_{t-1}) \tag{7}$$

$$E_t = E_{t-1} + \lambda_E(E^* - E_{t-1}) \tag{8}$$

$$I_t = I_{t-1} + \lambda_I(I^* - I_{t-1}) \tag{9}$$

where P_{t-1}, E_{t-1}, and I_{t-1} are initial conditions of population, employment and per capita income, respectively; λ_P, λ_E, and λ_I are speed adjustment coefficients to the desired level of population, employment, and income, which are generally positive, with larger values indicating faster growth rates. Current employment, population and income levels are functions of their initial conditions and the change between the equilibrium values and initial conditions at their respective values of speed of adjustment (λ). Substituting equations 7, 8, and 9 into equations 4, 5, and 6 while slightly rearranging the terms gives the model to be estimated and expressed as:

$$\Delta P = \alpha_{0P} + \beta_{1P}P_{t-1} + \beta_{2P}E_{t-1} + \beta_{3P}I_{t-1} + \gamma_{1P}\Delta E + \gamma_{2P}\Delta I + \sum \delta_{IP}\Omega^{P} \quad (10)$$

$$\Delta E = \alpha_{0E} + \beta_{1E}P_{t-1} + \beta_{2E}E_{t-1} + \beta_{3E}I_{t-1} + \gamma_{1E}\Delta P + \gamma_{2E}\Delta I + \sum \delta_{IE}\Omega^{E} \quad (11)$$

$$\Delta I = \alpha_{0P} + \beta_{1I}P_{t-1} + \beta_{2I}E_{t-1} + \beta_{3I}I_{t-1} + \gamma_{1I}\Delta E + \gamma_{2I}\Delta P + \sum \delta_{II}\Omega^{I} \quad (12)$$

where ΔP, ΔE, and ΔI are the region's changes in population, employment and per capita income, respectively. The speed of adjustment becomes embedded in the coefficient parameters α, β, and δ. Following Deller (2007), this model captures structural relationships while simultaneously isolating the influence of the level of entrepreneurship on regional economic growth. The equations estimate short-term adjustments of population, employment and income (Δ*P*, Δ*E*, and Δ*I*) to their long-term equilibrium (P^*, E^*, *and* I^*).

For the purpose of this study, measures of entrepreneurship are incorporated in the model, in addition to the variables that are traditionally linked to economic growth. These variables include measures of human capital, infrastructure, agglomeration, and a vector of additional socio-economic variables. The model estimation also investigates whether the degree of urbanization impacts economic growth. This is done by using a dummy variable to identify metro and non-metro counties. This specifically determines the effect of agglomeration to economic growth as rural areas are found to be more likely to engage in entrepreneurship than the metro areas, although urban areas are more successful in turning a business start into a high-growth business (Drabenstott, 2004).

2.2 Endogeneity test

Most studies found a positive effect of entrepreneurship on economic growth revealing that entrepreneurship increases employment and income levels. However, some studies showed that economic growth is also found to influence entrepreneurship (Storey, 2003). Entrepreneurship is likely to be endogenous in the model since counties with high levels of economic growth have a strong incentive for individuals to start businesses. Hence, a test for possible endogeneity is done as model estimation is biased when entrepreneurship variables are endogenous. In this study, Hausman's test under the null hypothesis of no endogeneity is employed to test whether entrepreneurship is endogenous. If the entrepreneurship index is exogenous, the model presented above will be estimated in reduced form. That is, the simultaneous equations can be solved equation by equation, given that the conditions for identification are satisfied. Estimation procedures are heavily drawn from the methods of Greene (1997) and Wooldridge (2002). The Statistical Packages for the Social Sciences (SPSS) is used for the empirical tests.

If the entrepreneurship measure is found to be endogenous and there exists a simultaneous relationship between the growth measures and the entrepreneurship index, the model will be expanded into a four-equation model expressed as:

$$P^* = f\left(E^*, I^*, En^* / \Omega^P\right) \tag{13}$$

$$E^* = g\left(P^*, I^*, En^* / \Omega^E\right) \tag{14}$$

$$I^* = h\left(P^*, E^*, En^* / \Omega^I\right) \tag{15}$$

$$En^* = f\left(E^*, I^*, P / \Omega^{En}\right) \tag{16}$$

where P^*, E^*, I^*, and En^* represent the equilibrium levels of population, employment, per capita income, and entrepreneurship respectively, and Ω^P, Ω^E, Ω^I, and Ω^{En}, are a set of variables describing initial conditions, and other variables that are traditionally linked to economic growth. Following the equations above, the model to be estimated can be expanded as:

$$\Delta P = \alpha_{0P} + \beta_{1P}P_{t-1} + \beta_{2P}E_{t-1} + \beta_{3P}I_{t-1} + \beta_{4P}En_{t-1} + \gamma_{1P}\Delta E + \gamma_{2P}\Delta I + \gamma_{3P}\Delta En + \sum \delta_{IP}\Omega^P \tag{17}$$

$$\Delta E = \alpha_{0E} + \beta_{1E}P_{t-1} + \beta_{2E}E_{t-1} + \beta_{3E}I_{t-1} + \beta_{4E}En_{t-1} + \gamma_{1E}\Delta P + \gamma_{2E}\Delta I + \gamma_{3E}\Delta En + \sum \delta_{IE}\Omega^E \tag{18}$$

$$\Delta I = \alpha_{0I} + \beta_{1I}P_{t-1} + \beta_{2I}E_{t-1} + \beta_{3I}I_{t-1} + \beta_{4I}En_{t-1} + \gamma_{1I}\Delta E + \gamma_{2I}\Delta P + \gamma_{3I}\Delta En + \sum \delta_{II}\Omega^I \tag{19}$$

$$\begin{aligned}\Delta En = {} & \alpha_{0En} + \beta_{1En}P_{t-1} + \beta_{2En}E_{t-1} + \beta_{3En}I_{t-1} + \\ & \beta_{4En}En_{t-1} + \gamma_{1En}\Delta P + \gamma_{2En}\Delta E + \gamma_{3En}\Delta I + \sum \delta_{IEn}\Omega^{En}\end{aligned} \tag{20}$$

where ΔP, ΔE, ΔI, and ΔEn are the region's changes in population, employment, per capita income, and entrepreneurship, respectively.

2.3 Specification of variables

The specified model of growth is used to analyze the impact of entrepreneurship to regional economic growth using changes in population, employment and per capita income growth as endogenous variables. Following the existing literature on entrepreneurship and economic growth (Acs and Armington, 2005; Camp, 2005; van Stel and Suddle, 2005; and Henderson, 2006), the model employs growth measures as endogenous variables. The model is specified as an equation with dependent variables as functions of entrepreneurship, human capital, infrastructure, agglomeration, and a set of socio-economic variables.

The choice of variables to represent entrepreneurship is based on theoretical considerations presented in Chapter 3 and on previous studies on entrepreneurship and economic growth. The entrepreneurship variables derived from data on self employment include number of

proprietors in a county (PROP), number of proprietors in a county per 1000 people in the labor force ($PROP_{LF}$), number of proprietors in a county per 1000 people in the labor force between 1995 and 2005 ($CHPROP_{LF}$) and the growth in the number of proprietors per county (CHPROP). Measures of entrepreneurship derived from firm births per county (BIRTH), firm births per 1000 people in the labor force per county ($BIRTH_{LF}$), change in the number of firm births in a county per 1000 people in the labor force ($CHBIRTH_{LF}$), change in the number of firm expansion per county (CHEXPAND), change in the number of firm deaths per county (CHDEATH) and number of firm deaths per county per 1000 labor force ($DEATH_{LF}$). A positive relationship between the measures of entrepreneurial activity and economic growth is hypothesized based on theory and the results of previous studies. On the other hand, a negative relationship between measures of firm deaths and growth measures is hypothesized.

In addition to entrepreneurship, additional explanatory variables are included in the employment growth model to better understand the factors affecting economic growth in the Appalachian region. Human capital variables which reflect the quality of labor force is measured using share of the population with high-school education ($EDUC_{HI}$). A higher share of the population with high school education indicates a higher quality of the labor force in the county. Furthermore, a higher quality of the labor force is expected to be more efficient and therefore reduces the average cost of the business leading to a higher employment and income growth. Hence, a positive relationship between the human capital variable and the measures of economic growth is hypothesized.

Infrastructure variables include the county's miles of road per square mile (ROADDEN) and miles of state road per square mile (STROADDEN). The quality of infrastructure affects the firm's average cost and is expected to affect employment and income growth. A positive relationship between the growth measures and the quality levels of a county's infrastructure is expected as infrastructure defines the ease of distribution of goods and services between the firms and the market.

Agglomeration of firms is found to positively affect growth by reduced costs of information transfer and knowledge spillovers arising from diversity (Henderson, 2006). To measure agglomeration, the empirical models include population density (POP_{DEN}) and a dummy variable to identify metropolitan counties (METRO). Agglomeration factors are expected to have a positive effect to both employment and income growth when agglomerations increase network externalities (Ciccone and Hall, 1996).

