Abstract

Uncertainty and complexity are fundamental to innovation and decision making, especially in global high technology industries. Entrepreneurs interact with venture capitalists through the entrepreneurs’ communication and learning about the potential of new business venture. We believe that uncertainty and complexity are fundamental to the process of innovation through the synergy between entrepreneurs and venture capitalists. The purpose of this conceptual paper is to provide a conceptual synthesis on a complexity system approach to the innovation relationship between entrepreneurs and venture capitalists.

Keywords – Learning, Synergy, Venture Capital, Innovation, Entrepreneurship

Introduction

Technology and innovation can be determined by the interaction between business entrepreneurs and financial venture capitalists. Entrepreneurs interact with venture capitalists through the entrepreneurs’ communication and learning about the potential of the new business venture. In this paper, we analyse innovation and the relationship between entrepreneurs and venture capitalists through a complex systems based integrated synergy model. The emergent behavior of complex systems in the context of globalization and the commercialisation of the global internet, are so rich and varied that any attempt to identify it by reductionist means - mechanistic, linear thinking, is difficult. By contrast, complex systems theory suggests that in a complex environment one should seek to identify patterns and principles, the iteration of which generates the richness of outcomes. In the same
vein, Drazin and Sandelands (1992) suggested that rules which govern individual action and interaction “constitute a deep structure that generates relationships among actors and produces macro-order” (p.235). Therefore, in applying the principles of complexity theory to represent complex environments, one should develop reasoning for isolating the rules or principles which drive their dynamics (Berger and Herstein, 2012). In this conceptual article, we combine traditional aspects of market competition with the role of social structure (Granovetter 1985) to analyze the relationship between venture capitalists and the financial community and their interaction with business entrepreneurs. This paper is thus an attempt to analyze the innovation process, by entrepreneur’s communications to venture capitalists for financial funding decisions.

The importance of analyzing innovations in organizations and businesses in the complex, context of institutions and society has been illustrated in depth in the field of business, institutions and society as it has become a crucial area of social science and management research. Models of corporate social performance (Choi et al, 2011; Carroll, 1979; Wood, 1991a, 1991b), focusing on the internal aspects of the firm; social control of business (Berger et al, 2011; Jones, 1995) focusing on the external environment of the firm; stakeholder models (Berger et al, 2013; Donaldson and Preston, 1995; Freeman, 1984; Hill and Jones, 1992), focusing on the various actors that constrain and influence the firm’s behavior and performance. We believe that a complex systems approach allows a broader and richer approach to the various processes that drive innovations.

In this conceptual article, we try and integrate the nature of innovation in the context of complex systems, with an application to the relationship between entrepreneurs and venture capitalists. Venture capitalists in making funding decisions combine not only economic and market criteria, but also social and institutional criteria in their valuation of international corporations and new business ideas. The valuation of entrepreneurship and the efforts of entrepreneurs will depend on institutional factors under complex systems. The purpose of this conceptual paper is to provide a preliminary conceptual framework of this idea, and to contribute to the literature on the nature of innovation in business and society in the 21st century.

**Venture Capitalists and Entrepreneurs as Complex Entities**

The basic notion of complexity theory is that complex adaptive systems are far from being in equilibrium and conditions are poised at the edge of chaos. In these circumstances they are capable of very complex information storage and manipulation (Achrol, 1991; Coleman, 1990; Day, 1994). The edge of chaos is a state between order and disorder, between a condition of constrained or fixed interconnections and completely loose or random ones. In that condition, complex adaptive systems are capable of tackling, by self-organization, the complex optimization problems generated by the endless evolution of their environments. Self-organization is not a property of the constituent elements of the system as such, but stems from “their interrelation and organization,...the operation of building blocks acting in concert, in parallel, combining to form new blocks at a higher level” (Baker 1995, p.107). Thus, complex adaptive systems possess properties such as

Complexity as applied to organization studies borrows the elements of nonlinearity and far from equilibrium conditions from the Pregogine School. Organizations must be open to information and resources from the environment. Controlled environmental and internal noise, such as new reflections and outside perspectives, challenge existing equilibrium and push towards new, emergent states. This is done by self-organization and organizations must be able to contain it within some boundaries because otherwise they run the risk of disintegration (Anderson and Narus, 1990; Bucklin and Sengupta, 1993; D’Aveni, 1996).