Other socio-economic variables such as per capita income taxes (PCTAX), property taxes (PROPTAX), government expenditure per capita (GOVEX), and percent of families below poverty (POVERTY) will also be included in the empirical analyses. Taxes are expected to have a negative relationship with the measures of economic growth as it reduces demand for consuming goods and services as well as reducing firm profits. Government expenditure is hypothesized to have a positive relationship with employment and income growth as it reflects investments for the welfare of the public. On the other hand, a negative relationship between percent of families below poverty and the measures of economic growth is expected. A higher percentage of families in poverty indicates slower increases in employment and income levels. CRIME is hypothesized to have a negative effect on measures of economic growth while percent of population 35 to 64 years old is expected to

have a positive effect. Summary of the variables used in the analyses are presented in Tables 1, 2, and 3.

2.4 Types and sources of data

Data on 410 counties of the Appalachian region drawn from several sources are used in the empirical analysis. Endogenous variables include county level growth in population, employment and per capita income (wage levels) for years 1995 to 2005 as indicators of economic growth. These data as well as their initial values are drawn from the publications of the Regional Economic Information System - Bureau of Economic Analysis (http://www.bea.gov/regional/reis/) for various years. Table 1 presents the summary of the definition and sources of the endogenous variables and their initial values.

Exogenous variables include entrepreneurship measures as well as socio-economic variables such as changing demographics of the workforce and other economic variables affecting economic growth. Controlling for these factors in addition to entrepreneurship measures increases the understanding of economic development in the Appalachian region.

Variable	Definition	Sources
Dependent variables /Growth measures		
ΔP	Change in population between the years 1995 and 2005	REIS-BEA
ΔE	Change in employment between the years 1995 and 2005	REIS-BEA
ΔI	Change in per capita income between the years 1995 and 2005	REIS-BEA
Initial Conditions		
P_{t-1}	Population in 1995	REIS-BEA
E_{t-1}	Employment in 1995	REIS-BEA
I_{t-1}	Per capita income in 1995	REIS-BEA

Table 1. Definition and Sources of Endogenous Variables and their Initial Conditions

To measure entrepreneurship, the number of nonfarm proprietors in the counties drawn from the publications of the Regional Economic Information System (REIS-BEA) from the Bureau of Economic Analysis is used. REIS draws information on proprietorship from income tax files of sole proprietors and partnerships and publishes county level estimates of the number of farm and nonfarm proprietors and their incomes. The data are used to construct four variables used as indicators of entrepreneurial activity in a county. These are the number of proprietors in the county in 1995 (PROP), the number of proprietors in a county per 1000 people in the labor force ($PROP_{LF}$) which is derived by dividing the number of proprietors by the total nonfarm employment multiplied by a thousand. This is based on the labor market approach of controlling for different absolute sizes of the geographical unit, in this case the counties, where the denominator is the size of the work force. The Labor Market approach assumes that entrepreneurial firms arise from the work force (Baptista, Escaria, and Madruga, 2005). The third and the fourth measures of entrepreneurial capacity are change in the number of proprietors in a county per 1000 people in the labor force between 1995 and 2005 ($CHPROP_{LF}$) and the growth in the number of proprietors (CHPROP).

Additional measures of entrepreneurship are based on firm birth data including firm births per county (BIRTH), firm births per 1000 people in the labor force per county ($BIRTH_{LF}$), change in the number of firm births in a county per 1000 people in the labor force ($CHBIRTH_{LF}$), change in the number of firm expansion per county (CHEXPAND), change in the number of firm deaths per county (CHDEATH) and number of firm deaths per county per 1000 labor force ($DEATH_{LF}$). Data on firm births are from the publications of the US Census Bureau's Statistics of US Businesses (SUSB). SUSB use data extracted from the Business Register, corresponding to a file of single and multi-establishment employer companies maintained by the U.S. Census Bureau. Definition and data sources of entrepreneurship variables are summarized in Table 2.

Variable	Definition	Sources
Entrepreneurship Variables		
PROP	Number of proprietors per county in 1995	REIS-BEA
$PROP_{LF}$	Number of proprietors in a county per 1000 people in the labor force in 1995	Constructed
$CHPROP_{LF}$	Change in the number of proprietors in a county per 1000 people in the labor force between 1995 and 2005	Constructed
CHPROP	Change in the number of proprietors in a county between 1995 and 2005	Constructed
BIRTH	Number of firm births per county in 1998	SUSB-U.S. Census
$BIRTH_{LF}$	Firm births per 1000 people in the labor force in 1998	Constructed
$CHBIRTH_{LF}$	Change in the number of firm births in a county per 1000 people in the labor force between 1998 and 2005	Constructed
CHEXPAND	Change in the number of firm expansion per county between 1998 and 2005	Constructed
CHDEATH	Change in the number of firm deaths per county between 1998 and 2005	Constructed
$DEATH_{LF}$	Number of firm deaths per county per 1000 labor force in 1998	Constructed

Table 2. Definition and Data Sources of Entrepreneurship Variables

In addition to measures of entrepreneurship, the exogenous variables used in analyzing the factors affecting economic growth are included in the empirical models. These variables are categorized into human capital or the quality of the labor force, infrastructure, agglomeration, and other socio-demographic characteristics of the county as summarized in Table 3. Human capital or the quality of the labor force is measured using the share of the population with high-school education ($EDUC_{HI}$). To control for the county's quality of infrastructure, data on the miles of road per square mile (ROADDEN) and miles of state road per square mile (STROADDEN) are used in the models.

To measure agglomeration, the empirical models include population density (POPDEN) and a dummy variable to identify metropolitan counties (METRO). Other socio-economic variables such as per capita income taxes (PCTAX), property taxes on businesses (PROPTAX), government expenditure per capita (GOVEX), and percent of families below

Variable	Definition	Sources
Entrepreneurship Variables		
human capital		
$EDUC_{HI}$	Share of the population with high-school education	U.S. Census
infrastructure		
ROADDEN	Miles of road per square mile	NRAC-WVU
STROADDEN	Miles of state road per square mile	NRAC-WVU
agglomeration		
POPDEN	Population density	REIS-BEA
METRO	Dummy variables to identify metropolitan counties	U.S. Census
other variables		
PCTAX	Per capita income taxes	County and City Data
PROPTAX	Property tax per capita	County and City Data
GOVEX	Government expenditure per capita	County and City Data
POVERTY	Percent of families below poverty	County and City Data
NATAMER	Natural amenities ranking	ERS-USDA
CRIME	Crimes reported per 100,000 of population	County and City Data
POP35_64	Share of population 35 to 64 years old	County and City Data

Table 3. Definition and Data Sources of Socio-Demographic Variables

poverty (POVERTY) are included in the empirical analyses. Natural amenities ranking (NATAMER) of the Economic Research Services (ERS-USDA) is used to account for endowment of natural amenities in Appalachian counties. Additional variables include crimes reported per 100,000 population (CRIME) and percent of population 35 to 64 years old (POP35_64). Data on explanatory variables are from the publications of the BEA-REIS, the Census Bureau, and the Economic Research Service (ERS) of the United States Department of Agriculture (USDA), and the Natural Resource Analysis Center-West Virginia University (NRAC-WVU).

Tables 4, 5, and 6 present the summary of descriptive statistics of endogenous variables and their lagged values, the entrepreneurship variables, and the variables that are traditionally

Variable	Minimum	Maximum	Mean	Standard Deviation
Endogenous Variables				
ΔP	-88141	252636	3589.30	16359.21
ΔE	-5119	118600	3398.39	8692.32
ΔI	2880	14738	7765.54	1720.59
Initial Conditions				
P_{t-1}	2566	1322460	53692.63	91220.84
E_{t-1}	1203	825870	27139.84	56668.27
I_{t-1}	10180	28369	16790.71	2832.76

Table 4. Descriptive Statistics of Endogenous Variables and Initial Conditions

linked to economic growth. The tables present the minimum, maximum, mean and standard deviation of 410 counties in Appalachia which are included in the analyses.

Variable	Minimum	Maximum	Mean	Standard Deviation
PROP	262.00	96914.00	4001.57	6962.20
$PROP_{LF}$	76.51	496.06	173.99	53.47
$CHPROP_{LF}$	-164.52	266.81	41.28	55.08
CHPROP	-2645.00	31539.00	1469.00	2883.39
$BIRTH_{LF}$	0.38	2816.00	11.50	139.04
$CHBIRTH_{LF}$	-20.94	204.00	0.08	10.40
BIRTH	-19.00	2946.00	116.40	239.22
CHBIRTH	-357.00	438.00	2.17	46.16
CHEXPAND	-355.00	7884.00	18.78	392.49
CHDEATH	-147.00	2802.00	6.45	140.98
$DEATH_{LF}$	0.16	46.71	4.08	3.09

Table 5. Descriptive Statistics of Entrepreneurship Variables

Variable	Minimum	Maximum	Mean	Standard Deviation
$EDUC_{HI}$	35.50	87.20	61.19	10.16
METRO	0.00	1.00	0.26	0.44
POPDEN	7.18	1811.17	108.06	139.97
POVERTY	2.90	46.80	15.41	7.41
ROADDEN	0.08	0.74	0.33	0.12
STROADDEN	0.00	0.61	0.22	0.11
NATAMER	-3.72	3.55	0.13	1.16
GOVEX	1168.00	33391.00	3791.97	2340.03
PCTAX	43.00	1317.00	286.01	160.46
PROPTAX	22.20	99.10	72.54	17.17
CRIME	0.00	8487.00	2262.91	1556.56
POP35_64	27.78	47.08	39.60	2.29

Table 6. Descriptive Statistics of Education, Agglomeration, Infrastructure, Natural Amenities, Government Expenditure, Taxes, and Crime Rate

2.5 Model estimation methods

The estimation methods are drawn heavily from Greene (1997) and Wooldridge (2002). The system of simultaneous equations is a complete system of equations since the number of equations is equal to the number of endogenous variables. The reduced form implies that the model can be solved equation by equation given there are no restrictions on parameter space and that orthogonality holds for the error terms. However, to guarantee that the system of equations has unique solutions, the conditions for identification must be satisfied. These include the rank and order conditions. To satisfy the rank condition, the number of exogenous variables excluded from an equation should be equal or greater than the number of endogenous variables included in the equation. This is a necessary condition to ensure

that the system has at least one solution. The rank condition requires that there is at least one non-zero determinant in the array of coefficients of the excluded variables which appears in the other equations. The rank condition ensures that there is exactly one solution for the structural parameters. In the model, there are more than one excluded variable in each equation, hence, both the order and rank conditions hold.

Ordinary least square (OLS) gives a biased and inconsistent estimate of the structural model if independent variables include endogenous variables. The simultaneity bias comes from the correlation between the right-hand side endogenous variable with the error terms. The models presented above imply simultaneity or reverse causation between dependent variables. Therefore, the estimation is done using two-stage least squares (2SLS) regression. 2SLS is a method used frequently to deal with endogenous variables. It uses instrumental variables that are uncorrelated with the error terms to compute estimated values of the problematic predictors in the first stage and then uses those computed values to estimate a linear regression model of the dependent variable in the second stage. Since the computed values are based on variables that are uncorrelated with the errors, the result of the two-stage estimation is optimal.

The estimation involves the use of two-stage least squares regression (2SLS) in estimating a four-equation model with changes in population, employment, per capita income, and an entrepreneurship index as endogenous variables. The entrepreneurship index represents the change in entrepreneurial activity constructed using principal component analysis. Selected variables used as measures of entrepreneurial activity in the previous estimations are used to construct an index that represents measures of entrepreneurship from the data on self-proprietorships and firm births. Principal component analysis is used to seek a linear combination of variables such that the maximum variance is extracted from the variables. The eigenvalues from the principal component analysis are presented in Table 7. Five measures of entrepreneurial activity are used to construct the entrepreneurship index. Change in the number of proprietors per 1000 labor force ($CHPROP_{LF}$) has the strongest contribution in extraction with an eigenvalue of 1.606. This is followed by the change in the number of proprietors (CHPOP) with an eigenvalue of 1.471. Figure 8 shows the map of the constructed entrepreneurship index for Appalachia.

The theoretical simultaneity between the individual measures of growth and the entrepreneurship index is tested using Hausman test for endogeneity in the four-equation model. If entrepreneurship is endogenous, the equations are estimated using two-stage least squares (2SLS) regression to correct the endogeneity problem. The procedure for Hausman test is heavily drawn from Wooldridge (2002). The first step is a regression of the endogenous variable ΔEn (entrepreneurship index) with all the exogenous variables. The residuals are then saved and included as an additional regressor in the estimation of the original equations. After running an OLS regression for each dependent variable (change in population, employment, and per capita income), a t-test for the coefficient of the first stage residuals is performed with a null hypothesis of no endogeneity. A p-value less than 0.10 indicates entrepreneurship index as endogenous. The results show that entrepreneurship is endogenous with population growth and employment growth but not with per capita income growth. Therefore, the population growth equation and employment growth equation are estimated while treating entrepreneurship also as endogenous. Since

Component	Eigenvalues		
	Total	% of Variance	Cumulative %
$CHPROP_{LF}$	1.606	32.115	32.12
CHPROP	1.471	29.412	61.53
$CHBIRTH_{LF}$	0.970	19.395	80.92
CHBIRTH	0.538	10.762	91.68
CHDEATH	0.416	8.316	100.00

Table 7. Results of Principal Components Analysis

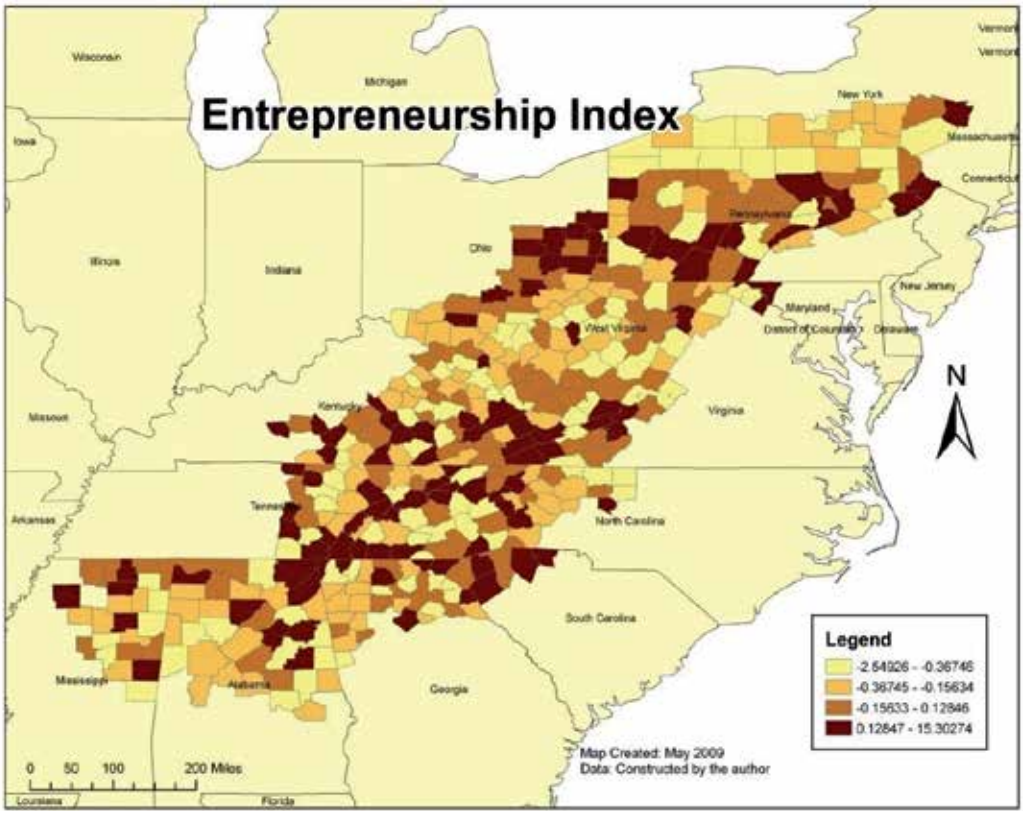

Fig. 8. Entrepreneurship Index for Appalachian Counties

entrepreneurship is not endogenous with per capita income growth, the ΔI equation is estimated with only population growth and employment growth used as endogenous variables. The results of Hausman test are summarized in Table 8.

	Hausman statistic	p-value
Population equation	0.112**	0.017
Employment equation	0.062*	0.077
Per capita income	0.037	0.403

***, **, * Significant at 1 %, 5 %, and 10%, respectively

Table 8. Results of Hausman Test for Endogeneity

3. Two-Stage Least Squares estimation (2 SLS) results

This section of the study is a discussion of the results in estimating the four-equation model where an entrepreneurship index is treated as an endogenous variable in addition to the measures of economic growth. The index is constructed using principal component analysis and tested for endogeneity against population growth, employment growth, and per capita income growth using the Hausman test. The result is a four-equation model where entrepreneurial growth is also estimated against other endogenous variables in the model as well as exogenous variables. The results are presented in Table 9.

3.1 Change in population

The result of Hausman test reveals that entrepreneurship is endogenous with population growth. Therefore, to account for the endogeneity issue, the structural equation is estimated using two-stage least squares (2-SLS) estimation. Population growth (ΔP) is regressed against the endogenous variables – employment growth (ΔE), per capita income growth (ΔI) and growth in entrepreneurship (ΔEn), its lagged value (P_{t-1}), and other variables linked to economic growth. The results in Table 9 show that employment growth (ΔE) is positive and significantly affecting population growth. This supports the hypothesis that "people follow jobs". The coefficient indicates that an increase in total employment leads to a 1.5 increase in population. This supports the theory of the positive interaction between population growth and employment growth as hypothesized in previous studies.