It is a nonlinear complex adaptive process which gives rise to complicated and evolving market formations where economic, social and psychological factors as well as random events intertwine and transfer information via multiple links (Arndt, 1979; Dickson, 1992). Complex systems exhibit nonlinear, aperiodic, emergent behavior where direct causal links disappear and long-term predictions become impossible (Dwyer and Walker, 1981; Eisenhardt, 1989). Studies have mathematically demonstrated the nonlinearity of these interactions (Day and Wensley, 1988). As a result, there can be no direct link between intention, decision, and outcome; rather we can talk of multiplicity of causes and co-evolving outcomes (Lippman and Rumelt, 1982).

The relationship between venture capitalists and business entrepreneurs suggests an open organization, one which constantly fosters relationships with its environment and receives information which continuously pushes the organization towards new equilibrium states. Present data combine with the mental model of the organization and lead to actions, whose outcome is fed back as noise or disturbance to shake the organization from its equilibrium. Noise about the state of technology, the behaviour of business entrepreneurs, global economic health, is distributed inside the organizations of venture capitalists, and self-referential expectations formation (Sinkula, 1994) make sure that venture capitalists develop different mental models (Mills and Margulies, 1980), interpret different things differently. Individuals formulate their behavior according to their cognition, what their neighbors do and what the collective purpose dictates (Norek, 2012). In other words, actions and their consequences recursively alter individual behaviors which, in turn, alter the patterns of links and relationships inside and outside the organization, allowing for a new macro-order to emerge. This is shown in the figure below.

Our framework, being an application of complexity, seeks precisely to provide a framework for facilitating the process of choice of attractors, in the context of market and social interactions between venture capitalists and business entrepreneurs and add an element of predictability to analysis of complex systems. Understanding a phenomenon adds up to constructing a suitable metaphor or schema and, based on the schema, generating a detailed but sufficiently abstract description of the phenomenon to override the limitations posed by the schema. In the same vein, we have constructed a schema which is capable of generating descriptions and meanings in the complex environment of venture capitalists and business entrepreneurs.
Quality of Entrepreneurial Ventures and Measurement

The technology bubble of the late 1990's and early 21st century helped to illustrate the difficulties for the venture capitalists and financial community in analysing and measuring the quality of new technologies managed by business entrepreneurs. As analysed in works such as Reeves and Bednar (1994); Dean and Bowen (1994); Bitner (1990); Bolton and Drew (1991); Spencer (1994); Waldman (1994), the research defining quality and its linkage to outcomes such as market share, costs, profits in manufacturing industries has led to conflicting results. The concept of quality, which has been reviewed in Reeves and Bednar (1994) has been defined in many ways, including conformance to specifications (Levitt, 1972); fitness for use (Juran, 1988); meeting customers’ expectations (Parasuraman et al, 1985). The issue of quality intangibility and even the definition of quality itself (Reeves and Bednar, 1994; Zeithaml, Parasuraman et al, 1990; Curry, 1985; Brown et al, 1993) have become increasingly complex, as many of the world’s major industries have shifted to services and knowledge based industries. Can the quality of an entrepreneur’s new venture be easily measured by venture capitalists?

What is fundamental to our analysis is the role of measurement costs (Williamson, 1985; North, 1990). The concept of stakeholder theory raises measurement problems, because of the diversity of stakeholder interests; this is especially true in service and knowledge based industries, because of the inherent intangibility of product and service quality in these industries (Spender and Grant, 1996; Hosmer, 1995). We believe that when
such measurement problems exist, firms and clients tend to further depend on market
signals and “external cues” and the evaluation made by other organizations in the market,
which serve as external cues of certification and measurement. This becomes an issue for
even the narrower, economic based definitions of market competition and success.

An ideal way of classifying products for our current purposes is found in the
work of Jacobson (1992) developed a typology which distinguishes between search
and experience goods. The quality of search goods can be ascertained before purchase,
common examples being transport services or cheap clothing. The quality of experience
goods, however, can be learnt only after use, good examples being holidays and
restaurants meals. Darby and Karni (1973) developed this typology by identifying
a third category, for which they coined the term credence goods; Nayyar (1990) and
Nayyar and Kazanjian (1993) have also analyzed the importance of such information
asymmetries, and economies of scope, but from the angle of firm diversification.
Credence goods are goods whose quality is rarely learned, even after purchase and use.
Examples of such credence goods are numerous and include the worth of a transfer of
title on a property, the impact of the services of a particular graphic artist or copywriter
in an advertising campaign or the quality of care received on hospitalisation for a non-
specific medical problem. In our opinion, the quality and value of an entrepreneur’s new
business, especially in new technologies, is similar to a credence (Darby and Karni,
1973) good for a substantial period of time.