The lagged value of population is significant and the sign of the coefficient is negative. This means that counties with lower initial population had higher population growth which further supports the hypothesis. The education variable is also negative which means that counties with a higher proportion of the population with high school education had lower rates of population increase. The coefficient for miles of road per square mile (ROADDEN) is significant and positive as expected. This supports the theory of the positive effect of better quality infrastructure in attracting people. The figure shows that a mile increase of road per square mile results to a 0.05 increase in population.

3.2 Change in employment

Using two-stage least squares (2-SLS) estimation, the change in employment (ΔE) equation is regressed against the endogenous variables – population growth (ΔP), per capita income growth (ΔI), and entrepreneurship (ΔEn), its initial value (E_{t-1}), and a set of socio-economic variables. The results in Table 9 indicate a significant and positive relationship between population growth and employment growth which supports the "people follow jobs" hypothesis. Specifically, an increase in population gives a 0.98 increase in employment. Other variables used in the estimation are not statistically significant.

3.3 Change in per capita income

Since the result of endogeneity test revealed that per capita income growth is not endogenous with entrepreneurship, the ΔI equation is estimated as a function of the endogenous variables- population growth and employment growth, its lagged value (I_{t-1}), a set of other variables linked to economic growth and entrepreneurial growth which is treated as an exogenous variable. The results show a significant and positive relationship

between per capita income growth and its lagged value. This indicates that Appalachian counties with higher growth in per capita income initially had higher per capita income.

The education variable also has a significant and positive coefficient supporting the hypothesis of the contribution of education in increasing income. The result indicates that a percentage increase in population with high school education increases per capita income by $0.16.

3.4 Change in entrepreneurial activity

The constructed entrepreneurship index (ΔEn) is tested for endogeneity against three measures of growth – population growth (ΔP), employment growth (ΔE), and per capita income growth (ΔI). The result of Hausman test showed that entrepreneurship is endogenous with population growth and employment growth, but not with per capita income growth. Therefore, the entrepreneurship equation (ΔEn) is estimated as a function of the endogenous variables - change in population and change in employment and the set of variables traditionally linked to economic growth. The results in Table 9 indicate a significant and positive relationship between growth in entrepreneurial activity and employment growth. This provides evidence on the role of entrepreneurship in increasing job creation. The coefficient for population growth is also statistically significant; however, the sign is negative which is contrary to hypothesis. This means that counties with lower population increases had higher growths in entrepreneurial activity. The per capita income variable (ΔI), treated as exogenous, is also found to be significant in determining entrepreneurial growth. However, the coefficient is negative.

	CHPOP Equation		CHEMP Equation		CHPCI Equation		ENTREP Equation	
Variable	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**	**Coefficient**	**p-value**
Endogenous Variables								
ΔP	-	-	0.981*	0.074	-0.319	0.433	-0.534***	0.004
ΔE	1.543***	0.000	-	-	0.143	0.588	1.340***	0.000
ΔI	0.127	0.296	-0.141	0.628	-	-	-	-
ΔEn	-0.126	0.472	-0.401	0.583	-	-	-	-
Initial Conditions								
P_{t-1}	-0.850***	0.000	-	-	-	-	-	-
E_{t-1}	-	-	1.107	0.253	-	-	-	-
I_{t-1}	-	-	-	-	0.455***	0.000	-	-
Other variables								
ΔI	-	-	-	-	-	-	-0.127**	0.024
ΔEn	-	-	-	-	0.038	0.744	-	-
$EDUC_{HI}$	-0.103*	0.064	0.096	0.291	0.161**	0.038	-0.088	0.123
POPDEN	-	-	-	-	-	-	-	-
METRO	-	-	-	-	-	-	-0.072	0.155
POVFAM	-	-	-	-	0.039	0.662	-	-
ROADDEN	0.051*	0.091	-	-	-	-	-	-
STROADDEN			-	-	-	-	0.005	0.891
NATAMER	0.039	0.170	-	-	-	-	-	-
GOVEX	-	-	-	-	-0.046	0.408	-	-
PCTAX	0.013	0.691	-0.009	0.792	-0.076	0.230	0.015	0.779
PROPTAX	0.044	0.151	-	-	-	-	-	-
CRIME	-	-	-0.152	0.433	-	-	-	-
POP35_64	-	-	0.007	0.886	-	-	-	-

***, **, * Significant at 1 %, 5 %, and 10%, respectively

Table 9. Estimation Results of 4-Equation Model

4. Conclusions

The entrepreneurship index is constructed from selected measures of entrepreneurial activity using principal component analysis (PCA). PCA is employed to seek a linear combination of five entrepreneurship variables to come up with a single measure of entrepreneurial capacity. The index is used as a dependent variable in the four-equation growth model to determine simultaneous relationships between entrepreneurship and the measures of economic growth. The Hausman test is used to determine causal relationships between the entrepreneurship index and the growth measures. Results reveal that entrepreneurship is endogenous with population growth and employment growth, but not with per capita income growth. Therefore, the population growth equation is estimated while entrepreneurship as an endogenous variable and empirically estimated using instrumental variables. The employment growth equation is estimated the same way. However, since entrepreneurship is exogenous with per capita income growth, the per capita income equation and the entrepreneurship equation are empirically estimated while treating per capita income and entrepreneurship as exogenous. The estimation of the entrepreneurship equation in the four-equation model shows significant relationships with all the other endogenous variables. However, a positive association is observed only between the employment growth and the growth in entrepreneurial activity.

5. Limitations and future research

5.1 Limitations of the study

This study has expanded the examination of the determinants of regional economic growth by adding entrepreneurship factors in a regional model using simultaneous equations. However, improvements in the study can be done considering its limitations. The first limitation is in the construction of the entrepreneurship index. Exploring ways to construct the index would affect the results of the estimations and using different combinations of data that measure entrepreneurial activity will give different estimates that will facilitate comparison of results.

The second limitation is in the choice of variables included in the analyses. For example, additional amenity indicators could have been used in the estimation and/or other measures of amenity endowment could have been explored to enhance the performance of the models. Using different measures of the factors linked to economic growth can help in comparing results towards a more robust estimation.

5.2 Recommendations for future studies

The above limitations can provide opportunities for the improvement and expansion of the study in the future. Several aspects of the study can also be expanded to further the investigation of the link between entrepreneurship and economic growth. First, the effects of entrepreneurial activity can be further investigated by industry. For example, variables representing self-employment, firm births, and firm deaths in different industries such as manufacturing, construction, trade, transportation, and other sectors can be integrated in future work to extend the examination of the effects of entrepreneurship in the economy. Particularly, this will categorize the contribution of entrepreneurial activity from different

sectors and will identify the industries that contribute towards the achievement of economic growth.

Second, the model can be specified as a spatial econometric model to incorporate the role of space in examining the relationship entrepreneurship in economic growth. Spatial distribution of economic activity has received great interest from economists concerned with location decisions, urban growth, regional growth, land use change, and other areas of regional studies. Integrating spatial aspects in the analyses will determine spatial dependence in regional growth patterns and capture spillover effects.

Third, the study could be extended to a national-level analysis to increase variation in the data through increased sample size. Increasing the scope of the study will yield insights on a greater perspective with more general applications.

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16

Entrepreneurs' Resilience Measurement

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1. Introduction

Since independence, the Malaysian government had appointed several agencies to assist her in increasing the number of entrepreneurs. These agencies had produced quite a significant number of business start-ups from various backgrounds and products. However, the concern was on the number of success rate that these agencies can produce in terms of sustainable and successful entrepreneurs. Based on the current sources of data, the success rate for the start-ups to sustain was constantly below four per cent (MDeC 2008). The next question was how can these agencies able to detect at the early stages those new entrepreneurs who have the potentials to drop out. Thus, the author developed an instrument for measuring the psychological side of resilience index of these entrepreneurs. This index will help the agencies to take some measures to assistthe new start-ups sustain their business.Before this effort, those agencies hadbeen monitoring these new start-up or entrepreneurs' development based on the figures of their business performances such as profits, turnovers, sales rather than on their resilience level such as self-strengths, cognitive strengths and social networking skills.

Thus, the purpose of this chapter is to describe how the writer developed an entrepreneurship resilience instrument which can be used to measure the level of resilience of newly developed entrepreneurs. This level of resilience can be measured in the form of certain index. Based on this index, certain early measures or interventions can be taken to help the sustainability of the entrepreneurs' business. In summary, the chapter will describe how the concept of resilience was determined in the context of its constructs and contents to be measured, how the first draft of the entrepreneur resilience instrument based on the above concept was designed, how the content validity of the draft entrepreneur resilience instrument was determined, how the face validity of the draft entrepreneur resilience instrument was determined, how the items' reliability of the draft entrepreneur resilience instrument was determined, determination of consistency in terms of the items' reliability through test-retest (standardization) process, factorial analysis procedure and interpretation of the index level of entrepreneurs resilience.

2. Developing the concept of resilience

The first step was to define the concept of resilience in the context of entrepreneurship based on literature reviews. The author found thatthere was no specific terms such as entrepreneurial resilience at that time except for the term 'business resilience' which was

measured in terms of 'business organizations' performance' such as the amount of sales, income and revenue. The word 'emotional resilience' was found not suitable to be used because it is a common term being largely used in the discipline of psychology and focusing only on one dimension only. The word 'business resilience' was also not suitable to be used because it focuses on the organization itself rather than the human beings. The word 'social resilience' was also not suitable because it's a term commonly used in sociology and anthropology to refer to the survival of a community in a population within a certain physical environment.

The term resilience had slowly developed based on the following events:

- Resilience emerged as a major theoretical and research topic from the studies of children of schizophrenic mothers in the 1980s (Luthar, Cicchetti, & Becker, 2000; Masten, Best, &Garmezy, 1990).
- Emmy Werner (1980) was one of the first scientists to use the term resilience. She studied a cohort of children from Kauai (Hawaiian Islands). Kauai was quite poor and many of the children in the study grew up with alcoholic or mentally ill parents.
- In psychology, resilience refers to the positive capacity of people to cope with stress and catastrophe. It is also used to indicate a characteristic of resistance to future negative events.
- At work place, resilience means the act of resolving conflicts, turn disruptive changes into new directions, learn from this process, and become more successful and satisfied in the process (hardiness).
- In this sense "resilience" corresponds to cumulative "protective factors" and is used in opposition to cumulative "risk factors". The phrase "risk and resilience"' in this area of study is quite common.
- Commonly used terms, which are essentially synonymous within psychology are "psychological resilience", "emotional resilience", "hardiness", and "resourcefulness".
- Resilient children and their families had traits that made them different from non-resilient children and families.
- Resilience can be described by viewing: (1) good outcomes regardless of high-risk status, (2) constant competence under stress, and (3) recovery from trauma(Masten, 1989).
- Resilient people are expected to adapt successfully even though they experience risk factors that are against good development. Risk factors are related to poor or negative outcomes.
- Finally, resilience can be viewed as the phenomenon of recovery from a prolonged or severe adversity, or from an immediate danger or stress (Carver &Scheier, 1999; Davidson, 2000).
- In this case, resilience is not related to vulnerability

The author then synthesized the concept of entrepreneur resilience from the psychology school of thought and applied it in business management contexts. Based on several references of the meaning of resiliencein general and related readings of how successful entrepreneurs overcome their business challenges, the author concludes that entrepreneurship resilience means 1) the ability to cope well with high levels of on-going disruptive change of the surroundings towards their business; 2) sustain good health and energy when under constant pressure of various business problems; 3) bounce back the

business with acceptable means from setbacks; 4) overcome business adversities; 5) change to a new way of working and managing the business when the other way is no longer possible and do all this without acting in dysfunctional or harmful ways.

3. Developing the first draft of the entrepreneur resilience instrument

Having definedthe construct 'entrepreneur resilience', the first step in developing the instrument was to do a thorough literature review search on its sub-construct. For each of the sub-constructs, the author determined their concepts which were then used as the content of each items in the instrument. To further validate the determination of these sub-constructs and concepts and also the items' contents of the draft resilience instrument, the author confirmed some of them with the qualitative data collected from the interviews with twenty real new entrepreneurs or start-ups that had been in business between three to five years. . The framework for the approach of this instrument was determined based on universal input-process-output model. Finally, the 'feel' of the items in the instrument was written based on how the entrepreneurs use their resilience strengths in facing their business problem situations.

Based on the reading evidences, the author concluded that entrepreneur resilience can be described by three different components pertaining to a complete human development such as

1. Self (internal strengths)
2. Business situational-cognitive abilities (cognitive competence)
3. Business social-relational abilities (social competence)

'Self' can be referred to five different dimensions such as emotional strength, mental strength, physical strength, spiritual strength and moral stand. Business-situational cognitive abilities can be referred to i. have meta-cognitive capacity to plan, monitor and evaluate own activities, ii) critical thinking competences applied to business situations-problem solving skills, decision making skills, conceptualizing skills, logical reasoning, evaluating, judgment, analysing, inferring, questioning, perceiving, prioritizing, patterning, conceiving etc., iii) creative thinking competences applied to business situations-idea collecting, visualizing, making analogies, ideas designing, predicting trend, intellectual guessing, hypothesizing, discovering attitudes, look for alternatives, innovative. Finally, business social-relational abilities can be referred to i) Ability to form secure attachments, ii) basic thrust of partners/workers, iii) ability and opportunity to actively seek help from others, viability to make and keep good friends, iv) ability to empathize, v) possess good-other awareness, vi) possess good communication skills and vii) being open to a variety of ideas and points of view

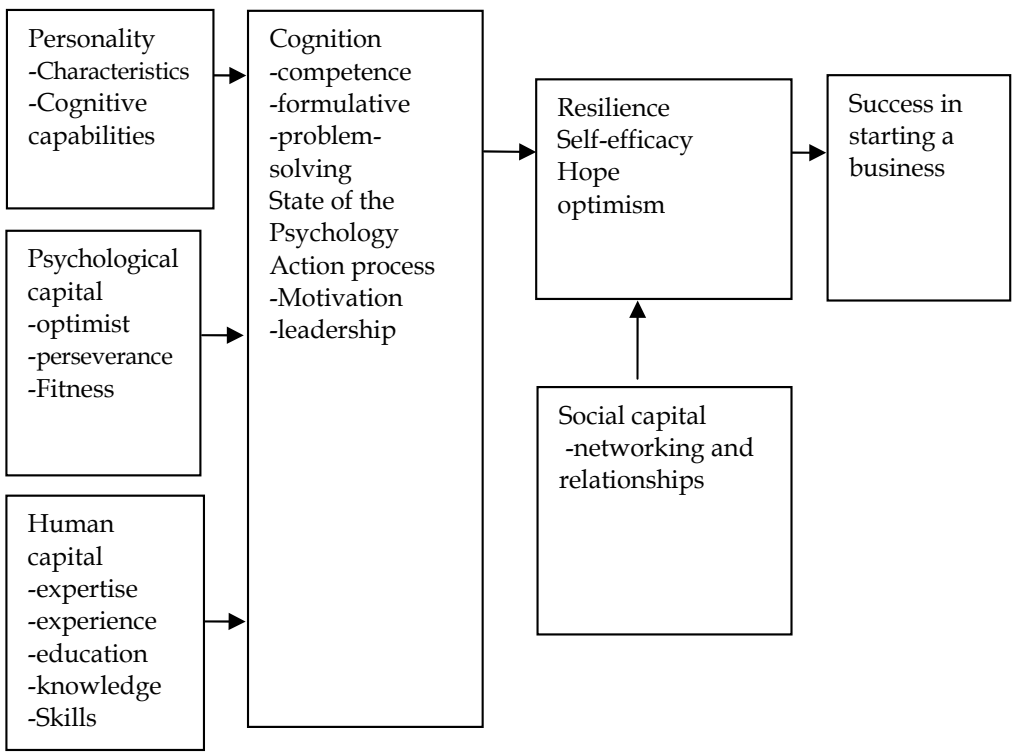
Theory underlying the concept of entrepreneur resilience

The basic model used in this research was based on the *Successful Start-up Business Model* proposed by Baron, Frese and Baum (2007) in the *The Psychology of Entrepreneurship* book. This model combines an entrepreneur's factors such as his or her own personality, his own human capital and his psychological capital which are needed for him or her to start a business. These three factors then contribute to four main elements for success such as the state of his or her psychology, cognition, action and social capital which are the main

ingredients for producing resiliency and drive entrepreneurs to start a business and sustain it after that. In short, Baron, Fresedan Baum emphasized that there is a relationship between entrepreneur and psychological, cognition and social factors in determining the success of a business.

This model pointed out that for an entrepreneur to be successful in starting a business, it depends on two main foundations. They are the basic foundation and the proximal foundation. The basic foundation consists of four factors such as the entrepreneur's personality (characteristics and capabilities), his or her psychological capital (optimist, perseverance and fitness), human capital (expertise, experience, education, knowledge and skills) and social capital (networking and relationships). These four factors then contribute to the outcomes of the proximal foundations which has four main elements for success such as the internal state of psychology, cognition (such as competence and problem-solving) and finally the action process. All these three elements then contribute to the outcome of resilience, self-efficacy and hopes in the entrepreneur. This state of resilience, self-efficacy and hopes then drives the success of starting a business. This model is depicted in the diagram below:

Basic Foundations Proximal Foundations



Sources: Baron, Fresedan Baum (2007); Brooke (2004) ;Luthans (2004, 2007)

Fig. 1. Successful Start-up Business Model from the human side

Brooke (2004) who is also in agreement with Baron, Fresedan Baum (2007) adds financial capital to the already four factors proposed by them. Luthans (2004) further expands the criteria or the outcomes of the psychological capital such as self-efficacy, hopes, optimism and resilience. According to him, an entrepreneur should put a high hope and confidence with the knowledge, skills and capabilities he or she has in starting a business. An entrepreneur also has to be optimistic so that whatever problems he or she encounters are treated as temporary and thus trying to overcome those problems. He further added that an entrepreneur must be resilient as a preparation to face business problems and difficult situations. In short, the four capital of the human side of the entrepreneurs play a vital role in ensuring the success and sustainability of a business. In another study conducted by Nandram and Samsom (2006) on more than sixty entrepreneurs in Europe also found the important role of the human factors a) for explaining venture performance or start-up, b) in describing the development of firms and finally c) explaining venture failures. They proposed Strategic Management model which also support Baron, Fresedan Baum (2007)'s model in terms of the human factors that contribute to the success of a business start-ups. Based on the above definition of resilience, the format and the corresponding references of the constructs and sub-constructs of resilience from the literature review, the first draft of the instrument was built. This first draft was then polished through several processes of amendments and items' reliability and validity. Each of the items in each section has its negative match except for the outcomes section. The purpose was to prepare for measuring the non-resilience level of a respondent other than acting as a check and balance throughout the instrument.