The research on stakeholder theory also shows that in a complex systems environment
including the financial community, venture capitalists, government regulation, global
trends in technology, measurement is a complex process (Swanson, 1995; Jones,
1995). Our key research question then is what additional factors help to determine an
entrepreneur’s firm’s quality, position in the market when quality certainty is no longer
guaranteed. In this sense, if market signals (Anderson et al, 1994; Heil and Robertson,
1991) help to overcome uncertainty in general, an important issue is which signals and
complex processes, influence the venture capitalists and the investment community?

**Signals, Invisible Assets**

The diversity of stakeholder interests (Jones, 1995; Donaldson and Preston, 1995;
Freeman, 1984; Hill and Jones, 1992) creates difficulties for venture capitalists and the
financial community, in the measurement and in determining a business entrepreneur’s
performance. With the existence of measurement costs (Norek, 2013; North, 1990),
external intermediaries can also play a potential role in certifying the content and value of
the business entrepreneur’s products or services. Under such uncertainty, the evaluation
of a business entrepreneur’s products and services is also influenced by external
organizations, which help to certify and measure the quality and content of a firm’s
products or services. This idea overlaps with recent works such as Podolny (1993);
Camic (1992); Haunschild (1994); Carter and Manaster (1990), which have recently
further developed the earlier works of White (1970); Sorensen (1983); Bonacich (1987);
Simmel (1950); Dutton and Jackson (1987), to show that a firm’s position in the social
structure can in turn affect not only rewards, but can reduce the firm’s ability to interact
with firms with different social status. We believe that this basic idea of interdependence can be taken further.

For a new entrepreneur’s new venture, where the quality and content of the product or service being exchanged is uncertain, external cues like intermediaries help to measure and certify a firm and its quality in the market place for its stakeholders. Such external cues help to identify a firm’s, “invisible” assets. Itami and Roehl (1987) have also noted that traditional research has tended to define assets too narrowly, focusing on the tangible assets, such as plant and equipment. They note that invisible assets such as accumulated consumer information, brand name reputation, management skill, corporate cultures are just as important to the success of the firm. But the existence or possession of such invisible assets can be more easily communicated to the other party, if the backgrounds of the two parties are shared. Such shared backgrounds allow each party to find the points of salience, or focal points (Berger and Herstein, 2012), creating a more bilateral relationship as in relationship marketing, rather than an anonymous, multilateral market exchange.

We believe that information concerning such invisible assets can be revealed in a slightly different way than for tangible assets, to competitors and the market. If the invisible assets are rare, and imperfectly imitable, then this will provide the firm with a sustained advantage over competitors. In turn, the ability to reveal such information and possession of invisible assets provides the firm with a competitive advantage that cannot be easily imitated. The importance of providing information indirectly to the market through market signals has been analyzed in great detail in Spence (1973); Robertson et al, (1995); Choi et al (2011); Heil and Robertson (1991); Moore (1992).

Proposition 1: The importance of shared background in sending and receiving signals leads to a separation of insiders and outsiders in such signal based communication, for example between business entrepreneurs and the venture capital community.

Milgrom and Roberts (1992) provide a more general definition of signals:

“...signals demonstrate to others the actor’s intentions or abilities or some other characteristic about which the actor has private, unverifiable information.”

(Milgrom & Roberts, 1992)

An example of a signal would be a firm’s willingness to provide a money back guarantee for its product, to signal to consumers the firm’s commitment and confidence in the product. One of the problems with signals is that they can be, manipulated by the firm, in order to provide what could be deceptive information about its invisible assets. For example, there is no guarantee that a firm’s willingness to provide money back guarantees will actually ensure good value and a high quality product for the consumer. A distinction now needs to be made between signals and, indices. A positive signal for one stakeholder, such as consumers may send the wrong signals to another stakeholder, such as alliance partners. Our key issue is whether certain signals can send an undeniably effective message to all stakeholders. “Indices”, as defined by Jervis (1985) are:
“....statements or actions that carry some inherent evidence that the image projected is correct because they are believed to be inextricably linked to the actor’s capabilities or intentions.”

Indices, unlike signals, cannot be as easily manipulated and are always true. Examples include private messages the perceiver overhears or intercepts. In some sense, an indice is a type of signal that cannot be manipulated, and is truthful in its information content. Our point is that if we make a distinction between signals and indices, such factors as a firm’s history, or past success may play a role in the information conveyed by a firm. Kreps and Spence (1984) have in their work already noted the importance of history in the role of competition within industries. The ability to use indices, also depends on a particular, or rare experience, in that there is a linkage to some aspects of past success of the firm, an experience, which other competitors cannot easily imitate. As discussed by Stern and Reve (1980), Shostack (1970), and NG et al (2012), the various symbols, beliefs and values that are part of a firm’s culture will reflect the unique early history of the firm. Part of a firm’s history of course can be success in the industry, such as leading to the establishment of a satisfied client base.