4. Managing the content validity

The purpose of this phase was to get the agreements of the entrepreneurship experts and some entrepreneurs on the concept, constructs and content of the items selected in the draft resilience instrument. This phase was necessary as part of the instrument development procedure for ensuring its content validity. A one day workshop was conducted which involved six entrepreneurship professors from local universities, seven entrepreneurs and entrepreneurship development staffs and a few facilitators who were PhD students in Entrepreneurship and Business Education from the local universities. Most of the comments were on the technical aspects of the draft instrument such as the number of items, sentence structure and length and the use of Likert scales. Overall, the constructs and the content of the items were agreed upon with some suggestions of rewording the sentences.

5. Managing the face validity

Face validity is a necessary procedure in any instrument development process (Benson & Clark 1983). The purpose is to check whether the items can be understood easily and similarly by any respondent. This session was conducted with several new entrepreneurs from various business types. The researcher presented to the new entrepreneurs the underlying framework for the development of the instrument in terms of the overall approach such as the input-process-output format. The orientation of writing the items based on how an entrepreneur uses his or her internal strengths and cognition to manage his or her business problems in a certain business context. Finally, the construction of the items based on the concepts of the constructs and sub-constructs based on the literature

review search and interviews data with the entrepreneur. In terms of the number of items, the entrepreneurs were told that at this stage the number of items weredecided based on the saturated number of contents found in the literature review. The number of items had to be determined by the item reliability and factorial analysis test in the later stage. All the new entrepreneurs tried to respond to the items in the draft instrument. Most of them took more than 45 minutes to finish it. However, one of them managed to finish responding to the items in 20 minutes. In terms of the items' sentences, they informed a number of items that they did not understand and need to be rewritten including the sentence grammatical errors. The author then looked into those sentences that cannot be understood either readily or easily and reword them. At this stage, the items in the instrument had been reworded many times from long sentences to short sentences while ensuring the meanings did not changed.

6. Managing the items'reliability

The next necessary procedure in any instrument development process is to determine the items' reliability. The purpose of this procedure was to determine which items should be retained and which items should be dropped based on the values of the Cronbach Alpha (Creswell, 2008; Gall and Gall, 1998). There were three stages of development for this purpose. First, the draft instrument with 204 items was piloted with thirty respondents (both the one with 4 Likert scales and 5 Likert scales). Second, based on the Cronbach Alpha values of each items in both of the draft instruments with 204 items which were less than 0.5, some items were dropped which left the instruments with only 151 items. Third, the draft instrument with 5 Likert scales were chosen because the Cronbach Alpha values were better than the one with 4 Likert scales. This newer draft instrument with 151 items were tested on five different groups of samples for the purpose of standardization.

7. Managing the standardization process

For this phase, five different groups of new entrepreneurs were administered with the draft instrument of 151 items and 5 likert scales. This process is called standardization. The purpose was to ensure that the same instrument when administered on the different groups of entrepreneurs (from different places and backgrounds), the Cronbach Alpha values of the items remained almost the same. This means that this instrument is highly reliable to be used on any group of the new entrepreneurs population. Table 1 shows that the values of the Cronbach alpha of the constructs for the five different groups when compared were more or less the same.

8. Factorial analysis procedure

The final phase of this process of developing the entrepreneur resilience instrument was to run the factorial analysis procedure on the draft instrument with 151 items and 5 Likert scales. The purpose of doing factorial analysis was to determine whether the items for each construct truly belong to them or in other words whether the items measure the constructs. This procedure informs which items should be rejected or retained under one construct. It works by calculating the correlational values between the items within the given constructs

	Constructs	*CronbachAlpha* (5 Likert Scales)	Group 1 N = 30	Group 2 N=30	Group 3 N=30	Group 4 N=43	Total N= 133
1	**Optimistic (item P&N) n item=24**	0.7318	**0.8182**	**0.7497**	**0.7425**	**0.8083**	**0.7886**
2	**Perseverance (item P&N) n=16**	0.6164	**0.5596**	**0.5343**	**0.6977**	**0.6601**	**0.6302**
3	**Fitness (item P&N) n=26**	0.5133	**0.7984**	**0.6697**	**0.7029**	**0.7297**	**0.7228**
4	**Competences (item P&N) n=14**	0.6985	**0.6491**	**0.5197**	**0.7077**	**0.2104**	**0.5373**
5	**Formulative (item P&N) n=16**	0.6553	**0.6889**	**0.7172**	**0.7516**	**0.5765**	**0.6727**
6	**Problem solving (item P&N) n=12**	0.5692	**0.5653**	**0.5288**	**0.4578**	**0.6728**	**0.5553**
7	**Social networking (item P&N) n=20**	0.8124	**0.6013**	**0.6578**	**0.6231**	**0.5400**	**0.6056**
8	**Business performance =23**	0.8861	**0.9370**	**0.8914**	**0.8162**	**0.9551**	**0.9373**

Table 1. Test-Retest Results (for draft instrument with 151 items and 5 Likert scales)

in a set of data. It also takes into considerations the size of the sample. The following are the assumptions in doing this procedure:

1. Communality
   - Estimate the values of the common variance of each item under on construct (factor) (Field, 2000)
   - The values of the communality is between 0-1
   - For the sample size less than 100, the communality values is >0.6
   - For the sample size between 100-200, the communality values is within the range of 0.5
2. Eigen value
   - Determine the number of constructs or factors (Kaiser 1974)
   - For Eigen values >1 or more should be do further test
   - Represent the total variance as a whole which is explain by the factor analysis
3. Loading factor
   - Determine whether an item is included or not included in a factor
   - Provide the correlational values between items in a factor, the bigger the values of the loading factor, the stronger the correlations between the items in a factor
   - The method of determining the values of the loading factor depend on the sample size (Guadagnoli & Velicer 1988)
   - The minimum values of the loading factor is 0.3 (William and Monge, 2001
   - According to Tabachnick & Fidel, 2001, loading factor for each sample group:
   - Sample >150, loading factor 0.5
   - Sample >150 , loading factor 0.4
   - Sample >300 loading factor 0.3
4. Finally, the items within these constructs will be tested again for its Cronbach Alpha to double check the internal consistency of the values.

Construct: Self

	Sub-constructs/Factors									
Item no.	1	2	3	4	5	6	7	8	9	10
c111	.792									
c101	.763									
c128	.579									
c115	.549									
c58	.502									
c91		.793								
c85		.774								
c1		.564								
c121		.560								
c124										
c119			.800							
c120			.692							
c3				.702						
c29				.645						
c15				.540						
c9										
c4					.670					
c43					.531					
c37					.519					
c65										
c52										
c51										
c98						.761				
c99						.563				
c31						.555				
c71							.718			
c79							.679			
c45										
c105								.725		
c23								.571		
c94									.794	
c87									.516	
c73										.800
Alpha	0.788	0.762	0.783	0.496	0.405	0.500	0.520	0.382	***0.339***	***x***
Eigen value	7.148	2.276	2.048	1.841	1.761	1.389	1.344	1.247	1.225	1.041
Explain variance (%)	21.661	6.896	6.205	5.580	5.337	4.209	4.074	3.777	3.712	3.153
Total Explain variance (%)	64.606									

Construct: Cognitive

	Sub-constructs/Factors							
Item no.	1	2	3	4	5	6	7	8
c107	.711							
c54	.652							
c47								
c41		.754						
c83		.588						
c5								
c39								
c33			.642					
c20			.611					
c75			.555					
c77				.745				
c60				.676				
c81				.527				
c96					.692			
c89					.621			
c67						.747		
c69						.728		
c18							.790	
c11							.647	
c6								.695
c25								.607
Alpha	0.577	0.567	0.531	0.472	0.438	0.487	***0.377***	0.414
Eigen value	3.486	2.025	1.589	1.355	1.295	1.171	1.117	1.093
Explain variance (%)	16.599	9.645	7.567	6.452	6.166	5.578	5.319	5.202
Total Explain variance (%)	62.528							

Constructs: Social Networking

	Sub-constructs/Factors			
Item no.	1	2	3	4
c49	.789			
c35	.732			
c103		.815		
c126		.714		
c116		.533		
c56			-.736	
c113			.680	
c109	.519		.577	
c93				.720
c63				.701
Alpha	0.580	0.528	***x***	***0.193***
Eigen value	2.152	1.502	1.298	1.056
Explain variance (%)	21.525	15.024	12.982	10.558
Total Explain variance (%)	60.088			

Table 2. Factor Analysis Results for Items belong to each construct/factor (Number of respondents = 133; Loading Factor = 0.5)

Factorial Analysis Results for Items Rejected in Each Construct

Based on the above factorial analysis results of the loading factors of those items less than 0.5 were automatically rejected as listed below. Furthermore, those items that were written in italic were the additional items that were rejected after testing their Cronbach Alpha values once more. Thus, the total number of items rejected based in the draft instrument with 151 items and 5 likert scales were 22.

No	**Self**	**Cognitive**	**Social Networking**	
1	**Optimistic** *15, 4, 43*	**Competence** 39, ***11, 18, 81***	113, ***56, 63, 93***	
2	**Perseverance** 9, 23, ***94, 37***	**Formulative** 5, 47		
	Fitness 45, 124, ***73, 105, 87***	**Problem Solving**		

Total items reduction = 22; Items' Communality <0.5; Loading Faktor< 0.5; Alpha Cronbach< 0.5; Corrected item-total correlation <0.3.

Table 3. The total number of items rejected in the draft instrument with 151 items and 5 likert scales (Number of respondents= 133; Loading Factor= 0.5)

Retained items from draft instrument with 151 items and 5 likert scales

The following is the list of items retained for each construct in the draft instrument with 151 items and and 5 Likert scales which totalled up to 84 items altogether. The number with the sign (*) refers to the negative items.

OPTIMISTIC (O) 18 item	1,2*,9,16*,17,25,28*,35,40*,47,51,52*,61,64*,70*,71,79*,84*
PERSEVERANCE (P) 8 item	3,6*,11,12*,22*,29,46*,67
FITNESS (F) 16 item	4*,5,10*,13,19,20*,21,30*,31,36*,43,49*,56*,60*,63,76
COMPETENCES(C) 6 item	7,8*,14*,15,18*,23
FORMULATIF(FM) 12 item	24*,27,32*,33,38*,39,42*,45,50*,53,62*,78
PROBLEM SOLVING (PS) 12 item	26*,34*,37,48,55,65,68*,72*,73,77*,82*,83
SOCIAL NETWORKING (SN) 12 item	41,44*,54*,57,58*,59,66*,69,74*,75,80*,81
Total 84 items	**Plus Outcome 23 items**

Table 4. List of items retained for each construct in the draft instrument with151 items and and 5 Likert scales

9. Interpretation of the index level of entrepreneur resilience

Since the reliability of both the positive and negative items are stable throughout a series of group's administration, three format of the entrepreneur resilience instruments were proposed. The purpose was to provide some flexibility to choose which format suits the need of a particular organization interested in using it. For each format, the index calculation is slightly different. Also for each index level, there is an interpretation of that from the resilience point of view. Finally for each interpretation, there is a recommendation of steps to be taken by the entrepreneurs either to maintain or improve his or her resilience strengths.

Three different format of the entrepreneur resilience instruments were proposed based on the level of recommendation and reasons for them (Table 3).

Interpretation and intervention of the resilience index scores

Low scores: Range between lowest and lower middle

A self-rating score within this range indicates that business is probably a struggle for the entrepreneur and he/she knows it. He/she may not handle the business pressure well. He/she don't learn anything useful from bad experiences. He/she feels hurt when people criticize him/her. He/she may sometimes feel helpless and without hope.

Intervention proposed

If an entrepreneur scored within this range, he/she should ask this question for him/herself "Would I like to learn to handle my difficulties better?" If the answer is yes, then a good

	Format	Choice	Reasons
1	Instrument A: 42 resilient items altogether (replaced some items with the non-resilience items for the purpose of lie detectors) plus the 23 resilience outcome items (Total items: 65)	First	Respondents will feel most comfortable because the number of items are just moderate. In addition, it also includes the outcomes of the resilient attitude in terms of perceptive performance.
2	Instrument B: 42 resilience items + 42 non resilience items and 23 resilient outcomes items (Total items: 107)	Second	Respondents will feel tired to answer a lot of items and this might influence their honesty, thus the results of the measure. However, it can measure both the resilience and non-resilience level
3	Instrument C: 42 resilience items altogether (replaced some items with the non-resilience items for the purpose of lie detectors) but without the outcome items (Total items: 42)	Third	Even though the number of items are the least compared to the above two but the outcomes of the resilience in terms of perceptive performance are not included.

Table 5. Format of the entrepreneur resilience instruments, the level of recommendation and reasons for them.

way to start is to meet with other entrepreneurs/entrepreneurs who are working to develop their resiliency skills. Let them coach, encourage and guide you. Another way, is to get resiliency coaching from a trained business counsellor. The fact that the concerned entrepreneur feel motivated to be more resilient is a positive sign.

High scores: At the highest level

High scores: A self-rating score within this range indicates the entrepreneur is taking up the business challenges very well. This means he/she is already very good at bouncing back from business setbacks. He/she has taken the right steps and strategies to sustain his/her business. He/she also likes learning new ways to be even better which will take his/her already good skills to even a much higher level-something like reaching to the advanced level of business growth.

Suggestion proposed:

If anentrepreneur scored within this range, he/she should ask this question for him/herself "Would I like to share and make myself available to other entrepreneurs who are trying to cope with business difficulties?" He/she should be a real life role model for them.

Middle scores: Range between middle and upper middle

Middle scores: A self-rating score within this range indicates the entrepreneur is taking up some (not all) of the business challenges very well. Once in a while he/she might have some difficulties but able to bounce back after some time with some hard work or struggles.

Notes for administrator to consider:

Being a middle scorers, he/she might underrate him/herself than overrate him/herself. Some people have a habit of being modest and automatically give themselves a 3 on every item for a total of middle scores. Thus, if he/she is a middle scorer, we need to find out how valid is their self-rating is. One way, is to ask two people who know he/she well to rate him/her on the items and see what scores they come up with. Have a discussion with them about each of the items where there is a discrepancy and listen to what they say. If they rate him/her higher, then the entrepreneur has a good resilience level.

Intervention proposed:

If anentrepreneur scored within this range, he/she should ask this question for him/herself, "Would I like to fight harder to achieve excellence in my business?". If the answer is yes, then a good way to start Is to model other entrepreneurs who had developed their resiliency skills and become successful. Learn about them and follow their steps. Another way, is to develop a networking with them and let them inspire you.

The use of resilience outcomes level

The purpose of having to measure the level of perceptive business performance is to find out if the psychological based resilience level of the entrepreneur is parallel with it. The point is some entrepreneur thinks he or she is resilient but the fact is his or her perceptive business performance is not doing very well. Thus, some other reasons for the difference should be looked into. These reasons could be uncontrollable factors such as changing in trends, policy, unexpected natural disasters and family incidences. On the other hand, it could be the business knowledge and skills factors of the entrepreneurs.

10. Implementation of the instrument

This instrument should be administered on the new entrepreneurs who have started their businesses between 1-3 years. Most experts also agreed that these are the number of thriving years that entrepreneurs usually have to strive before reaching the stage of clearly firm with their stand to stay in the business regardless of any obstacle they would face from time to time. In addition, the stage where they are willing to face any challenge that come in their way towards success.

11. Conclusion

Based on the resilience index and its interpretations, entrepreneurs can think of what are the necessary resilience training interventions to take for the purpose of sustaining their businesses.

i. Resilience Training

Resilience is a critical personal competency for individuals who wish to re-ignite their careers, succeed under sustained pressure; quickly recover from work, health or relationship

setbacks and full fill their life goals. Equally, resilience has become a key strategic competence for organizations that want to attract, retain and motivate great people. Entrepreneur who have a resilient disposition are better able to maintain poise and a healthy level of physical and psychological wellness in the face of business's challenges. Entrepreneur who are less resilient are more likely to dwell on problems, feel overwhelmed, use unhealthy coping tactics to handle stress, and develop anxiety and depression. Resiliency can be developed by learning and practicing mindfulness and other mind-body techniques. Mindfulness helps them achieve an elevated sense of awareness by consciously recognizing and accepting the present. It brings purposeful, trained attention out of the negative thoughts of the mind and into the reality of the world in the present moment.