We believe that because indices are always truthful signals, only certain types of firms would have an incentive to use indices. Indices are more credible than signals, on the other hand, because not all firms want to convey information about their history, especially if it included various failures.

Proposition 2: Indices may be more widely used by successful entrepreneurial firms, because indices are more credible than signals, and entrepreneurial firms would like to convey their past successes with as much credibility as possible.

As mentioned before, a business entrepreneur, providing a firm’s year when it was established, implying the age, or information about the number of branches and stores, implying the size of the client base are indices, rather than signals. But because they are indices, they provide much more certain information to venture capitalists and the financial community than signals, or claims about the quality of a entrepreneur’s firm’s product, quality, because such signals can be more easily manipulated. In a world where venture capitalist often experience a proliferation of firms’ signals and where it is difficult to distinguish between truths and bluffs, indices provide a highly credible way for an entrepreneur’s firm to convey information. Organisations have different past histories. Indices, unlike signals, may allow organisations who have been successful in the past, or in other areas, to convey information credibly to customers. In turn, a firm with such positive invisible assets, or indices has an incentive to make it known to the market or to the industry. Such indices can be seen as more truthful by the stakeholders in the market, especially venture capitalists and the investment community.

Perceptions of customers are greatly influenced by factors that can prove firm success, present robustness of the firm’s resources. In this sense, indices are especially important as invisible assets, because they can provide truthful information, knowledge about a firm’s capabilities, and past successes. At the same time, such indices, as firm
history, age, and its client base are difficult to imitate for competitors. In this sense, indices are an invisible and non-imitable asset. The relationship between market signals and truthful, institutional indices is shown in the figure below.

**Figure 2:** Signals, Invisible Assets and Indices

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**Market versus Institutional Value**

Global technology industries require complex interactions between the financial institutions and the business entrepreneurs. External intermediaries can also play a potential role in certifying the content and value of an actor’s products or services. We believe that a firm’s or actor’s identity in the market place for knowledge based industries is determined by four drivers of identity, which help to certify the quality, value and content of the actor’s products or services. This idea overlaps with recent works such as Podolny (1993), Camic (1992), Haunschild (1994) which have recently further developed the earlier works of White (1970), Bonacich (1987), Dutton and Jackson (1987), Simmel (1950) to show that an actor’s position in the social structure can not only affect rewards but can reduce his ability to interact with actors of different social status. We believe that this basic idea of interdependence can be taken further. With assets such as science, technology and knowledge, where the value and content of the product or service being exchanged are uncertain, external cues like intermediaries help to identity and certify an actor, and its products or services’ value and quality in the market place. This is shown in the figure below.
Fig. 3. Development process model adapted from Ulrich and Eppinger (2008) and Menke (1991).

Thus, a duality exists in the complex interaction between the clarity of market forces, and the socially complex nature of institutions. The figure above is just an illustration of this duality, the need to integrate in complex systems, “both” the market and institutional forces determining the relationship between business entrepreneurs and venture capitalists and the financial community. We listed potential indices, such as client based, external intermediaries to illustrate the principle, rather than to claim that such indices are generic or fixed for all industries. We believe that integrating both market signals and institutional indices provides a more comprehensive picture of the complexities surrounding commercialisation of global technology, business entrepreneurs and the venture capitalist community.

**Stakeholders, Signals, Indices**

It is well known that external stakeholders play an important role in the success of companies. Dwyer and Schurr (1987) has shown how difficult it is for excellent companies to maintain their success over even several years; part of the difficulty of maintaining success is the need to respond to internal as well as external stakeholders. External commentary such as favorable commentaries in business publications create awareness, which can be used by companies in their marketing strategy (Cronin and Taylor, 1992; Anderson et al, 1994). Although the increasingly turbulent and uncertain
environment has increased the importance of such external factors, the existing literature has not conceptually framed how such factors can be analyzed. We believe that the earlier distinction between signals and indices help to clarify their roles. We believe there are several major indices (Jervis, 1985) or external measurement drivers, of relevance to stakeholders, for any firm in industries where quality is intangible. This will vary according to the industry and the various stakeholders for that industry.