Forming a resilient disposition entails:

- Fostering acceptance
- Finding meaning in life career
- Developing gratitude
- Addressing spirituality
- Retraining one's attention

A resilient approach leads to addressing problems rather than avoiding them, a positive, optimistic outlook and a flexible, adaptive disposition. Research has shown that these techniques engage the prefrontal cortex, the part of the brain that regulates emotion, thinking and behaviour. Resilience training empowers individuals to change unconstructive behaviours, actions and ways of thinking. Training helps new entrepreneur develop four types of resilience to lead a more balanced and healthier life as a businessman;

- **Cognitive —** preserving attention, memory, judgment and problem-solving skills.
- **Physical —** maintaining well-being through regular exercise, a healthy diet and restful sleep.
- **Emotional —** approaching life career with a realistic, balanced and flexible disposition and addressing rather than avoiding problems.
- **Spiritual —** practicing and keeping in mind the concepts of forgiveness, acceptance, compassion, true meaning and purpose.

The following are proposed topics for resilience training interventions of the new entrepreneur

1. Resilient Organization Training

This training helpentrepreneurs to build a resilient organization. A resilient organisation is calm, energised, engaged, focused and purposeful. Leaders and workers cultivate health, happiness and productivity. This attracts, retains and motivates all stakeholders. A Resilient organisation is one which realises its own potential through nurturing the ability of those working within it to i) Bounce back from adversity, ii) Thrive on challenge iii) Explore and reach their own full potential and iv) Have a positive impact on others. Resilience interventions systematically extract the benefits of stress management, individual and corporate health, emotional intelligence and thinking skills. Language, practical skills and creative frameworks become part of organisational culture - one which respects and honours the combined potential of body, heart, mind and spirit.

2. Resilient entrepreneurs training

Entrepreneurs can also attend resilient training based on needs. The content of the resilient training for entrepreneurs should cover the 6 core skills such as:

1. Optimism based on changing mindset towards business which changes way oftackling projects, erases negative thought patterns and depression.
2. Regulating emotions to perform at optimum levels under stress.
3. Engage in effective relationships.
4. Problem solving techniques.
5. Personal resilience techniques.
6. Managing staff in a pressurised fast paced environment

12. Appendix

The sample instrument

Instruction

The Please tick (√), write or circle your answer where appropriate.
Your answers are very important to the accuracy of this study.
(Please return the completed questionnaire in the enclosed self-addressed envelope at your earliest convenience.)

No	Item	Strongly Disagree	Dis agree	Less Agree	Agree	Strongly Agree
1	I have a strong sense of vision to succeed that keep myself going	1	2	3	4	5
2	I tolerate the pressure to grow my business further within the limited resources	1	2	3	4	5
3	I am always clear what to do regardless of the business problems I have.	1	2	3	4	5
4	I usually formulate a series of steps to close the gap between the current position of my business and the desired goal	1	2	3	4	5
5	I can accept failures as part of the learning process in business	1	2	3	4	5
6	I believe in working not more than eight hours a day regardless of how much work to do	1	2	3	4	5
7	I will feel comfortable if work tasks are clearly defined	1	2	3	4	5
8	I believe customers have to adapt to my product	1	2	3	4	5
9	I know when the time is right to act when change in strategy is inevitable	1	2	3	4	5
10	I usually finish my work task	1	2	3	4	5

No	Item	Strongly Disagree	Dis agree	Less Agree	Agree	Strongly Agree
	adequately and on schedule					
11	I am healthy and fit most of the time since I run my business	1	2	3	4	5
12	I keep studying the market trend of my product(s) to adjust my strategy	1	2	3	4	5
13	I tolerate ambiguity of what I should do to achieve my business goal	1	2	3	4	5
14	I do a lot of brainstorming with my partner(s) or staff(s) to formulate creative idea(s)	1	2	3	4	5
15	I manage change in my business organization by taking one step at a time *Saya menangani perubahan dalam perniagaan dengan mengambil satu langkah pada satu masa*	1	2	3	4	5
16	I can accept sudden heavy workload in the last minute (i.e. customers' order; project's change of timelines, etc)	1	2	3	4	5
17	I make a point to learn from different cases of problems	1	2	3	4	5
18	I even become more strongly motivated if I have not yet achieved success	1	2	3	4	5
19	I do not automatically accept what I see and hear about my business	1	2	3	4	5
20	I work fast by organizing my business activities according to priorities and timelines	1	2	3	4	5
21	I believe in working as a team with my business partner(s) or staff(s) to accomplish a task	1	2	3	4	5
22	I don't allow myself get stucked by keep looking to the future of my business	1	2	3	4	5
23	I accept my client's comments to improve my product(s)	1	2	3	4	5
24	I enjoy the feeling of autonomy to steer my business towards success	1	2	3	4	5
25	I evaluate all new evidences that come with my business problem(s)	1	2	3	4	5

No	Item	Strongly Disagree	Dis agree	Less Agree	Agree	Strongly Agree
26	Once I have set out on the path to solution, I follow through it myself till end	1	2	3	4	5
27	I feel intrinsically rewarded when I can solve a problem	1	2	3	4	5
28	I hand over to someone I trust to handle my staff(s)'s work problems	1	2	3	4	5
29	I gather relevant and up-to-date information of an issue before taking a position	1	2	3	4	5
30	I can accept other people's views for my business	1	2	3	4	5
31	I keep giving assistance or encouragement to deepen social support to my staff(s) when resolving conflicts	1	2	3	4	5
32	I am affected when my client(s) express their feelings of dissatisfaction	1	2	3	4	5
33	I feel that I cannot keep up with the current needs of my business to expand	1	2	3	4	5
34	I rely heavily on my staff(s) to report on the sales performance	1	2	3	4	5
35	I am very capable of adapting to change in my business environment (i.e. resource supply, government policy, cost of materials, consumers' trend, loss of good employees etc)	1	2	3	4	5
36	I tell my feelings of doubts to my business partner(s) or staff(s)	1	2	3	4	5
37	I wonder if I have the capability to sustain my business	1	2	3	4	5
38	I search for information on how to strategically allocate my limited resources for efficiency (i.e. time, money, equipment, space etc)	1	2	3	4	5
39	I have to think of myself during critical times and let my staffs take care of themselves	1	2	3	4	5
40	I am willing to spend my time and energy to help my business partner(s) or staff(s) in need	1	2	3	4	5

No	Item	Strongly Disagree	Dis agree	Less Agree	Agree	Strongly Agree
41	I have a lot of stamina almost every day since I run my business	1	2	3	4	5
42	I persist discussing with my partner(s) on any decision even though its difficult	1	2	3	4	5

Section 2

No	Item	Strongly Disagree	Disagree	Less Agree	Agree	Strongly Agree
1	Overall, the performance of my business is getting better each year	1	2	3	4	5
2	The returns of my business is increasing each year.	1	2	3	4	5
3	The cost of running my business is still reasonable	1	2	3	4	5
4	The turnover growth of my business is better each year	1	2	3	4	5
5	The number of personnel in my business is still manageable.	1	2	3	4	5
6	The financial risks of my business is still within my control	1	2	3	4	5
7	There is a possibility of earning more income from new opportunities that my business had identified.	1	2	3	4	5
8	I can see that my business is thriving very well	1	2	3	4	5
9	The number of clients is adding up from time to time due to my business product(s)'s quality	1	2	3	4	5
10	The speed of development of my business is suitable with the effort that I had put in	1	2	3	4	5
11	My business has a good potential to grow and sustain in the future	1	2	3	4	5
12	I am comfortable with the time span that I had used to bring my business to a more stable stage	1	2	3	4	5
13	I accept the fact that there is a cost to any decision that I take in my business activities	1	2	3	4	5
14	I am able to ignore my fear of failure and future results to continue working hard for my business	1	2	3	4	5
15	I can always figure out how to solve problems that arise at my	1	2	3	4	5

No	Item	Strongly Disagree	Disagree	Less Agree	Agree	Strongly Agree
	business place					
16	I don't let myself neglect the daily running of business even though preoccupied with many problems	1	2	3	4	5
17	I can take advantage of the changing environment to my benefit	1	2	3	4	5
18	I respond to adverse situations in my business with positive attitude	1	2	3	4	5
19	I am able to handle many conflicting decisions in my business with patience	1	2	3	4	5
20	I don't act impulsively whenever I face with stressful moments with my clients and staff(s)	1	2	3	4	5
21	I react constructively to stressful situations in my daily running of business *Saya bertindak secara konstruktif dalam situasi yang tertekan semasa*	1	2	3	4	5
22	I manage to see and capitalize on the opportunity that come with change in my business environment	1	2	3	4	5
23	I courageously face potentially disruptive changes by turning adversity into advantageous opportunity	1	2	3	4	5

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Entrepreneurship has a tremendous impact on the economic development of a country. As can be expected, many public policies foster the development of self-entrepreneurship in times of unemployment, praise the creation of firms and con- sider the willingness to start new ventures as a sign of good fortune. Are those behaviours inherent to a human being, to his genetic code, his psychology or can students, younger children or even adults be taught to become entrepreneurs? What should be the position of universities, of policy makers and how much does it matter for a country? This book presents several articles, following different research approaches to answer those difficult questions. The researchers explore in particular the psychology of entrepreneurship, the role of academia and the macroeconomic impact of entrepreneurship.

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