For example, based on existing empirical research on science and technology industries, we can create a list of such potential indices for entrepreneurs in technology industries. Firstly, a firm’s client base is a driver of quality; the position or status (Podolny, 1993; Frank and Cook, 1995) of the particular clients, can in turn help to elevate a new, entrepreneurial firm’s ranking and quality. Secondly, the ability and reputation for being innovative, such as developing new products, a dynamic corporate culture, are another type of index in the market place (Haunschild, 1994), affecting quality. Thirdly, a firm’s networks, whether they be with collaborators, or with competitors can also be an index of quality in the market place, especially legitimizing a new technology firm. Fourthly, outside external sources of information, such as Standard and Poor indices in financial markets; consumer reports written by private organizations; business magazines and commentaries all help to serve as an index of quality.

Proposition 3: An entrepreneurial firm’s value to stakeholders in industries where quality is intangible, such as technology, is affected by market signals as well as institutional indices. Indices could include the list of clients; reputation for successful innovation; network of partners or competitors; evaluation by external intermediaries.

The indices, or truthful signals certify the entrepreneurial firm’s quality and status, providing an, “indirect” measurement to stakeholders. These complex processes create a ranking of the business entrepreneurs by the venture capitalists and the financial community. This is shown in the figure below.

As we discussed earlier in this article, the definition of quality has varied, among conformance to specifications (Levitt, 1972); fitness for use (Juran, 1988); meeting customers’ expectations (Parasuraman et al., 1985; Parasuraman et al, 1993). Our existing analysis is that when there is quality intangibility, the various existing definitions of quality may still apply, but whether they meet the criteria of quality and success is also affected by these external indices of measurement. A firm’s overall and continued success in its market, or in its industry, needs to take into account these external factors; stakeholder theories, which measure the performance of firms and their responsiveness to external constituencies such as customers, government, society (Jones, 1995) also need to incorporate the role played by these external indices.

Our framework also helps further illustrate the behavioral research of Burt (1992), Feld (1981) and Granovetter (1985), on the importance of relationships within the social structure and how it influences competition. Stakeholders of the entrepreneurial firm need to evaluate not only the competitiveness of the firm in the market, but also the entrepreneurial firm’s position in the social structure, and its relations with the four external indices of quality measurement; the abstract economics based model of
anonymous exchange and competition is only a beginning. Research in stakeholder theories helps to bring together these two major frameworks in management research. The intangibility of quality in services and knowledge based industries, illustrates the importance of external cues, or indices in further identifying firms and determining their quality for stakeholders.

Conclusions and Discussion
Technology entrepreneurs interact with venture capitalists through complex communications about the entrepreneurs’ new business venture. The purpose of this conceptual paper was to analyse the complex systems that drive the market and institutional relationship between business entrepreneurial learning towards the venture capitalist and investment community. Entrepreneurs by definitions are free of the constraints of society and institutions by being, “entrepreneurial”. However, financial investors such as venture capitalists are very much part of institutions and society. We provided a preliminary framework for understanding the direct and indirect measurement of value that takes place in interactions between entrepreneurs and financial investors such as venture capitalists. Signals (Spence, 1973) were contrasted with, “indices” (Jervis, 1985) to illustrate the potential mismatch between entrepreneurs who are relatively free of institutional constraints, and financial investors who are very much part of the institutional community.
Business entrepreneurs are known as exceptional learners – but whether they are exceptional learners towards the investment community is questionable. We analyzed the relationship among the entrepreneur’s firm, stakeholders and external measurement through the concept of market signals (Blau, 1975; Spence, 1973; Heil and Robertson, 1991) and indices (Jervis, 1985). These external, institutional indices for such credence goods industries (Darby and Karni, 1973) such as high technology include: list of clients; reputation for successful innovation; networks of partners or competitors; evaluation by external intermediaries. Entrepreneurs compete in the market against other entrepreneurs; however, they also maintain long term relations with these indices, or external drivers of measurement that help to overcome quality intangibility. We provided a preliminary framework for integrating such complex processes between business entrepreneurs and the venture capitalist and investment community.

Further research is warranted on the following issues. Firstly, there is a need to analyse in more depth the way quality and value can be measured for a new business entrepreneur’s products and services. The shift of many of the world’s mature economies towards increased technology and knowledge entrepreneurship will make such research issues increasingly important. Secondly, there is a need to further research the dynamics of the relationship between market and social structure when stakeholders in the financial community such as venture capitalists, and pension funds, drive the success of entrepreneurial firms. The potential importance of stakeholder concepts require further research on integrating the role of signals, the measurement of entrepreneurial firms, and how to improve the accuracy of valuations towards innovation and entrepreneurial firms in the 21st century.

References


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